

# Advances in the Study of Diffusion of Innovation in Health Care Organizations

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Federal policy makers have been concerned with diffusion of innovation for some time. In the past, thought and policy were dominated by an assumption that innovation was good, progress to be welcomed. There continues to be an interest in encouraging diffusion of valuable innovations, those which promise to improve the quality of medical care or the way in which health institutions operate. However, in recent years, the desire to slow innovation has also been felt. Rapidly rising costs have focused attention on the need to contain the spread of costly, duplicative, and often medically questionable technologies. The 1960s concern of the Regional Medical Programs to diffuse technologies has been overtaken by a desire to restrain unnecessary adoption of innovation and to contain health system costs.

An understanding of the reasons for adoption of innovation is essential for those making policies intended to either speed up or slow down diffusion. As a guide to action, the literature is disappointing. It contains one well-developed theory concerned with the adoption of innovation by individuals, a cumbersome and inconclusive body of theory concerned with organization attributes as these influence organizational innovation, and a few first steps toward an understanding of the decision-making processes which characterize health institutions confronting opportunities to innovate.

## Weaknesses in Available Theory

The great majority of studies investigating the diffusion of innova-

tion fall within a common framework. "Classical" diffusion theory offers explanation of the adoption of innovations by single individuals who are first in a community to hear of and adopt innovations and who pass information along to others who also adopt. Numerous studies have analyzed (1) the role of individuals in information networks and (2) the character of information passed. There are severe limits to the applicability of classical theory to *organizational* adoption of innovation. It is impossible to assume an identity of interest among all participants within a complex organization such as a hospital, clinic, or public health department. Thus the assumption that single individuals adopt (and implement) innovations must be modified or discarded.

Researchers have evolved several strategies for circumventing this problem. One is to assume that *persons in positions of formal power* act on behalf of their organizations and may be therefore studied as individual adopters. A second is to assume that *organizations* behave as *individuals*. A third is to assume that *organizational wholes* adopt innovations and to relate organizational properties to the innovation process. A fourth is to assume that a group of organizational *decision makers* negotiate policies and determine the interests, resources, and strategies which they bring to the decision process. The first two strategies allow the use of concepts from classical theory. The latter two strategies constitute radical departures from classical tradition, and move toward organizational and political theory.

The utility of available diffusion theory is also limited by the dominating assumption that innovation is desirable. Scholars as well as policy makers are now questioning the validity of this assumption but research does not yet reflect this change in perspective. Because innovations have been considered to be valuable, *in general*, studies have focused on "innovativeness," defined as the number of innovations adopted by a person or organization. This focus has resulted in a theoretical blurring of innovation attributes. Classical theorists provided a list of innovation attributes which affect the speed of diffusion: relative advantage, complexity (understandability), triability, observability of consequences and compatibility with values. Little has been done however to consider these or other attributes as reasons for organizational adoption. Studies have tended to treat all innovations in the same way.

Available theory depends almost exclusively upon studies

which analyze the diffusion of procedures and programs among health organizations. When the adoption of hardware technologies is considered, the focus is usually on the introduction of computerized records or some other operational technology where hospital administrators are the decision makers. This leaves policy makers with the job of generalizing from these studies when faced with situations where physicians are the important decision makers.

Recent literature is characterized by another debilitating problem. Theory has not been emphasized. Studies of organizational innovation have tended to manipulate aggregate data, usually that collected by the American Hospital Association, in the apparent hope that patterns will emerge. The result seems to be general confusion. One comes away from a review of this literature aware of a large number of variables which show some promise as predictors. Yet patterns are elusive. The cry for improved and more consistent measurement techniques is common. But our willingness to retain or abandon a variable should rely not simply on confirmation but on relationships among variables in a meaningful body of theory.

In selecting articles for attention in this review I have given strong preference to articles with sound theoretical underpinnings and to exploratory studies which generate hypotheses. I believe that carefully conducted inquiries geared to generating or refining theoretically important variables show greater promise for advancing general theory than do artificially sophisticated research designs. Until coherent, empirically grounded theories of organizational innovation are available, large scale "tests" are premature and wasteful.

This review makes no pretense of comprehensiveness. Rather I have selected articles which are particularly useful in gaining an understanding of the diffusion of innovation in health organizations. I considered relevant for inclusion studies dealing with health institutions generally, the disparate nature of which is obvious.

In preparing this report, I reviewed the literature published since 1960. My focus was on adoption of health technologies (either physical or social) in organizational contexts. Innovation was defined, in most of the studies reviewed, as the adoption of a program or technology which is new to the adopting unit. I wanted to find studies having sufficient theoretical and methodological force to warrant confidence. Studies are somewhat arbitrarily classified into three research frameworks. The frameworks are themselves analyti-

cally distinguishable. Particular studies often contain components of more than one framework.

The three theoretical frameworks which provide the basis for organizing the studies derive from classical theory, organizational theory, and political theory. Several questions must be answered if we are to acquire an understanding of the diffusion process: (1) How do responsive individuals within an organization receive and adopt innovative ideas? Classical theory has much to say about this. (2) What aspects of organizations constrain or facilitate the adoption or implementation of innovations? Organization theory is helpful here. (3) What interests and values relevant to innovation are effectively represented in organizations? How are these expressed? What is the outcome? In answering these questions political analysis is necessary.

## Theories of Diffusion

### *A. The Classical Model: Information and Influence*

Ideas central to the classical diffusion theory were introduced in the 1930s when scholars studying the adoption by farmers of hybrid corn noted patterns of communication and influence. Elaborated since that time in a variety of studies, diffusion theory has been most fully developed in the work of Everett Rogers (Rogers, 1962; Rogers and Shoemaker, 1971). Rogers focused on the process through which a new idea is communicated by a person who is aware of it to another person who thereby becomes aware of and adopts the new idea. His formulation incorporated many ideas, two of which have been widely used in the study of organizational diffusion. These involve the classification of persons as local or cosmopolitan and the identification of opinion leaders.

Robert Merton first used the terms "*localites*" and "*cosmopolites*" (Merton, 1949). The former referred to persons whose ambitions and social satisfactions derive primarily from their participation in the local community, the latter to persons whose primary rewards and satisfactions derive from participation in one or more functional communities (such as a professional group or national corporation). The distinction was used successfully by Coleman et al. in their classic study of the adoption of new drugs by physicians (1966). Because they participate in and identify with national net-

works, "cosmopolites" are the first to get the word regarding available innovations and are first to adopt them. Cosmopolites tend to be younger, better educated, more technically competent, and more geographically mobile than localites.

The concept of the "*opinion leader*" came to diffusion theory through efforts of students of electoral voting to understand the effect of media on the decision of voters. The idea was introduced when studies failed to show a direct effect of media on voter decisions (Lazarsfeld et al., 1948). Rather, it appeared that some voters, "opinion leaders," are influenced by media sources and that these voters influence their associates. Opinion leaders are centrally located in their groups sociometrically, "belong" to the groups they influence (are thought to have the group's interest at heart), conform generally to group standards, are socially accessible to group members, and are considered technically competent.

These two ideas converge to the extent that both opinion leaders and cosmopolites rely on information which comes from outside the local group and are considered competent. Cosmopolites are potential opinion leaders. Used frequently to guide research, these ideas have encouraged examination of (1) the interpersonal networks through which information passes and influence is exerted; and to a lesser extent (2) the social characteristics, motivations, attitudes, competencies, and leadership skills of particular individuals.

Most research in the "classic" tradition occurred during a period of great faith in progress. Opinion leaders were uncritically considered to be promoters of innovation. Little thought was given to the possible role of leaders in slowing diffusion. However, neither the concept of the "opinion leader" nor the "cosmopolite" requires (or benefits from) a pro-innovation bias. As Tanon and Rogers (Gordon and Fisher, 1975: 51-77) note, opinion leaders may use their influence to speed up or slow down the diffusion process. Similarly, cosmopolites may, in perfect accord with the standards of their reference groups, distrust proposed innovation.

*Individual Adopters Acting on Behalf of Organizations* The most interesting development in the application of these concepts is Becker's suggestion that opinion leaders are selective in their sponsorship of innovations (Becker, 1970). Becker studied the diffusion of innovations in ninety-five local health departments. He defined innovation as the introduction of new programs into local health

departments and considered the local health officer to be the program adopter. His primary contribution was to divide innovations into categories of low and high adoption potential, defined as an innovation's probable ease or difficulty of diffusion. To assess ease of diffusion, Becker asked a panel of experts to rate innovations according to the extent to which they departed from existing values and institutions. Those innovations which departed least he characterized as "high adoption potential" (HAP) innovations. Those departing most he described as having "low adoption potential" (LAP). For study, measles immunization was selected as a HAP innovation, diabetes screening as a LAP innovation.

Becker found that different types of persons led the way in adopting the two types of innovations. Those earliest to adopt HAP innovations were young, liberal, cosmopolitan health officers who were frequently early adopters of innovations and who were considered innovative by their peers. Becker explains HAP adoption as follows: Early HAP adopters are persons who value and seek the professional prestige which their data shows is associated with a high rate of innovation. Persons so motivated seek out information sources which will provide them with early and scientifically sound information about new things in their field. Their "most valued sources of information" are those sources which provide early information, especially professional meetings outside the state and professional journals. Relying on the information available through these "cosmopolite" sources, leaders adopt a relatively large number of HAP innovations ahead of others in the local community.

These early adopters become known to local community colleagues as sources of practical information about innovations. Local colleagues seek them out for information concerning "costs, problems, political risks, likelihood of opposition from interest groups, efficacy of the innovation when initiated and so forth" (Becker, 1970: 269). Thus they are accorded a central place in the local innovation information network: they are innovation opinion leaders. Becker diagrams the adoption activities of HAP innovators as in Fig. 1.

The circumstances surrounding LAP adoption are more puzzling. While the usual leaders are holding back, unsure about the acceptability of risky programs, another type of officer may adopt, an officer who is older, less well educated, generally localite, not frequently innovative, and not viewed as innovative by peers.

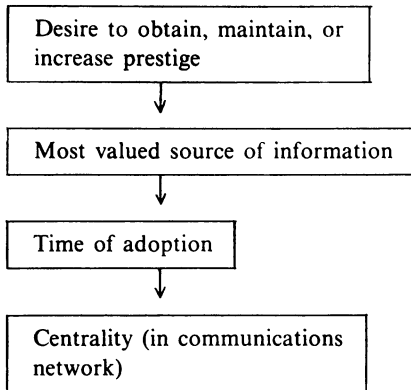


FIG. 1. Behavior of HAP Innovation Adopters.

Whereas HAP leaders are consistently innovative, LAP innovation pioneers are first to adopt only one or two programs. They do not acquire centrality as a result. Others do not usually follow their lead. If innovations they pioneer take hold, it is only after the usual group of HAP innovators have picked them up.

To explain the idiosyncratic nature of LAP innovation adoption, Becker suggests that localite pioneers may be innovating in response to desires of local constituencies. They may also feel more free to take professional chances since they have established places in their local communities. Becker's data did not allow him to explore LAP innovation further. However, his identification of a sub-category of positive innovation decisions suggests interesting questions. To be specific, consumer interests in health care may find entry into medical decision-making through localite opinion leaders. The idea that market considerations may encourage otherwise reluctant organizations to adopt consumer-desired innovations is common in the literature on business firm adoption (Schon, 1971; Utterback, 1974; Zaltman et al., 1973). This idea deserves further attention in the study of health care institutions.

The work of Kaluzny et al. (1974) includes an interesting finding relating to Becker's theory. Like Becker, Kaluzny et al. divide innovations into low and high risk categories. They examine the characteristics of twenty-three health departments and ninety-three hospitals which adopted innovative service programs. Like Becker, they find that classical concepts (in this case, cosmopolitan orientations of organization members and staff training) are strong

predictors of new program adoption when the new programs do not diverge sharply from traditional activities. Also, like Becker, they find a different and confused pattern in the adoption of risky innovations.

The two studies are not comparable. Becker began with a specific theory. He sought to measure the variables relevant to it and control those extraneous. Kaluzny and his colleagues sought to measure the relative influence on adoption of a large number of variables suggested by a large number of theoretically dissimilar studies. Becker defines a specific risk: the risk of attempting influence where major departures from tradition are involved. Kaluzny et al. consider various types of risk: relative advantage (payoff), social approval, innovation complexity (ease of understanding), clarity of results, association with major activities, and persuasiveness. In spite of these many differences, these studies find a common pattern which warrants further study.

A similar dichotomy in explanatory power occurred in Bingham's study (1976) of the adoption of innovation in local government. Bingham found that two organizational variables (size of unit and availability of resources) were important predictors of the adoption of innovation by units of local government. Prediction was good, however, only for "process" innovations, innovations largely internal to the governmental unit and largely invisible to the public. None of the traditional organizational variables tested by Bingham explained "product" innovations. Bingham concluded that "these findings seem to suggest that 'invisible' innovations, those away from public scrutiny, may be much more predictable than those in the public eye." Bingham's conclusions are similar to Becker's in that they both suggest that when interest in an innovation is limited to professionals in the field it is quite predictable. Innovation patterns which are not predictable may be influenced by "random" (not understood) factors peculiar to the local community. Becker suggests that community forces may enter the professional agencies' decision-making process through localite officials. Bingham suggests simply that visible innovation draws the attention of interested parties in the community.

In a particularly interesting study of ninety-three public health departments, Mohr (1969) placed individuals motivated to innovate into organizational context. This study contains important elements of the organizational and political perspectives but most closely



complements Becker's work. Indeed, Becker selected his sample of public health officers to overlap Mohr's and to make use of the latter's data.

Mohr emphasizes motivation to innovate, together with resources for innovation and obstacles to innovation. To assess motivation, Mohr examines the ideology and activism of public health officials. Ideology is defined by the health officer's opinion as to the proper scope of *public* health services as distinguished from privately supplied services. Activism is defined by the emphasis which the official places on activities directed to influencing groups in the community, acquiring additional support for the agency, relating the agency to community or professional groups, and identifying problems in the community. The public health officer who views the proper scope of public health activities as expanding into nontraditional programming and who is active in pursuing these goals is considered motivated to innovate.

Mohr speculates that motivation to innovate will be successful in direct ratio to the availability of resources in a given situation and in inverse ratio to obstacles to innovation. He begins with a person (a public health officer) who is motivated to introduce a new idea into an organization. The motivated innovator encounters obstacles to the successful introduction<sup>1</sup> of programmatic innovation. Obstacles may be cost (of materials, time, skills) or human factors (fears of organization members concerning their values, their job security, their self esteem). The innovator may have resources with which to overcome obstacles. These may include money, skills, authority, charisma, support of prestigious individuals, and self confidence. With these propositions Mohr specifies "why some of the many independent variables covered by previous studies were related to innovation; each indicated either a relative absence of obstacles or a relative presence of motivation or resources" (Mohr, 1969: 114).

Mohr suggests that lack of trained supervisory personnel is an organizational obstacle inhibiting innovation. Financial resources and the availability of trained supervisory personnel enhance successful innovation. Community size, the variable most strongly correlated with innovation, is important since large communities tend to have large public health departments. Because large public

<sup>1</sup>In Mohr's work successful introduction includes measures of the extent of implementation (personnel allocated to the innovations) as well as formal adoption.

health departments have greater resources, they are able to undertake a larger number of innovative programs.

It is very interesting, however, that Mohr finds that size, while it affects the total number of new programs a health department can offer, does not affect the *proportional* amount of innovation undertaken by a health department. Proportional innovation Mohr defines as the proportion of personnel resources allocated to nontraditional programs. Smaller departments devote comparable resources to innovation but soon reach a limit in the number of different programs possible. This is a result of (1) the limits on the divisibility of staff supervisory time, (2) the limits a small department faces in attracting and in justifying the hiring of specialized personnel which may be necessary for particular programs, (3) the limits on loose funds within the organization and the greater need, therefore, to obtain and respect the limits of categorical grants, (4) the more limited access of small departments to personnel and funds from state and federal sources.

In large departments there is greater likelihood of "slack resources," both funds and personnel available for allocation to new programs. The motivated health officer in a large department has the resources needed to overcome obstacles to adopting and implementing a large number of new programs. Why should the greater availability of slack resources lead to a large number of innovative programs rather than to a few done in more depth (as is the pattern in smaller organizations)? Mohr, following Cyert and March (1963), suggests that slack resources are used to pursue status-motivated innovation.<sup>2</sup> Relying primarily on Becker and on Mohr, it is possible to outline a sequence of behavior which results in the adoption of HAP innovations.

A health official motivated to adopt many innovations by a desire to obtain high professional status seeks out early sources of information (professional association meetings or journals, regional pioneers). The official selects innovations for adoption according to their adoption potential. He calculates the effect of anticipated obstacles and resources in determining adoption potential. Success in adoption results when resources are great enough to overcome

<sup>2</sup>As Becker's later study indicated, a health officer who adopts a large number of innovations is accorded prestige but a health officer who uses resources to intensively develop fewer programs is not.

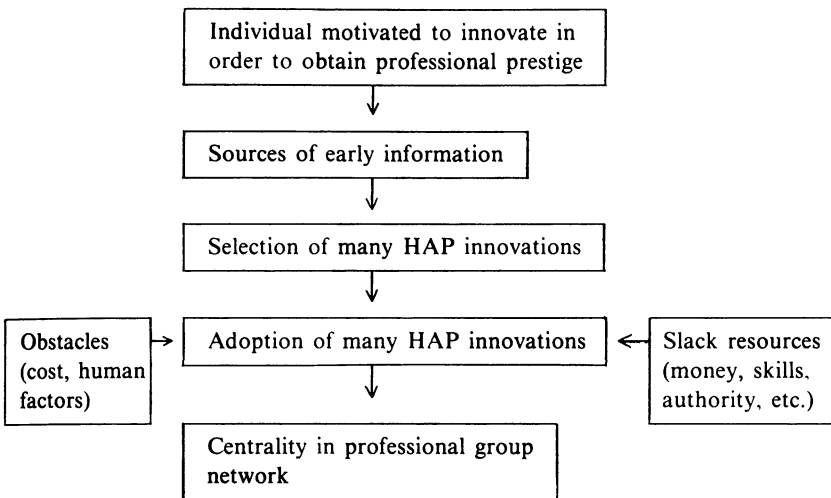


FIG. 2. Patterns of Adoption for High Adoption Potential Innovations.

obstacles. By virtue of being an early adopter, the innovator is sought out by colleagues for information and advice.

We seem then to have a theory which explains the diffusion of readily acceptable innovations among professionals, especially in organizations where slack resources are available. The theory falters as an explanation of professionally risky innovations or innovations falling outside the orbit of the professional group. The theory suggests that diffusion occurs primarily in response to the values held by professional groups and that these groups have during the past rewarded innovativeness. The applicability of the theory in the future would seem to depend upon continued belief of professionals that innovativeness is good. This may or may not imply a belief that innovations, on the whole, advance the field.

This theory offers useful knowledge to policy makers interested in slowing diffusion. Mechanisms which would make adoption more costly could offset advantages professionals acquire through innovation. The theory is less useful to those interested in encouraging the diffusion of disruptive, publicly visible, or otherwise risky innovations. Factors encouraging the adoption of these innovations remain largely unknown.

*Organizations Treated as Individual Adopters* Walker's study (1969) of diffusion of government innovations among American states is relevant to the understanding of diffusion in organizations

since he suggests that organized groups behave like individuals. In studying adoption of innovation by state legislatures Walker asks: Why do pioneer legislatures adopt programs more readily than others? And, how do these new forms of service or regulation spread to other units? He looks at eighty-eight innovations and one hundred years of legislative history. He considers legislative adoption to constitute innovation.

Drawing directly on the information/influence body of theory, Walker speculates that innovators (legislatures viewed as "individuals" or composed of "individual innovators") fall into three leagues: national pioneers, regional pioneers, and followers. Innovation travels from national centers of legislative innovation *through* regional centers to parochial outposts. Like other potential adopters, legislators seek trustworthy sources from which to filter ideas and gain the information and reassurances necessary to adoption. The applicability of examples and information is evaluated by legislators in terms of the league to which they belong.<sup>3</sup> Regional opinion leaders identify with and emulate the front runners, yet provide examples which laggard states consider relevant to their own experience.

This characterization of regional "opinion-leader" states is confirmed in general by Walker's data. He does find exceptions which are not explained. In addition, he finds the regional model less applicable since 1930 than it was previously. He speculates that individuals in "parochial" states are increasingly involved in national networks (for example, professional associations and federal programs) as a result of increases in societal scale (that is, fewer people are "localities" by default, through lack of exposure to "cosmopolite" networks).

### *B. Organizational Factors in Diffusion Theory*

Researchers who are concerned with adoption of innovation by organizations have found classical diffusion theory lacking and have turned to organizational theory for assistance in determining factors which influence organizational innovation. Available theory is de-

<sup>3</sup>Relevant to this point is Rowe and Boise's (1974) observation that diffusion of innovation is largely limited to functionally similar organizations: police, departments of public health, etc. Diffusion among disparate organizations may require different linkers.

rived principally from the work of management theorists interested in the behavior of corporations. Theories of organizational innovation have generally assumed known organization goals, particularly profit and hierarchy of command. Those who study organizations have tried to specify the consequences for the firm of a variety of structural and economic factors. Some of these factors tie into the classical interest in the flow of information. Others are quite independent.

*Structural Factors* A number of variables describing organizational structure have been posed by investigators as important to organizational innovation. Studies of health organizations have drawn upon and adapted the formal organization theories of Simon (1957), Thompson (1967), Cyert and March (1963), March and Simon (1958), Perrow (1972) and others. In the process of applying and extending the theories of these men, a large number of variables have been studied. These include: organizational complexity, centralization of decision making, and formalization of rules and behavior as well as size and resource base.

The theoretical underpinning for these variables includes the following ideas: a diversity of tasks in an organization (*complexity*) requires employees with diverse backgrounds and perspectives. Organization members are stimulated by the diverse ideas which circulate within the organization as a result. Wide-ranging information becomes available to the organization through the multiple memberships of professionals in the organization. Difficulties encountered by managers in supervising diverse tasks leave individuals more freedom to innovate.

*Centralization* of decision making is thought to inhibit the adoption of innovation by reducing the flow of information among organization members and thereby the spread of new ideas. It is argued that members who do not hold high positions are not encouraged to contribute and may be discouraged from doing so by elite members. The latter are thought to protect the status quo since it is within the prevailing order they hold power. In a corollary fashion, organization members are likely to resist changes instituted from above because they have not had a hand in the formulation and distrust the consequences of the innovation for their security and comfort.

*Formalization* of rules and behavior is also thought to inhibit communication and therefore awareness of new ideas on the part of

organization members. Highly formalized rules limit the consideration of alternatives: organization members are less motivated to propose new methods and may be actually punished for deviation. In addition, value may be displaced from organization purposes to organization rules. The result is that change proposals elicit "resistance to change" from members who have attached value to the rules.

There is supporting evidence for all of these interesting ideas. There is also contradictory data. The lack of clear cut findings and the consequent need for reassessment have highlighted the need to compare definitions and measurements. A discussion of difficulties encountered in applying the above theories follows.

Wilson (1966) argues that greater diversity in organizational tasks encourages the proliferation of ideas but handicaps the actual implementation of any one. Cooke (Zaltman et al., 1973) suggests that the resolution of conflict between this apparent truth and the findings of other scholars lies in the greater number of attempts which occur in complex organizations. That is, the positive relationship between complexity and new ideas is greater than the negative relationship between complexity and implementation. Even though complex organizations adopt proportionately fewer of the projects they consider, they have more adoptions overall as a result of attempting so many.

Zaltman et al. (1973) suggest that decentralized decision structures inhibit rather than facilitate the adoption of innovation because those holding decentralized power may come to believe that changes resulting from innovation will shrink *their* existing influence. Corwin (1969) argues that decentralized systems may provide more opportunity for different groups and individuals to express their differing points of view and thereby focus discontent which might otherwise remain latent. Hage and Dewar's data (1973) suggest that whatever positive effect decentralization may have is counteracted by the inclusion of persons unable to agree. Mansfield (1973) reports a *negative* correlation between the number of persons required to approve an innovation and the speed with which an industrial firm brings the innovation into use.

Zaltman et al. (1973) suggest that rule formalization *increases* the ability of organization personnel to achieve implementation by reducing role conflict and role ambiguity. Clearly specified rules, he feels, (1) reduce uncertainty among personnel as to how the innovation will affect their jobs and (2) minimize the likelihood that

new procedures will conflict with old ones. Farlee's account (1972) of the difficulties which developed around the use by hospital nurses of a new computerized record keeping system may support this proposition. The system was poorly adapted to actual routines and procedures. Cooperation was unrewarding because no person in authority took an interest in the nurses' compliance with it.

A number of scholars have now proposed a common resolution to the contradictions in the diffusion literature: there are stages to the innovation process not adequately differentiated and therefore not measured. At least four similar schemes have been proposed (Hage and Aiken, 1967; Rogers, 1962; Zaltman et al., 1973; French and Becker in Gordon and Fisher, 1975: 115-140). These schemes differentiate no fewer than three stages: (1) *ideas* enter the organization and are considered; (2) *adoption decisions* are made; (3) *implementation* occurs.

In the idea stage, information and creativity are very important. This stage requires flexibility, circulation of ideas, a variety of perspectives, and freedom from threat of excessive discipline. At the adoption stage, other factors become important: motivation, resources, and the ability to reach a consensus. In the final implementing stage, such factors as perceived legitimacy, disruptiveness, displacement, and trust become important. The various scholars who propose that diffusion researchers pay more attention to stages in the process do not feel available data can be sorted retroactively. Rather, it is necessary to collect data which will allow necessary differentiation to occur.

Stage theory explanations are not entirely satisfactory explanations of discrepant results, however. Most research has entered the process at roughly the same stage. That is, studies have tended to differentiate between organizations which have and have not formally introduced the innovations under study. Nor does stage theory address contradictions in reasoning which occur within stages, whether, for example, the inhibiting effects of organization groups protecting existing power arrangements are greater in centralized or decentralized organizations.

Two responses to the confusion seem in order. First, confusion will continue until scholars are more careful that their measurements refer to the same concepts. Downs and Mohr (1975) have provided a useful summary of the most common and most paralyzing conceptual and methodological difficulties. Second, characteris-

tics of organizational structure may be less important than other variables or important only in conjunction with other variables (Mohr, 1969; Hage and Dewar, 1973; Bingham, 1976).

*Economic Factors* It may be argued that profit and non-profit organizations innovate for reasons of prestige when slack resources are available and immediate problems are met. Whether other knowledge of innovation gained through the study of profit-motivated industries is applicable to health care institutions is a topic worth examining. Scholars have generally shied away from suggesting that health care organizations are motivated by profit increase. Warner (1974: 443) suggests that in non-profit organizations prestige considerations may take the place of profit considerations.

Economic studies of industrial innovation have placed great emphasis on "relative advantage" as a reason for innovation. In general this has meant that an innovation promises profit advantage to the adopting unit: unit price is less than what would otherwise occur, a larger share of the market is captured, or a higher price is allowable. Anticipated advantage is tempered by the size of the investment required to bring it into use and the risk associated with possible failure. Fear of risk decreases as others in the field provide examples of successful adoption (Warner, 1974; Utterback, 1974), but increases to the extent that major technological improvements in the innovation itself are predicted. Major improvements which rapidly alter the innovation make delay in adoption advantageous (Utterback, 1974: 625). The speed of diffusion is positively related to the competitiveness of the industry or market. Warner quotes Nelson: "A firm may dawdle if the result is merely slower growth of profits, but it is likely to be activated when the result is a serious erosion of a previous profit or market share position. The pressures to adopt . . . innovations rapidly will be greater in reasonably competitive than in more sheltered industries" (Warner, 1974: 437).

Slack resources have frequently been identified as an important economic consideration in innovation. Slack resources are resources not required for ongoing operations or pressing problems. These "loose" resources may be allocated to innovation.

Slack resources also include uncommitted staff capabilities within the organization or available to it. Tilton (1971) suggests that one reason subsidiaries of large firms are capable of rapid imitation (diffusion) is that they have access to the specialists and professional



personnel of the parent firm. According to Aiken and Hage, interorganizational cooperation has a similar outcome. When two or more organizations share resources, their combined resources make innovation more possible. "And here too, resource is understood to mean not only money, space, or equipment, but also staff which may be in short supply, depending upon the market and the qualifications needed" (Aiken and Hage, 1971: 78).

Because the objectives of profit-motivated industries and tax-supported agencies, such as public health departments, are different, few authors view economic models as relevant to public agency innovations. Several authors have attempted to apply economic theory to voluntary hospitals. Pauly and Redisch (1973) have argued that the voluntary hospital is a profit organization. They argue that physician staffs control and benefit financially (take the profits) from voluntary hospitals. The hospital is a "physicians' cooperative." In the absence of empirical data on the control structure of hospitals, the assumption that doctors act as a group and prevail in decisions seems unjustifiable. It may be argued, however, that economic models could apply to the radiology department and the clinical laboratory. The assumption that radiologists and pathologists are cohesive and important actors in the decision to adopt innovations in their departments is more easily justified than is the Pauly and Redisch assumption. However, even this assumption requires empirical confirmation.

Lee has suggested that hospital administrators seek to maximize not profits but "utility." In this model, where shareholders are absent, decisions are made to enhance the status and economic well-being of administrators. Lee notes that "the salary, prestige, security, power, and professional satisfaction of decision makers are dependent upon the prestige and status of the organizations with which the decision makers are associated" (Lee, 1971: 49). The status of the hospital is, in turn, a function of "the range of services available and the extent to which expensive and highly specialized equipment and personnel (including M.D.s) are available." The administrator is motivated to increase these hospital "inputs" to innovate, so long as he can cover costs incurred. Payment by third party payers which covers a hospital's expenditures without measuring improvements in outputs encourages adoption of equipment and service innovations.

Abt Associates (1975) picked up on Lee's model and provided supportive evidence for it. In a study of capital equipment purchases

by Boston area hospitals, they found that equipment was not in full use, suggesting that it was purchased without respect to demand. Minimum effort went into estimating use and operating costs. Little or no attempt was made by hospitals to measure the effectiveness of a specific piece of equipment. Interviewees indicated that hospitals compete for physicians and patients and purchase new equipment to attract them.<sup>4</sup>

This single empirical study of the decision-making behavior of hospitals is highly suggestive. It would seem highly desirable for researchers to empirically determine the propriety of assumptions used in economic models and determine their applicability to health institutions. In general, one may observe that the usefulness of economic models will depend upon a better understanding of the decision-making structure of institutions and of the rewards and constraints surrounding innovation.

### *A Political Approach to Decision Making in Organizations*

Relatively little scholarly attention has been paid to the political aspects of decision making in health organizations. What are the goals sought by different groups? What resources do they command? Who prevails? This omission is particularly glaring in the study of health institutions since the goals of these organizations are more various and more disputed than are those of business firms.

If decisions in health organizations are open to pressure from competing ideologies and interests, it becomes essential to determine the relevant actors in the decision process, including their objectives and the resources they can deploy to achieve desired ends. Political resources are resources which may be used to persuade or coerce others to cooperate in (apply their own resources to) the pursuit of goals desired by the leader. Although others may be included, Dahl's classic list includes: access to money and wealth; control over jobs; control over information and expertise; esteem or social standing; the rights pertaining to office; group solidarity; the right to vote; intelligence; education; time and energy (Dahl, 1961). This list can be adapted to particular needs.

<sup>4</sup>Several other authors concerned with hospital purchase of equipment assume that hospital purchase of innovative equipment is necessary to attract or retain physicians (Lee, 1971; Pauly and Redisch, 1973; Mills, 1972).

1. *The Group Environment of the Health Care Institution* Roos, with her associates (1974), seeks to understand hospital behavior in terms of the hospital's relationships with various interested parties which control resources the hospital needs. Each hospital is assumed to require: doctors, patients, patient support (third party payers), and capital funds for equipment and construction. The hospital must accommodate to the desires of those who control these essential resources. The relative emphasis which the hospital puts on quality, access, and efficiency is related to the emphasis that powerful groups place on these objectives. In examining this power, the authors look at hospital size and ownership structure (proprietary, government, or voluntary). Range of services offered (a measure of innovation) is examined as an aspect of quality. Measures are derived from archival data of the American Hospital Association.

Roos proposes that community doctors want a hospital which caters to the needs of their private practices (quality and access) and to their personal and professional freedom. Medical schools are interested in high quality medical training and research. (They are likely, therefore, to promote the acquisition of sophisticated equipment and techniques.) Government agencies are concerned with access to care (open admission, area-wide planning), with facilities, and with costs. Third party payers are also increasingly concerning themselves with cost. Philanthropic sources are attracted to projects which carry high prestige. It is interesting that these authors ascribe no concerns to patients since they ascribe no power to them. Patients are a necessary component of hospital activities but they are provided to the hospital by doctors and are paid for by third party payers. The latter two are considered to have power as a result of controlling the patient resource. Hospitals are analyzed by size and ownership for their relative dependence on each of the above. What resources do they need most and how many alternative sources are available to them?

The model these authors develop has a powerful logic. Using it and various measures of performance, they challenge common assumptions about how goals are determined in hospitals. They find, for example, that large government hospitals offer the largest number of sophisticated services. Roos suggests that "their heavy dependence on interns and residents for meeting staffing needs, and

their extensive medical school affiliations, open up the larger state and governmental hospitals to strong medical school pressures for quality and service."

Krause (1971) has also proposed a scheme for relating political diversity to the adoption of innovation. He suggests that manufacturing corporations are particularly active in their efforts to promote the adoption of equipment and other products. Further, he speculates that the promotion of an innovation by a corporation is negatively related to the enthusiasm of health professionals. The less sponsorship elsewhere, the greater the efforts of the producing corporations to "sell" the innovation themselves. However, Krause argues that corporations normally act in coalition with other health interests. These include medical research physicians who want to undertake "frontier research" and others who want the prestige of advanced technology.

Krause argues that this latter category of fellow travelers was less likely in 1971 to include administrators of teaching hospitals than in the past. This group came under increasing pressure from community groups and from the federal government to provide community medicine. The activism of the poor and the anti-establishment physicians in the 1960s found reflection in hospital politics at the local level and in federal government priorities and budget allocations.

Krause suggests that non-teaching hospitals and community physicians are influenced by the corporations and the teaching hospitals, but lack necessary information on the effectiveness of innovations. Thus, he views non-university hospitals as the major victims of unscrupulous salesmen. According to Krause, they have paid for prestigious equipment which they have neither the patient volume to need nor the staff to maintain. From this perspective, the reluctance of local decision makers to adopt innovations may often represent sound judgment. Without additional information and possibly additional need or resources, local adopters may stand to serve other interests than their own.

This approach has not been well developed, yet its intellectual importance seems undeniable. The actual process by which adoption of innovation occurs in health units inevitably involves not only individuals with certain inclinations and organizations with certain properties but groups with certain interests. These interests will be among the obstacles and resources which will affect the success of

those individuals who attempt to influence the behavior of a health organization. Their relative importance will be enhanced by organizational and environmental structure. Other candidates for study as political forces would include foundations, professional societies, banks, competing health units<sup>5</sup> and institutional donors such as the American Cancer Society.

*2. Organizational Decision Making* Roos (1974) also applied a political perspective to the decision-making process within the hospital. She studied an effort to consolidate the laboratories of four hospitals; two hospitals actually consolidated their laboratories. This split offered some of the advantages of an experimental design. Roos rejects the rational economical explanation for the merger since all four hospitals did not make the same "rational" choice. She also eliminated the theory that policies are made in consideration of the effect they are expected to have on physicians' incomes (Pauly and Redisch, 1973). Cost theory also failed to explain the different behavior of the four hospitals.

Roos analyzed the content of a large number of lengthy, in-depth interviews to determine the interests of various parties involved in the decision process. She identified events which caused the perspectives of participants to change, thereby providing a dynamic decision-making model. In general, she argues that innovation is a function of (1) political and technological events which affect hospitals; and (2) the performance satisfactions and dissatisfactions of groups within the hospitals. The latter is in part a function of the former which alters group perceptions of what is technically and politically possible. Roos proposes the following propositions to explain the laboratory consolidation in two hospitals and its rejection in two others.

Changes occur: (1) When there are changes in the goals of powerful groups. An example is the change which occurred in the position of administrators when they came to believe that the federal government would take action if they did not and therefore that they could maintain control only by anticipating government actions. (2) When the power of opposition groups is decreased. For example, the power of opposing board members decreased when the

<sup>5</sup>Kurt R. Student found, for example, that implementation of a new scheduling system in one hospital's admissions office was thwarted in part by the fear that doctors would send patients to another hospital (Griffith et al., 1976).

hospital confronted new needs to economize. The financial stress, to which consolidation seemed one answer, occurred as a result of the demands of community groups for increased care of indigents. (3) When the power of proponent groups increases. For example, the power of the younger physicians, the specialists, and those who favored closer cooperation with the medical school increased when the hospital's recruitment problems became severe. Another group (the pathologists) who favored consolidation gained power when they organized themselves into a self-controlling group. (4) When the old structure becomes obsolete for achieving goals. Medicare regulations reduced the ability of hospitals to subsidize money-losing departments through excess lab fees. Therefore, the incentive to have separate labs was reduced. (5) When performance gaps provide impetus to change. Satisfied groups are likely to oppose change rather than to be neutral since the known is familiar (and satisfactory) and the unknown may be bad (everyone can think of examples where experiments turned out badly). But dissatisfied groups seem to join coalitions for change. In this study, the unavailability of sophisticated laboratory services was felt most acutely by the medical school which felt the most advanced equipment was necessary for education and by the pathologists whose opportunities were limited by available equipment.

Roos concludes her study by noting that the rational model, in which the organization's best interests are assumed to govern, will not predict behavior. Organizational best interest (in this case economy) may be known to persons and even valued, but is apt to be of less concern than the more immediate interests of sub-units within the organization. Roos observes that laboratory cost reduction only became a high priority to groups within the hospital when they saw the possibility of controlling the savings involved and in applying them to immediate concerns. Consolidation was not achieved until issues of control were resolved.

Several other case studies reinforce the validity of both the organizational and political perspectives although emphases and conclusions vary. Farlee (1972) and Griffith et al. (1976) provide case studies of hospitals attempting to implement new procedures. In these accounts there is support for the idea that change induces insecurities on the part of individuals. It seems clear that in some cases diffusion rests on the ability of proponents to improve communication and clarify directives. Yet the case studies also show that

within and among institutions, interests as well as motivation and resources do differ. Clearer communication or greater participation is not likely to alter these basic commitments.

## Summary and Conclusions

This paper surveys the current research in diffusion of innovation as it applies to health organizations, and highlights suggestive studies. A reading of the literature reveals one well-developed theory. Classical theory has a good deal to say about individual responses to innovation, and about the circulation among professionals of information relevant to innovations. Recent studies suggest that professional norms which reward innovation, coupled with a desire of professionals to achieve professional esteem, result in predictable adoption by professionals of low risk innovations. Innovations which depart from professional norms or promise to be disruptive to community or professional relationships are more difficult to predict.

Organizational theory has produced a large number of variables which have been used in studies of innovation in health organizations. Among these the availability of slack resources, funds, and staff, has been a variable of considerable importance in predicting the adoption of innovation. Other factors are less clear. Conceptual and methodological problems have made an assessment of the role of structural factors difficult. Few empirical studies have examined the effect of economic factors in the diffusion of innovation in medical care organizations. Most of these organizations have been assumed to be free of profit-seeking behavior. Observers have questioned whether this is entirely so since some potential decision makers, such as pathologists, benefit economically. Others have suggested that hospitals (1) consume profits internally, and (2) spend resources to maximize prestige. Thus cost-related models of organization behavior are useful.

Political theory has contributed very little to innovation theory as yet. Since health organizations can quite justifiably be seen as pluralistic decision-making bodies, its increased use appears promising. Innovation in health care institutions may be studied from this perspective by (1) determining the goals and values of various parties interested in the introduction of an innovation; (2) identify-

ing the resources these parties command and the alliances they are able to make; and (3) specifying the processes through which interested parties enter the decision-making process and negotiate a conclusion.

### *Undesirable Diffusion*

The application of classical diffusion theory is limited because of its traditional assumption that innovation is beneficial. Scholars are now questioning the validity of this assumption but research does not yet reflect this changing perspective. Several activities are implied. The medical and social consequences of an innovation must be assessed as must the cost effectiveness of adoption of innovations by various types of health organizations. Then studies must establish the relationship of classical and organizational theory to *both* useful and wasteful adoption. In addition, research should investigate the rejection and discontinuation of innovative technologies.

### *Attributes of Innovations*

The value of an innovation and the desirability of its diffusion may be seen as an aspect of a larger area of research neglect: the attributes of innovations as these affect diffusion. The assumption that innovation characteristics influence the diffusion process was a major tenet of classical theory. That the organization-focused study and the innovation-focused study constitute valuable complements is well demonstrated by two studies in a non-medical area of diffusion. Walker (1969, 1973) and Gray (1973) used these alternative strategies in their investigations of legislative innovation in the American states. Walker identified stable aspects of the environment (such as regionalism and the growing professionalism of the public bureaucracy) which affected innovation patterns. Gray documented patterns in the spread of innovations which were specific to characteristics of the innovations themselves.

Scholars interested in medical innovations have demonstrated an awareness of the need to reintegrate the innovation-focused approach into the study of organizational diffusion. This reorientation has not, however, been reflected in empirical studies. Interest has taken two forms. Four of the attributes identified by classical



theorists (advantage, understandability, triability, and observability) as well as some notions of structural and fiscal prerequisites to innovation use have been incorporated into a scheme proposed by Bernstein et al. (Gordon and Fisher, 1975: 79–114) for classifying medical innovations.

Others have suggested classifying innovations in terms of their likely reception by organized groups. This idea is related to the classical theorists' "compatibility with values" but goes beyond the embodiment of values by individual members to structural interrelationships. That receiving groups will resist innovations which threaten to alter prevailing behavior patterns and structures of control (and privilege) has been the assumption of the organizational and political theorists discussed in this paper. However, only Becker (1970) has made the "adoption potential" of an innovation *by medical organizations* a central component of research. Becker's scale involves indicators of relative benefit and communicability but also indicators of the extent to which behavioral change was implied by the innovation or reallocations of power were suggested. Schon (1971), Rowe and Boise (1974), and Roos (1974) have discussed the organizational meaning of innovation traits and provided social and political explanations for the resistance of organized groups to "beneficial" innovations.

### *Medical Technologies*

In view of the federal government's interest in the optimal diffusion of medical technologies, it is distressing to note the almost total absence of studies which address such innovations. Available theory depends almost exclusively upon studies which analyze the diffusion of procedures and programs among health organizations.

While theory formulated to explain the diffusion of social organizational technologies is likely to be useful to the study of medical technologies, the direct extrapolation of findings cannot be justified. The difficulty may well lie in the insecurities of social scientists in dealing with medical technology. In view of the limited empirical study devoted to physicians in general, another explanation offers itself: real or imagined problems of access. Whatever the reason, the bias against the study of hard technologies and physician decision makers must be corrected if the limits of developing theory are to be determined and a broad-based theory constructed.

## References

- Abt Associates, Incorporated, 1975. *Incentives and Decisions Underlying Hospitals' Adoption and Utilization of Major Capital Equipment*. (HSM-110-73-513). Prepared for National Center for Health Services Research and Development, Health Resources Administration, Washington, D.C. (NTIS No. PB-251-631)
- Aiken, M., and Hage, J. 1971. The Organic Organization and Innovation. *Sociology* 5:63-82.
- Becker, M.H. 1970. Sociometric Location and Innovativeness: Reformulation and Extension of the Diffusion Model. *American Sociological Review* 35:267-282.
- Bingham, R.D. 1976. *Innovation, Bureaucracy and Public Policy: A Study of Innovation Adoption by Local Government*. University of Wisconsin—Milwaukee, Urban Research Center Publication.
- Coleman, J.S.; Katz, E.; and Menzel, H. 1966. *Medical Innovation: A Diffusion Study*. Indianapolis: Bobbs-Merrill.
- Corwin, R. 1969. Patterns of Organizational Conflict. *Administrative Science Quarterly* 14:507-522.
- Cyert, R.M., and March, J.G. 1963. *A Behavioral Theory of the Firm*. Englewood Cliffs: Prentice Hall.
- Dahl, R. 1961. *Who Governs?* New Haven: Yale University Press.
- Downs, G.W. Jr., and Mohr, L.B. 1975. Conceptual Issues in the Study of Innovation. Paper delivered at the Annual Meeting of the American Political Science Association, San Francisco.
- Farlee, C. 1972. Failure of an Innovation: Computer-Generated Medication Schedules. *Hospital Administration* 16:43-51.
- Gordon, G., and Fisher, G.L. (eds.). 1975. *The Diffusion of Medical Technology: Policy and Planning Perspectives*. Cambridge: Ballinger Publishing Co.
- Gray, V. 1973. Innovation in the States: A Diffusion Study. *American Political Science Review* 67:1171-1185.
- Griffith, J.R.; Hancock, W.M.; and Munson, F.C. 1976. *Cost Control in Hospitals*. School of Public Health, University of Michigan, Ann Arbor: Health Administration Press.
- Hage, G., and Aiken, M. 1967. Program Change and Organizational Properties: A Comparative Analysis. *American Journal of Sociology* 72:503-519.
- Hage, G., and Dewar, R. 1973. Elite Values Versus Organizational Struc-

- ture in Predicting Innovation. *Administrative Science Quarterly* 18:279-290.
- Kaluzny, A.D.; Gentry, J.T.; and Veney, J.E. 1974. Innovation of Health Services: A Comparative Study of Hospitals and Health Departments. *The Milbank Memorial Fund Quarterly: Health and Society* 52:51-82.
- Krause, E.A. 1971. Health and the Politics of Technology. *Inquiry* 8:51-59.
- Lazarsfeld, P.F.; Berelson, B.; and Gaudet, H. 1948. *The People's Choice*. New York: Columbia University Press.
- Lee, M.L. 1971. A Conspicuous Production Theory of Hospital Behavior. *Southern Economic Journal* 38:48-58.
- Mansfield, E. 1973. Speed of Response of Firms in New Techniques. *Quarterly Journal of Economics* 77:290-311.
- March, J., and Simon, H. 1958. *Organizations*. New York: Wiley.
- Merton, R.K. 1949. *Social Theory and Social Structure*. New York: Free Press.
- Mills, C.W. 1972. Technostructure and Medicine. *The Milbank Memorial Fund Quarterly: Health and Society* 50:143-158.
- Mohr, L.B. 1969. Determinants of Innovation in Organizations. *American Political Science Review* 63:111-126.
- Pauly, M., and Redisch, M. 1973. Not-for-Profit Hospital as a Physician's Cooperative. *American Economic Review* 63:87-99.
- Perrow, C. 1972. *Complex Organizations: A Critical Essay*. Glenview, Illinois: Scott Foresman.
- Rogers, E.M. 1962. *Diffusion of Innovations*. New York: The Free Press.
- Rogers, E.M., with the assistance of F.F. Shoemaker. 1971. *Communication of Innovations: A Cross Cultural Approach*. New York: Free Press.
- Roos, N.P.; Schermerhorn, J.R.; and Roos, L.L., Jr. 1974. Hospital Performance: Analyzing Power and Goals. *Journal of Health and Social Behavior* 15:78-92.
- Rowe, L.A., and Boise, W.B. 1974. Organizational Innovation Current Research and Evolving Concepts. *Public Administration Review* 34(3):284-293.
- Schon, D.A. 1971. *Beyond the Stable State*. New York: Random House.
- Simon, H. 1957. *Administrative Behavior*. New York: Macmillan.
- Thompson, J.D. 1967. *Organizations in Action*. New York: McGraw-Hill.
- Tilton, J.E. 1971. *International Diffusion of Technology: The Case of Semi-Conductors*. Washington, D.C.: The Brookings Institution.

- Utterback, J.M. 1974. Innovation in Industry and the Diffusion of Technology. *Science* 183:620-626.
- Walker, J.L. 1969. The Diffusion of Innovations Among the American States. *American Political Science Review* 63:880-889.
- . 1973. Comment: Problems in Research on the Diffusion of Policy Innovations. *American Political Science Review* 67:1186-1191.
- Warner, K.E. 1974. The Need for Some Innovative Concepts of Innovation: An Examination of Research on the Diffusion of Innovations. *Policy Sciences* 5:433-451.
- Wilson, J.Q. 1966. Innovation in Organization: Notes Toward a Theory. In *Approaches to Organizational Design*, edited by J.D. Thompson. Pittsburgh: University of Pittsburgh Press, pp. 193-218.
- Zaltman, G.; Duncan, R.; and Holbeck, J. 1973. *Innovations and Organizations*. New York: Wiley.

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