READINGS FOR OCT 18TH -

A. Diffusion of Innovations - innovation, technology and new economies


Summary Chapter 1 – Elements of diffusion

Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. Diffusion is a special type of communication concerned with the spread of messages that are perceived as new ideas. Communication is a process in which participants create and share information with one another in order to reach a mutual understanding. Diffusion has a special character because of the newness of the idea in the message content. Thus some degree of uncertainty and perceived risk is involved in the diffusion process. An individual can reduce this degree of uncertainty by obtaining information. Information is a difference in matter energy that affects uncertainty in a situation where a choice exists among a set of alternatives.

The main elements in the diffusion of new ideas are: (1) an innovation (2) that is communicated through certain channels (3) over time (4) among the members of a social system.

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1.1 Innovation
An innovation is an idea, practice, or object perceived as new by an individual or other unit of adoption. Most of the new ideas discussed in this book are technological innovations. A technology is a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome. Most technologies have two components: (1) hardware, consisting of the tool that embodies the technology as a material or physical object, and (2) software, consisting of the knowledge base for the tool.

The characteristics of an innovation, as perceived by the members of a social system, determine its rate of adoption. Five attributes of innovations are: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability. Re-Invention is the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation.
1.2. Communication Channels
A communication channel is the means by which messages get from one individual to another. Mass media channels are more effective in creating knowledge of innovations, whereas inter-personal channels are more effective in forming and changing attitudes toward a new idea, and thus in influencing the decision to adopt or reject a new idea. Most individuals evaluate an innovation not on the basis of scientific research by experts but through the subjective evaluations of near peers who have adopted the innovation. These near peers thus serve as role model, whose innovation behavior tends to be imitated by others in their system.

A distinctive aspect of diffusion is that at least some degree of heterophily is usually present in communication about innovations. Heterophily is the degree to which two or more individuals who interact are different in certain attributes, such as beliefs, education, social status, and the like. The opposite of heterophily is homophily, the degree to which two or more individuals who interact are similar in certain attributes. Most human communication takes place between individuals who are homophilous, a situation that leads to more effective communication. Therefore, the heterophily that is often present in the diffusion of innovations leads to special problems in achieving effective communication.

1.3. Time
Time is involved in diffusion in (1) the innovation-diffusion process, (2) innovativeness, and (3) an innovation's rate of adoption. The innovation decision process is the process through which an individual (or other decision-making unit) passes from first knowledge of an innovation to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. We conceptualize five steps in this process: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. An individual seeks information at various stages in the innovation-decision process in order to decrease uncertainty about an innovation's expected consequences. The decision stage leads (1) to adoption, a decision to make full use of an innovation as the best course of action available, or (2) to rejection, a decision not to adopt an innovation.

1.4. Social System
A social system is a set of interrelated units that are engaged in joint problem solving to accomplish a common goal. A system has structure, defined as the patterned arrangements of the units in a system, which gives stability and regularity to individual behavior in a system. The social and communication structure of a system facilitates or impedes the diffusion of innovations in the system. One aspect of social structure is norms, the established behavior patterns for the members of a social system.

Opinion leadership is the degree to which an individual is able to influence informally other individuals' attitudes or overt behavior in a desired way with relative frequency. A change agent is an individual who attempts to influence clients innovation-decisions in a direction that is deemed desirable by a change agency. An aide is a less than fully professional change agent who intensively contacts clients to influence their innovation-decisions. We distinguish among three main types of innovation-decisions: (1) optional innovation-decisions, choices to adopt or reject an innovation that are made by an individual independent of the decisions of other members of the system, (2) collective innovation-decisions, choices to adopt or reject an innovation that are made by consensus among the members of a system, and (3) authority innovation-decisions, choices to adopt or reject an innovation that are made by relatively few individuals in a system who possess power, status, or technical expertise. A fourth category consists of a sequential combination of two or more of these three types of innovation decisions: Contingent innovation-decisions are choices to adopt or reject that are made only after a prior innovation-decision.
A final way in which a social system influences diffusion concerns consequences, the changes that occur to an individual or a social system as a result of the adoption or rejection of an innovation.

Summary Chapter 2 – A history of diffusion research

This chapter showed that although diffusion research began as a series of scientific enclaves, it has emerged as a single, integrated body of concepts and generalizations, given though the investigations are conducted by researchers in different scientific disciplines. A research tradition is a series of investigations on a similar topic in which successive studies are influenced by preceding inquiries. The major diffusion traditions described are anthropology, early sociology, rural sociology, education, public health/medical sociology, communication, marketing, geography, and general sociology.

Eight main types of diffusion research were identified:

1. Earliness of knowing about innovations.
2. Rate of adoption of different innovations in a social system.
3. Innovativeness.
4. Opinion leadership.
6. Rate of adoption in different social systems.
7. Communication channel usage.
8. Consequences of innovation.

When scholars follow an intellectual paradigm in a research field, it enables them to pursue a coherent set of research directions. The paradigm also imposes and standardizes a set of assumptions and conceptual biases that, once begun, are difficult to recognize and overcome. That is the challenge for the next generation of diffusion scholars. In my first book on diffusion (ROGERS 1962, x), I stated, "This book suggests that students of diffusion have been working where the ground was soft . . . The challenge for future research is to expand the area of digging and to search for different objectives than those of the past. Perhaps there is a need to dig deeper, in directions that theory suggests."

Summary Chapter 3 – Contributions and criticisms of diffusion research

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.
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.

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

**Summary Chapter 4 – The generation of innovations**

Past diffusion researches usually began with the first adopter of an innovation, that is, with the left-hand tail of the S-shaped diffusion curve. Events and decisions occurring previous to this point have a considerable influence upon the diffusion process. The scope of future diffusion research should be broadened to include study of the entire process through which an innovation is generated.

The *innovation-development process* consists of all the decisions, activities, and their impacts that occur from recognition of a need or problem, through research, development, and commercialization of an innovation, through diffusion and adoption of the innovation by users, to its consequences. Recognition of a Problem or need may occur when a social problem rises to a high priority on the agenda of topics which deserve research.

Many, but not all, technological innovations come out of research. *Basic research* is defined as original investigations for the advancement of scientific knowledge and that do not have the specific objective of applying this knowledge to practical problems. The results of basic research may be used in *applied research*, which consists of scientific investigations that are intended to solve practical problems. *Lead users* develop innovations and then convince a manufacturing company to produce and sell the innovation, often after the lead user has created a prototype of the innovation. The usual next stage in the innovation development process is *development*, defined as the process of putting a new idea into a form that is expected to meet the needs of an audience of potential adopters. *Technological determinism* is the belief that technology causes changes in society. An opposite viewpoint is *social constructionism*, which states that social factors shape a technology. A next stage, *commercialization*, is defined as the production, manufacturing, packaging, marketing, and distribution of a product that embodies an innovation. Commercialization is carried out mainly by private firms.

A particularly crucial point in the innovation-development process is the decision to begin diffusing an innovation to potential adopters. How are innovations evaluated for their efficacy, safety, and other factors? Finally, an innovation may diffuse, be adopted, and, eventually, cause consequences, the final stage in the innovation-development process. The six stages described here may not always occur in a linear sequence, the time order of the stages may be different, and certain stages may not occur at all.

**Summary Chapter 5 – The five stages of innovation-decision process**

The *innovation-decision process* is the process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. This process consists of five stages: (1) *knowledge*, when the individual is exposed to the innovation’s existence and gains an understanding of how it functions; (2) *persuasion*, when the individual forms a favorable or unfavorable attitude toward the innovation; (3) *decision*, when the individual engages in activities that lead to a choice to adopt or reject the innovation; (4) *implementation*, when the individual puts an innovation into use; and (5) *confirmation*, when the individual seeks reinforcement for an innovation-decision already made but may reverse the decision if exposed to conflicting messages about it.

Earlier knowers of an innovation, when compared to later knowers, are characterized by more formal education, higher social status, greater exposure to mass media channels of
communication, greater exposure to interpersonal channels of communication, greater change agent contact, greater social participation, and greater cosmopolitanism.

*Re-invention* is the degree to which an innovation is changed or modified by a user in the process of its adoption and implementation. Re-invention occurs at the implementation stage for many innovations and for many adopters. A higher degree of re-invention leads to (1) a faster rate of adoption of an innovation and (2) a greater degree of sustainability of an innovation. *Sustainability* is the degree to which an innovation is continued over time after a diffusion program ends.

**A model of five stages in the Innovation-Decision Process**

*Discontinuance* is a decision to reject an innovation after having previously adopted it. Discontinuance can be of two types: (1) *replacement discontinuance*, in which an idea is rejected in order to adopt a better idea which superseded it, and (2) *disenchantment discontinuance*, in which an idea is rejected as a result of dissatisfaction with its performance. Later adopters are more likely to discontinue innovations than are earlier adapters. We conclude that stages exist in the innovation-decision process, although further study of this issue is needed.

A *communication channel* is the means by which a message gets from a source to a receiver. We categorize communication channels (1) as either interpersonal or mass media in nature and (2) as originating from either localite or cosmopolite sources. *Mass media channels* are means of transmitting messages that involve a mass medium such as radio, television, newspapers, and so on, that enable a source of one or a few individuals to reach an audience of many. *In-terpersonal channels* involve a face-to-face exchange between two
or more individuals.

Mass media channels are relatively more important at the knowledge stage, and interpersonal channels are relatively more important at the persuasion stage in the innovation-decision process. Cosmopolite channels are relatively more important at the knowledge stage, and localite channels are relatively more important at the persuasion stage in the innovation-decision process. Mass media channels are relatively more important than interpersonal channels for earlier adopters than for later adopters. Cosmopolite channels are relatively more important than localite channels for earlier adopters than for later adopters.

The *innovation-decision period* is the length of time required for an individual or organization to pass through the innovation-decision process. The rate of awareness-knowledge for an innovation is more rapid than its rate of adoption. Earlier adopters have a shorter innovation-decision period than do later adopters.

**Summary Chapter 6 – Attributes of innovations and their rate of adoption**

This chapter suggested five attributes of innovations by which an innovation can be described. Individuals' perceptions of these attributes predict an innovation's rate of adoption. We recommend that measures of the five perceived attributes should be developed in each diffusion study, rather than utilizing existing scales borrowed from previous investigations.

![Variables Determining the Rate of Adoption Diagram](image)

*Rate of adoption* is the relative speed with which an innovation is adopted by members of a social system. In addition to the perceived attributes of an innovation, such other variables affect its rate of adoption as (1) the type of innovation-decision, (2) the nature of communication channels diffusing the innovation at various stages in the innovation-decision process, (3) the nature of the social system; and (4) the extent of change agents' efforts in diffusing the
innovation. Most past research, however, concentrated on predicting the rate of adoption by the five perceived attributes of innovations.

*Relative advantage* is the degree to which an innovation is perceived as better than the idea it supersedes. The relative advantage of an innovation, as perceived by members of a social system, is positively related to its rate of adoption. *Overadoption* is the adoption of an innovation when experts feel that it should be rejected. *Preventive innovations*, defined as new ideas that an individual adopts now in order to lower the probability of some unwanted future event, diffuse more slowly than incremental (nonpreventive) innovations.

*Compatibility* is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters. The compatibility of an innovation, as perceived by members of a social system, is positively related to its rate of adoption. Naming an innovation and positioning it relative to previous ideas are important means of making an innovation more compatible. Change agents often ignore indigenous knowledge systems, which provide one means by which individuals give meaning to an innovation.

*Complexity* is the degree to which an innovation is perceived as relatively difficult to understand and to use. The complexity of an innovation, as perceived by members of a social system, is negatively related to its rate of adoption.

*Trailability* is the degree to which an innovation may be experimented with on a limited basis. The trialability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption.

*Observability* is the degree to which the results of an innovation are visible to others. The observability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption.

A basic theme of this chapter is that change agents and diffusion scholars must understand how potential adopters perceive new ideas. Such perceptions count in determining the nature of the diffusion process.

**Summary Chapter 7 – Innovativeness and adopter categories**

*Adopter categories* are the classifications of the members of a social system on the basis of *innovativeness*, the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a system. A variety of categorization systems and titles for adopters have been used in past studies. This chapter described the standard five adopter categories that are widely followed today in diffusion research, and their applications. Adopter distributions tend to follow an S-shaped curve over time and to approach normality. The continuum of innovativeness can be partitioned into five adopter categories (innovators, early adopters, early majority, late majority, and laggards) on the basis of two characteristics of a normal distribution, the mean and the standard deviation. The dominant attributes of each category are: Innovators-venturesome; early adopters-respect; early majority-deliberate; late majority-skeptical; and laggards-traditional.
The relatively earlier adopters in a social system are no different from later adopters in age, but they have more years of formal education, are more likely to be literate, and have higher social status, a greater degree of upward social mobility, and larger-sized units, such as farms, companies, schools, and so on. These characteristics of adopter categories indicate that earlier adopters have generally higher socioeconomic status than do later adopters. Earlier adopters in a system also differ from later adopters in personality variables. Earlier adopters have greater empathy, less dogmatism, a greater ability to deal with abstractions, greater rationality, greater intelligence, a more favorable attitude toward change, a greater ability to cope with uncertainty and risk, a more favorable attitude toward science, less fatalism and greater self-efficacy, and higher aspirations for formal education, higher-status occupations, and so on.

Finally, the adopter categories have different communication behavior. Earlier adopters have more social participation, are more highly interconnected in the interpersonal networks of their system, are more cosmopolite, have more contact with change agents, greater exposure to mass media channels, and greater exposure to interpersonal communication channels, engage in more active information seeking, and have greater knowledge of innovations, and a higher degree of opinion leadership.

“**The CHASM**” is changing → highly industry dependent...

- **Classical**
  Early market VS Mainstream Market

- **The New Reality**
  The CHASM may have moved depending on your industry !!!
Adoption of new weed spray in an Iowa Farm neighborhood, HERE

Past research thus shows many important differences between earlier and later adopters of innovations in (1) socioeconomic status, (2) personality variables, and (3) communication behavior. The distinctive characteristics of the five adopter categories mean that these adopter categories can be used for audience segmentation, a strategy in which different communication channels and/or messages are used to reach each sub audience.

Rapid growth in adoption of genetically engineered crops continues in the U.S.

Summary Chapter 8 – Diffusion networks

This chapter dealt with opinion leadership, communication networks, and the critical mass. Opinion leadership is the degree to which an individual is able to influence informally other individuals’ attitudes or overt behavior in a desired way with relative frequency. Opinion leaders play an important role in diffusion networks, and are often identified and utilized in diffusion programs.

Homophily is the degree to which individuals who communicate are similar. Heterophily is the degree to which individuals who interact are different in certain attributes. Interpersonal diffusion networks are mostly homophilous. Homophily can act as an invisible barrier to the rapid flow of innovations within a social system, as similar people interact in socially horizontal patterns, thus preventing a new idea from trickling down from those of higher socioeconomic status, more education, and greater technical expertise.

When interpersonal diffusion networks are heterophilous, followers generally seek opinion leaders of higher socioeconomic status, with more formal education, greater mass media exposure, more cosmopolitanism, greater contact with change agents, and more innovativeness. Compared to followers, opinion leaders have greater mass media exposure, more cosmo-politeness, greater contact with change agents, greater social participation, higher social status, and more innovativeness. Opinion leaders conform more closely to a system’s norms than do their followers. When a social system’s norms favor change, opinion leaders are especially innovative.
A communication network consists of interconnected individuals who are linked by patterned flows of information. An individual's network links are important determinants of his or her adoption of innovations. The network interconnectedness of an individual in a social system is positively related to the individual's innovativeness. Interconnectedness is the degree to which the units in a social system are linked by interpersonal networks.

Networks provide a certain degree of structure and stability in the predictability of human behavior. Communication structure is the differentiated elements that can be recognized in the patterned communication flows in a system. This structure consists of the cliques within a system and the network interconnections among them that are provided by bridges and liaisons. Individuals are identified as belonging to cliques on the basis of communication proximity, the degree to which two linked individuals in a network have personal communication networks that overlap. A personal network consists of those interconnected individuals who are linked by patterned communication flows to a given individual. Personal networks that are radial (rather than interlocking) are more open to an individual's environment, and hence play a more important role in the diffusion of innovations.

The information exchange potential of communication network links is negatively related to their degree of (1) communication proximity and (2) homophily. This generalization expresses Mark GRANOVETTER's theory of "the strength-of-weak-ties." Individuals tend to be linked to others who are close to them in physical distance and who are relatively homophilous in social characteristics.

The critical mass occurs at the point at which enough individuals in a system have adopted an innovation so that the innovation's further rate of adoption becomes self-sustaining. The critical mass is particularly important in the diffusion of interactive innovations such as e-mail, where each additional adopter increases the utility of adopting the innovation for all adopters.

Interactivity is the degree to which participants in a communication process can exchange roles in, and have control over, their mutual discourse. As more individuals in a system adopt a noninteractive innovation, it is perceived as increasingly beneficial to future adopters (this is a sequential interdependence effect on later adopters). However, in the case of an interactive innovation, the benefits from each additional adoption increase not only for all future adopters, but also for each previous adopter (this is reciprocal interdependence).

A threshold is the number of other individuals who must be engaged in an activity before a given individual will join that activity. An innovator has a low threshold of resistance to adopting a new idea, and so few (or no) interpersonal network influences are needed for adoption. In contrast, a late majority individual has a much higher threshold that must be overcome by near-peer network influences in order to overcome resistance to the innovation. Thresholds act for individuals in a somewhat parallel way to the critical mass at the system level. An individual is more likely to adopt an innovation if more of the other individuals in his or her personal network adopted previously.

Summary Chapter 9 – The change agent

Change agents operate interventions, defined as actions with a coherent objective to bring about behavior change in order to produce identifiable outcomes. For example, an HIV prevention program such as 'stop AIDS' in San Francisco was designed to slow the rate of HIV infection. Targeting (defined as the process of customizing the design and delivery of a communication program on the basis of the characteristics of an intended audience segment) is
one means of segmenting a heterogeneous audience so that customized messages that fit each individual's situation are delivered. Currently, the Internet is often utilized to deliver such targeted messages.

A change agent is an individual who influences clients' innovation decisions in a direction deemed desirable by a change agency. Change agents face two main problems: (1) their social marginality; due to their position midway between a change agency and their client system, and (2) Information overload, the state of an individual or a system in which excessive communication inputs cannot be processed and used, leading to breakdown.

Seven roles of the change agent are: (1) to develop a need for change on the part of clients, (2) to establish an information exchange relationship, (3) to diagnose problems, (4) to create an intent to change in the client, (5) to translate intentions into action, (6) to stabilize adoption and prevent discontinuance, and (7) to achieve a terminal relationship, with clients.

A change agent's relative success in securing the adoption of innovations by clients is positively related to (1) the extent of the change agent's effort in contacting clients, (2) a client orientation, rather than a change agency orientation, (3) the degree to which the diffusion program is compatible with clients' needs, (4) the change agent's empathy with clients, (5) his or her homophily with clients, (6) credibility in the clients' eyes, (7) the extent to which he or she works through opinion leaders, and (8) increasing clients' ability to evaluate innovations.

Further, we propose that contact by change agents is positively related to (1) higher socioeconomic status among clients, (2) greater social participation, (3) higher formal education, and (4) cosmopolitanism.

An aide is a less than fully professional change agent who intensively contacts clients in order to influence their innovation-decisions. Not only do aides provide lower-cost contacts with clients than is possible with professional change agents, but they are also able to bridge the heterophily gap between professionals and clients, especially lower socioeconomic status clients. Aides have less competence credibility, the degree to which a communication source or channel is perceived as knowledgeable and expert, but they have greater safety credibility, the degree to which a communication source or channel is perceived as trustworthy. An aide's safety credibility is due to his or her homophily with the client system. Inauthentic professionalism is the process through which an aide takes on the dress, speech, or other identifying, marks of a professional change agent.

In recent decades diffusion scholars have become aware that an alternative to the classical diffusion model exists in the form of decentralized diffusion systems. These diffusion programs have outrun the classical model (a relatively centralized approach). In centralized diffusion systems, such as the agricultural extension services in the United States, overall control of diffusion decisions (such as which innovations to diffuse, which diffusion channels to use, and to whom to diffuse innovations) is held by government officials and technical subject-matter experts. Diffusion in centralized systems flows from the top down, from experts to users. In contrast, decentralized diffusion systems are client-controlled with a wide sharing of power and control among the members of the diffusion system. Instead of coming out of R&D systems, innovations in decentralized systems bubble up from local experimentation by non expert users. Local units decide which innovations should diffuse through horizontal networks, allowing a high degree of re-invention. Decentralized diffusion systems are based upon convergence communication, in which participants create and share information with one another in order to reach a mutual understanding. Decentralized diffusion systems are (1) most appropriate for certain conditions and (2) can be combined with elements of centralized systems to form a hybrid diffusion system.
Summary Chapter 10 – Innovation in organizations

An organization is a stable system of individuals who work together to achieve common goals through a hierarchy of ranks and a division of labor. Individual behavior in an organization is relatively stable and predictable because organizational structure is characterized by predetermined goals, prescribed roles, an authority structure, rules and regulations, and informal patterns. Although behavior in organizations is relatively stable, innovation is ongoing.

At first, innovation in organizations was mainly studied by correlating independent variables with organizational innovativeness in cross-sectional data analysis. A consistent finding in this organizational innovativeness research was that larger organizations are more innovative. Rather low correlations of characteristics variables with organizational innovativeness were found, perhaps because the organizational structure variables that were studied were related to innovation in one direction during the initiation subprocess of the innovation process and in the opposite direction during the implementation subprocess. For instance, low centralization, high organizational complexity, and low formalization facilitate innovation in the initiation subprocess, but impede implementation. Today, research on organizational innovativeness is much less likely to be conducted than is study of the innovation process in organizations.

The presence of an innovation champion contributes to the success of an innovation in an organization. A champion is defined as a charismatic individual who throws his or her support behind an innovation, thus overcoming the indifference or resistance that the new idea may provoke. Research has shown that innovation champions may be powerful individuals in an organization, or they may be lower-level individuals who possess the ability to coordinate the actions of others. The degree to which champions are powerful seems to depend on the nature of the innovation and the organization in which it is gaining acceptance.

Studies of organizational innovativeness tended to be replaced by research on the innovation process in organizations. We divide the innovation process into two subprocesses: (1) initiation, all of the information gathering, conceptualizing, and planning for the adoption of an innovation, leading up to the decision to adopt and (2) implementation, all of the events, actions, and decisions involved in putting an innovation into use. The two initiation stages are (1) agenda-setting and (2) matching. The three implementation stages are (1) redefining/restructuring, (2) clarifying, and (3) routinizing.

Agenda-setting occurs in the innovation process when a general organizational problem that may create a perceived need for an innovation is defined. A performance gap, the discrepancy between an organization's expectations and its actual performance, can trigger the innovation process. Matching is the stage in the innovation process at which a problem from the organization's agenda is fit with an innovation, and this match is planned and designed.

Redefining/restructuring occurs when the innovation is re-invented so as to accommodate the organizations needs and structure more closely and when the organization's structure is modified to fit with the innovation. Both the innovation and the organization usually change during the innovation process.

Clarifying occurs as the innovation is put into more widespread use in an organization, so that the meaning of the new idea gradually becomes clearer to the organization's members.
Routinization occurs when the innovation has become incorporated into the regular activities of the organization and loses its separate identity. Sustainability, a closely related concept to routinization, is defined as the degree to which an innovation continues to be used after the initial effort to secure adoption is completed. Sustainability is more likely if widespread participation has occurred in the innovation process, if re-invention took place, and if an innovation-champion was involved. This fifth stage, routinization, marks the end of the innovation process in an organization.

Summary Chapter 11 – Consequences of innovations

Consequences are the changes that occur to an individual or to a social system as a result of the adoption or rejection of an innovation. Although obviously important, the consequences of innovations have received inadequate attention by change agents and by diffusion researchers. Consequences have not been studied adequately because (1) change agencies have overemphasized adoption per se, assuming that an innovation's consequences will be positive, (2) the usual survey research methods may be inappropriate for investigating consequences, and (3) consequences are often difficult to measure.

Consequences are classified as (1) desirable versus undesirable, (2) direct versus indirect, and (3) anticipated versus unanticipated. Desirable consequences are the functional effects of an innovation for an individual or for a social system. Undesirable consequences are the dysfunctional effects of an innovation for an individual or for a social system. Many innovations cause both positive and negative consequences, and it is thus erroneous to assume that the desirable impacts can be achieved without also experiencing undesirable effects. We conclude that the effects of an innovation usually cannot be managed so as to separate the desirable from the undesirable consequences.

Direct consequences are the changes to an individual or a system that occur in immediate response to an innovation. Indirect consequences are the changes to an individual or a system that occur as a result of the direct consequences of an innovation. They are the consequences of the consequences of an innovation.

Anticipated consequences are changes due to an innovation that are recognized and intended by the members of a system. Unanticipated consequences are changes due to an innovation that are neither intended nor recognized by the members of a system. The undesirable, indirect, and unanticipated consequences of an innovation usually go together, as do the desirable, direct, and anticipated consequences. An illustration is provided by the introduction of the steel ax among Australian aborigines, which caused many undesirable, indirect, and unanticipated consequences, including breakdown of the family structure, the emergence of prostitution, and misuse of the innovation itself. The case of the steel ax illustrates three intrinsic elements of an innovation: (1) form, the directly observable physical appearance and substance of an innovation, (2) function, the contribution made by the innovation to the way of life of individuals or to the social system, and (3) meaning, the subjective and frequently subconscious perception of the innovation by members of the social system. Change agents more easily anticipate the form and function of an innovation for their clients than its meaning.

Stable equilibrium occurs when almost no change is occurring in the structure or functioning of a social system. Dynamic equilibrium occurs when the rate of change in a social system is commensurate with the system's ability to cope with it. Disequilibrium occurs when the rate of change is too rapid to permit the system to adjust. Change agents generally wish to achieve a rate of change that leads to dynamic equilibrium, and to avoid disequilibrium. One goal of diffusion programs is to raise the level of Good in a system. A second dimension
of consequences is whether the distribution of Good among the members of a system becomes more or less equal. The consequences of the diffusion of innovations usually widen the socioeconomic gap between the earlier and later adopting categories in a system. Further, the consequences of the diffusion of innovations usually widen the socioeconomic gap between the audience segments previously high and low in socioeconomic status. A system's social structure partly determines the equality versus the inequality of an innovation's consequences. When a system's structure is already very unequal, the consequences of an innovation (especially if it is a relatively high-cost innovation) will lead to even greater inequality in the form of wider socioeconomic gaps.

What strategies could be followed in order to narrow gaps? The answer depends on three main reasons why socioeconomic gaps ordinarily widen as a consequence of diffusion: (1) "ups" have greater access to information that creates awareness of innovations; (2) they have greater access to innovation-evaluation information from peers; and (3) "ups" possess greater slack resources for adopting innovations than do "downs". When special efforts are made by a diffusion agency, it is possible to narrow, or at least not to widen, socioeconomic gaps in a social system. In other words, widening gaps are not inevitable. The digital divide is the gap that exists between individuals advantaged by the Internet and those individuals relatively disadvantaged by the Internet. This inequality exists both within the United States and between North America and Europe versus developing nations. Efforts to bridge the digital divide, such as providing public access to computers and the Internet in cyber cafés and telecenters, are under way.
BOOK REVIEWS: Rogers & Shoemaker, 1971*
Hartmut ALBRECHT

This book is substantially an enlarged, reedited and complemented new edition of the best known book of Rogers, *Diffusion of Innovations* from 1962. The order of presentation is essentially the same as in the previous edition, which gave a comprehensive overview on diffusion research. The following is emphasized as new:

1. The old book was written for students in later semesters; the new book “is directed to social scientists with an academic interest in the microanalysis of communication and change, and to change agents whose purpose is to diffuse innovations”(p. xviii).

2. The new book shows in many parts a new orientation, generally taking examples from communication theory. This is in line with the new title, the review of the research tradition of diffusion investigations, as well as with the choice of new terms, like the replacement of the adoption process by innovation-decision process and the related phases: knowledge, persuasion, decision, confirmation.

3. The book shows two entirely new chapters, showing a relevant enlargement in theme compared to the first edition: instead of looking at innovation and diffusion exclusively from situations of free choice for single individuals, now group- or collective decisions as well as decisions in organizations receive their own chapters. The look at collective decisions is based on orientations mainly developed by George M. BEAL (1966, 233ff) and became known under the label social-action-concept, and through the investigations of political scientists, who tried to find out, who mainly influences decisions in larger communities (power holders). The discussion of decisions in organizations is based on the sociologically and social-psychologically oriented work of the general organization literature and 300 non-empirical studies from all over the world, classified into research traditions of the respective authors (Cultural anthropology, agricultural economy, communication, education, early sociology, agricultural extension, geography, general economic science, sociology, engineering, journalism, marketing, medical sociology, psychology, administration, rural sociology, statistics and rhetoric). This overview alone makes the purchase of the book worthwhile for all, who are active in this field of research and teaching.

The classification of the empirical studies according to main research methods applied and main results (done in the Diffusion Documentation Center at Michigan State University, East Lansing) created the possibility, to link the generalizations about diffusion with all studies confirming the stated relationship, contradicting it, or showing that such a relationship could not be assessed at all; e.g. “early adopters have larger sized units (farms, and so on) than do later adopters (152 studies, or 67 % support; 75 studies do not support)”(p. 361). I do not know any publication, offering a comparable overview on diffusion research.


The critic, presented in the following, is intended to stimulate the rethinking of the relevant aspects of diffusion research and the analysis of its results by ROGERS and SHOEMAKER, who come from a different orientation.

Following POPPER, the value of a theory is proved if serious efforts to refute it fail; because it is not difficult, in a recurrent investigation of similar situations to find confirmation of established hypotheses. From this orientation, studies that contradict (‘not supporting’) the hypo-
theses have to be seen as refutation. Under this perspective, - if confirmation is only seen at a limit at minimum 90 % of the studies – only 41 out of 101 generalizations persist. For these 41 not rejected generalizations nearly without exception less than 10 studies exist, which in general have not been designed as ‘effort of refutation’ (POPPER). Practically this means, that the core of the derived relationships (to which the generalizations of the studies refer) in the pre-sent form cannot be confirmed. This claims evidently for a reformulation of the generalizations (hypotheses). Either the conditions of validity must be specified more clearly or relations-hips in another theoretical orientation have to be found.

The necessity for this has been recognized for a long time. Striking for me is the investigation of BELCHER, on participation in a recommended vaccination campaign against polio in Georgia, USA, published 1958 in the journal ‘Rural Sociology.’ The study was designed on the basis of the generalizations that came from the rural sociological diffusion research at that time, and checked the vaccination acceptance against characteristics like income, school education level, contact to media, cosmopoliteness, etc. It was discovered that most of the relationships did not match the expectations, in fact they often contradicted the hypotheses. The fact, that a great deal of hypothesized generalizations have not been confirmed by the observa-tions, means that the same factor (age, size of enterprise, contact to media, etc.) does not have the same direction and strength of effect upon adoption behavior in different situations. There-fore effects cannot be explained by isolated factors, but only by constellations of factors, - the whole context of the specific situation. Respecting this fact, LEWIN had developed and tested the approach of field theory in 1931. ROGERS and SHOEMAKER make use of the studies that came out of this orienta-tion at different places throughout their book (LEWIN, LIPPITT, CHIN and others).

Approaches to this perspective are also visible in the first edition (diffusion of innovations) in the final chapter, written together with A. Eugene HAVENS (pointing to COTTERELL’s ‘situational field’, 1942). However. theses approaches have not been used so far for the further de-velopment of a theoretical foundation for diffusion research.

As a consequence, the new book also does not offer a satisfying interpretation of the expe-rience, that – successful – diffusion processes frequently show a wave like curve, that means, that the curve of adoption per unit of time at first inclines only slowly, than more quickly, turns, and fades out again slowly. ROGERS and SHOEMAKER make analogy to explain the curves of the individual learning processes, (p. 178: “If a social system is substituted for the individual in the learning curve, it seems reasonable to expect that experience with the innova-tion is gained as each successive member in the social system adopts it.”) and the course of epidemic diseases. The first explanation equates learning (recall) performance with decision and action, and equates individual and social system – two risky theoretical jumps. The second explanation equates decision and action with passive suffering (being infected). Another ex-planation is also given, (in the old edition ‘interaction effect’) which says, that many informed persons, as compared to only a few informed persons, can inform (influence) more non-informed people per unit of time. The slowed course of diffusion in the second half of the process then can only be based on the reason, (an assumption far from reality) that towards the end of the process it becomes more and more difficult to find non-knowers to whom the knowers could tell about the innovation (p. 179).

The course of successful and failed diffusion processes, and the critical consideration of inno-vators in the early stage of the diffusion process can be interpreted on the basis of well proofed theory, if the following points are considered:

1. In the initial situation the potential readiness for action of all members of the social system
are already differentiated (according to attitude, relative attachment to norms, knowledge and skills, subjectively felt urgency, relative advantage of an innovation, objective conditions and options for action, etc.). In many cases for these factors normal distribution can be assumed. (only a few cases with exclusively driving factors, and only a few with exclusively inhibiting factors).

2. The situations of action are to be seen as force fields, in which the factors in different strength act as driving or restraining forces (HRUSCHKA 1964, 117ff).

3. The change of the constellation of forces causes behavior change, and is decisive: the subjective appreciation of the assumed consequences of an innovation (in case of succeeding) as well as the likelihood of success and the fear of the possible negative consequences of the adoption of an innovation (in case of failure) as well as the likelihood of failure.

4. In small scale social systems (with which advisory work and more general support normally deal) the perception fields of its members overlap. The behavior of others (relevant members of the social system) influences a change of the action situation in the remaining ones (reciprocal dynamic action-reaction relations).

5. Firstly, Innovations cause uncertainties (defense attitude of the others). With the proof that desirable results can be realized, they then introduce driving forces into the action situation of others and reduce restraining forces (risk). This effect is multiplied, if influential persons (comparable relevant others) adopt and render the innovation into the new norm. These dynamic effects are situated – in successful diffusion processes – timely in the first half of the whole process. Afterwards, in substance, only the differentiation of the action situations inhibits action. This explains the slow fading out of the process (for the whole process compare e.g. ALBRECHT 1969, 2566ff.; BOESCH 1966; EMERY 1962).

Such an interpretation, without additional assumptions, or another theoretical approach, makes it possible, to also explain processes, that so far unfortunately have not gained recognition in diffusion research, namely those where promotional efforts create active resistance, actuate conflicts in the social system and fail partially or totally. The underlying reasons for these social psychological processes have been analyzed by SPIEGEL (1961). With the help of the semantic differential profile (polarities profile) he assessed the distribution of opinions in the social field (concerning a product, an object of opinion, an innovation) and could thereby make the emergence and the crystallization of the fronts of rejection visible. Based on this and other studies, the likely processes of the introduction of innovations opposing norms or the introduction of innovators not fitting to the norm can be described and receive their first orientation in reality (ALBRECHT 1969,268ff.).

Lastly.: Rogers and Shoemaker state explicitly, that directed change, or planned change is the main theme of their book. An adviser or change agent, seeking helpful orientation for his work, - unfortunately – will not find much help. Two facts seem to be relevant here:

1. The great majority of diffusion studies are based on ex-post interviewing of the 'adopting units'. Together with the surely necessary and revealing consideration of the time factor (the relative position of the adoption in time compared with other adopters): 'innovativeness of members of a social system,' has led research to nearly exclusively successful innovation processes but not ones that have failed. The causes of failure would have been of special interest. Without investigating the causes of failure of directed change, diffusion research can only describe such change without methodologically targeted support. The effects of restraining factors in specific situations are not a matter of research. Therefore, no insights
can be gained about how these restraining forces can be lowered or overcome.

2. As an advisor, one can learn from diffusion research, that individuals with better education, higher income, greater prestige, cosmopolite personal contacts, increased media access, etc., adopt innovations earlier than others. These are factors of the situation, scarcely influenced by an advisor. He can only influence his methodological approach. The methodological procedures of support organizations were researched in too few studies in connection with the adoption and diffusion of innovations, that this category of studies does not measure (see p.72f.), as even a possible category of studies. Field experiments – that would give answers to questions about purposeful methods of promotion – are explicitly cited as necessary by the authors. They state (p. 65), that recently there is a trend in this direction. Therefore, it would be worthwhile to direct the theoretical orientation, that up to now nearly exclusively concerns the target system, with a same emphasis on the support system. If support fails, then causes have to be searched for in the whole field of interaction (that is in the support system, the target system and between the two systems). CHIN 1962, and RILEY and RILEY 1959, among others, give valuable theoretical contributions on this issue.

For the actual state of the art diffusion research, referred by Rogers and Shoemaker therefore is valid, what BENNIS (1965,339) criticized correctly, but in another context: “They are theories of change, and not of changing”. That is the reason to point here to work of BENNIS, BENNE AND CHIN (1962) and of HAVELOCK (1971), in which the possibilities and problems of planned change are dealt with.

Alltogether: the book of ROGERS and SHOEMAKER is extremely informative, stimulating, and highly readable – it needs readers who can critically check it.

Bibliography

Preface
Innovation and diffusion was a main topic of study in the early professional life of Hartmut Albrecht, my academic teacher and predecessor. This interest connected him to colleagues such as Eugene Wilkening, Herbert Lionberger, Everett Rogers in the USA; Anne van den Ban in the Neth-erlands; and to many of the early participants of the ESEE2 group. I find myself, now, one of the senior members of this group. Out of respect and appreciation, I am bringing to completion, in the footsteps of Erna Hruschka and Hartmut Albrecht, some of their unfinished work. A new MSc bloc-course on ‘Knowledge and Innovation Management’ brought about the opportunity to study the books of Rogers again, and to add to the book review of Hartmut ALBRECHT of the second edition now one of all five. This review of his work is, indeed, late in coming especially as Albrecht’s re-view in 1973 was published only in German in Sociologia Ruralis, along with his “habilitation” (1969) about innovation processes in agriculture which provided his alternative theoretical concept. As Everett ROGERS in edition two refers to 3 of Albrecht’s earlier German publications (1963, 1964, 1965), it is noticeable that ALBRECHT’S later and even more significant writings (1969, 1973) do not appear in editions three to five. When the three of us met on 17 June 1996, at Schloss Thurnau in Bavaria for an afternoon symposium among economists, Rogers acknowledged Albrecht “as his most important German colleague”. Unfortunately, Albrecht and Rogers are no longer with us to read and react to this review themselves. However, life and science goes on and from this per-spective it is never too late.
Positive Assessment
Judging by the number books sold and citations given, Rogers is the most successful scientist to ever come out of the tradition of Rural Sociology. This begs an explanation. Everett Rogers is a highly gifted writer, a very talented communicator and has a feeling for relevant and challenging issues. Much of his communication success is due to his ability to make complex things simple. He gives his audience a feeling of understanding by grasping the few common features and factors underlying the confusing diversity of reality. He appears as the great simplifier, showing that within research on innovation and diffusion thousands of phenomena, cases, and studies from many different research domains and research traditions can be traced back to a few simple principles and a limited number of generalizations.

In each edition, his carefully selected cases and examples provide persuasive evidence that impress and often surprise the reader. Some of these, such as ‘Water Boiling in Peru’, ‘Steel Axes for Stone-


2 ESEE = European Seminar on Extension Education, bi-annual informal conference meeting of re-searchers and University teachers, mainly from Europe. 1 64

Age Aborigines’ or ‘Hard Tomatoes in California’ have circled the globe and entered innumerable Social Science textbooks.

Despite the growing boom of new studies – primarily sparked by his own writings - his efforts to keep up-to-date did not diminish. Each new edition of his famous first book was revised as he strove to integrate new developments and findings as well as answer criticisms. This is demonstrated by the additional pages, new chapters and bibliographies listing recent titles in each edition, including the fifth edition (2003) which appeared one year before he passed away at 83 on 31 October 2004.

Albrecht’s critique was based on Rogers’ books, especially the first two editions; as is this updated review version. Many of our critiques get their inspiration from Rogers’ texts. His work is a fore-runner without which many of our alternative concepts and theoretical frameworks (e.g. ALBRECHT et al. 1989) could not have been developed. In this sense, we are proud to be his scholars and see our contributions as complementary to a unique and paradigmatic masterpiece of applied social science in agriculture.

Critical Considerations
By highlighting Rogers’ efforts, and not just his achievements in the positive assessment above, some seed of criticism appears. Ultimately, Rogers must be measured by his self-established yard-stick and aspirations. Rigor is required, especially as his outstanding success sees him widely regarded as the classic author in this field. Where he fails, countless novices fail with him. Even where he does not fail but only gives rise to the slightest misunderstanding, he shares responsibility for the resulting consequences for science and practice.

Here I will state a few general criticisms, followed by several sub-chapters which discuss specific points in greater detail, along with evidence from sources.
Herbert LIONBERGER (1960) summarized the findings of the rural sociology tradition in his book “Adoption of New Ideas and Practices”, obviously written for extension staff and use in
the work of Land Grant Colleges. Along with the key findings and generalizations, most of the special terminology can be found there. He even included the most prominent of the early medical sociology studies (COLEMAN & MENZEL. 1955, COLEMAN ET AL. 1957). The famous diffusion curve with adopter categories and percentages along mean and standard deviation is presented on page 37, referring back to ROGERS & BEAL (1958, 33).

ROGERS refers to LIONBERGER regularly in his first two editions, in the third edition his name only appears as the co-author of a study about Taiwan, and in the last two editions LIONBERGER is no longer mentioned. Rogers claims to go far beyond the rural sociology tradition and to summarize findings and approaches from all different disciplines (six in the first edition, eight in chapters and 16 as categories in the bibliography of the fifth edition). His subtitle of edition two “A Cross-Cultural Approach” even includes the traditional societies in developing countries. Rogers writes for scientists but also for other educated readers like “advanced college students enrolled in” social science courses. He presents a more scientific attitude and writing style than LIONBERGER although there is not much difference in substance. While LIONBERGER reads like a summary of experiences gained from research and extension work, Rogers reads like a summary of findings only from re-search, and as the theoretical foundation of a new tradition of interdisciplinary research.

We see a clear strategy of confirming importance by applying the “more of the same” principle. LIONBERGER (1960) refers to exactly 100 diffusion studies. ROGERS (1962) reviews 506 diffusion studies in edition one (p. 5), continues with more than 1500 in edition two (p. 41), and cites 5200 studies in the preface of edition five (p. xvii). Here the interested reader can also find a type of an academic CV with the author’s evaluation of the different stations and their performances over his career. Compared with the marked increase in studies, the promised qualitative gains are less remarkable:

“The stream of diffusion scholarship over the past sixty years represents both similarities and differences, continuities and discontinuities, and so does this book. By no means, however, do I seek only to synthesize the important findings from past re-search. I also strive to criticize this work (including my own) and to suggest directions for the future that are different to the past. I have once again titled this book diffusion of innovations to identify it with the forty-year sequential tradition of diffusion studies marked by my 1962 book of the same title.” (V: xviii)

Over the five editions it is difficult to avoid the impression that his first and foremost aim is to build up, defend and maintain the author’s reputation. This desire, in moderation, fuels most outstanding performances but it should not affect scientific quality. Errors are always attributed to others; criti-cisms only concern other researchers, the readers, or whom ever, but never Everett Rogers himself. At no point do we read ‘here I have failed, here I have to correct previous statements or explana-tions’. Yes, progress is seen in terminology and insights; yes, Rogers was incomplete, therefore, more studies were included and complementary chapters added, but he himself was never wrong. Only under the heading of “Shortcomings of the Pre-sent Approach” (II: 91ff.) does he deal with his own approach to summarizing findings, but in a defensive way that is without further consequences. (See my paragraph on generalizations, later.) This unwillingness for self-criticism and self-correction leads to more and more inconsistencies and internal contradictions from edition to edition.

A Critical Attitude, but Not Applied to his Own Thoughts and Writings

“One general criticism of the rural sociology tradition which has been voiced by rural soci-ologists themselves (examples are Lionberger 1952 and 1960), is the lack of attention to sociological theory. There is a noticeable tendency for many rural
sociology diffusion studies to approach raw empiricism, with little emphasis upon the sociological significance of findings."

And two pages earlier: "a great number of later rural sociological studies have followed an uni-maginative ‘factors-related-to-innovativeness’ approach. The results add very little, in many cases, to present knowledge of how new ideas diffuse except further verification of previous findings." (I: 36f.) In Table 2.1 he points out that the only common interest of five research traditions (except anthropology) was to create findings on correlates of innovativeness. At the end of the book, he lists 52 non-linked (context free) generalizations, making it easy for generations of students and scholars to select their research hypotheses and do exactly what he had pointed out to be useless (I311-315). In the later editions, these “useless” studies help increase the number of studies supporting his generalizations.

Meanwhile this is done mainly by applying multivariate statistics, mostly Probit and Logit regression models and taking premises and magnitude of the regression coefficients as true, even if sometimes there is no way to find any plausible explanation. The most glaring inconsistency is in his attempt at posing a theory first and following it with 52 “generalizations” which should provide “a skeleton summary of the major conclusions of what is known about the diffusion of innovations” in his chapter I,XI, (I: 300-315. 101 generalizations detailing all studies supporting or not supporting are mentioned in II: 346-385). More about this inconsistency between a holistic “situationist” theory and isolated context-free generalizations follows.

Contextual dependency of Causal Relations - In Search of the Appropriate Theory

“A science without a theory is blind because it lacks that element which alone is able to organize facts and give direction to research. Even from a practical point of view the mere gathering of facts has very limited value. It cannot give an answer to the question that is most important for practical purposesnamely, what must one do to obtain a desired effect in given concrete cases? To answer this question it is necessary to have a theory, but a theory which is empirical and not speculative. This means that theory and facts must be closely related to each other. LEWIN, 1936"

Rogers chose this statement of LEWIN as a preface to his chapter I, XI; certainly a good choice. He then states:

“A search of the diffusion literature reveals (1) a general lack of agreement upon sociological concepts involved in adoption behavior, and (2) absence of a synthesis of these concepts into a general theory that might be tested by empirical research.

The many studies that have been completed provide an excellent base for an attempt to formulate a general theory of the diffusion and adoption of innovations. Ordinarily, one would expect theoretical considerations to appear in the early chapters of a book. They could then serve as a framework for the entire volume. However, in the present case it is our belief that any theoretical statement must be so highly tentative that it is more appropriately placed at the end rather than at the beginning of the present work. The purpose of this chapter is to state a direction in which analysis should proceed toward a general theory of the diffusion and adoption of new ideas.”

Rogers continues under the headline „Theoretical Approach“:

“Perhaps one of the most effective means of conceptualizing adoption and diffusion behavior is first to view this behavior in its most basic and elementary form, and then to develop some of the complex variables affecting this behavior. At one level of
conceptualization, adoption of a new idea by an individual is a type of action. According to Parsons and Shils (1952, p. 56), an act consists of three basic elements: (1) an actor (2) orienting to (3) a situation. This conceptualization of human behavior implies:

1. Behavior is oriented toward attaining ends or goals.
2. It takes place in situations.
3. It is normatively regulated.
4. It involves an expenditure of effort or "motivation."

After identifying an ultimate goal as an individual’s desire for security, he defines security as the "subjective state of well-being which minimizes tension" (I: 301). This again reminds me of Lewin’s field theory of behavior and behavior change, where driving and inhibiting forces orient action to reach an equilibrium of forces under different levels of tension. And so do the next two citations:

"Behavior takes place in situations. Individuals do not exist as a mass of disconnected units. They are members of social systems, and these memberships in social systems have important effects upon their behavior. The situational fields in which behavior occurs do not necessarily follow community or organizational boundaries. One may be psychologically identified with a group and take the group’s perspective as his own without being on the membership list. Of course, physical proximity, along with social status and other psychological identifications, are factors influencing frequency of interaction. 3. The term "situational field" (Cottrell, 1942) is somewhat preferable to "situation," as the former does not imply time boundaries, while the latter does. "Situation" tends to connote a given time and place. Situational field is defined as that part of the environment which is perceived by an actor as significant for him." (I: 302)

"Perception - The concept of perception is a key dimension in understanding the diffusion of ideas. Although a new idea may be regarded as advantageous by experts in some field, a particular actor may not perceive the innovation in a similar manner. Perception is the way in which an individual responds to any sense or impression which he detects (Lindesmith and Strauss, 1956, p. 85). Perception is a function of the situational fields within which the individual operates. Knowledge of these situational fields, the manner in which the individual identifies himself, his sense of security, and the normative regularities may enable the theoretical specification of some of the conditions for adoption behavior. As Cottrell (1924) stated, "Items of behavior such as attitudes, traits, etc., studied apart from the context provided by the actor’s definition of the situation, yield meaningless results." Thus, it is essential that the present model for adoption behavior account for the actor’s perceptions of the situation."

Rogers had the right theoretical perspective, whether based on Lewin or other more or less contemporary sources does not really matter, he could clearly define it. The pity is that he did not apply it. Not in the previous chapters, for which the theoretical attempt came too late, nor in his subsequent conclusions. He does not come back to this theoretical approach in the following four editions nor does he apply it. Instead, he falls back on the list of 52 context-free and independent "generalizations", unfortunately, exactly what people were looking for and what has survived until today. Generalizations resistant to deeper insights like weeds resistant to herbicides, which he carefully enlarged and confirmed through four more editions.

At least a bit of “situationism” appears when he explains why he restricts himself to those
strategies which “apply to a broad range of change agent-client relationships”. “Such recommendations are often useless outside of a very specific situation because they are rarely general in their application” (I: 278). In his later editions two to five, he is more detailed and methodology-oriented in his respective chapters about the change agent.

BELCHER (1958) as an Example of How Exceptions are Used to Confirm the Rule
Clear empirical evidence for the contextual dependencies of causal relations is given in the form of the study of BELCHER (1958) published in *Rural Sociology* on the acceptance of polio vaccination. This study contradicts all common hypothesis from the rural sociology diffusion research tradition up to that point. Everett ROGERS (1962) shows knowledge of this study, first on p. 24 where he refers to a list of studies by Katz and Levin indicating “21 drug studies plus additional analysis of medical innovations such as polio vaccine”. Polio vaccine is also mentioned on p. 45; then again in a list of „studies about public health ideas” on p. 37. In footnote 16 he cites BELCHER 1958 and on p. 174 in a chapter about adopter categories he lists 17 studies confirming the hypothesis: “Higher Social Status Than Later Adopters”. He states in the related footnote 23: „Research studies which support this statement are .... BELCHER (1958) ...“. This is doubtlessly false because BELCHER found the opposite - the early adopters had the lowest social status. By committing this error ROGERS could maintain the hypothesis more easily. His readers did not have any incentive to check the original study as it was part of a longer list, and one of 500 studies reviewed overall as Rogers states in his preface. In the second edition, the study is classified correctly as not supporting the generalization, but the list of supporting studies totals 275 against 127(II: 357, 359). The name BELCHER is not included in the author index (many others are also missing) and in editions three to five his name is no longer mentioned.

3 Typing error, should read 1942 5

Generalizations and how to Confirm Them?
In the second edition there is an extra little chapter “Purpose of This Book”. There we find:

“The primary purpose of this book is to synthesize a series of generalizations from research on the diffusion of innovations. Each of these generalizations represents the relationship found between two or more concepts.” (II: 41)

But what are these generalizations? Obviously, they are not hypotheses about causal relations be-tween variables or groups of variables because they do not take any context into consideration. Are they correlations? Again, no, because they do not statistically relate variables. The basis of these generalizations is a given number of studies. As more studies confirm rather than contradict the generalization, the more likely it is to be confirmed again in future studies – provided the context is the same as in the studies reviewed, or that the context does not matter. This would produce a type of a general socio-economic law, and no contradicting studies would be found from the past nor in the future.

Rogers himself is well aware of this problem in edition two: “Another shortcoming of our generalizations in the following chapters is the deceit of their neatness and simplicity. Or generalizations deal almost entirely with pairs of concepts, whereas the real nature of diffusion is certainly a cob-web of interrelationships among numerous variables”…Why not include more variables?

"Unfortunately it cannot be. Most of the empirical diffusion studies reviewed in this book fo-cus upon only two-variable hypotheses, and we cannot summarize findings that do not exist. Further, our ability to understand three-variable, four-variable, and so on generalizations usually suffers in direct proportion to the number of variables..."
included. Therefore for the sake of clarity and because we lack an empirical basis to do other-wise, the generalizations in this volume, with only a few exceptions, deal with two concepts.1) However, where the original research publication provided a basis for doing so, we coded a generalization as ‘condi-\textit{tional}, meaning that the relationship found between two variables depends upon a third vari-\textit{able}.” ... “However, only 331 (about 5 percent) of the 6,811 empirical generalizations avail-\textit{able as of July 1968, were conditional. All the rest (95 percent) are two-variable generaliza-tions. In Appendix A we consider the conditional relationships as not supporting each diffu-sion generalization.” (II: 93f. and III: 131, but without the footnote. The entire Appendix A is omitted in editions three-five, but a smaller number of generalizations is presented throughout the chapters and in the summaries.)

At first glance the procedure, clearly made explicit, might convince quick readers. But what does it really mean? “For the sake of clarity” the appropriateness of the generalizations is purposefully sac-rificed. He counts “\textit{conditional relationships}” as not supporting the two-variable relation. The only reason given to maintain and even increase the number of generalizations from the first edition is the scarcity of such studies with conditional relations, and the over-whelming majority of studies using inappropriate study design. Unfortunately, many readers and research scholars did not see it like that, but took it as widely con-\textit{firmed hypotheses valid for all types of innovation-situations.}

**Does the Diffusion Curve Often Follow a Normal Distribution?**

Early mainstream social sciences tried to follow the standards of natural sciences. That meant using quantification, statistical analysis and testing hypothesis, as general as possible, to find “social laws” analogous to natural laws. This was abandoned later on, all human action came to be regarded as context bound and only roughly predictable when the context remained more or less the same and qualitative research increased in importance again. At the time the first edition came out, it was a sensation that a social phenomenon like the diffusion of innovations should follow the normal distribution. This, never really true but carefully established and maintained myth, contributed a large part to the public interest in diffusion research and Everett ROGERS’ books.

“The major findings from the hybrid study are: 1. The first use of hybrid seed followed a bell shaped (but not exactly normal) distribution when plotted over time. (Ryan and Gross, 1943)” (I: 34)

“\textit{Testing Adopter Distributions for Normality. A general finding of past investigations is that adopter distributions follow a bellshaped curve over time and approach normality. There are useful implications of this generalization for a standard method of adopter categorization. Eight adopter distributions tested by Rogers (1958b) were bellshaped and all approached normality, although half of those tested were found to deviate significantly from normality (Table 62). Four additional studies appear in the literature on the normality of adopter dis\textit{tributions. None of these analyses utilized the most precise statistical tools for determining normality, but each found that adopter distributions approached normality. 1. Ryan and Gross (1943) found the distribution of dates first use of hybrid corn was nearly normal...”}

Looking at Table 6-2, the correct result of Ryan and Gross is presented, significantly different from normal distribution at one percent level of significance (Ryan and Gross underline that by figure 4, which shows the curve they observed next to the one normally expected). In the commentary to his table 6-2, Rogers suggests possible reasons for deviations come from how the time of adoption (trial versus full adoption) was determined
and by how farmers were considered, for instance, did they start farming during the course of diffusion. At the end of the four cases he cites, none of which really support normal distribution but only a certain similarity to it, he sums up:

"Most adopter distributions closely approach normality and many are normal. Further research is needed to determine specifically why some adopter curves are normal and some are not. No claim is made, however, that adopter distributions for all innovations are necessarily normal. Sorokin (1959, p. 684) has attacked such a claim: "The convincing logical considerations as well as the factual tests do not give any basis for a belief in the existence of any 'normal' or even typical curve of diffusion or diffusion rate for all cultural values in all circumstances. Such a 'normal' curve is but a myth." I prefer to disagree with Sorokin, as do most diffusion researchers. The normal adopter distribution is useful if viewed as an "ideal type" that provides a standard from which statistical goodness-of-fit can be computed." (I: 158f.)

In the second edition this reads: "Research has generally shown that the adoption of an innovation follows a normal, bell shaped curve when plotted over time on a frequency basis." (II: 176f.) Later, he again gives details to support this although the facts presented do not confirm the generalization so clearly (II: 179f., continued up to V: 275).

Finally, he concludes by introducing his famous diffusion curve with the adopter categories according to mean and standard deviations of the normal distribution in Figure 6-1 in I: 162. (Fig. 5-2: II, 182; Fig 7-3, V: 281).

The Problem with Innovativeness

"The criterion for adopter categorization is innovativeness, which is the degree to which an individual is relatively earlier to adopt new ideas than other members of his social system. Thus, it is plain that innovativeness is a "relative" concept. One has either more or less innovativeness than others in a social system. It is essential to specify the social system whose members one is classifying on the basis of their innovativeness." (I: 159f.)

This is right when only one innovation is considered. Often, Rogers and his followers computed in-innovativeness across several innovations over a number of years. In this case, it is not only the type of social system but also the type of innovations considered that influences the measured construct. Those readers who are not trained in the social sciences will regard innovativeness as an absolute measure of a personal character trait. Even though Rogers knows better, he enhances research around innovativeness and devotes much space in his books to this question of correlates of innovativeness.

That he knows better is shown in his little chapter on "Consistency of Innovativeness." (I: 186f.)

"There is no clear-cut evidence, as to whether or not innovating behavior is completely consistent."..."There is less evidence, however, that a farm innovator is also an innovator in political ideology, consumer behavior, or other areas of life. In any event, it is doubtful whether an individual who is an innovator for one idea is a laggard for another idea." (I: 187)

The last sentence is a statement of opinion, not based on facts. Life experience shows that the oppo-site is also likely. People do not follow the latest fashions in all fields of life even when, for example, they are very innovative in their job. Or they may be risk averse and reluctant to innovate in their job, but very innovative in their hobby. Rogers admits this indirectly, in the subchapter on "Changes in Adopter Categories over Time", (I: 189), and he states that it is a fact that also comes out in several panel studies. But then Rogers brings in a pile of potatoes analogy that attempts to demonstrate that innovativeness is more
“In fact, the shifting of individuals among adopter categories over time may be likened to a bell-shaped pile of potatoes. The potato pile rests precipitously near the edge of a table. As the potatoes rearrange their relative positions within the stack over time, an occasional potato is shoved over the edge of the table and out of the pile and distribute themselves throughout the stack. While the pile retains its bell shape over a time period, individuals within may be changing positions.” (I: 191).

Changes occur because it is a relative construct, and so it is clearly not a stable character trait.

Most of his „generalizations“ must be seen as an artifact of method because they are based on a majority of studies reviewed. While a minority of studies do not support them, this majority results from the type of innovations selected, better even to say innovation-situations selected. Most of studies reviewed come from Rural Sociology and deal with farm modernization. Evidence from other research fields is then eclectically added, most of the cases again deal with modernization issues, to give an impression of the overall validity of the generalizations.

By establishing „ideal types“ of diffusion curves and of adopter categories and their characterization, he mixes up normative and empirical considerations leaving the reader with an impression that this all is based on empirical evidence.

**Explanation of the Second Part of the Diffusion Curve**

The most difficult task for Rogers – and he never solved the problem – was to explain why the diffusion curve, shaped like a normal distribution, went down in its second part:

“The writings of early sociologists, learning psychologists, and students of the interaction effect provide theoretical reasons for expecting adopter distributions to be normal. The interaction effect is the process through which individuals in a social system who have adopted an innovation influence those who have not yet adopted. Adopter distributions follow a bell-shaped curve over time and approach normality.” (I: 191f.)

The writings of early sociologists only indicate a similarity to a bell-shaped curve without offering any explanation. The analogy to learning curves – which in themselves are not widely accepted in learning psychology – is pure speculation. Rogers unconvincingly offers the inter-action effect as an explanation:

“*If the first adopter of the innovation discusses it with two other members of the social system, and these two adopters pass the new idea along to two peers, the resulting distribution follows a binomial expansion. This mathematical function follows a normal shape, when plotted.*” (I: 154)

“The interaction effect begins to level off after the second half of the individuals in a social system have adopted because each new adopter finds it increasingly difficult to tell the new idea to a peer who has not yet adopted.” (I: 155, V: 274)

The first statement is wrong because the y = x2 function gives a J-curve. The second statement may be right, but is irrelevant because while information is a precondition for adoption it is not the only factor of influence. The standard case of hybrid corn is sufficient to prove this empirically:

“*Nonadopters are often aware of an innovation but are not motivated to try out and...*”
adopt it. Ryan and Gross (1943) reported that almost all of the Iowa farmers in their study heard about hybrid seed corn before more than a handful were planting it. “(II: 108) “Knowing about an innovation is often quite a different matter from using the idea. Most individuals know about many innovations which they have not adopted.” (II: 108)

Nevertheless, this “information trickle down” explanation is kept alive up to the fifth edition (V: 274).

**Pro-innovation Bias**

In editions two-five Rogers criticizes diffusion research as suffering from a “pro-innovation bias”. In later stages he also admits that rejection or discontinuance is sometimes more rational and better for the actor than “unwise” adoption, because innovations are not equally good for all potential adopters.

“There may be both rational and irrational discontinuances just as there are both rational and irrational adoption decisions.”(I: 91)

“Most past research on the diffusion of innovations investigated either rational adopters, or irrational under-adopters, or else compared the two types of individuals. Few studies are available on irrational over-adopters or rational rejectors.”(I: 142)

“Our discussion should not be interpreted to mean that traditional norms are necessarily un-desirable. In many cases, tradition may lend stability to a social system where it is undergoing rapid change and the danger of disorganization.”(I: 62)

But the following text in the same chapter is so clearly in favor of “modern” and so disparaging of “traditional” that the cited statement is discredited. (V: 282-285). This is also implied in calling the latest adopter category “laggards”, a terminology maintained through all five editions, instead of using a more neutral term like “latest adopters”. (V: 281).

**Closing Statement**

“Altogether: the book of ROGERS and SHOEMAKER is extremely informative, stimulating, and highly readable – it needs readers who can critically check it.” This is how Hartmut ALBRECHT ended his review of the second edition from 1973. The reception of the book up to edition five indicates that this type of reader is in the minority.

**References**


THE DIFFUSION OF INNOVATIONS – the Hohenheim concept

The introduction and diffusion of innovations, is examined from the point of view of recurring processes and causational factors. How can they be explained with the help of the theoretical concepts described in the previous papers, and what conclusions can be drawn for extension practice? The main concepts applied in this context are:

- Our framework-model or “intersystem-model” of organized promotion work
- The field theory of Kurt LEWIN, explaining behaviour and behaviour change
- Our model of human perception, including defence mechanisms (cognitive dissonance reduction)
- Our model of the stages of systematic problem solving

Innovations in the sense that we use the term can be new products and equipment but also new methods and ideas. For the purposes of extension, we are interested in those innovations that re-date to improved problem solving. In fact, the term "changes" might be more exact, but the word is not commonly used in this context. We state categorically, therefore, that an innovation is by no means always something new and need not necessarily be an improvement on current ideas and practices.

Although "biological" or "organic" farming has suddenly become topical again, and represents a radical innovation for many farmers, it should be remembered that this method was, until recently, the only method of farming in the history of agriculture, which stems back more than five thousand years. We should also not be too eager to equate good with new and old with bad. When extension promotes innovations, we must not blindly equate this with progress. Innovations are only to be understood as changes to the status quo, which using the best current judgement are considered to be a better solution to problems.

The first person to practice an innovation in a social system is called the innovator. Carrying out his decision, in other words modifying his behaviour to accomplish the change, is referred to as the adoption of the innovation. If adoption can be tried out at small scale, this is called trial and especially in research adoption is referred to the point in time, when full use of the innovation is made for the first time. If the innovation is abandoned afterwards, this is called discontinuation. If more members of the social system also adopt the same innovation, dissemination of the innovation occurs, which is termed the diffusion process.

Research in diffusion processes (diffusion or adoption process research) began in the mid 1920’s in an effort by the American Agricultural Extension Service to get feedback on the effectiveness of its services. Since it was difficult to gage the success of the main objective of the Extension Service through imparting knowledge, attitudes and skills to improve the conditions of life, the number of farmers adopting a recommended innovation served as a convenient indicator of the efficiency of advisory work.

Although introducing innovations in all spheres of society is an important activity, agricultural sociologists (followed in the meantime by geographers) are still in the forefront of this research. Today thousands of surveys are available all over the world using different approaches to tackle the problem and sometimes producing varied and contradictory results. After much debate, the method that seems to be slowly gaining ground in recent years is the "situation-specific approach". We also adopt this systems-based perspective, because it arises naturally from the consistent application of the basic concepts described above.

What recurrent factors can we observe?
There is a typical shape for a diffusion curve when innovations are established successfully and remain undisturbed in a social system. At the outset the adoption rate is low; it then rises gradually and falls again towards the end. If we present it graphically as a curve of percentages (Diagram 1), it usually takes the shape of an S. But sometimes at the beginning adoption is particularly hesitant and accelerates increasingly only in the final phase; this gives rise to a J-shaped curve.

Diagram 1: Two different curves of diffusion

If we look at the rates of adoption as an absolute number of adopters per unit of time instead of in percentages, the result is a bell-shaped or wave curve, as in Diagram 2, similar to a normal distribution.

Moreover, we observe again and again that the innovator is usually in a very difficult position. In addition to bearing the burden of risk for his innovation, he may also be shunned in his social system. Nevertheless, there is eventually a change of opinion and, after the hesitant adoption of the innovation by a few individuals in the early stages, the process of diffusion gets under way and runs on its own accord without further counselling and promotion throughout the social system.

From these observations we can divide the diffusion process into four phases, as in Diagram 2. The explanation of events can then be based on these phases.

Diagram 2: Phases in the diffusion process
1 The innovator as “trouble maker”

The diffusion of innovations does not occur simply as the reaction to new information. Someone must first experience a problem for which he would like to find solutions. If new alternatives result from his search for solutions, the potential innovator is then faced with the dilemma that the innovation he is considering has not been tried out in his locality. His estimation of necessary inputs is still uncertain and he cannot know whether, or to what extent he will achieve the desired results. In short, the innovator runs a special risk, both economic (something ventured, nothing necessarily gained) and social (insult added to injury).

It is mostly financially and socially secure people who take risks like these – they do not plunge blindly into possible ruin, but try to limit risk as much as possible very carefully gathering maximum information and trying to extend their knowledge and security by the cautious and, if at all possible, phased implementation of the innovation. This is why innovators tend to have a longer trial phase compared with those adopting the innovation at a later stage. If the opposite happens, as stated by ROGERS, (2003, 218) the so-called “innovativeness” difference overrules the influence of reduced risk along the diffusion process. However, we think that ROGERS and many of his scholars overemphasize the personal influence and undervalue situational aspects in the person-situation-interaction. To the extent that the neighbours can observe what is happening, for them the innovator takes on the function of local experimenter. Seeing what he does and observing him being successful reduces the risk of adopting for the followers, a phenomenon also visible in the RYAN & GROSS data (see KIM-06.doc).

The activities of the innovator have an unsettling effect on the others and create psychological tension, for which an outlet must be found. The deviant behaviour of the innovator is a silent re-proach to the others that their methods are old-fashioned, backward and ultimately wrong. For them to spend time trying to assess the innovation is a much more laborious way of relieving tension than simply to dismiss it for the time being – thus they reject the innovation and the innovator. Rejection can take different forms such as avoiding contact, not greeting, joking and rendering the innovator and his innovation ridiculous.

Sometimes this rejection and opposition can be more than just dealing with cognitive dissonance. The others might anticipate disadvantages to themselves, if the innovator succeeds with the innovation and if this innovation spreads. Massive interventions, like destroying his field or burning his barn, might need additional explanations.

Innovators often experience this rejection by their contemporaries first hand, but there is no going back. Giving up would be precisely the disgrace that the others wish upon them, and it would not help the problem that the innovation was intended to solve. Thus, the innovator searches for contacts outside his locality or strengthens his contact with people who can offer him both social affirmation and the chance to discuss the innovation at a well-informed level. In a neighbouring social system there may already be innovators who have begun the innovation earlier and may have broader experience.

2 The critical phase
Not all neighbours react equally negatively. Some see themselves in a situation comparable to the innovator either because they have to contend with a similar problem or because they feel themselves to be of equal status and, therefore, have a right to take a leading part in any new developments. Some are friends or relatives to the innovator and, therefore, keep in contact and withhold their mistrust or rejection.

The more that individuals identify with the innovator, the greater their interest in his behaviour and the possible success of the innovation. It may well be that they do not seek direct contact with the innovator, perhaps because it would mean they were admitting their own ignorance, but they begin to observe, and to make enquiries through casual conversation or seek information deliberately from other farmers, the extension service, magazines or the Internet.

If the innovation proves successful and fulfils the expectations of the innovator, the risk of failure is reduced for the others, so that some of them start to try it out too. If there are several farmers who adopt the innovation, the search for information by the other members of the social system becomes easier. Other farmers are then more willing to compare themselves to these early adopters than to the innovator himself. Moreover, usually among the early adopters there are key people who can influence various groups to imitate them. The initial reaction – rejection of the innovator and his innovation – can scarcely bring about an adequate reduction of tension for the other farmers any longer, because by now the innovation has become undeniably attractive and there is far less risk to deter them. Thus open-mindedness and interest in the innovation can develop on a wide scale.

This phase is referred to as the critical phase, because this point finally decides whether or not the innovation takes off. The few data available on this problem show that the diffusion process sustains itself with no further need of support by the extension service or of development measures when about 10 to 20% of potential adopters have taken up the innovation. Most critical are unsatisfying results by some of the early adopters, that enhance existing resistances and approve the scepticism of the non-adopters.

3 Transition to the self-sustaining process
While the successful adoption of the first few farmers confirms the attractiveness of an innovation and reduces their risk, adoption by influential people brings a new dynamism into the process: it can now be recognized that what is currently new is going to be the norm in the future. What was regarded as deviant behaviour on the part of the innovator is now felt to be a new approach which is a valid path for development. This recognizable trend increases the tendency of others to join such a movement. The diffusion process now develops its own impetus to continue, and a wave of adoption follows. The tension that prompts behavioural change consists now of avoiding the negative forces that would occur if they did not join the common trend.

But, this does involve the danger of more adoption of innovations without full appreciation of the prerequisites and the consequences. Farmers may no longer adequately check whether the innovation is really beneficial in their specific situation. Thus, the risk of misguided adoption of innovations increases, with the frequent result that economic differences are intensified: the already economically weak farmers are tempted toward misplaced investment and can no longer maintain their position in the system of local competition.

4 Final phase of the wave
If the innovation had become the norm, we would expect the curve to show diffusion taking off again and then coming to an abrupt end when all members of the social system had adopted it. Why then do the adoption rates sink slowly and gradually after reaching their
peak?

This can only be explained if we assume that the innovation is not equally appropriate and advantageous for all concerned. Just as the innovator was initially psychologically closest to the innovation, and was logically the first to adopt it, there are now people for whom inhibiting forces are far stronger than the driving forces. We can assume, therefore, that all potential adopters, if we were to classify them before the start of the diffusion process according to their pattern of psychological forces in relation to the decision on adoption, form approximately a normal distribution which is expressed by the bell-shaped diffusion curve.

Up to the peak of the diffusion curve, more new driving forces have been produced by the diffusion process itself. These new driving forces have then caused the balance of forces in the subsequent adopters to be altered. Now no further driving forces derive from the process itself, so that the flattening out of the curve can only be explained by the disappearance of inhibiting forces in the adopters – which is a result of a fortuitous change in their circumstances over time.

We can imagine this happening, for example, where the capital for adopting an innovation has, by a certain point in time, been finally saved, or where an old loan has been paid off and more credit can now be borrowed, or where the farmer has got the freedom to decide in favour of an innovation because he could take over the farm from his parents.

5 The situation-specific approach
After this explanation drawing on behaviour theory and the "situation-specific approach", we have to point out that this can only be regarded as an example of the possible courses of events. In reality the diffusion of an innovation through the whole social system is exceptional. It is probably more common for innovations to be adopted by a few individuals and not disseminated. Often the innovation spreads in sections of the social system only or in various sub-groups in separate diffusion processes that run their individual courses. The diffusion curve can also suddenly break off, if for example, an unknown pest invades or if clearly better methods become available before the previous method has been fully disseminated, etc.

Diffusion is hindered in particular if it begins with the wrong farmer or if the innovation contravenes existing norms.

The nature and speed of the diffusion of innovations depends ultimately on the combined effect of a large number of recurring factors. They include the features of the innovation, the characteristics of the adopters and their situation, the type of information sources that come into play, the structure of the communication relationships, the course of preceding stages of the process and the results of new forces in the psychological field of the potential adopters of the innovation.

Despite many common characteristics in different processes, we must be careful not to simply transfer experiences from a few individual cases to future extension projects. The dissemination of innovations depends on the specific conditions of particular situations. The exact same factor can have a completely different significance, and possibly also a completely different effect, in different contexts. Thus, the extension worker is well advised to analyse each situation afresh and with great care to find out which factors can cause the target groups to change their behaviour. This is what we mean by the term "situation-specific approach".

In some cases, innovations have not been successful, because
there was no social contact between advisers and the target group
the “wrong innovator” began the innovation
no support was given from the social system
positive results were not apparent at the beginning.

These examples are clear indicators of how extension work should be approached. Before innovations are undertaken, important recurrent features that can affect the course and speed of the diffusion, and recurrent obstacles to development measures, have to be overcome (Table 1 and Table 2). Most characteristics of innovations are greatly shaped by the observer, therefore, comprehensibility largely depends on the level of understanding of the observer. Objective features do not count as much as their subjective perception.

Table 1: Recurring problems in the diffusion of innovations

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact</td>
<td>How have contacts to the innovator been made? Is there any possible, rejection of the innovator?</td>
</tr>
<tr>
<td>Observability</td>
<td>To what extent can first results and ongoing processes be observed e.g., microbial processes, or events in private life? Due to selective perception the observer may not notice it.</td>
</tr>
<tr>
<td>Comparability of motivation</td>
<td>Can potential adopters who are in a different situation and with different needs relate to their own situation and understand the principles of the innovation and assess it as useful or useless for their own situation?</td>
</tr>
<tr>
<td>Compatibility in modes of thought</td>
<td>Is the innovation a concrete and visual object, which can be related to the experiences and situation of the possible innovator or is it an abstract concept to which clients cannot relate?</td>
</tr>
<tr>
<td>Previous experiences</td>
<td>To what extent are possible innovators influenced by previous experiences, e.g., previous failures or successes, relation to extension worker, other services and organizations, etc?</td>
</tr>
<tr>
<td>Risk experience</td>
<td>Does the client have reserves? In case of failure, can he take these reserves to compensate the risks involved? Is there any guarantee to cover loss, how is solidarity within the group?</td>
</tr>
<tr>
<td>Comparability</td>
<td>Can the innovation and the abilities needed for application be linked to other experiences or similar situations?</td>
</tr>
<tr>
<td>Compatibility of norms</td>
<td>Does the innovation match or clash with e.g., legal prescriptions or social norms, such as propriety, customs, morals, taboos? Or is it neutral?</td>
</tr>
<tr>
<td>Unintentional effects</td>
<td>Do any unforeseen changes occur, e.g., wrong or uncritical adoption of innovations, changes in the social structure, damage to the environment?</td>
</tr>
</tbody>
</table>

Source: Adapted from ALBRECHT et al. 1989, 96.
Table 2: Important recurring attributes of innovations that can affect the course and speed of diffusion

Comprehensibility
Do clients understand why the suggested innovation is a solution? Do they know about the effects? How much information and knowledge would be necessary to modify the innovation? (to adapt better to their situation) What can be varied and to what extent without endangering success?

Complexity
How many stages does the innovation involve? How severe are these changes with respect to the known situation; what is the clarity of the consequences?

Divisibility, Triability
Can it be tried out on a small scale, extended in stages, partially adopted?

Risk
For example, what is the certainty of yield? Can inputs be calculated? What are the consequences of failure?

Observability
Is it possible to observe any result during implementation e.g., of all/some or none of the stages, and the results of colleagues, on model farms or demonstration plots?

Observability of success
How can first successes be observed and when? How long does it take between the stage of inputs and possible experience of success?

Observability of failure
How and when? What reasons are given for the successes and failures and how are they linked with the innovation?

Comparability of motivation
Does the potential adopter have the same motives as the innovator, do the objective advantages of the innovation meet subjective needs? (is the innovation really a solution or does it cause additional problems?)

Compatibility with norms
Can the adoption of the innovation be reconciled with existing rules, with social norms? Does the innovation match existing cultural practices and norms?

Comparative advantage (The innovation compared with the precursory practice) e.g.,
Labour input
What implication does the innovation have on labour input? To what extent are there physical implications, e.g., difficulty of work or lack of practice, or also psychological implications, e.g., when rigid habits are changed?

Costs
What costs are involved, direct or indirect, short or long term, with the problems of allocation or the demands on liquidity?

Return
What is the benefit of the innovation, e.g., in monetary terms or other benefits, how can you quantify non-monetary benefits?

Source: Adapted from ALBRECHT et al. 1989, 97. 7

6 Consequences of innovations
There are no purely technical innovations. Diffusion is not only a social process, it also has social consequences, and it creates winners and losers. Social status and prestige, but also the economic ranking of members of a social system change as a result of innovation processes.

Even so called "sustainable innovations," adopted and maintained by all members of the social system, can prove to be unsustainable in a wider sense, that is they create negative effects for the economy or the ecology, which in the medium or long term are greater than the short term benefits for the adopters.
But losers can be the next generation of innovators. HAGEN (1962,217) stated that entrepreneur-ship and innovativeness in traditional societies emerges especially within persons and groups, as a consequence of withdrawal of status respect. Technology assessment is an attempt to forecast the intended and unintended effects of the innovations, especially new technologies. But, since the task is complex and difficult to resolve, those having vested interest in the diffusion do not like being stopped, technology assessment is not po-litically supported. Globalisation and increased international competition is another mechanism, not to hold back technological developments.

7 Conclusions for the methodology of extension work

Finally, after considering the basic concepts underlying extension and the diffusion of innovations, let us take preliminary stock and draw some conclusions about the methods applied in ex-tension work.

A general principle for all advisory work is, therefore, think from the point of view of the client and take his whole social context into consideration.

In order to do so, we have to establish the inhibiting and driving forces in the field of action of the client; we have to understand the particular way of looking at the problem from his subjective perception and mode of thought. Only with this approach can we conclude what kind of help, ar-guments and reasoning will really fit the problem situation of the extension partner. But, because extension is only one factor in a social environment, the possible reaction and influence of both the contact person and the groups to which the client relates have an important role in attaining and implementing solutions to problems.

In areas where innovations can suggest that the situation of a large target groups is improved, ex-tension has the possibility of making a wide impact if it succeeds in setting in motion a self-sustaining process of diffusion of innovations. For this success, innovators have to be found who have benefited from the solution to the problem and are in a position to take the necessary action, and who have as many points as possible in common with the other members of the target group. They then have to be given the technical support that will enable them to achieve demon-strably good results with the innovation. If the first people to adopt the innovation in the social system experience rejection, they have to be given support of a social kind. This support should come from the adviser helping them establish contact with innovators with the same or similar problems in the vicinity. The best initial situation is an established contact to a group, showing interest for a certain prob-lem solution, where an innovator is nominated and supported by the group to try it out. The rejection of the social community is then easier to bear and the critical phase can be shorter and less critical.

Any good results must be effectively made known to the other members of the social system. Excessive emphasis on early adopters should be avoided, since this can create new defensive re-actions. Different segregated audiences should be addressed with special messages and through specific information channels. If a self-sustaining diffusion process comes about, it presents the extension service with a new task. Ill-considered or the wrong adoption of innovations has to be prevented, because experi-ence shows that later adopters examine the innovation less carefully. What is more effective than just stating that an innovation is unsuitable is showing other, more appropriate solutions for the people in question. It is advisable to bear this problem in mind from the start, so that the exten-sion worker can have proven alternatives ready if the occasion arises.
There is no point in using pressure or financial grants to encourage the introduction of innovations unless the target group experiences and appreciates the value of the innovation after its adoption, so that they will retain it for its own value when the financial aid ceases or the pressure is removed. Therefore, instead of direct material incentives to the innovators, it is better to use only pledges to cover the risk of failure.

Innovations should not be seen as detailed blueprint solutions, because to work successfully in a range of situations, they should be adaptable to the specific circumstances and requirements. There is no difference in extension between standard solutions or innovations. ROGERS (2003, 17) terms it “re-invention”. The developers and promoters of innovations have to carefully monitor the variations, adaptations and re-inventions of adopters, to incorporate the more useful and wide-spread applicable ones into the recommendations. This joint learning between developers and users is a process comparable to biological evolution, and, therefore, DOUTHWAITE (2001) talks about “learning selection” as an additional task for research, development and extension.

Bibliography


Two Problems Caused by the Innovation Diffusion Curve

by Tim Kastelle

The economist Rudi Dornbusch succinctly describes the way that ideas spread:

**Things take longer to happen than you think they will and then they happen faster than you thought they could.**

It’s the innovation S-Curve in words, this is what that looks like graphically:

![Innovation Diffusion Curve](image)

And the problem is that the value for X is larger than we expect it to be – that’s the essence of Dornbusch’s quote.

I ran across the quote in a post by Andrew Hargadon discussing how sustainability in business is taking longer than expected to arrive. Hargadon explains why X is big:

Forget all the names and dates you learned in elementary school, great social and technical revolutions begin with a whisper, not a bang. They take decades to develop and then, when they do, they change everything overnight.

Take the industrial revolution. It started with a whisper: three different technologies slowly emerging in the 1700s. Coal slowly replaced wood as the dominant source of fuel; the steam engine slowly replaced animal and wind power (to pump water from coal mines); and large ironworks slowly replaced local craftsmen and blacksmiths. For decades, these technologies and the businesses and lifestyles that surrounded them grew and evolved. Then, all of the sudden, the last few decades of that century and the first few of the next saw an explosion of innovation across all industries—from textiles to shipping to railroads to iron and metalworks.

The impact didn’t come from any one of these technologies, it came from the interaction between them.
This slow diffusion causes two problems for firms. The first is that if you are a powerful incumbent, you see the slow diffusion and you think that it will continue to expand along path C – slow and steady. The consequence of this is that when the change does happen, even though there have been warning signs for ages, it still takes you by surprise.

There is a quote from the CEO of a major book store in Game-Changing Strategies by Constantinos Markides:

We were late in implementing [the web] but not in evaluating it. And our evaluation was that this thing did not make sense. yet every time I tried to explain our reasons why we wouldn't do it to Wall Street, my share price went down! Even in 1997 when online distribution of books went from zero to 6 percent, superstores increased their share from 10 percent to 22 percent – yet our stock price dropped by 40 percent. So in the end, we decided we had to do something.

This is exactly what path C thinking sounds like. And the problem it leads to is this (via Boing Boing):

But there are also problems for innovators in the S-Curve. The long delay in diffusion causes a lot of firms to go out of business trying to catch the new wave.

You can see this in the Kodak case. Here’s the world’s first digital camera:

It was invented by Kodak in 1975. The problem was, the rest of the economy wasn’t ready for digital cameras yet. Digital memory was still so expensive that you couldn’t actually take usable photos then. Does anyone else remember how crappy the first
digital photos were in the late 90s? They were just awful. The supporting technology didn’t catch up with the camera technology for about 25 years.

That is exactly what Hargadon is talking about – it takes multiple innovations to disrupt an industry.

Kodak took this to mean that digital cameras would evolve along path C. So they kept the technology on the shelf and waited. If an independent entrepreneur had invented the digital camera, he or she would have gone bankrupt waiting for the supporting technologies. Or, if they were lucky, they might have sold the rights to a big company like Kodak.

The point is, when you’re early in the S-Curve, it usually takes a lot longer to get to the tipping point than you’d like it to.

The first step in addressing these problems is being aware of them. However, there are also some positive steps that you can take as well. I talk more about these here.

Student and teacher of innovation - University of Queensland Business School - links to academic papers, twitter, and so on can be found here.

✧ Nondiffusion of the Dvorak Keyboard*

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Most individuals who write on a computer do not realize that their fingers tap out words on a keyboard that is known as "QWERTY," named after the first six keys on the upper row of letters. The QWERTY keyboard is intentionally inefficient and awkward. This keyboard takes twice as long to learn as it should and makes us work about twenty times harder than necessary. But QWERTY has persisted since 1873, and today unsuspecting individuals are taught to use the QWERTY keyboard, unaware that a much more efficient keyboard is available. In recent years of talking about the QWERTY keyboard with hundreds of large audiences, the present author has never encountered anyone who uses an alternative.

Where did QWERTY come from? Why does it persist in the face of much more efficient alternative keyboard designs? QWERTY was invented by Christopher Latham Sholes, who designed this keyboard to slow down typists. In his day, the type bars on a typewriter hung down in a sort of basket and pivoted up to strike the paper; then they fell back into place by gravity. When two adjoining keys were struck rapidly in succession, they jammed. Sholes rearranged the keys on a typewriter keyboard to minimize such jamming; he "anti-engineered" the letter arrangement in order to make the most commonly used letter sequences awkward. By thus making it difficult for a typist to operate the machine and slowing down typing speed, Sholes's QWERTY keyboard allowed early typewriters to operate with a minimum of jamming. His design was then used in the manufacture of all typewriters. Early typewriter salesmen could impress customers by pecking out "TYPEWRITER" as all of the letters necessary to spell this word were found in the top row (QWERTYUIOP) of the machine.

Prior to 1900, most typists used the two-finger, hunt-and-peck system. Later, as touch typing became popular, dissatisfaction with the QWERTY typewriter began to grow. Typewriters
became mechanically more efficient, and the QWERTY keyboard design was no longer necessary to prevent jamming. The search for an improved design was led by Professor August Dvorak at the University of Washington, who in 1932 used time-and-motion studies to create a much more efficient keyboard arrangement. Dvorak filmed people while they were typing and spent a decade analyzing which operations slowed them down. The Dvorak keyboard has the letters A, O, E, U, I, D, H, T, N, and S across the home row of the typewriter (Figure 1-1). The QWERTY keyboard and the Dvorak keyboard

![Standard QWERTY Layout](StandardQWERTYLayout.png)

![Dvorak Layout](DvorakLayout.png)

The Dvorak keyboard is much more efficient for typists than the QWERTY keyboard, which was designed more than a century ago to slow down typists so as to prevent the jamming of keys on early typewriters. Yet almost no one has adopted the Dvorak keyboard. Superior technological innovations do not necessarily diffuse themselves.

Less frequently used letters were placed on the upper and lower rows of keys. About 70 percent of typing is done on the home row, 22 percent on the upper row, and 8 percent on the lower row. On the Dvorak keyboard, the amount of work assigned to each finger is proportionate to its skill and strength. Further, Professor Dvorak engineered his keyboard so that successive keys-tokes fell on alternative hands; thus, while a finger on one hand is stroking a key, a finger on the other hand can be moving into position to hit the next key. Typing rhythm is thus facilitated; this hand alternation was achieved by putting the vowels (which represent 40 percent of all letters typed) on the left-hand side and the major consonants that usually accompany these vowels on the right-hand side of the keyboard.

Professor Dvorak was thus able to avoid the typing inefficiencies of the QWERTY keyboard. For instance, QWERTY overloads the left hand, which must type 57 percent of ordinary copy. The Dvorak keyboard shifts this emphasis to 56 percent on the stronger right hand and 44 percent on the weaker left hand (for a right-hander, as are 90 percent of the public). Only 32 percent of typing is done on the home row with the QWERTY system, compared to 70 percent with the Dvorak keyboard. The newer arrangement requires less jumping back and forth from row to row. With the QWERTY keyboard, an efficient typist's fingertips travel more than twelve miles a day, jumping from row to row. These unnecessary, intricate movements cause mental tension and carpal tunnel syndrome and lead to more typographical errors. Typists typing on the Dvorak keyboard have broken all speed records.
One might expect, on the basis of its overwhelming advantages, that the Dvorak keyboard would have completely replaced the inferior QWERTY keyboard. On the contrary, after more than seventy years, almost all typists still use the inefficient QWERTY keyboard. Even though the American National Standards Institute and the Equipment Manufacturers Association have approved the Dvorak keyboard as an alternate design, it is still almost impossible to find a typewriter or a computer keyboard that is arranged in the more efficient layout. Vested interests are involved in hewing to the old design: manufacturers, sales outlets, typing teachers, and typists themselves. Unknown to most computer users, their machine that comes equipped with a QWERTY keyboard can easily be switched to a Dvorak keyboard. Nevertheless, a consider-able effort, estimated at about a weeks training, is required for someone accustomed to the QWERTY design to become proficient on a Dvorak keyboard.

Here we see that technological innovations are not always diffused and adopted rapidly, even when the innovation has obvious advantages.


Bibliography:

 đôi * 2 Life Cycles

**Learning Goal:** Judge the stage a product is in for the 2 Life Cycles.
https://sites.google.com/a/wcastl.org/the-westminster-school-of-business-and-communication/marketing/2lifecycles

The product life cycle was first introduced in the 1950s to explain the expected life cycle of a typical product from design to obsolescence, a period divided into the phases of product introduction, product growth, maturity, and decline. The goal of managing a product's life cycle is to maximize its value and profitability at each stage.

**Diffusion of Innovation**
A critical component to the product life cycle is the Diffusion of Innovation Lifecycle (DOI). DOI can be referred to as the technology adoption lifecycle but means the same thing. The DOI model describes the adoption of new product or innovation, according to the demographic and psychological characteristics of the defined adopter groups. The process of adoption over time is typically illustrated as a classical normal distribution or "bell curve." The model indicates that the first group of people to use a new product is called "innovators," followed by early adopters and so on.

A critical insight into the DOI is that impersonal marketing methods like advertising and media stories may spread information about new innovations, but it's conversations that spread adoption.

Why? Because the adoption of new products or behaviors involves the management of risk and uncertainty. It's usually only people we personally know and trust - who we know have successfully adopted the innovation themselves - who can give us credible reassurances that our attempts to change won't result in embarrassment, humiliation, financial loss or wasted time.

1. **Innovators** - The adoption process begins with a tiny number of visionary, imaginative innovators. They often lavish great time, energy and creativity on developing new ideas and gadgets. And they love to talk about them.

Right now, they're the ones busily building stills to convert cooking oil into diesel fuel and making websites to tell the world about it. Unfortunately their one-eyed fixation on a new behavior or gadget can make them seem dangerously idealistic to the pragmatic majority. Yet no change program can thrive without their energy and commitment.

How to work with innovators:

- Track them down and become their "first followers", providing support and publicity for their ideas.
- Invite keen innovators to be partners in designing your project.

2. **Early Adopters** - Once the benefits start to become apparent, early adopters leap in. They are on the lookout for a strategic leap forward in their lives or businesses and are quick to make connections between clever innovations and their personal needs.

They love getting an advantage over their peers and they have time and money to invest. They're often fashion conscious and love to be seen as leaders: social prestige is one of
their biggest drivers. Their natural desire to be trend setters causes the "take-off" of an innovation. Early adopters tend to be more economically successful, well connected and well informed and hence more socially respected. Their seemingly risky plunge into a new activity sets tongues wagging. Others watch to see whether they prosper or fail, and people start talking about the results. And early adopters like to talk about their successes. So the buzz intensifies. What early adopters say about an innovation determines its success.

Early adopters are important for another reason. They become an independent test bed, ironing out the chinks and reinventing the innovation to suit mainstream needs.

![Diagram of the chasm]

3. Early Majority - Assuming the product or behavior leaps the chasm, it may eventually reach majority audiences. Early majorities and pragmatists, comfortable with moderately progressive ideas, but won't act without solid proof of benefits. They are followers who are influenced by mainstream fashions and wary of fads. They want to hear "industry standard" and "endorsed by normal, respectable folks".

Majorities are cost sensitive and risk averse. They are looking for simple, proven, better ways of doing what they already do. They require guaranteed off-the-shelf performance, minimum disruptions, minimum commitment of time, minimum learning, and either the cost neutrality or rapid payback periods. And they hate complexity. They haven't got time to think about your product of project. They want to hear "plug-and-play", "no sweat", or "user-friendly" and "value for money".

How to work with the early majority:

- Offer give-aways or competitions to stimulate buzz.
• Use Mainstream advertising and media stories featuring endorsements from credible, respectable, similar folks.
• Lower the entry cost and guarantee performance.
• Redesign to maximize ease and simplicity.
• Cut the red tape: simplify applications forms and instructions.
• Provide strong customer services and support.

4. Late Majority - They are conservative pragmatists who hate risk and are uncomfortable with new ideas. Practically their only driver is the fear of not fitting in, hence they will follow mainstream fashions and established standards. They are often influences by the fears and opinions of laggards.

How to work with the late majority:

• Focus on promoting social norms rather than just product benefits: they'll want to hear that plenty of other conservative folks like themselves think it's normal or indispensable.
• Keep refining the product to increase convenience and reduce costs.
• Emphasize the risks of being left behind.
• Respond to criticisms from laggards.

5. Laggards - Meanwhile laggards hold out to the bitter end. They are people who see a high risk in adoption a particular product or behavior. Some of them are so worried they stay awake all night, tossing and turning, thinking up arguments against it. And don't forget they might be right! It's possible they are not really not laggards at all, but innovators of ideas that are so new they challenge your paradigms! In the early stages, where you are focusing on early adopters, but when you come to work with late majorities you'll need to address their criticisms, because late majorities share many of their fears.

How to work with leaders:

• Give them high levels of personal control over when, where, how and whether they do new behavior.
• Maximize their familiarity with new products and behaviors. Let them see exactly how other laggards have successfully adopted the innovation.

5 Main Factors Influencing Adoption of an Innovation
There are five main factors that influence adoption of an innovation, and each of these factors is at play to a different extent in the five adopter categories. The categories explain why some things take off and others do not.

1. Relative Advantage - The degree to which an innovation is perceived as better than the idea it supersedes by a particular group of users, measured in terms that matter to those users, like economic advantage, social prestige, convenience, or satisfaction. The greater the perceived relative advantage of an innovation, the more
rapid its rate of adoption is likely to be.

2. **Compatibility** - The degree to which an innovation is perceived as being consistent with the values, past experiences, and needs of potential adopters. An idea that is incompatible with their values, norms or practices will not be adopted as rapidly as an innovation that is compatible.

3. **Complexity** - This is the degree to which an innovation is perceived as difficult to understand and use. New ideas that are simpler to understand are adopted more rapidly than innovations that require the adopter to develop new skills and understandings.

4. **Triability** - The degree to which an innovation can be experimented with on a limited basis. An innovation that is triable represents less risk to the individual who is considering it.

5. **Observable Results** - The easier it is for individuals to see the results of an innovation, the more likely they are to adopt it. Visible results lower uncertainty and also stimulate peer discussion of a new idea, as friends and neighbors of an adopter often request information about it.

**Example**
The innovation adoption lifecycle presents some interesting dilemmas to consider for marketers. Think about this. In 1996, the first tablet device was released by Palm. It was okay but failed to ever attract a mass market following. Microsoft gave it a swing in 2000 by developing the Pocket PC. Again, this was a great product for a few people but the market never opened up beyond a couple of innovative and early adopter business people.

In 2010, Apple unveiled the iPad operating on the IOS platform. By the end of 2013, the late majority have jumped onto the scene and 195 million tablets were sold in that year alone. In regards to the innovation adoption lifecycle, a the product has hit the crowning achievement of working through the American population much like Laptops did before the tablet. At this time, consumers are happy with the incremental innovation that continues to improve the speed, screen quality and size of the tablets being produced.

However, the question should be asked, "what is the next big thing?" How do marketers prepare to make sales through the entire innovation adoption lifecycle. How do marketers prepare for new products which could disrupt the innovation adoption lifecycle of their current product line?

Equally as important, what happens when products are not allowed to go through the innovation adoption lifecycle? Clayton M. Christensen explains this in his book "The Innovators Dilemma - When New Technologies Cause Great Firms to Fail." He describes these types of technology killers as disruptive innovations. A disruptive innovation is an innovation that helps create a new market and eventually disrupts an existing market (over a few years or decades), displacing an earlier technology. While we are not in a place to answer this question, it is critical to understand that the innovation adoption lifecycle can be disrupted at any point in the cycle.

**Product Life Cycle**
Development

The development stage is the problem-solving process for our class. It takes brainstorming, SWOT analysis, and product development lessons and formulates a product that is worth attempting to turn into a scaleable, repeatable business.

Introduction

This is the stage where a product is conceptualized and first brought to market. The goal of any new product introduction is to meet consumers’ needs with a quality product at the lowest possible cost in order to return the highest level of profit. The introduction of a new product can be broken down into five distinct parts:

1. Idea validation, which is when a company studies a market, looks for areas where needs are not being met by current products, and tries to think of new products that could meet that need. For most startups, the idea typically comes from a negative experience that leads them to develop a solution.
2. Conceptual design occurs when the idea seems to address the need and you develop begin to mockup prototypes.
3. Prototype and testing occur when the first version of a product is created and tested by engineers and by customers. This is all about producing an MVP (minimum viable product) and getting it in front of people. Consumer feedback leads to iterations that consumers actually want and need.
4. Manufacturing ramp-up is the final stage of new product introduction. This is also known as commercialization. This is when the product goes into full production for
release to the market. In the introduction phase, sales may be slow as the company builds awareness of its product among potential customers. Advertising is crucial at this stage as you are attempting to educate people on how your product solves a problem for them. In the introduction stage, you are primarily trying to "Get Customers".

5. Techniques used to exploit early stages make use of penetration pricing (low pricing for rapid establishment) as well as "skimming," pricing high initially and then lowering price after the "early acceptors" have been lured in.

**iPod Example**
The message surrounding the launch focused on "1,000 songs in your pocket" made easy with the iTunes digital jukebox.

Most of the marketing was focused on the mp3 player as the solution. It was not a major success by Apple's standards and was not even compatible with Windows operating systems. Let's just say that Apple learned a great deal from this and the second generation iPod added functionality with Windows. However, this was not enough to change the opinions of the mass market. Apple still did not have a winner.

**Growth**
The growth phase occurs when a product has survived its introduction and is beginning to be noticed in the marketplace. At this stage, a company can decide if it wants to go for increased market share or increased profitability. In extremely rare circumstances, the product will be able to increase market share and profitability. This is the boom time for any product. Production increases, leading to lower unit costs. Sales momentum builds as advertising campaigns target mass media audiences instead of specialized markets (if the product merits this). Minor changes are made as more feedback is gathered or as new markets are targeted. The goal for any company is to stay in this phase as long as possible.

If the product is doing well and killing it is out of the question, then the marketing department has other responsibilities. Instead of just building awareness of the product, the goal is to build brand loyalty by adding "Get Customers" and retaining "Keep Customers".

**iPod Example**
The iPod turned the corner for mass adoption when it rolled out the following advertising: people making expressions listening to an iPod on a colored background.

The advertising focused on the simplicity and beauty of a product that worked on every operating system by running through the new iTunes store. The iTunes store sold music at 99 cents and sold a total of one million songs in the first week. This growth product arguably made more of an impact on Apple's success than any other product. Just to be sure you
understand, I was talking about the iTunes store.

Maturity
At the maturity stage, sales growth has started to slow and is approaching the point where the inevitable decline will begin. Defending market share becomes the chief concern, as marketing staffs have to spend more and more on promotion to entice customers to buy the product. At this time, you typically see companies transition to "Keep Customer" and "Grow Customer" to additional product lines. Additionally, more competitors have stepped forward to challenge the product at this stage, some of which may offer a higher-quality version of the product at a lower price. This can touch off price wars, and lower prices mean lower profits, which will cause some companies to drop out of the market for that product altogether. The maturity stage is usually the longest of the four life cycle stages, and it is not uncommon for a product to be in the mature stage for several decades.

A savvy company will seek to lower unit costs as much as possible at the maturity stage so that profits can be maximized. The money earned from the mature products should then be used in research and development to come up with new product ideas to replace the maturing products. Operations should be streamlined, cost efficiencies sought, and hard decisions made.

From a marketing standpoint, experts argue that the right promotion can make more of an impact at this stage than at any other. One popular theory postulates that there are two primary marketing strategies to utilize at this stage—offensive and defensive.

- Defensive strategies consist of special sales, promotions, cosmetic product changes, and other means of shoring up market share. It can also mean quite literally defending the quality and integrity of your product versus your competition.
- Marketing offensively means looking beyond current markets and attempting to gain brand new-buyers. Relaunching the product is one option. Other offensive tactics include changing the price of a product (either higher or lower) to appeal to an entirely new audience or finding new applications for a product.

iPod Example
The addition of the Nano and Shuffle products to the original design helped extend the life of the iPod. In addition, iTunes partnered with Nike to add more value to the iPod. This was an offensive strategy that increased market share by adding value to both Nike and the iPod.

Apple iPod performance and sales were relatively unstoppable even at this point. However, Apple knew that greater opportunities for the technology existed. That is when they decided to challenge their own product line.

Decline
This occurs when the product peaks in the maturity stage and then begins a downward slide in sales. Eventually, revenues will drop to the point where it is no longer economically feasible to continue making the product. Investment is minimized. The product can simply be discontinued, or it can be sold to another company. A third option that combines those elements is also sometimes seen as viable, but comes to fruition only rarely. Under this scenario, the product is discontinued and stock is allowed to dwindle to zero, but the company sells the rights to supporting the product to another company, which then becomes responsible for servicing and maintaining the product.

Again, this stage is all about "Grow Customers" as the company attempts to pass the customer off to more profitable units or products at an earlier stage in the cycle. Worst case scenario, the customer is lost.

*iPod Example*

The iPod dominated the music industry for 5 years with the iPod. In 2006, Apple introduced the iPhone. The iPhone combined all the technology of the iPod and went a step further by enabling calling. Since the inception of the iPhone, the iPod has steadily decreased in sales. However, no one would argue against this move as the iPod is still a strong product but nothing that it once was and most certainly on the steady path of decline.

**Problems with the Product Life Cycle Theory**

While the product life cycle theory is widely accepted, it does have critics who say that the theory has so many exceptions and so few rules that it is meaningless. Among the holes in the theory that these critics highlight:

- There is no set amount of time that a product must stay in any stage; each product is different and moves through the stages at different times. Also, the four stages are not the same time period in length, which is often overlooked.
- There is no real proof that all products must die. Some products have been seen to go from maturity back to a period of rapid growth thanks to some improvement or redesign.
- The theory can lead to an over-emphasis on new product releases at the expense of mature products, when in fact the greater profits could possibly be derived from the mature product if a little work was done on revamping the product.
- The theory emphasizes individual products instead of taking larger brands into account.
- The theory does not adequately account for product redesign and/or reinvention.

Most importantly, the product life cycle is meant to be read as a guide for the steps a product will take with out continued development and marketing efforts. Sometimes a product needs to go throw the entire cycle to the point of cancelation and at other times the product needs a simple tweak or improvement. The point is there are phases in development.

**Student Activity**
• Judge the stage of Cloud Computing is in on the Product Life Cycle.
  o How can companies such as Dropbox/Box improve their cloud offerings? How can they lengthen the product life cycle?

Sources

• Product Life Cycle by Inc