A THEORY OF INNOVATION DIFFUSION FOCUSED UPON SOCIAL
INTERRELATIONSHIPS IS PRESENTED. INTERACTION OF VARYING KINDS
AND SIZES OF SOCIAL UNITS RELATES INDIVIDUALS TO OTHER
INDIVIDUALS, GROUPS, INSTITUTIONS, OR CULTURES. INNOVATION
MAY BE INITIATED BY ANY OF THESE FOUR SOCIAL UNITS AND MAY BE
DIRECTED TOWARD SUBSEQUENT ADOPTION BY ANY OF THE UNITS. THE
THEORY IS CALLED A CONFIGURATIONAL THEORY BECAUSE THE
EMPHASIS IS PUT ON PATTERNS OF RELATIONSHIPS BETWEEN
INNOVATORS AND ADOPTERS, RATHER THAN UPON THE SOCIAL UNITS
THEMSELVES. SPECIFIC ELEMENTS OF THE THEORY INCLUDE THE
INITIATOR OR INNOVATOR, THE TARGET OR ADOPTER, THE LINKAGE
BETWEEN THE TWO, AND THE PROCESS OF DIFFUSION BY WHICH AN
INNOVATION IS INCORPORATED INTO A CONFIGURATION.
ENVIRONMENTAL INFLUENCE UPON INNOVATION DIFFUSION WILL DEPEND
UPON WHETHER THE ENVIRONMENT IS PERSISTENT AND SUPPORTIVE,
NEUTRAL, OR INHIBITING. CONFIGURATIONAL RELATIONSHIPS CAN BE
DIVIDED INTO THREE BROAD CATEGORIES--MOLECULAR,
MOLAR-MOLECULAR, AND MOLAR--DEPENDING GENERALLY UPON THE SIZE
OF THE TWO SOCIAL UNITS SERVING AS INITIATOR AND ADAPTER AND
THE PARTICULAR RELATIONSHIP'S AMENABILITY TO CONTROL.
COMMUNICATION WITHIN SOCIAL UNITS IS DISTINCT FROM THE
LINKAGE OR COMMUNICATION NETWORK BETWEEN CONFIGURATIONS. THE
PROBABILITY OF DIFFUSION WILL BE AFFECTED BY THE AMOUNT OF
VARIABLE RESOURCES--MATERIAL, CONCEPTUAL SKILLS, PERSONNEL,
AND INFLUENCE. ELEVEN HYPOTHESES SUGGESTED BY THE THEORY ARE
ENUMERATED. (JK)

THE CONFIGURATIONAL THEORY OF
INNOVATION DIFFUSION.

--

By

HARBANS SINGH BHOLA.

A PERSONAL NOTE

I would welcome comments and suggestions from
conference participants and readers on the usefulness
of this theoretical formulation in person during the
conference days, or by mail at the following addresses:

<u>Till December 31, 1965</u>

School of Education,
Ohio State University,
Arps Hall,
Columbus, Ohio, 43210

<u>After December 31, 1965</u>

In Care of
Mr. Sohan Singh,
ASIA FOUNDATION,
12, Hailey Road,
New Delhi, India

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PREFACE

This presentation is adapted from <u>A Theory of Innovation Diffusion</u>
<u>and its Application to Indian Education and Community Development</u>, a
Ph.D. dissertation completed by the author in the Graduate School of
the Ohio State University, Columbus, Ohio during 1965. The material
is made available to the Conference on "Strategies for Educational
Change," Washington, D. C., November 8-10, 1965, as a professional
courtesy and does not constitute a part of official papers and
documents of the conference.

The author wishes to acknowledge his debt of gratitude to
Professor Egon G. Guba of the School of Education, Ohio State University
who gave so generously of his time and counsel in the refinement and
formalization of the theory presented here. The theoretical model in
its present form has benefited considerably from a theoretical assessment
of the formulation by Professors David L. Clark, Egon G. Guba, and
Roy A. Larmee of the Ohio State University. Professor Virgil E. Blanke,
Ohio State University, Professor W. W. Charters, Jr., Washington
University, Professor Edgar Dale, Ohio State University, Professor
Herbert F. Lionberger, University of Missouri, Professor Matthew B. Miles
of Teachers College, Columbia University made several comments and
suggestions on an earlier draft for which the author is extremely
grateful.

It has not been possible for the author, for reasons of his own
professional limitations, to include in the formulation all the
suggestions made or to meet all the objections raised by the aforementioned
writers and researchers. For the remaining inadequacies of this presenta-
tion, therefore, the author alone is responsible.

INTRODUCTION

The lack of a <u>general</u> theory of social change or innovation
diffusion has been often pointed out in literature. Matthew B. Miles
in his concluding commentary on the papers included in his <u>Innovation</u>
<u>in Education</u> points out that:

> The 250-odd generalizations produced by the authors
> [of these papers] come in various sizes, shapes, and
> degrees of potency. There is no systematically drawn
> theory of social change within which they can be elagently
> (or even compulsively) organized. [1]

Another researcher in the field of innovations has expressed
similar sentiments. W. C. Meierhenry writes:

> ... There are not as yet well developed theories of
> innovation in any field and certainly not in education.
> Further, since various theories are just now being
> postulated, there are no clear, neat models from which
> to work... [2]

<u>The Configurational Theory of Innovation Diffusion</u> resulted
from endeavours to meet the need of a neat model, a systematically
drawn theory of planned change, a general theory that would be
applicable to all kinds and levels of social change.

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[1] Matthew B. Miles (Ed.), <u>Innovation in Education</u>, New York:
Teachers College, Columbia University, 1964.

[2] <u>Media and Educational Innovation</u> (Preliminary Report on a
Symposium on Identifying Techniques and Principles for Gaining
Acceptance of Research Results of Use of Newer Media in Education)
Lincoln, Nebraska: The University of Nebraska, 1964.

Discussion of Available Models

Both Meierhenry and Miles are, of course, aware of available schemas and models bearing on or related to the process of change and innovation diffusion. The implication of their remarks is that available models, useful as they are, do not go far enough. These available formulations have indeed clarified the process of change, have identified the stages of innovation-adoption, and suggested taxonomies and categories of tasks that must be performed to make change more or less certain rather than merely random and accidental. But they are often descriptive, contextual, or much too global.

One of the many models pertaining to change is Kurt Lewin's three-phase process:[3] (1) unfreeze, (2) move, and (3) refreeze. This is based on the basic assumption that people change either to improve their present condition or to avoid a worse condition. The unfreezing then involves creating dissatisfaction with the present, movement to a new condition is achieved by inducement or reward, and refreezing involves the establishment of equilibrium set after the new level of behavior has been reached.

Lewin's model focuses on the individual and his value re-orientation. Its primary interest is in acculturation and the psychological and perceptual correlates of this process. Therein lie the limits of its application.

Everett Rogers[4] working in the rural sociology tradition suggests a useful model based on stages of adoption. It posits five stages in the adoption process -- awareness, interest, evaluation, trial, and adoption. This model has proved highly heuristic suggesting, for instance, the study of innovators (defined as early adopters) and communication behavior of adopters at various stages of adoption. However, this model again emphasizes the individual functioning as a private person and is strongly related to one research tradition.

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[3]Kurt Lewin and Paul Grabbe, "Conduct, Knowledge, and Acceptance of New Values, "Journal of Social Issues, 1(1945), 64.

[4]Everett M. Rogers, Diffusion of Innovation, New York: The Free Press, 1964

Farnsworth[5] suggested an application model in educational change
going through the following sequence: recognize and articulate the
need, propose a solution, create interest in the suggested solution,
demonstrate usefulness, invite group and public interest, obtain
official approval and community financing, and remove any legal
restrictions. As an application model for use in American education
it makes a lot of sense but it lacks theoretical sophistication and
generalizeability.

Guba-Clark[6] schema of "Research Into Action" is again a useful
tool in as much as it provides categories of tasks and functions that
must be performed before research and invention can deliver an innovation
and an innovation can, in due course, become a non-innovation, a matter
of fact routine for its adopters. The schema does not, however, address
itself to question of implementation of change over these various stages.

An interesting model of change that looks at rejection rather than
acceptance of innovation is that of Eichholz.[7] Eichholz identified
different forms of rejection as ignorance, suspended judgement, situational,
personal, and experimental; and analyses the possible causes of such
rejection. The state of the subject and his anticipated responses related
to each form of rejection are indicated.

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[5]Philo T. Farnsworth, Adaptation Processes in Public School Systems,
New York: Columbia University Press, 1940.

[6]Egon G. Guba: "From Research into Action," a banquet address at the
Annual Meeting of the Educational Research Association of New York State,
October, 1964. Also David L. Clark, "The Engineering of Change in
Education," in Don D. Bushnell et al Proceedings of the Conference on
the Implementation of Educational Innovations, (Interim Report) Santa
Monica, California, Systems Development Corporation, (2500 Colorado
Avenue) 1964; David L. Clark and Egon G. Guba,"An Examination of
Potential Change Roles in Education,". a paper presented at the Seminar
on Innovation in Planning School Curricula, October, 1965.

[7]Gerhard C. Eichholz, Development of a Rejection Classification
for Newer Educational Media, Unpublished Doctoral Dissertation, Columbus:
The Ohio State University, 1961.

Eichholz provides a complementary perspective to the adoption concept included in Rogers's model. The diagnostic value of Eichholz's categories of rejection behavior should be of considerable value at the level of the individual adopter. However, a theory going beyond diagnosis into prescriptions of achieving innovation diffusion and social change is still needed by those investigating or practicing change.

There thus remains the need for an event theory of innovation diffusion, a theory focussing on the diffusion event and contributing insights toward making the diffusion event more probable. Such a theory needs to encompass both individuals and groups. And it needs to be inter-disciplinary, inter-situational, and inter-cultural.

The Value Position

The theory presented here is designed to _explain_ the process of innovation diffusion and _predict_ success or failure of innovation diffusion plans and projects. It focuses on the diffusion event and its practical concerns lie in increasing the probability of occurrence of such events.

Questions will certainly arise with respect to the worthwhileness of diffusion events as also with regard to the men and means employed to secure the occurrence of those events. These are important value questions but we do not seek to answer them. This theory takes a value position for granted. We are committed to planned change designed on the basis of research and informed opinion; organized for maximum effectiveness; handled by people trained to do the job.

We are indeed aware of a strong and aggressive tradition against planned change, in democratic countries, in some sectors of our social and economic life and especially in the area of Education. It is a tradition haunted by the ghosts of _laissez-faire_, rugged individualism, and classical liberalism: and sentimentalised by the _Brave New World_ and the _1984_. Any organized intelligent planning for social change is dubbed as manipulation, thought-reform, an ugly battle for the minds of unsuspecting men. In the educational sector of our social lives those afraid of planned change are particularly eloquent. The teachers have a self-concept which is true only in educational folklore. If not a rite, education is still considered an art, a personal style, a matter between the teacher and his student.

The position taken here is this: educational change based on the new educational technology could be had and education as art and personal style could still be saved if we worked for the art of the science of instruction. The art and the science of instruction are certainly not incongruent. We could accept the science of instruction from the researcher and innovator and apply our art and creativity in the use of materials and techniques to our special circumstance.

Planned change in all the different sectors of our social and economic life must be accepted because it seeks to maximize the social returns of our systems and it does not necessarily damage the individual and his right to self-fulfilment within a better, more productive social system. It very often improves the chances of such fulfilment. We believe, then, that innovators and change agents should be enabled to work for innovation diffusion as long as they are competent, are using their social skills for common good, have been assigned to their roles by the people themselves through known democratic procedures and can be removed from those positions again, through established processes; and as long as individuals, or groups have the freedom not to consume the innovation or change offered and made available.

This theory, as was indicated earlier, focuses on diffusion. Within this specialization, however, it is meant to be a comprehensive theory. It should be possible, for instance, to use this general theory to deduce conceptual models for innovation diffusion in different subject-matter areas and diffusion traditions as special cases of this general theory.

In its present stage of presentation it is not a quantitative theory but it is sufficiently formalized to render relational statements or hypotheses that can be empirically tested.

Innovation itself has been defined in so many different ways. The position taken by this theory is that an innovation is always something definable that is 'new' to an adopter individual, group or system; that from the web of interacting relationships involved in social change we can always identify one or a whole series of diffusion events involving an innovator or an agent acting on his behalf, an innovation that is being diffused, and an adopter, or again some one acting on adopter's behalf.

Theory construction in many ways is a hazardous task. Since we will isolate diffusion events from the diffusion process -- the whole web of such events -- it might sometimes seem as if innovation diffusion is a linear unidirectional process starting at one end and terminating at the other. This certainly is not so. It goes back and forth; round in circles; breaks up to form galaxies of a thousand diffusion events, big and small, of long and short durations. It is an interaction of many different roles at the same time. Neither man, nor his social group is primary: they exist in interaction. Innovation diffusion, that is, is a process concept. Innovators and adopters necessarily interact on each other. Innovators when successful may change adopters -- sometimes only perceptibly, sometimes considerably. But adopters may influence and change the innovators that came to influence and change them. Adopters may make innovators change their strategies, phase out innovations, change the packaging of an innovation, or give it up altogether!

The theory presented here is called the Configurational Theory of Innovation Diffusion because of the emphasis put on patterns of relationships between innovators and adopters. The configurational aspect is further enriched through a consideration of environmental and linkage factors entering the functional equation suggested as part of the theory.

A Snythesis of Psychological and Sociological Approaches

An important feature of this theoretical formulation consists in the fact that it synthesises the psychological (Ideographic) and sociological Namothetic approaches to social change. This theory accepts the position that innovations are adopted by individuals and therefore the individual is the locus of adoption. It accepts, at the same time the reality of groups and organizations to which individuals contribute for reasons of personal commitment or social contract. It is thus recognized that individuals submit to group decisions or organizational decisions, to a more or lesser degree, depending upon the nature of the group or organizational structure. This submission consists in accepting leader-follower relationships within groups or the recognition of decision-making rights of bureaucratic hierarchies within organizations. It has been theorized that molar (between groups or organizations) adoption relationships are mediated through molecular (between individuals) adoption relationships; but in most cases the innovator does not have to work directly with individuals or at least with all individuals. He could utilize the existing compliance relationships within groups and organizations by working at the molar level and later work with individuals,if necessary, and if worthwhile.

As we have pointed out before, some of the available models of innovation and social change have been highly contextual and it has been found difficult to equate the parameters of one change situation to another. An obvious example is provided by our attempts to transfer insights from the highly successful diffusion research tradition in rural sociology to education. Understandably, there has been little success in doing so for most attempts have been based on common sense rather than theory. The formulation presented here, by suggesting a typology of innovation diffusion situations, provides a theoretical basis -- both a bridge and a filter -- for transferring research results from one research tradition to another.

The Configurational Theory of Innovation Diffusion is the product of a synthesis of available knowledge in the area of innovation diffusion and in the foundational disciplines of social change. Being a synthesis it does not discard tested knowledge or disprove formulations that have already demonstrated their heuristic value. It places them in mutually explanatory relationships within a larger framework provided by this theory. Conversely, available concepts, and formulations could be deduced from the theory advanced here. By providing an inter-situational, and inter-cultural perspective it rejects some questions that have been raised so often by innovation diffusion researchers. For example, the following questions we believe cannot be profitably asked in their general form

but would need considerable limiting: What are innovators like? What are change agents like? What is the communication behavior of early adopters? We would need to know the type of culture, organization, group and the nature of the configurational relationship between innovator and adopter before these questions could be posed.

Significant Variables of Change

A review of literature in the area of innovation research and theory[8] led us to the position that the characteristics of an innovation were not primary in determining the probability of the diffusion of an innovation. The more important factor was the availability of resources of skills, personnel, material and influence with both innovators and adopters. If all the needed resources were available and deployed, the adoption of any innovation could be achieved for an individual, group, organization or culture, in due course of time.

The resources -- and especially the influence resources, will be impossible to employ unless the innovator and the adopter had been linked to each other through some communication or interaction pattern. Linkage (communication) was, therefore, considered to be another important factor determining the probability of the diffusion event.

Environments within which innovators and adopters exist may multiply the effectiveness of resources or may neutralize them resulting in expenditure of resources with no gains in diffusion. Environment would, therefore, be another important factor in determining the probability of the diffusion event. This incidentally is a factor so far wholly neglected in most innovation models.

Lastly, the nature of the "actors" -- individuals, groups, institutions (organizations), and cultures -- entering into the innovation-adoption transaction would affect the probability of diffusion directly and through interaction with environment, linkage, and resources.

These assumptions and logical operations determined the nature and structure of the theoretical formulation presented below.

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[8]Harbans S. Bhola, Innovation Research and Theory, Columbus: School of Education, Ohio State University, 1965. This paper was originally written as a pre-conference document for the Ohio State University and U.S. Office of Education joint conference on the Strategies for Educational Change to be held in Washington, D. C., November 8-10, 1965.

THE THEORY

The general theory of innovation diffusion suggested here and called the Configurational Theory of Innovation Diffusion can be stated as a function (f) symbolized as follows:

$$D = f(CLER)$$

In descriptive terms Diffusion (D) of innovation is a function of the Configurational (C) relationship between the Initiator (i) from a class of such initiators and the Target (j) from a class of such targets; the _extent_ and _nature_ of Linkage (L) _between_ and _within_ configurations; the environment (E) in which the configurations are located; and the resources (R) of both the initiator and target configurations.

The various terms used in the above explanatory statement are defined as follows for the purposes of the theory propounded here.

The Definition of Terms

Innovation: Innovation is a _concept_ (about military organization, curriculum construction, marketing practices, agricultural methods), an _attitude_ (about communal or racial harmony, women voting rights), a _tool_ with accompanying skills (16mm film projector, an insecticide spray machine) or two or more of these together introduced to an individual, group, institution or culture that had not functionally incorporated it before.

An innovation is an innovation with respect to a particular individual, group, institution or culture, but is not necessarily a new invention or addition to general human knowledge.

Configuration: Configurations are social units within which individuals play a variety of formal and informal social roles. These roles may be played _as_ individuals _in_ groups in institutions or _in_ cultures. Thus four configurations are recognized:

1. Individual (I)[9]
2. Group (G)
3. Institution (IS)
4. Culture (C)

---

[9] For the purposes of this theory a single individual (I) has also been considered a _configuration_. While a configuration by definition is "the relative position or arrangement of parts" we may consider an I as a configuration in the same sense that 0 is a number in arithmetic. We could have avoided the difficulty by calling I,G,IS, and C social _units_ but believe that more will be lost than gained by such labelling. It is necessary to emphasize the often neglected point that forms, patterns, structures of innovator and adopter systems are an important consideration for diffusion.

Initiator (or Innovator): When a configuration is playing the role of an initiator with respect to an innovation so that it may be accepted into another configuration for reasons such as personal profit, social idealism, or official duty, that configuration is termed an Initiator or an Innovator.

An innovator role is here distinguished from an inventor role. The two roles may, however, be combined in one person or group or an institution.[10]

Target (or Adopter): The configuration on which an initiator is working for the acceptance of an innovation is a Target configuration or an Adopter system.

Configurational Relationship: An initiator configuration acting on another target configuration together make a configurational relationship, symbolized by C_{ij}.

Whereas a configuration (x) may be an initiator configuration and a configuration (y) may be a target configuration for an innovation P; for another innovation Q the relationship may be reversed, configuration (y) becoming an initiator configuration and configuration (x) becoming a target configuration. Both configurational relationships C_{xy} and C_{yx} may exist contemporaneously.

Linkage: Linkage is communication. Two configurations are in communication with each other directly or through the mediation of a third party.

The word "linkage" is used in this theory in place of communication to emphasize the act of being linked and to underscore the idea that production of messages by a disseminator would not complete the communication act. The intended receivers of messages must be linked in. Linkage may be inter-configurational (L_b) or intra-configurational (L_w), that is, it may be between or within configurations.

Diffusion: Diffusion is the process involving information consumption, social interaction, and behavioral change through which an innovation is incorporated into a configuration, tending toward a socio-psychologically stable and integrated relationship with the cognitive-affective-motor structure of that configuration.

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[10]The innovator role as defined here is different from the innovator role in the tradition of rural sociology where innovators are defined as earliest adopters. The description of innovator role as used in this formulation, we hope, will provide a better conceptualization of roles needed for organizing diffusion among cultures, organizations and communities.

An innovation may be considered to have been _totally_ diffused when the innovation is voluntarily sought as a _need_ or _value_ by a configuration and when the configuration itself can provide or has access to the skills and resources needed for adoption by a new member of the configuration, not previously related to the innovation.

Environment: Environment is defined as the system of physical, social, and intellectual forces and conditions in which configuration(s)is/ are located. Environment may be near and remote, may be determined by both perceptual and persistent factors.

Resources: Resources are material, conceptual, and psychological abilities, and capacities of innovators to cause diffusion and of target systems to absorb the innovations.

We will now discuss the different variables in the functional equation -- diffusion, environment, configurational relationships, linkages, and resources, in that order -- in greater details.

Diffusion

We have already defined diffusion in the preceding section. Diffusion may be seen analytically as going through the stages aiming at:

1. Disseminating information
2. Maximizing interaction
3. Facilitating behavioral change and action
4. Providing support and service for integration

The first three of the stages mentioned here are roughly comparable to Guba and Clark's[11] dissemination, demonstration, and implementation stages in their 'Theory Into Action' model below.

---

[11]See Footnote 6 on page 3.

Table 1

Guba-Clark Schema for Change in a Social Process Field

	Research	Development	Dissemination	Demonstration	Implementation
Objective	To advance knowledge	To apply knowledge	To distribute knowledge	To build conviction	To facilitate action
Criteria	Validity of the knowledge produced	1) Feasibility 2) Performance	1) Intelligibility 2) Fidelity 3) Comprehensiveness 4) Pervasiveness	Credibility	1) Effectiveness 2) Efficiency
Relation to Change	Provides basis for innovation	Produces innovation	Informs about innovation	Promotes innovation	Incorporates innovation

As indicated earlier the theory presented is an innovation diffusion theory; and in terms of the above table begins after the research and development stages. However, what might at first sight appear to be a neglect of these two important stages of theory into action model is really not a neglect. It may be noticed that the function of promoting, accelerating, or institutionalizing research and development for creating innovations for societies is itself a problem of innovation diffusion. In this case the innovation is a package of awareness, skills, opportunities and new structures needed by our college communities and intellectual resources to produce a subsequent generation of innovations.

Going back to the table on page 11, this theory suggests another stage in innovation diffusion after the stage of implementation, called service and support. This extension may read as follows:[12]

Table 2

A Suggested Extension to Guba-Clark Schema

	Service and Support
Objective	To consolidate or establish adoption
Criteria	1) Continuity 2) Valuation 3) Support
Relation to Change	Integrates innovation

Total diffusion may be said to have occured only after the service and support stage when incorporation of innovation has become rewarding and a maintenance sub-system is born in the system. Total diffusion is thus not a numerical concept requiring every single element in a configuration to integrate the innovation.

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[12]The most recent revision of Clark and Guba "Classification Schema of Processes Related to and Necessary for Change in Education" provides for this stage in innovation adoption. See David L. Clark, and Egon G. Guba, op. cit.

An innovation may be said to have been <u>functionally</u> diffused after the <u>implementation</u> stage.

The following bar graph presents the comparisons schematically:
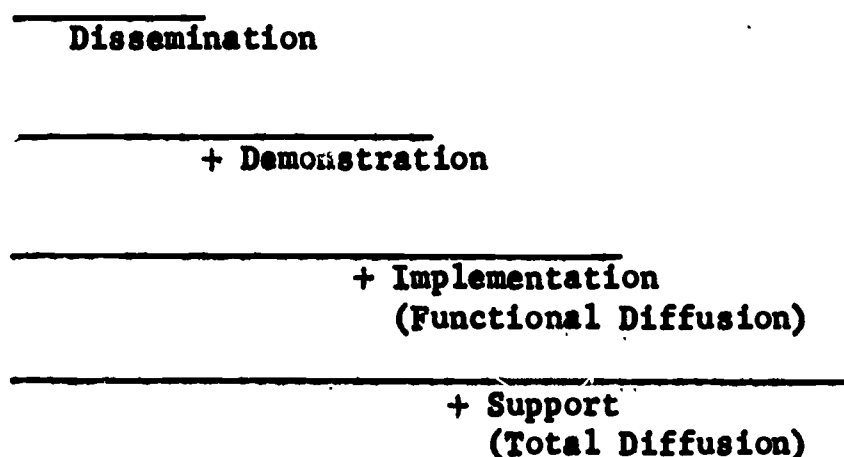
<u>Dissemination</u>

<u>+ Demonstration</u>

<u>+ Implementation</u>
(Functional Diffusion)

<u>+ Support</u>
(Total Diffusion)

Figure 1. A Schematic Comparison of Different Stages of Diffusion

Environment

Conceptualization of environment has been bothering researchers for a long time. More recently there has been a second wave of interest in social process fields in the concept of environment. The introduction of Environment (E) as a variable in experimentation and analysis has made a major difference in the ability of researchers to predict and explain human and social characteristics.

We have defined environment as comprising physical, social and intellectual conditions and forces that impinge continuously on a configuration. In the case of an individual it will include "a range of environments from the most immediate social interactions to the more remote cultural and institutional forces."[13]

Researchers have noted a lack of interest in the <u>measurement</u> of environment. There are indeed many tests of individual traits and personality characteristics but hardly any attempts have been made to measure social environments.[14]

There are difficulties involved even in the definition of environment that must precede any attempts at measurement.

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[13]Benjamin S. Bloom: <u>Stability and Change in Human Characteristics</u> New York: John Wiley and Sons, 1964, Pages 183-200.

[14]Lee J. Cronback: <u>Essentials of Psychological Testing</u> (2nd Edition) New York: Harper and Brothers, 1960.

If environment is a sum total of physical, social and intellectual conditions and forces inpinging on individuals some of its parts may be perceived by particular individuals only while some of its parts may be perceived by all individuals in a time-space. Again some of its parts may be unique (not repeated) and transitory in terms of a generation of time and some may be persistent. In a <u>rough and ready</u> way then environment may be viewed along two dimensions: objective--subjective, and instantaneous--persistent. The following table may then be used in conceptualizing four components of an environment:

Table 3

Four Components of Environment

	Subjective	Objective
Instantaneous	1	2
Persistent	3	4

We are not interested in the instantaneous environments whether subjective or objective. It is difficult to handle this concept or to conceive it in <u>concrete</u> terms.

Persistent-subjective environments will be actualized by particular individuals only which may mean that there will be as many environments as there are individuals. This concept may not be considered here either because we can cope with this component in terms of <u>individual perceptions</u>.

It is the persistent-objective environment which will, wholly or in part, supply the ecology of an innovation. The <u>net component</u> of forces in such an environment operating on an innovation may make it:

1. a supportive environment
2. a neutral environment, or
3. an inhibiting environment.

The state of the art of <u>measurement</u> of environments being what it is, it is not easy to define the three types of environments -- supportive, neutral, or inhibiting -- operationally. Only suggestive statements can be made about them.

Supportive Environment: Supportive environments encourage initiators to support innovations and targets to accept them. The Sputnik, for instance, provided in the United States an environment highly supportive of innovation diffusion.

Neutral Environment: Neutral environments do not directly contribute to innovation diffusion one way or the other.

Inhibiting Environment: Inhibiting environments do not sanction innovations and make target systems unresponsive to initiators' efforts. Pressey's teaching machine, for example, in the inhibiting environment of the depression years in the United States was not accepted by educators or others as a teaching or testing aid.

Weak and Powerful Environment

Supportive and inhibiting environments may in themselves range from weak to powerful.

Powerful   Weak   Weak   Powerful

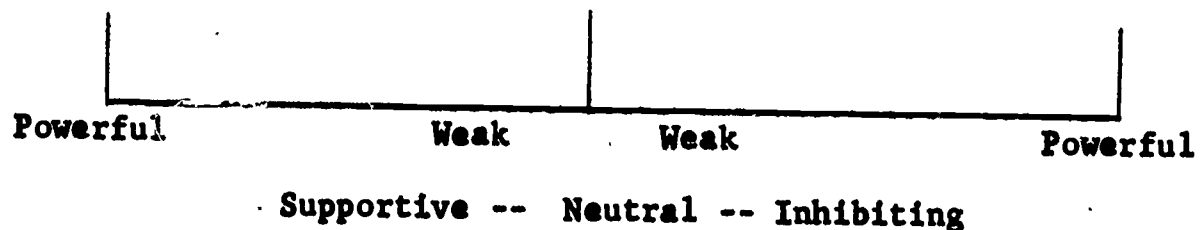Supportive -- Neutral -- Inhibiting

Figure 2.   Supportive - Inhibiting Continuum of Environment
            for change

An environment, whether supportive or inhibiting is powerful when the configuration finds it difficult to interact with it and is completely at its mercy. An environment, whether supportive or inhibitive, is weak when the configuration may alter it or may interact with it selectively.

Dissimilar Environment for Two Configurations in One Configurational Relationship

Both the initiator and target systems may not be open to the same environment. The following combinations are possible. We may not be able to state definite probabilities for each combination or to put them on an interval scale but three more or less distinct groups can be perceived.

Table 4

Probabilities of Diffusion for Combinations of Differential Initiator and Target Environments

Initiators	Targets	
+	+	Diffusion
0	+	very likely
+	0	
0	0	Diffusion
-	+	difficult
+	-	
-	0	Diffusion
0	-	most unlikely
-	-	

Supportive environments are not desirable in an absolute sense or beyond a certain maximal limit. In some cases it may indicate communal or national stress or other social malfunctioning. The system may want innovation for prestige, or for ceremonial rather than functional reasons. Also a stress situation may not give any time for the innovation to get routinised and pay dividends but may throw it out too soon in favour of another.

Location of Configurations with Respect to Each Other

In some cases the Target may lie within the Initiator configuration and the I may act as T's environment. Other things being equal diffusion would be more likely in such situations.

In other cases the Initiator may lie within the Target configuration and the T may act as I's environment; in which case, other things being equal, diffusion would be comparatively difficult to handle, unless T was desirous of change.

Configurational Relationships

We have already defined configurations and configurational relation-
ships. The concept of configurational relationships is the most important
component of the theory being presented here. It is a concept that provides
a comprehensive inventory of innovation diffusion relationships: a typology
of innovation diffusion situations which will encompass classroom teaching,
pressure groups in politics, agricultural extension, community education,
charismatic leaders, acculturation, and others besides. It will thus
give to the theory the generality that we intended it to have.

The concept of configurational relationships will help us also to
view innovation diffusion in its dynamic aspects by suggesting that a
molar innovation diffusion relationship must break up and act at molecular
and "atomic" levels for diffusion to come through, as in chemical reaction
between two mutually active chemical compounds. We will discuss this in
greater detail in our section on linkage.

The following matrix attempts to tabulate different innovation
diffusion relationships likely to occur in human societies:

Table 5

A Typology of Configurational (Innovator-Adopter) Relationships

		TARGETS			
		Individuals (I)	Groups (G)	Institutions (IS)	Cultures(C)
	(I)	I-I	I-G	I-IS	I-C
INITIATORS	(G)	G-I	G-G	G-IS	G-C
	(IS)	IS-I	IS-G	IS-IS	IS-C
	(C)	C-I	C-G	C-IS	C-C

The entries in the preceding table thus stand for sixteen possible
innovation-adopter patterns: (1) an Individual acting on another
Individual, (2) an Individual acting on a Group, (3) an Individual
acting on an Institution, (4) an Individual acting on a Culture,
(5) a Group acting on an Individual, (6) a Group acting on another
Group, (7) a Group acting on an Institution, (8) a Group acting on
a Culture, (9) an Institution acting on an Individual (10) an Institution
acting on a Group, (11) an Institution acting on another Institution
(12) an Institution acting on a Culture, (13) a Culture acting on an
Individual, (14) a Culture acting on a Group, (15) a Culture acting
on an Institution, (16) a Culture acting on another Culture.

These sixteen configurational relationships can be divided into
three broad categories -- molecular, molar-molecular and molar. Number 1
above is a molecular relationship. (See small box in the table on page 17)
Numbers 6, 7, 8, 10, 11, 12, 14, 15, 16 above are molar relationships.
(See larger box in the table on page 17.) Nos. 2,3,4,5,9,13 above
(Not boxed-in in the table on page 17) are molar-molecular relationships.
(See also the table below.)

Table 6

Classification of Molar, Molecular, and Molar-Molecular Configurational (Innovator-Adopter) Relationships

__Molecular Relationships__

I-I

__Molar-Molecular Relationships__

I-G
I-IS
I-C
G-I
IS-I
C-I

__Molar Relationships__

G-G	IS-IS
G-IS	IS-C
G-C	C-G
IS-G	C-IS
	C-C

The molecular relationships, it is hypothesized, are most amenable to control and molar the least with the molar-molecular relationships occupying an intermediate position. This is brought out in the following discussion.

An "I" configuration is just one person. This person's behavior both as an initiator and a target has only one choice in each case. There must be one clear cut decision. An "I" configuration is thus a homogeneous configuration, and therefore, as a unit easiest to cope with.

A Group with 20 members may be, theoretically so completely heterogeneous that its members may make 20 different decisions. As initiators they may dissipate their innovation diffusion energies and as targets they may make a variety of adoption-rejection responses. Even though a group of 20 is not likely to make twenty different responses and exist as a group it may still make a group decision not shared by a small number of group members who may form themselves into one or more deviant sub-groups and manage to avoid total group pressures. In fact the latter is likely to be often true unless the group is in a crisis or under stress and individual considerations are resigned to group ends. A "G" configuration then under normal conditions may be considered to be heterogeneous. As initiator it may make different diffusion plans, and as target it may make different adoption-rejection responses making diffusion comparatively difficult to cope with.

An IS configuration though often composed of many members has a bureaucratized structure with fixed and well-defined decision-making and compliance roles. Once an institutional decision is made the IS provides few alternatives, if at all, to members who are expected to fall in line. Those who do not accept an innovation must tolerate[15] it. Those who cannot even tolerate must quit (or sometimes stay and sabotage.)

However, institutions cannot be considered homogeneous because of the latent heterogeneity that must always exist in institutions because of a number of "small groups" within them.

IS can be considered homogeneous only for the purposes of formal[16] acceptance of innovations but not necessarily for functional acceptance of innovations. The nature of the problems of diffusion will thus depend upon what kind of diffusion we have in view -- formal, or functional?

_____

[15]The concept of toleration will be developed further in our section of Resources.

[16]Within institutions and organizations, some individuals may accept an innovation only formally, or minimally or may merely tolerate it. They may do so because the decision-making hierarchy asked them to adopt an innovation and these individuals do not care to show resistance for fear of punishment or of rewards being withheld. This formal innovation adoption is a minimal acceptance, decision to put on the act of adoption without cognitive and attitudinal re-structuring necessary for functional acceptance.

Cultures are the most heterogeneous of configurations. They are composed of so many institutions, groups, and individuals that clear decision making for cultures as units is almost impossible. Therefore both as initiators and targets they are most difficult to cope with in configurational relationships for the purposes of innovation diffusion.

The concept of heterogeneity can provide a methodological insight on the study of innovation diffusion. It may be possible to assign rough indices of heterogeneity to configurations entering a particular configurational relationship in terms of total number of differential decisions they are likely to make. The following matrix then would show roughly the extent of the problems of control and therefore of investigation of diffusion in various configurational relationships. The difficulties of control may be seen as increasing along the vertical, horizontal and diagonal lines of the following diagram in the directions indicated:
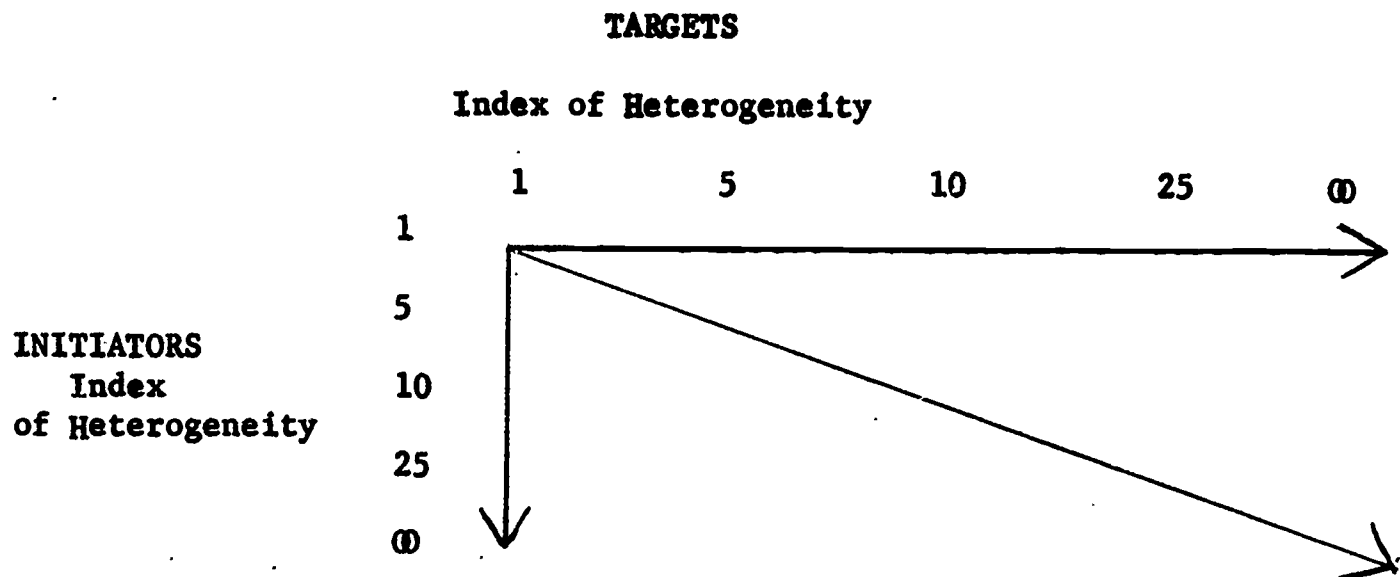
TARGETS

Index of Heterogeneity

Figure 3. A Matrix Showing Rough Indexes of Difficulty in Coping With Change in Diffusion Situations.

In the preceding discussion of Groups, Institutions, and Cultures, the concept of "heterogeneity" is not used in any absolute sense. Culture, for example, refers to a concept which means that members of a society are highly homogeneous in some attributes and that there exist processes through which such homogeneity is maintained. Again, members of an institution or an organization would show some homogeneous attributes, possibly relating to norms, values, and objectives. Groups would also be homogeneous to a degree otherwise they would not even exist as groups.

On the other hand, there would be a danger in reifying cultures, groups and institutions and considering them as unities with complete internal uniformity. Using an analogy from chemistry, groups, institutions, and cultures are more like mixtures than like chemical compounds. Cultures will have groups within them at cross purposes with each other, institutions will have "small groups" and cliques, and groups will have deviant individuals within them. In a theoretical sense then, heterogeneity within group, institution, and culture configurations can be taken for granted.

Second Order Configurational Relationships

Within the 16 configurational relationships discussed earlier there will be further variations since these four configurations I, G, IS, and C are themselves variables. There may be different sub-classes or types among individuals, groups, institutions and cultures with different communication and socio-psychological structures and each sub-class may have different susceptibility to change.

In the following discussion we will look for suitable classifications of individuals, groups, institutions, or cultures which make them more or less open to play initiator and target roles.

Socio-psychological typologies of these configurations with respect to their compatability with innovation diffusion and change processes are obviously needed to explain, to control, and to predict diffusion with increased refinement. It is not within the scope of the present theory to develop such categories and we will have to look for them in available literature, however inadequate, the results of such search. Unfortunately, these typologies are not easy to find in sociological and psychological literature and those that are available are not operational and easy to use. In the following discussion the classification schemes to describe different types of individuals, groups, organizations and cultures have been more or less arbitrarily selected by way of illustrating the point. The substantive value of the classifications in diffusion context is not being asserted.

Individuals as Variates

For a categorisation of individuals (I) with respect to susceptibility to change we will have to go to personality psychology or sociology to find individual types that could be classed as more or less compatible with innovation diffusion process.

One such classification is suggested by David Riesman[17] who classifies individuals as tradition-directed, inner-directed, and other-directed. This classification is chosen here because it was advanced by Riesman in the context of social influence and may therefore be directly relevent to our needs.

The three personality types are seen as subject to different emotional sanctions and controls. The tradition-directed person reacts to his culture as a unit which is mediated to him through a small number of people that he comes in contact with every day of his life. He is expected to behave in an approved way and the operative sanction in his case is the fear of being shamed.

The inner-directed person acts in tune with his psychic gyroscope incorporated early in life under the influence of his parents and other authority figures and is capable of great stability because of the internalization of a number of principles and guides that he feels guilty about violating.

The other-directed person is attentive to a larger social environment but unlike the tradition-directed individual he is cosmopolitan, susceptible to quick changes to fall in line, and capable of a superficial intimacy with every new and unfamiliar person and idea.

Groups as Variates

The group concept is indeed a complex one. Groups have been defined in terms of their foundations, types and levels, interaction patterns, and values. Since we are interested in whether or not one kind of group is more amenable to innovation diffusion than another, we will find a categorization based on leader-member interactions within groups more useful than any other.

In terms of leadership styles four types of groups have been suggested: (1) laissez-faire, (2) authoritarian (or aggregate), (3) democratic (or organic group), and group-centered groups.[18]

In the laissez-faire groups there is complete permissiveness. The leadership style requires no planning, initiating, or influencing of group members. Everybody is on his own. Such groups are likely to be very heterogeneous, might involve differential decisions and thus make innovation-adoption event very unpredictable.

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[17]David Riesman: The Lonely Crowd, New York: Doubleday and Co., Inc., 1954, Pages 40-41.

[18]C. Gratton Kemp: Perspectives on the Group Process, Boston: Houghton Mifflin Co., 1964, Pages 20-21

In _authoritarian_ (or aggregate) groups the leader controls all members. He plans in advance the content, method and outcome of learning or innovation-adoption processes. Such groups would probably make clear cut and quick decisions to accept innovations without necessarily being committed to the innovation and incorporating or internalizing it.

In _democratic_ or organic groups the leader and members act cooperatively through a process of selection, initiation, discussion and community action. Decision-making in such groups may be frustrating and take longer times but once a decision is arrived at it may mean innovation acceptance with commitment and positive affective behavior.

In the _group-centered_ group the leader will only establish and maintain a psychological climate of acceptance and understanding leaving everything else to the members. Here again the decision making will be frustrating but once a decision has been made it will involve group commitment and group action.

This further discrimination of G configuration as laissez-faire, authoritarian, democratic, and group-centered within a C_{1_i} involving a G will enable a social scientist interested in change to make a more sophisticated analysis of the change situation and make better qualitative judgements of the probability of innovation diffusion.

Institutions as Variates

Further classification of institutions, our IS configuration, based on some structural features that make them more or less susceptible to decision-making for change should similarly help a more refined analysis of innovation diffusion situation within institutions or organizations.

Institutions and organizations have been found to be differential in terms of operating characteristics like motivational structures, character of communication, character of interaction-influence process, decision-making, goal-setting, control processes, and performance.

Etzioni's[19] classification of organizations correlating the structure of power in organizations on the one hand and the motivations of members of institutions on the other is most relevent to innovation diffusion and change within institutions and organizations.

Etzioni suggests three types of organizations coercive, renumerative, and normative. Coersive organizations could achieve formal (if not functional) change even with considerable dissensus. Renumerative organizations need consensus at least with regard to instrumental activities for operational changes whereas normative organizations require high consensus of both ends and means for any innovation or change to occur.

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[19]Amitai Etzioni, _A Comparative Analysis of Complex Organizations_, New York: The Free Press of Glencoe, 1961, Pages 71-75

Cultures as Variates

Similarly, it is possible to classify cultures in respect to their probability of taking or resisting change. Daniel Lerner[20] classifies them as (1) Traditional, (2) Transitional, and (3) Modernist. He notes that Modernist cultures have the greatest amount of empathy which he considers the most useful characteristic contributing to change. The Traditional cultures have the least empathy and the Transitional cultures are intermediate in this attribute.

It is possible to see in the other-directed individual, the democratic group, the normative participative organization and the empathetic modern culture one single attribute: the ability to handle abstractions, or the competence at rational symbolic transformations. Though this concept needs to be developed considerably, it seems to be promising to explain susceptibility of configurations to innovation diffusion and we will talk more of this in our section on "Resources".

The preceding discussion of sub-classifications within configurations will enable us to sharpen our focus on the nature of configurational relationships while planning, initiating, and predicting innovation diffusion and change. Taking the example of our I-C configurational relationship suggested earlier we could have the following second order configurational relationships.

Table 7

Second-Order Configurational (Innovator-Adopter) Relationships under I-C Configurational Relationship

Culture (Target)

		Traditional	Transitional	Modernist
	Tradition-Directed	1	2	3
Individual (Initiator)	Inner-Directed	4	5	6
	Other-Directed	7	8	9

[20]Daniel Lerner, The Passing of the Traditional Society, Glencoe, Ill.: The Free Press, 1958.

It should be possible to work into this matrix commonsense, qualitative probabilities for different second-order configurational relationships. The remaining 15 first order configurational relationships can be similarly treated for second order relationships and qualitative probabilities.

Articulation of Initiator and Target Configurations

An initiator and a target configuration may need articulation to be able to enter into a configurational relationship at all. A university extension division, for instance, may need articulation by the State education department to enter into an innovation relationship with the local school system with the State department playing an _adapter_ role.

Such adapter roles will probably be necessary in many other situations. In some cases it will be necessary to create a new adapter configuration overlapping both I and T configurations. (Figure 4 (a)). In other instances, the adapter will provide a bridge between I and T through a legal requirement or social sanction or the other.(Figure 4 (b).
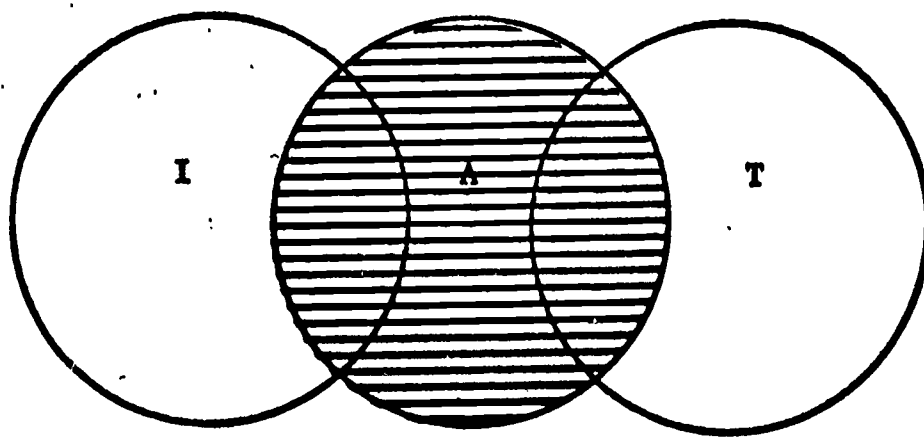
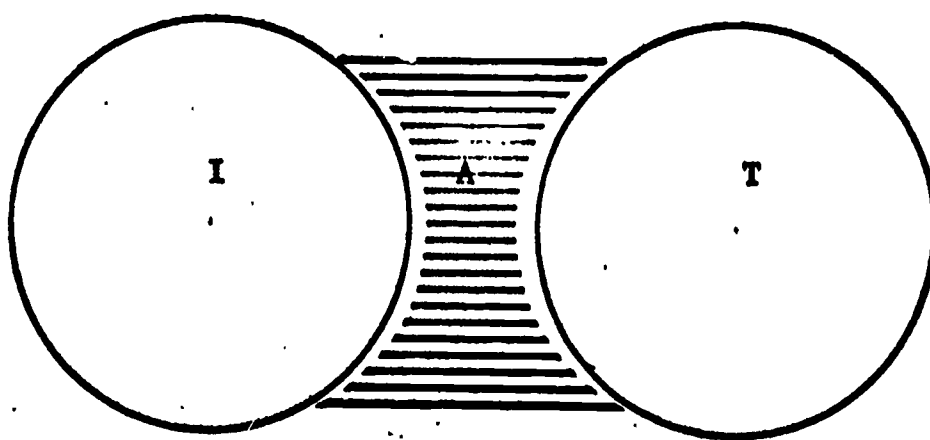

Figure 4 (a) Case of an Overlapping Adapter Configuration

Figure 4 (b) Case of a "Bridge" Adapter Configuration.

Identity of I and T Configurations

The initiator and target configurations will achieve identity when the same one configuration is both the initiator and the target. In such a case the innovation relationship becomes self-instruction, or creativity, or problem solving. Diffusion in such cases depends only upon the availability of resources to adopt and absorb the innovation.

Innovation and Enculturation

Configurational relationships may be consciously persued as stated policy, secret design, propaganda effort, pressure goal, or for profit motive. These consciously pursued relationships may be called innovating relationships.

Alternatively, these relationships may exist by sheer fact of continguity or nearness of two configurations in a field. Any communication between these continguous configurations would lead to 'unintended innovating relationships'. The products of such relationships will be called enculturation situations and will not be discussed as innovating relationships under the theory presented here.

Mutual Expectations of I and T Roles

Very often a configurational relationship, as defined here, comes into being because of the initiator's initiative and the target system is not even asked to play that role or even to know that he is the target. Such a relationship is one-sided. Other things being equal, innovation diffusion in such cases will be more difficult as compared with the situation where relationship is built on a mutual expectation of roles. In the latter situation diffusion would be more likely, provided other contributory conditions of innovation diffusion are available.

A most productive configurational relationship therefore, exists when both the initiator and target systems are conscious of their roles and have mutual expectations of these roles under some kind of social or institutional consensus.

Equal and Unequal Configurational Relationships

At least one further dimension of C_{ij} can be analysed. This is the equal-unequal dimension of a configurational relationship.

The equal and unequal concept may be defined in terms of resources at the command of two configurations in a C_{ij}. The amount of resources and the duration of time they are available will determine one index of innovation potential of initiators and the resistance potential of adopters, should they decide to resist adoption. It is not often that adopters actively organize resistance against innovations and most often we will be dealing with social inertia while talking of resistance potential of adopters.

The relationship when unequal may be positive or negative <u>from the point of view of diffusion probabilities</u>. When the initiator configuration has greater <u>potential</u> than the target the relationship is obviously unequal but positive for the innovator resulting in increased probabilities of innovation diffusion. When the target has greater potential than the initiator other things being equal, the diffusion probabilities are low as a result of possible target resistance or inertia.

Linkage (L), the next factor in our functional equation, is viewed in two parts: L_b (the Linkage between Configurations) and L_w (the Linkage within Configurations.) Linkage or communication network is seen as both personal and impersonal, with information and attitudes passing over wire or through the mouth among men and women in interaction through reading, writing, talking, listening, picturing, observing.

Linkage between configurations

Cultures operate through their institutions and groups; institutions and groups make decisions and initiate actions through individuals of which they are composed. Groups, Institutions and Cultures though they have been found to have 'syntalities' and modal personalities of their own yet they do not act outside of individuals. They do not communicate but provide structures of communication roles; they do not act but provide the limits of action or inaction. Individuals then, are the basic loci of change -- change when planned, change when manifested. Innovating relationships should therefore be looked upon as relationships between individuals acting on behalf of their groups, institutions, or cultures. Unless molar innovation relationships are broken down into molar-molecular and molecular configurational relationships diffusion is impossible to achieve.
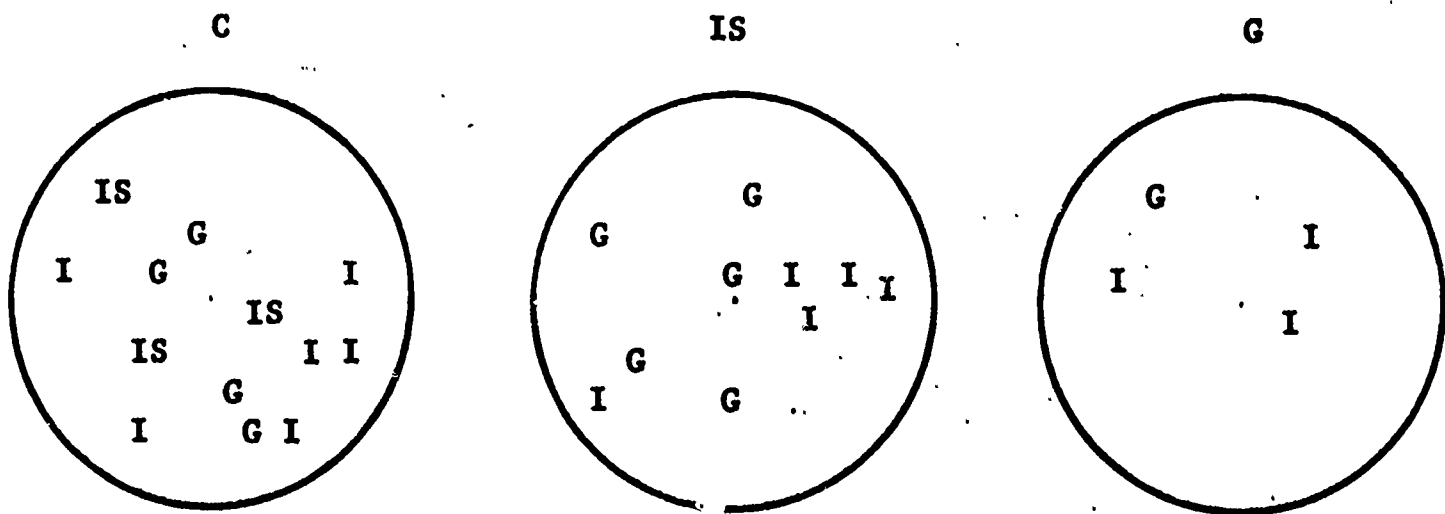

C   IS   G

Figure 5.   The Anatomy of C,IS, and G Configurations.

Diffusion may, therefore, have to be handled by innovators through chains of relationships. Two kinds of chains may be possible to indicate: operational and volitional.

Operational chains are linkages that hold individuals in groups and organizations enabling them to handle information flow needed for their maintenance. A University President and his faculty, for instance, are linked through operational chains. Operational chains will be symbolized here by (-).

Volitional chains are linkages that are created by and between individuals through their choosing and exercise of will to introduce non-routine information to a group or institution. The American Medical Association's political lobby would be linked to the Republicans in the United States Senate through a volitional chain. Volitional chains will be symbolized here by (=).

A Group acting on another Group, for most effective diffusion must go through chains of relationships of which the following may be two examples:

.G-I=I-G   or

G-I=I-IS-I=I-G

The I's occurring in these chains will be either Change Agents or Maximal Points of configurations which we will discuss later.

All the innovation diffusion relationships do not have to be seen as linear or as single linkages. There is the possibility of linkage networks, or the two of these in combination. A linkage network is examplified by the following:

```
                I=IS-- -
                I=IS- --
    I <========= I=IS7- - - =========> C
                I=IS- --
                I=IS-- --
```
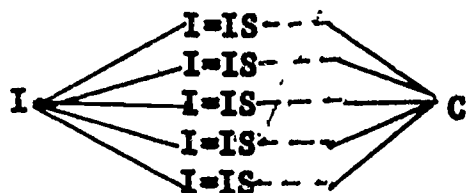
Figure 6, A Linkage Network or a Network of Operational and Volitional Chains.

Single linkages and linkage networks present two different communication concepts. The single linkage could be seen as the primary group situation involving the two-step flow of information, or influence and support through the small groups. The concept of linkage networks, however, parallels mass communication situation when information and influence is suspended in the environment, as it were, and is available in a probablistic sense to those who selectively interact with it. Single linkages, again, are like closed-circuit information distribution systems, while the linkage networks are comparable to broadcasting.

Maximal Points

We have already referred to the concept of chains for linking initiators and targets. For best results these chains need to be connected at maximal points, of both initiators and targets. In case of institutions, for example, the maximal point may be the heads of institutions when an innovator is working for toleration or physical incorporation. For achieving acceptance or functional diffusion a new maximal point will have to be located, shifting from the authority network of an institution to the influence network within it. Maximal points are thus not fixed but must shift with the shifting intents of the innovating system. Again, they are different for different config- urations and vary from time to time at different stages of the diffusion process. For example, in an informal group the maximal point will be the leader. Different areas of social life in communities, as we know, have different leaders. Therefore, leaders will have to be re-discovered for every new innovation. Different stages of diffusion of the same one innovation may infact require different types of leadership roles.

A change agent may be looked at as a maximal point of an initiator configuration. The change agent, again, need not be a fixed role and may shift in relation to the maximal points in a target configuration. For example, statuses of the change agent in the C_i and of the leader in the C_j may have to be matched for better communication. In traditional societies this matching may be specially necessary.

Important characteristics of a change agent seem to be his commitment to what he is trying to diffuse, his knowledge of it, and his acceptance by the target system.

Linkage Within Configurations (L_w)

The linkage within configurations may be viewed as an electrical circuit. Configurations may be fully-wired or partially-wired. In an institution communication roles and obligations are defined for each member of the institution. Such a system may be called a fully-wired system. This system has a multi-way potential. Should the need arise, and if bureaucratic sanctions permit each member of a fully-wired system may talk to every other member through the proper channel.

A group is not necessarily fully-wired. There are generally no defined and fixed proper channels and monitoring points as in the case of institutions and organizations. There is, in fact, considerable clogging and short-circuiting and the leader is effective in passing information and exerting influence to the extent that communication channels exist and are linked.

Under circumstances of intense goal-seeking behavior by groups or in the midst of crises groups may become institutionalized (or bureaucratized) and therefore become fully-wired.

Cultures, taken as units, are seldom fully-wired. If they are, they will become completely autocratic, where both public and private life is institutionalized. In democracies they are full of an infinite number of dead and live, fully- and partially-wired sub-circuits.

The most effectively wired sub-circuit in a culture is generally the leadership group or the decision-making elite. The second most efficiently linked are the attentive publics which are always seeking to get linked with the decision-making group to influence the latter's decisions. Under special circumstances of national stress most or all the sub-circuits in a culture may get linked into one total communication network, bringing the mass public into the network as well.[21]

The fully- or partially-wired system may be one-way, two-way, or a multi-way wiring system making it possible to have information, questions. or statements to flow one way or the other, or not at all. This 'monitoring' question is determined by social, political and ideological nature of a configuration.

A communication network would have a specific channel capacity. A configuration may, therefore, refuse to handle information about an innovation because all its channels are already full of some other information and it can take no more.

Circuit systems have also different calibrations. A network may handle the information that it has been designed to handle. An engineering firm, for example, may have a wiring system that will handle engineering information put on it. This system may also handle other symbolic information that an engineering community can normally handle and would be able to cope with commonsense information as well. It may not, however, be able to transmit information on classical music, or psychological anthropology because this network has not been calibrated for such information flow. Again, while an Indian village may do a very good transmission job of rumour or of information on Hindu mythology it may not cope with information on germ theory or abstract art or may lose it all in high semantic noise.[22]

Circuit-Breakers in L$_w$

Circuit systems may have people playing the roles of circuit breakers. Such persons may intentionally act as circuit-breakers for saving face, for personal profit, or for avoiding damage to an individual or system with which they identify. Such information may be considered high voltage information.

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[21] V. O. Key, Jr., Public Opinion and American Democracy, New York: Alfred A. Knofp, 1961

[22] Noise is a very well known concept of Information Theory and it has been considered unnecessary to develop it here.

Resources

The amount of available resources, as well as the duration of time for which they are available will affect the probability of diffusion. Both innovators and adopters need the necessary resources for completing the innovation transaction though some resources are needed more by the initiators than targets. These resources may be classified as follows:

1. Material Resources
2. Resources of Conceptual Skills
3. Resources of Personnel
4. Resources of Influence

Material Resources

The initiators and targets may lack the material resources for completing the innovation-adoption transaction. The initiators, for instance, may be operating on low budgets -- incidentally a very frequent handicap -- and may not be able to spend the money needed for the diffusion effort. The target systems may mentally go through the whole process of decision-making to accept the innovation but may not have the money to buy a new type of agricultural tool or the needed fertilizer. The art of innovation may then also consist in providing such resources.

Conceptual Resources

The resources of conceptual skills, again are needed both by initiators and the target systems. The conceptual resources of the initiators would probably consist largely in their ability to plan dissemination campaigns, to produce communication messages, and to explain and demonstrate the innovation. The conceptual resources of the target systems may consist of their abilities to handle symbolic transformations, and the fund of 'emphathy' both of which may be related to the educational status of a community.

It may be possible to quantify conceptual resources of adopter communities in terms of Symbolic Transformations Indexes for predicting innovation diffusion and for making practical decisions about using specific information media -- face to face communication, mass media, printed material -- in particular communities at the dissemination stage. The Symbolic Transformation Index (STI) may be seen as a multiple index based on total number of man-school years available in a community, newspaper circulation, number of radio receivers, movie attendence and the periods of times the communication and media facilities have been available to a community.

Personnel Resources

The resources of personnel again are needed both by initiators and target systems though their requirements are considerably different. The initiators need, for instance, a sufficient number of change agents who once a molar innovating relationship has been established can work

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to break it up into smaller molecular relationships and cope with the manifold innovation situations so produced. The target systems, most of all, need leadership and a sufficient number of "collaborators" those early adopters who can work for the initiator and his change agent.

Influence Resources

Influence is seen here as any generalized mechanism to channelize social interactions toward pre-determined ends.[23] The initiator systems would use influence of their own and that of leaders and "collaborators" in the community. Parsons has analyzed four types of influence as follows:

Table 8

Parsons' Paradigm of Influence

SANCTION		CHANNEL	
		Intentional	Situational
Positive:			
	Mode	Persuasion	Inducement
	Medium	Influence	Money
Negative:			
	Mode	Activation of Commitments	Deterrence
	Medium	Generalization of Commitments	Power

All the four types of influence -- persuasion, inducement, activation of commitments, and deterrence, may have to be used by initiators to diffuse innovation. Influence, again, may not be viewed as a fixed quantity but as capital that can be increased or decreased, earned and spent.

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[23] Talcott Parsons, "On the Concept of Influence," *Public Opinion Quarterly*, Vol. 27, No 1, Spring, 1963, Pages 37-62

Husbanding of Resources

Resources require good husbanding. They have to be used according to the best business principles.

Two innovations or two initiator systems acting on the same target system but pulling in different directions will obviously diffuse minimally, if at all. The waste of resources both financial and psychological will be considerable.

Investment and Return

The availability of resources within an adopter system does not mean that they will be used for the adoption effort. Resources will tend to be conserved and will be utilized if the investment will bring sufficient material, social, or psychological rewards.

The nature and extent of investment and the type and amount of return will determine the probability of diffusion of an innovation. Every innovation then will have a _salience_ ratio that will determine adoption. This salience ratio may be defined as the ratio between investment and return, given by

$$\frac{\text{Return}}{\text{Investment}} \quad \text{or} \quad R/I$$

The greater the value of the salience ratios, the greater the probability of adoption. As can be easily seen the R/I's for material and personnel resources are more easily quantified than those for conceptual and psychological resources.

Incidence of Cost and Returns

There is another difficulty in determining the salience ratios for innovations because in some cases the incidence of cost of innovation adoption may not be _visible_ or the profits and benefits accruing from adoption may be indirect, postponed, and hence _invisible_. An example of visible costs would be the adoption of a new type of spraying machine; that of a visible return the increased number of bushels of wheat per acre. An example of invisible costs would be indirect taxation; and that of invisible rewards the opportunity of living in a better, safer, enriching community through a comprehensive and permanent adult education program.

This concept is of special interest to innovators in those areas where the book-keeping is not in terms of dollars and cents but in terms of social and psychological returns.

The concept of visible and invisible costs and returns leads us to the concept of toleration of innovations, frequently referred to in earlier part of this theoretical presentation. Toleration covers an innovation situation wherein a member of a group, or a sub-environment in an institution does not accept or adopt an innovation functionally but does not reject it either. He does not see the cost of this "useless" innovation accruing to him, monetarily or psychologically. And he does not feel too strongly about it to protest and possibly pay the price of non-conformity.

The following Table envisages some toleration situations:

Table 9

Cost-Return Context of Innovation Adoption

		COSTS	
	Visible		Invisible
	High	Low	
RETURNS			
Visible:			
High	Ambiguous	Acceptance	Acceptance
Low	Rejection	Ambiguous	Toleration
Invisible	Rejection	Rejection	Toleration

Innovators working in the context of groups and institutions should find the concept of toleration, again, a very useful conceptual tool. After a formal acceptance through group decision or an administrative order the innovator may have to work with individual users for helping them change from toleration to acceptance -- from physical incorporation to functional incorporation. This may require training in the utilization of the new innovation, help to cope with any additional work that might be necessary, and setting up of rewarding situations for attitude change.

ASSESSMENT AND APPLICATION

Any elaborate test of the validity of the <u>Configurational Theory of Innovation Diffusion</u> through empirical methods must await the use of this theory by researchers for conceptualizing and designing diffusion research and experimentation.[24] A preliminary examination of its heuristic value has, happily, been encouraging.[25]

Three methodological approaches were used to test and assess the theory: (1) hypothesis testing with the use of empirical data collected by <u>other</u> researchers, (2) use of concepts, constructs, and statements from the logical structure of the suggested theory in explaining a real-life diffusion event, and (3) having three different judges evaluate the theoretical adequacy of the formulation against generally accepted criteria for theorizing in social science fields.

The following hypotheses were generated from the proposed theory. These, of course, are <u>not all</u> the hypotheses that can be generated from the theory. This short list should, however, indicate the fact that the proposed theory is heuristic and can be used to deliver testable hypotheses:

1. Coping with innovation is an unstable state. It must result either in the disuse of the innovation in question or in an innovations's becoming a non-innovation through routinization within the adopter systems.

2. Innovation adoption within molar configurational relationships must be mediated through molar-molecular and molecular relationships; and within molar-molecular configurations through molecular relationships.

3. Groups showing intense goal-seeking behavior while promoting or resisting innovation will tend to institutionalize (or bureaucratize) themselves to a more or lesser degree.

4. In institutions (or organizations) where decision-making roles have been clearly defined and formally distributed diffusion will go through two stages: (1) formal acceptance of an innovation by "authorities" with <u>toleration</u> from some or all individual adopters of the innovation, and (2) functional diffusion wherein the individual adopters would accept the innovation.

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[24]This hope seems real in view of the remarks of Professor Herbert F. Lionberger, University of Missouri in a letter to the author, dated September 7, 1965, saying that, "I for one will be referring to your paper in conceptualizing diffusion research studies in the future."

[25]H.S. Bhola, <u>A Theory of Innovation Diffusion and its Application to Indian Education and Community Development</u>, (Unpublished Doctoral Dissertation) Columbus: The Ohio State University, 1965. (Chapters 4 and 5)

5. For total diffusion to take place adopter and innovator must be the same configuration and should have the resources needed for incorporating the innovation.

6. Feedback to the innovator systems will have both information and influence content. The influence component of feedback may depress the efforts of innovators, may make them lose heart, become panicky, undertake unrealistic programs, and select desperate approaches.

7. An adopter community with higher "Symbolic Transformation Index" (STI) will demonstrate greater ability to understand communications and greater willingness to act on messages than an adopter community with low STI, the latter being a multiple index based on the total number of man-school years available in the community, newspaper circulation, number of radio receivers, movie attendence and the periods of times the communication and media facilities have been available to the community.

8. In strongly inhibiting environments a radical innovation will be rejected and will have chances of diffusion to the extent of its divisibility.

9. A larger configuration will innovate among sub-configurations located inside itself more easily than those located outside.

10. An innovation with low or invisible costs to the adopter but likely to bring high and visible returns will be accepted. An innovation with high and visible costs and invisible returns will be rejected.

11. Innovation adoption by individuals, groups, institutions or cultures is a kind of learning which will be transferable to subsequent innovation adoption situations. It would, therefore, be possible to classify communities as traditional, transitional or modernist in terms of number of innovations adopted over time.

It should be interesting to note that support is available in literature for Hypothesis, 2 which is only a different version of the well-known and empirically tested two- and three-step flow of information and influence hypothesis.

To take another example, the following statement from the AID research report may be quoted in partial support of hypothesis, 7:

The more intelligent a person, the more responsive he would be to the message. Since it was not possible to determine intelligence directly, indirect measures were used, such as level of education, literacy, extent of reading, and receptiveness to information.[26]

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[26]Paul Spector et al., Communication and Motivation in Community Development: An Experiment, Washington,D.C.: AID Office of Research Analysis, November, 1963.

The concept of STI can also be used to explain two seemingly contradictory results in the use of information sources at different stages of innovation adoption. Rogers[27], for example, found that use of information sources at the various stages of adoption in Colombia differed from that seen in communities in the United States. "No mention of any mass source was made by any of our 158 respondents at any stage in the adoption process." Similar patterns of use of information sources in different communities and cultures should in fact not be expected. Adopters as individuals and groups will use whatever communication source and medium is both available and accessible to them and whatever medium is functionally suited to their purposes. The STI of a community may in fact be so low that mass media even though available in a physical-definitional way are not really accessible or functionally present. In such cases these media would not be used at any stage of adoption of an innovation.

Hypothesis, 10 finds sufficient support in the following quotation:

The lack of cost and promise of future reward may explain the popularity of vaccination -- the people were getting little, but at no cost. Low cost with low but immediate returns may have accounted for the intermediate position of marmalade. Moderate cost with high returns may have been the operative relationship with regard to stoves. High cost with low immediate returns and only ill-perceived promise of future reward, may account for laterines being the least frequently chosen practice.[28]

A quotation from Waston's case study[29] that "...the ferment was exciting but wearing. Innovations hardly had a chance to make contribution before they were altered. Stability was hard to achieve," supports our theoretical position on the types of environments within institutions and our statement that supportive environments beyond a certain degree may be unnecessary and even harmful for innovation.

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[27]Everett M. Rogers, "Information Sources in the Adoption Process for 2, 4-D Weed Spray in three Colombian Peasant Neighbourhoods," in D. T. Myren (Ed.) First Interamerican Research Symposium on the Role of Communications in Agricultural Development, Mexico City, October 5-13,

[28]Paul Spector, op. cit., page 87

[29]Goodwin Watson, "Utopia and Rebellion: the New College Experiment," in Miles, op. cit., page 104

Johnson's[30] discussion of the "new cycle of change" after the introduction of innovative educational tools in school systems seems to support the concept of toleration advanced in our theory. The School Problems Commission in Illinois[31] is a case of an adapter system discussed in our theory under the sub-heading "Articulation of Initiator and Target Configurations."

These remarks while they provide only a sketchy validation for the total formulation do point up the fact that the formulation has some heuristic value.

Information on how these hypotheses are generated from the theory, and detailed material on supplementary approaches to validation are included in the original dissertation[32] and are omitted from this presentation for lack of space.

Theory Into Action

An attempt has also been made to examine the theory from the practioner's point of view as part of the author's dissertation.[33] The theory was translated and analogized to Indian Education and Community Development for purposes of suggesting change strategies.

As has been pointed, time and again, the most basic concept of this formulation is the typology of sixteen configurational relationships. The first task, therefore, for a planner of a diffusion campaign or program would involve the definition of the diffusion situation -- identification of those in the innovator role and the adopter role. An evaluative survey of environmental support or environmental resistance, of the existence or lack of communication networks, of material and psychological resources and other related questions would then be undertaken both to make the diffusion more probable by maximising linkage (L), environmental support (E), and resources (R), and to have realistic diffusion goals by not expecting miracles on scanty resources and on "instant" time-schedules. This would involve detailed system analysis of "innovation-adopter systems." The fact that the application of the theory into practice is mediated through the tradition of systems analysis research is of some theoretical significance. It also provides a point of contact with the research and practical skills built around PERT which enable diffusion planners to draw up reasonable diffusion schedules.

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[30]Donald W. Johnson, "Title III and Dynamics of Educational Change in California Schools," in Miles, op. cit. page, 171

[31]Donald C. Flesche, et al, "The Illinois School Problems Commission: An Innovation in Decision-Making at the State Level," in Miles, op. cit., pages 183-201

[32]H.S. Bhola, op. cit, Chapter 4.

[33]H.S. Bhola, Ibid, Chapter 5.

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