

*Innovation
in
British Columbia Community Colleges*

A Study of the Relationship Between
Innovativeness and Organizational Variables

by

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Abstract

From a review of the innovation literature, encompassing a broad range of research traditions and a variety of approaches to innovation research, the organizational context of innovation was identified as a research framework. This study was intended to bridge the gap between a theoretical understanding of innovation (largely derived from studies of the private and business sector) and its application to the concept of the public community college. The survey research methodology was modelled after organizational innovation studies from the organizational behavior and business management tradition in the structural-functional paradigm. Hypotheses were developed to address the research question: *"To what extent does innovativeness vary among British Columbia community colleges and to what degree do specific organizational characteristics correlate with institutional innovativeness?"*

Data on specific organizational variables were collected from eight B.C. community colleges. Findings primarily confirm that innovativeness varies among institutions and correlates positively with activity levels of professional cross-fertilization. The most significant implication of the study for policy relating to the community college system is that higher levels of opportunity and support for professional interaction and travel and conference funding are directly related to higher levels of innovativeness in community colleges.

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Chapter 1

Introduction

1.1 Community Colleges and the Innovation Theme

Innovation and *innovativeness* have a certain ring of appeal to most people. Who doesn't want to be recognized for being on the cutting edge and forefront of the latest developments in a given field or competitive environment? For some people it may be a matter of personal pride and satisfaction to be innovators; for others, there may very well be the additional motivation of survival in a competitive marketplace of ideas and products, techniques and processes. For those involved in the arena of higher education¹, the second motivation has taken on new prominence in the last decade (Behnke, 1987). Given the reality of a competitive environment for higher education in the 1980s and 90s, the interest of this writer was directed more to the matter of *organizational innovation* and *organizational innovativeness*² rather than the context of personal aspects of and influences on innovation.

Community colleges are by their very existence an embodiment of organizational innovation. The present reality of community colleges in the landscape of higher education is a rather recent phenomenon. In the flow of history of higher education, the community college is a most recent innovative concept, "a distinctly American social invention, ... unique in purpose, scope, and design" (O'Banion, 1989). The concept of the comprehensive community college, with the promise of higher education for everyone, took hold in the United States in the 1950s. In Canada, the decade of the 1960s, often referred to as the "golden age" for public education, provided the socio-economic context for the

¹ Throughout this paper, *higher education* is taken to mean *adult* and *post-secondary* education. In a broad sense, the institutional focus would be: colleges, institutes, and universities.

² Definitions and discussions of the terminology of *innovation* concepts, the terms referred to here, will be explored in later discussion.

comprehensive community college as an innovation that took hold in most provinces (Dennison and Gallagher, 1986).

Since their evolution during the "golden years" of educational expansion between 1960 and 1975, Canada's community colleges have passed through three phases of development. The most recent decade has been characterized by socio-political and economic forces which have created a climate of restraint and retrenchment under which provincial and territorial college systems have been forced to reassess their missions and reexamine their priorities with regard to programs and services (Dennison and Levin, 1988).

In their search for fiscal stability and effective planning, individual colleges have been forced to adjust in different ways. Some have placed limits upon program development and constrained their services to those activities for which adequate government funding was forthcoming. Others have sought ways to expand the scope of their operations, while eliciting additional funding from public and private sources, and pursuing new student clienteles. Still others have directed their efforts towards finding better and more creative ways of using the resources at their disposal, while, at the same time, revitalizing their overall organization.

Canada's community colleges were established upon principles of accessibility, community orientation, quality teaching, and adaptability to change (Dennison and Gallagher, 1986). The events of the last decade have challenged this last principle in new ways. More than ever before, creativity and innovation have become the key factors in the capacity of community colleges to fulfil their stated role as post-secondary educational alternatives for a wide cross section of Canadian society.

Co-incidentally, many organizations, particularly in the private business sector, which have faced similar economic pressures, have sought innovative ways of revitalizing their operations, renewing the strength of their personnel, and stimulating initiatives from all levels within their organization³.

This study was designed to capitalize upon the experience gained from innovation studies of the private sector in utilizing the concept of innovation, with its theoretical base, and to apply this experience to the community college environment. The motivation for modelling the study of innovation in community colleges was derived from a review of the innovation literature (Chapter 2) which reveals that it is extensive, spanning a considerable range of research traditions (Rogers, 1983) and a variety of approaches (Zaltman, Duncan, and Holbeck, 1973; Hage, 1980). Not surprisingly, the term *innovation* is not always used consistently (Behnke, 1988). For this proposed research project, the intention was to rely upon the prevalent Zaltman, Duncan, and Holbeck (1973) definition of innovation as "any idea, practice, or material artifact *perceived to be new by the relevant unit of adoption* (emphasis added)" (p. 10).⁴

The overwhelming bulk of research on innovation falls into what can be referred to as the **diffusion paradigm**, tabulated and synthesized by Everett Rogers in his three editions of Diffusion of Innovations over two and a half decades (1962, 1971, 1983). The Downs and Mohr (1976) critique laid to rest the notion that the diffusion paradigm could be all things to all research on innovation. No single paradigm can be expected to encompass the tremendous range of innovation studies. The recognition

³ Kanter (1983) serves as an example of such observations on the adjustments made in the private sector to external pressures. The last two chapters of her book, The Change Masters, are devoted to a discussion on "Realizing A Corporate Renaissance" in America.

⁴ The more detailed operational definition will be provided later and will vary somewhat from this introductory definition.

that many innovations occur within organizational settings has given rise to a research framework that could be identified as the **organizational context of innovation** (Behnke, 1988).

Most studies from the research tradition of education are innovation adoption or implementation studies in public school settings, fitting into the classical diffusion paradigm. These have been synthesized by Fullan (1982). Most of the research focusing on the organizational context of innovation can be located in the organizational behavior and business management research traditions. Hage (1980), Kanter (1983), Cohn and Turyn (1984), Dewar and Dutton (1986) are some of the more recent studies from this research tradition. One study in the education research tradition, set in the public school environment, stands out for taking the perspective of innovation in an organizational context, that is the Daft and Becker (1978) study: Innovation in Organizations.

With a review of the broad base of research on innovation in organizations that has built up in the organizational behavior and business management tradition came the realization of the void that exists in studies that investigate innovation in community colleges. The existing base of research on innovation in the organizational context provided fruitful ground for formulating research questions and hypotheses to explore innovation in community college organizational settings.

1.2 The Research Question

To what extent does innovativeness vary among B.C. community colleges and to what degree do specific organizational characteristics correlate with institutional innovativeness?

1.3 Hypotheses

The following hypotheses grew out of the existing literature on innovation in organizational settings.

1. *Innovativeness varies among B.C. community colleges.*
2. *Innovation initiation and implementation measures have positive correlations with*
 - (a) *concentrations of support function specialists in the organization*
 - (b) *activity levels of professional cross-fertilization*
 - (c) *levels of macro-environmental funding incentives*
 - (d) *levels of organizational innovation modality*
3. *Innovation initiation measures vary inversely with*
 - (a) *measures of organizational centralization*

1.4 Definitions and Operationalization of Variables

Just as the research question and the hypotheses were drawn from the existing body of theory and research, so are the definitions and operationalization of variables used in this study derived and adapted from prior research work.

Innovation is defined as *the initiation or the implementation of new ideas, processes, programs, or services in an organizational context.*

Elaboration:

- 'new' is taken to mean '*perceived to be new to the organization under investigation*'
- the context is organizational, in contrast to an individual context, in which an individual could adopt an innovation on a purely individual level without any involvement of the organization

Innovativeness is expressed as *a calculated ratio (quotient resulting from the number of innovations recorded in an organizational setting during a one-year period divided by the annual Student FTE's of that institution expressed in hundreds).*

Innovation Initiation is operationalized by counting the number of formal proposals (a written submission of an innovation type) to or by organizational managers at the level of director, dean, or higher within the organizational structure (within primary and support functions of institutions).

Innovation Implementation is operationalized by counting the number of innovation proposals which were translated into tangible action in the form of: (1) written policy or procedure change directive or communication by a director, dean, or higher level of organizational manager to result in the implementation of the accepted proposal; and/or, (2) the establishment of a new budget allocation (budget line) enabling the implementation of the accepted proposal.

Support Function Specialists are identified by directors, deans, or higher organizational managers as professional positions that exist to support other primary functions of administration, instruction, and human resource development by offering the specific functions of consulting, analysis, research and development.

Examples: systems analysts, computer resources consultants and/or coordinators, program and/or instructional development consultants and/or coordinators, institutional researchers, human resource development consultants and/or coordinators, institutional and/or strategic planners.

The Support Function Specialist Concentration is expressed as *a ratio of the number of FTE Support Function Specialists to the Student FTE's in hundreds*⁵.

Professional Cross-Fertilization is identified as opportunities available to employees of the organization during the specified one-year period to attend events where interaction occurred with other professionals (conventions, conferences, scheduled professional development activities, etc.). Professional Cross-Fertilization was measured by means of two surrogate measures:

- Travel and Conference Funding Measure, a calculated ratio of institutional expenditures on travel and conferences in relation to total institutional expenditures
- Professional Interaction Index, calculated from four-point reporting scales on: (a) annual frequency of professional interaction; and, (b) rating of institutional provision of professional interaction opportunities.

External Innovation Support Funding are funding incentives from outside the organization designated to support organizational innovations. Levels of funding are expressed as *a ratio of total External Innovation Support Funding over the duration of the study period in relation to Total Institutional Expenditures over the same time period*.

Examples: governmental funding specifically designated to promote innovations (e.g., B.C. Excellence Funding) or funding from other organizations, corporations, or supporting agencies for in-

⁵ *Student FTE's in hundreds* is used as a common denominator to standardize the variable measures on institutional size.

novation projects (e.g., B.C. CBE Pilot Project, a cooperatively funded project by two corporations and two provincial government ministries).

Organizational Innovation Modality is a measure of the existence of specific organizational mechanisms and structures designed to foster innovation in the organization. This measure is *a total count of the number of organizational mechanisms, structures, and/or arrangements instituted and mandated to foster innovation in the organization*. For example, in some institutions certain committees are given the mandate to initiate and/or implement innovations. Only if some specific reference to an innovation mandate exists will the arrangement become part of the count.

Organizational Centralization is a measure of the extent to which decision-making power is concentrated at the top of the organizational hierarchy. It was operationalized by following the Hage and Aiken (1968) *Scale of Personal Participation in Decision Making and Hierarchy of Authority*.

1.5 Scholarly Significance of the Study:

This study bridges the gap between a theoretical understanding of innovation (largely developed in the context of the private or business sector) and its application to the concept of the public community college (an educational organization).

Two significant scholarly outcomes are expected of this research. The first is to add to the base of knowledge about innovation in organizations, particularly with respect to an organization upon which little scholarly research has been conducted, the community college.

The second outcome is to provide colleges with a theoretical basis for initiating innovative activity. Innovation could then be directed from an established body of knowledge, rather than from hopeful, albeit haphazard, assumptions.

1.6 Overview of the Thesis

The thesis for the study, *Innovation in British Columbia Community Colleges*, is an outcome of reviewing the innovation literature. The review of the literature which led to the formulation of the thesis is presented in Chapter 2. The literature review narrows the terminology and definitions relevant to this study and identifies several approaches which have been taken to the study of innovation. The review of the literature led to the formulation of the research question and the hypotheses of the thesis. This framework for investigating *Innovation in British Columbia Community Colleges* is outlined in Chapter 3. The methodology of investigating the thesis can be categorized as survey research. Consequently, Chapter 3 includes descriptions of the measurement of the variables, the survey instruments, the research site, and the data collection and analysis procedures. Chapter 4 is an in-depth analysis of the data and research findings. Finally, Chapter 5 provides conclusions, recommendations, and implications derived from the survey research.

Chapter 2

Review of the Innovation Literature as it Relates to Higher Education Institutions

The purpose of this review is to develop a framework for organizing the innovation literature in such a way that it can be usefully related to a specific arena of investigation, namely, the context of community colleges as institutions of higher education. Although this review is meant to portray the breadth of the field of innovation, the main underlying concern is the organizational context.

2.1 The Imperative of Innovation

The corporate world has certainly heeded the call, "innovate or stagnate". The research and general literature of business and organizations of the mid-eighties embodies a resurgence of interest in innovation and innovativeness.⁶ The message is repeated time and again:

Today more than ever, because of profound transformations in the economic and social environment for American business, it should be a national priority to release and support the skills of men and women who can envision and push innovations. (Kanter, 1983, p. 354)

Drucker (1985a) makes his appeal much broader and urges:

Public-service institutions such as government agencies, labor unions, churches, universities, and schools, hospitals, community and charitable organizations, professional and trade associations and the like, need to be entrepreneurial and innovative fully as much as any business does. Indeed, they may need it more. The rapid changes in today's society, technology, and economy are simultaneously an even greater threat to them and an even greater opportunity. (p. 177)

Drucker adds an additional insightful note with respect to public-service institutions which underscores the imperative for taking an interest in the processes of innovation by these organizations:

⁶ Although a number of significant research studies date back to the seventies, popularization and renewed interest in innovation accompanied Peters and Waterman's (1982) promotion of In Search of Excellence, Kanter's (1983) challenge to corporate America with The Change Masters, and Peter Drucker's (1985a) legitimization of this flurry of interest with his Innovation and Entrepreneurship practitioners' book.

Public-service institutions find it far more difficult to innovate than even the most "bureaucratic" company. The "existing" seems to be even more of an obstacle. (p. 177)

Hence, even this paper represents an effort to move in the direction of adding to the understanding of innovation processes in public-service institutions by reviewing the innovation literature from a perspective of relevance to innovation in community colleges.

The imperative of innovation for higher education institutions has been communicated by various leading spokespeople. The vocabulary may differ from that of the business sector but the concern and the message of innovation come through nevertheless. For example, Gallagher (1987) in an editorial on Canada's 1987 Saskatoon National Forum on Post-Secondary Education notes:

Canadians with active interests in postsecondary education have not paid enough attention to the processes necessary to induce and manage change effectively.⁷ (p. 9)

Zemsky and Tierney (1986) attempt to chart a research agenda for higher education and stress the need for addressing aspects of innovation processes within the context of *change*:

We believe, however, that colleges and universities are now in the midst of *discontinuous change* (italics added) as a result of alterations in four major areas directly affecting the world of higher education. These forces themselves necessitate a fresh evaluation of both structure and process, toward an assessment of higher education's collective capacity for change. (p. 174)

Keller and McClenney (1985) state the challenge facing community colleges this way:

Higher education in all forms now must confront revolutionizing changes in the environment which have transformed the nature of educational practice. Community college educators must grasp the nature of these changes, gain new skills in identifying and interpreting environmental and institutional changes, and master new technological and management tools if their institutions are to succeed or ultimately survive. (p. 8)

The imperative of innovation in higher education has also been discussed in terms of *renewal* as it pertains to institutions and institutional resources. Similar arguments were included in a proposal

⁷ As will be noted later in this paper, when referring to Fullan's treatise, The Meaning of Educational Change, educators often subsume innovation concepts under discussions of *change* in educational environments.

advanced by Behnke (1987) to mobilize human resources for involvement in educational innovation in higher education institutions.

2.2 Problems With Terminology and Definitions

2.2.1 Inconsistent Use of Terminology

One of the difficulties in approaching the innovation literature is the inconsistent use of the term 'innovation'. There is a prevalent reliance in the literature on Zaltman, Duncan, and Holbeck (1973) who define innovation as "any idea, practice, or material artifact *perceived to be new* (italics added) by the relevant unit of adoption" (p. 10). Yet, the same authors outline three commonly employed contextual uses of the term 'innovation': (1) a use synonymous with invention, "a creative process whereby two or more existing concepts or entities are combined in some novel way to produce a configuration not previously known. A person or organization performing this type of activity is usually said to be *innovative* (italics added)" (p. 7); (2) designating as innovation the "process whereby an existing innovation becomes a part of an adopter's cognitive state and behavioral repertoire" (p. 8); (3) "to refer to that idea, practice, or material artifact that has been invented or that is regarded as novel independent of its adoption or nonadoption" (p. 8). Other widely quoted sources, Hage and Aiken (1970) and Mohr (1969), lend further credence to the importance of perception by organizational members as a component of defining innovation. In a more recent major study, Kanter (1983) utilized a very broad and comprehensive definition of innovation, encompassing all three uses identified by Zaltman, Duncan, and Holbeck. Kanter refers to innovation as "the process of bringing any new, problem-solving idea into use. Innovation is the generation, acceptance, and implementation of new ideas, processes, products, or services" (p. 20). Another widely quoted reference on innovation, Rogers (1962, 1971, 1983), equates innovation with technology (1983, p. 12) and treats in-

novativeness as "the degree to which an individual or other unit of adoption is relatively earlier in adopting a new idea than the other members of the system" (1983, p. 22).

2.2.2 Ambiguous Use of Terminology

Based on a considerable body of innovation research during the seventies and early eighties, qualifications and refinements have been introduced to the definition of innovation. Downs and Mohr (1976) critiqued innovation research for its instability, the characteristic of "extreme variance among its findings" (p. 700). Consequently, "the most straightforward way of accounting for this empirical instability and theoretical confusion is to reject the notion that a unitary theory of innovation exists and postulate the existence of distinct types of innovations whose adoption can best be explained by a number of correspondingly distinct theories" (p. 701). This is further emphasized by Tornatzky and Klein (1982), who feel that Downs and Mohr may have "underplayed the importance of *subjective factors*"; after all, "the perceptual literature in social psychology and related fields has for many years noted that even what is presumed to be invariant *physical reality* (italics added) is always subject to *social influences* (italics added)" (p. 28)⁸. One of the great synthesizers of the educational innovation literature, Michael Fullan (1982), also takes pains to drive home the point that innovation is laden with subjective meaning. Fullan's extensive treatment of 'educational change' in schools leans heavily on what others refer to as studies on innovation and implementation (Berman and McLaughlin, 1976; Daft and Becker, 1978; Miles, 1964).

The ambiguity surrounding the use of the term 'innovation' becomes readily apparent in a single paragraph right at the beginning of Fullan's treatise on The Meaning of Educational Change. On the

⁸ It must be noted that Rogers (1983) disagrees with Downs and Mohr (1976) in their assessment of instability (p. 132). On the other hand, Rogers does not address some of the other issues raised by the Downs and Mohr critique.

one hand, he uses innovation to mean an object, as he states, "I do not attempt to survey the content or substance of all the latest *educational innovations* (italics added)". Yet, in the same paragraph he refers to 'problems of *educational innovations* (italics added) in other countries' (p. 5), obviously referring to innovation as a complex process. Another instance of the terminology problem appears in the use of the concept of 'complexity'. Rogers (1962) and Rogers and Shoemaker (1971) have drawn attention to complexity as a characteristic of an innovation that affects its implementation. Fullan, along with many others, have referred to this factor since. However, Fullan's lack of any reference to another use and conceptualization of complexity illustrates the problem of coherence in innovation research and theory formulation. Research studies and reports focussing on innovation in organizations, as exemplified by Hage and Aiken (1970), and others since, Downs and Mohr (1976), have consistently utilized an organizational structure variable referred to as 'complexity', "the level of knowledge and expertise in an organization" (Hage and Aiken, 1970; p. 32). Fullan gives no recognition to this conceptualization of complexity and yet, by referring to the Daft and Becker (1978) study, Innovation in Organizations, which does examine and report on organizational complexity, the problem of lack of precision in terminology and definitions is highlighted even more. 'There is another whole world out there'⁹ which Fullan and perhaps others, especially in the subculture of 'educational innovation and school improvement', have neglected to build into their conceptualizations and terminology. Although Fullan's synthesis represents a significant contribution to the literature on educational innovation, it also exemplifies many of the problems surrounding the issue of definition and terminology relating to innovation.

⁹ Innovation studies in the area of organizational behavior, organizational change, organizational management, and business administration.

2.2.3 Multiplicity of Operationalizations of Definitions

Given the instability of innovation research and theory with the consequent inconsistent and ambiguous usage of terminology, it is not at all surprising to find a multiplicity of operationalizations of definitions. An ongoing discussion and debate over research findings (Hage and Aiken, 1970; Daft and Becker, 1978; and, Hage, 1980) brings to the foreground the aspect of multiplicity of operationalizations of definitions. Hage (1980), in his latter synthesis of Theories of Organizations, emphasized the need for *standardizing* measures, concepts, terms, definitions:

Words like change, innovation, and creativity are easy to use but not so easy to operationalize. An essential argument, and one contrary to the literature, is the necessity of standardizing output innovation on organizational size. (p. 165)

In more recent research studies considerable emphasis has been placed on making distinctions between different types of innovations rather than dealing with a universalistic approach. Thus, distinctions have been operationalized and tested between *administrative* and *technical* innovations (Daft and Becker, 1978; Kimberly and Evanisko, 1981; and, Zmud, 1984) and between *radical* and *incremental* innovations (Ettlie, Bridges, and O'Keefe, 1984; and, Dewar and Dutton, 1986). At times, researchers also prefer to operationalize innovation by restricting it to *first time* or *early* adopters (Daft and Becker, 1978) or by focussing on the *rate* (Damanpour and Evan, 1984) and *extent* (Baldrige and Burnham, 1975) of adoption. Downs and Mohr (1976), again referring to the problem of instability in innovation research, summarized three different operationalizations of innovation, the dependent variable in their study:

The first, and by far the most common, is the assignment to each organization of an innovation score based on its time of first adoption or use. The second is a simple, dichotomous adoption or nonadoption. This may be seen as merely a crude measure of the time of adoption, allowing many ties. The third operationalization is determined by the extent to which an organization has implemented an innovation, or the degree to which an organization is committed to it. (p. 709)

Fullan (1982) examined operationalizations of new school program implementations (i.e., educational innovations) and reports on a progression of approaches to the problem of operationalizing the concept

of innovation. Of particular interest is the evolution of the Levels of Use Model (LoU) by Hall and associates at the University of Texas, which developed from a *uni-dimensional*, single undifferentiated score assessment of innovation (Hall and Loucks, 1977) to a *multi-dimensional*, degree-of-implementation operationalization in later research applications (Loucks and Crandall, 1982).

2.2.4 Concluding Comments on Terminology and Definition Problems

Conceptualizations and operationalizations of innovation appear in a number of different forms as elaborated on in the previous sections. Even recently, Dewar and Dutton (1986) pointed out that "the current state of innovation theory is undergoing a critical but necessary change". They go on to reiterate, that "unstable results from innovation adoption and diffusion models call into question the validity and generalizability of innovation studies" (p. 1422). Their observation should come as no surprise. The study of innovation and change should really be seen within the context of a larger framework, that of theories of organizations. In this larger realm of organizational studies, much remains to be done to integrate "a rich array of theoretical concepts, (added to the literature in the past ten years), ... into a broader and general organizational theory" (Hage, 1980, p. 3). In Theories of Organizations, Hage (1980) draws attention to the emergence of four major paradigms during the past three decades: (1) structural-functional theories; (2) a political-value orientation; (3) a cybernetic-adaptive approach; and, (4) an environmental perspective on organizations. The conclusion could be drawn that studies of change and innovation, which, after all, occur within organizations, would bear similar colorations of perspectives.

Thus, this section ends on a note of caution. Given the empirical and theoretical instability of innovation research, care must be exercised in the interpretation of research findings and in the conceptualization of further research.

2.3 The Approaches to Innovation

2.3.1 On Perspectives and Paradigms of the Innovation Literature

On The Notion Of Paradigms:

The nature of innovation has been the focus of many studies during the past two decades, yet a reliable model for successful innovation has not emerged."

Delbecq and Mills (1985) (p. 24)

As yet, no generally accepted convention has been developed to sort out the research on innovation and organization in a conceptually meaningful and empirically useful way, one that fully captures the variety of relationships between the two.

Kimberly (1987) (p. 240)

Paradigms gain their status because they are more successful than their competitors in solving a few problems that the group of practitioners has come to recognize as acute. (p.23)

But it is hard to make nature fit a paradigm. (p. 134)

And it is only through normal science that the professional community of scientists succeeds, first, in exploiting the potential scope and precision of the older paradigm and, then, in isolating the difficulty through the study of which a new paradigm may emerge.

Kuhn (1962) (p. 151)

Ironically, it almost seems as if diffusion research in the various research traditions can be said to have been independently invented! Indeed, diffusion researchers in the several traditions which we have examined scarcely know of each other's existence.

Katz et al (1963) (quoted in Rogers, 1983; p. 38)

Diffusion research is thus emerging as a single, integrated body of concepts and generalizations, even though the investigations are conducted by researchers in several scientific disciplines.

Rogers and Shoemaker (1971) (p. 47)

The diffusion model is a conceptual paradigm with relevance for many disciplines.

Rogers (1983) (p. 89)

This short sequence of excerpts reveals the divergence of opinion that exists in the innovation literature with respect to agreed upon approaches, perspectives, and paradigms. The literature on innovation, as has already been indicated, is voluminous. Rogers (1983) alone refers to over 3000 references on diffusion of innovation. And that is just a part of the innovation literature. Indeed, it is

a challenge to anyone, this writer included, to come up with a meaningful framework of categorizing the research on innovation.

Everett Rogers, who has synthesized much of the innovation literature over the last two and a half decades, is perhaps entitled to and would like to lay claim to the crystallization of the *diffusion paradigm*. Yet, even while Rogers proclaimed it as such in his 1983 version of Diffusion of Innovations, the paradigm had the cracks of inconsistencies upon it. The strains on the diffusion paradigm were particularly evident from the researchers pursuing innovation implementation and adoption within organizational settings. Although Rogers recognizes that there are important differences between individual innovation decisions and organizational decisions, he proceeds to fit organizational innovation processes into the familiar diffusion paradigm. Not everyone would agree with such a process of paradigm fitting. The famous Downs and Mohr (1976) critique asserted that "progress toward what has been called *integrative theory* by Rogers and Shoemaker will have to be made before much of this data will be useful" (p. 700).

This short elaboration is simply an indication of the state of affairs with the innovation literature. A number of perspectives and perhaps several paradigms need to be recognized at this stage of theoretical development about innovation.

To some extent, a framework for organizing the literature of a field of investigation is marked by the conceptions of the reviewer. On the other hand, the structure that is presented must also strike a cord of agreement with others who are acquainted with the literature. The following is an overview of approaches to the innovation literature and it is hoped that this framework will gain a level of common consent.

First, if anything comes close to a widely recognized paradigm in the innovation literature it would be the **diffusion paradigm** so ably synthesized, elaborated upon, and periodically updated by Everett Rogers in his three editions (1962, 1971, and 1983) of Diffusion of Innovations, including the Second Edition by Rogers and Shoemaker, Communication of Innovations (1971). However, the diffusion paradigm is not accepted as a universal model to encompass the tremendous range of innovation studies. A second major approach to innovation studies needs to be recognized. Perhaps not to be featured as a second paradigm, nevertheless, a large number of research studies fall into a framework that could be identified as the **organizational context of innovation**. The study of organizations as social systems (organizational sociology) is a discipline in its own right. When innovation in an organizational context is placed within the disciplinary setting of organizational sociology, it is important to recognize several paradigms that exist in that discipline. Studies on innovation in organizational settings then should also be viewed from the perspectives of these existing paradigms. Thus, research on innovation in an organizational context can be seen as fitting into four paradigms¹⁰: (1) structural-functional; (2) socio-political; (3) cybernetic-adaptive; and, (4) cultural. A third major approach represented in the innovation literature is the **planned change - innovation management perspective**.

In an overview fashion, the major approaches can be visualized in outline form:

1. **Diffusion of Innovation Paradigm**
2. **The Organizational Context of Innovation**
 - (1) structural-functional paradigm
 - (2) socio-political paradigm
 - (3) cybernetic-adaptive paradigm

¹⁰ The approach taken in this review leans on the discussion of paradigms of organizational sociology by Jerald Hage in Theories of Organizations: Forms, Processes, and Transformation (1980).

- (4) cultural paradigm

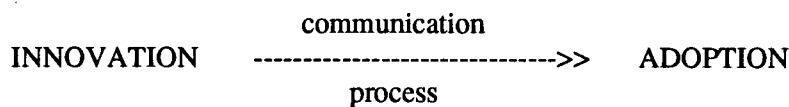
3. Planned Change - Innovation Management Perspective

What follows now is a brief review of each of these approaches found in the innovation literature.

2.3.2 The Diffusion of Innovation Paradigm

There is no doubt that Everett Rogers has made a tremendous contribution to the field by providing the most comprehensive treatment of the innovation research literature falling even remotely within the diffusion paradigm. The three editions of Diffusion of Innovations (1962, 1971, 1983) have been the starting point for many further studies on innovation. What then does the diffusion paradigm look like? According to Rogers (1983), "*diffusion* is the process by which an innovation is communicated through certain channels over time among members of a social system" (p. 5). It is basically a straight forward linear model of the innovation process, illustrated in Figure 2.3.2-1.

Figure 2.3.2-1 Simple Diffusion Paradigm Model



The Popularity of the Diffusion Paradigm

This model has formed the basis of a number of innovation research studies and syntheses of innovation research. Variations of the diffusion model have been employed to investigate innovation diffusion both at the level of individual adopters and at the organizational level. The popularity of innovation research and the use of the diffusion paradigm has been commented upon by Downs and Mohr (1976):

This popularity is not surprising. The investigations by innovation research of the salient behavior of individuals, organizations, and political parties can have significant social consequences. [These studies] imbue even the most obscure piece of research with generalizability that has become rare as social science becomes increasingly specialized (p. 700).

Rogers (1983) provides some reasons for the popularity of the diffusion paradigm: (1) it is relevant for many disciplines; (2) pragmatic utilization of diffusion research is high; (3) potential for theory building from this paradigm; and, (4) the research methodology implied by the classical diffusion model is clear-cut and relatively facile.

From Rogers' review of over 3,000 innovation studies, a profile emerges of the typical diffusion model research study. One of the typical studies would examine variance based on independent variables like innovation or adopter characteristics related to the dependent variable of innovation adoption by individuals as units of analysis. Such studies would account for over 60% of the diffusion research summarized by Rogers (1983) (based on Table 2-3, pp. 80-81). Rogers (1983) observes, "with over 3,000 diffusion publications on our hands, we do not need "more of the same"" (p. 94). Rogers attributes about 11% of the diffusion publications available in 1981 to the 'education research tradition'.

Criticisms of the Diffusion Paradigm

The diffusion paradigm has received its share of criticism. For example, Downs and Mohr (1976) drew attention to the 'pro-innovation bias' of diffusion research. Another problem that occurs in diffusion research is the 'individual-blame bias' whereby individual adopter characteristics are preferred to explain variance rather than building complex societal contextual variables into the hypothesized relationships. Of course, the usual problems of ex post facto research also plague diffusion studies. One particular aspect is the problem of recall. Respondents are asked to recall their experiences of past events and stages of innovation processes. Rogers points out another major problem of diffusion

research, that of confusing the issue of *causality* among the variables of the study. "It is usually implied in diffusion research that the independent variables "lead to" innovativeness, although it is often unstated or unclear whether this really means that an independent variable causes innovation." (Rogers, 1983, p. 115)

Suggestions for Improving Diffusion Research Design

Both Downs and Mohr (1976) and Tomatzky and Klein (1982), in articles dealing with conceptual and methodological issues in the study of innovation, have made suggestions for improvements to diffusion research design. Some of the suggestions are particularly relevant to studies dealing with innovation adoption in organizational settings. In both articles, the point is made that in organizational settings especially, a clear distinction must be made between *primary* and *secondary* innovation and organizational attributes. Attributes take on *subjective* meanings based on perceptions of the actors and subjects. Downs and Mohr (1976) offer the following advice to researchers:

One way of coming to grips with secondary attributes is to think of them not as being composed wholly of characteristics of the innovation or the organization but as characterizing the *relationship* between the two. The unit of analysis is no longer the organization but the organization with respect to a particular innovation, no longer the innovation, but the innovation with respect to a particular organization. Neither the organization nor the innovation would be described as compatible, for example, but rather the pair taken in conjunction. From this perspective, the secondary attributes can be viewed as variables that characterize the circumstances surrounding a particular decision to innovate. (p. 706)

In methodologically less poignant terms, Fullan (1982) alludes to the same issue but without any clear suggestions to overcome the problem.

Tomatzky and Klein (1982) offer several suggestions for improving research that tests the ability of innovation characteristics variables to predict innovation adoption and implementation:

- (1) Innovation characteristics research studies should *predict* (italics added), rather than simply explain in a *post-hoc fashion* (italics added), the critical events of the phenomenon.

- (2) Innovation characteristics research should focus on both adoption and implementation as the dependent variables, and not simply dichotomous yes/no adoption decisions.
 - (3) Model studies should utilize research approaches that are reliable, replicable, and permit some degree of statistical power. On this point, they add, that "the usual single-site qualitative case study cannot logically provide a basis for generalizing about the innovation process".
 - (4) Ideal innovation characteristics studies should utilize replicable and potentially reliable measures of innovation characteristics as perceived by decision-makers.
 - (5) Innovation characteristics research should consider several characteristics of the innovation examined. More than one innovation characteristic must be studied at the same time in order to adequately evaluate the relative predictive power of innovation characteristics across characteristics and to consider their interrelationships.
 - (6) Innovation characteristics studies should gather measures of innovation characteristics across several innovations, not a single innovation at a time.
 - (7) Research in this area should study innovations that will be adopted by organizations, not by individuals operating alone, if such innovations and such organizations are the author's real interest: It is not logical to attempt to generalize from the individual adoption process to the organizational innovation process as the two processes may in fact be quite different.
- (pp. 29-30)

Tomatzky and Klein (1982) applied their seven criteria to seventy-five innovation characteristics studies and concluded that the studies generally failed to meet these criteria. Yet, they argued that this line of research should not be abandoned, that "despite all the methodological weaknesses the relationships [they] were able to tease out using meta-analytic techniques suggest that more and better studies could elaborate on these findings" (p. 40).

2.3.3. The Organizational Context of Innovation

Although the diffusion paradigm has served as the theoretical framework for the bulk of innovation research, the point has been made that another context exists for a large number of innovation studies.

One perspective on this alternative context to the study of innovation comes from Kimberly (1987):

Theories of innovation and models of the diffusion process are typically silent on the relative importance of *contextual variables or outcomes* (italics added). By implication, therefore, we are led to conclude that contextual variables are relatively unimportant or, at least, that their influence on outcomes is less significant than that of variables that are not context-specific. (p. 239)

The focus on organizational context of innovation is also evident in the conclusion of a published research study by Zmud (1984):

The more complete the research models employed, the wider the spectrum of *organizational contexts* (italics added) in which innovation research is pursued, and the more comparable the research designs across these varied research contexts, the more likely it is that robust models of innovation behaviors will begin to emerge. (p. 737)

Whereas much of the diffusion research focussed on characteristics of innovations and adopters and the innovative behavior of individual adopters, there is widespread recognition that "organizations are frequently the context of or for innovation" (Kimberly, 1986, p. 25).

In this review, the broad range of innovation studies falling within the organizational context will be grouped into four paradigms that are seen to have emerged in the field of organizational sociology.

2.3.3.1 Organizational Innovation Research within the Structural-Functional Paradigm

A self-acknowledged representative of this paradigm to the study of organizational innovation is Jerald Hage (1980): "In these theories the organization, not the manager, is the analytical unit. The central concerns are less with design and more with structure and effectiveness" (p. 2). Hage (1980) includes innovation within the context of *change* in organizations and then examines innovation studies from several analytical perspectives: structural causes of innovation and creativity, stages in the process of change, causes of resistance, strategies for overcoming them, kinds of conflict during the change process, the special problem of radical change, the process of adaptation, kinds of crises, and other issues. In his synthesis, Theories of Organizations, Hage (1980) has made a major contribution to the study of organizational innovation by drawing out of the literature of innovation research premises and hypotheses that can continue to provide a basis for innovation research and theory building. Although of great significance, it would not be appropriate to repeat all of Hage's premises and hypotheses. Several research traditions (education, organizational behavior and business management, health-care) have contributed a great body of organizational innovation research which can be viewed as fitting the

structural-functional paradigm. In education, an outstanding example to be cited would be Daft and Becker (1978):

Rational innovation behavior is not a simple reaction to problems with search and decisions for change. Rational behavior means structuring the organization and channeling organizational energy toward the importation and proposal of ideas on a continuous basis, if the organization maintains high standards of performance and dissatisfaction with current procedures. (pp. 135-136)

Another study in the education tradition was an earlier investigation by Baldrige (1975) who emphasized the need for focussing on organizational structural variables:

Educational inventions, community action projects, new technologies in industry, and new health delivery systems are social inventions primarily adopted by complex organizations, not by individuals. More attention to organizational features in the innovation process is needed because organizations are now the major adopters of social inventions and because organizational factors and organizational dynamics are the major independent variables that seem to influence the amount, the rate, and the permanence of innovation. (p. 160)

Representative of the organizational behavior and management tradition of organizational innovation research is a study by Cohn and Turyn (1984). This study reports on several organizational structural variables commonly examined under the structural-functional paradigm: *organizational complexity*, *centralization*, and *formalization*. In another recent study in the same structural-functional research tradition, Dewar and Dutton (1986) include a distinction between *radical* and *incremental* innovations as they postulate three kinds of organizational variables being associated with innovation adoption. This study followed on the heels of the Ettlie, Bridges, and O'Keefe study in 1984 which examined organizational contextual and organizational strategy variables with respect to radical and incremental innovation adoption.

These more recent studies have confirmed Zaltman, Duncan, and Holbeck's (1973) contention that the relationships between the different organizational characteristics and the rate of innovation may vary depending on the stage of the innovation process. The thrust of their criticism of Hage and Aiken (1967), a study of program change in 16 social welfare organizations, and their synthesis, Social

Change in Complex Organizations (1970), revolves around the modelling of the stages of the innovation process and the *organizational dilemma* of reversed impacts of some organizational structural variables on the innovation process during different stages of the process. Of course, as has already been noted, later studies and syntheses (Hage, 1980) have taken these contentions into consideration. Since the distinction between *initiation* and *implementation stages* is of significance in the organizational context of innovation research studies, the Zaltman, Duncan, and Holbeck (1973) Comparison of Stages of the Innovation Process with Hage and Aiken (1970) is presented in Table 2.3.3-1. Levine (1980) zeroes in on another important consideration with respect to innovation in organizations, namely, the *institutionalization - termination phase*, the last phase of his four-stage model of innovation in organizations. Levine's model is also included in the comparison in Table 2.3.3-1.

Table 2.3.3-1 Comparison of Stages of the Innovation Process

Hage and Aiken (1970)	Levine (1980)	Zaltman, Duncan, Holbeck (1973)
		Initiation Stage
(1) Evaluation	(1) Recognition of need	- Knowledge-awareness substage - Formation of attitudes toward innovation substage
	(2) Planning and formulating a solution	- Decision substage
		Implementation Stage
(2) Initiation	(3) Initiation and implementation of plan	- Initial implementation substage
(3) Implementation		- Continued-sustained implementation substage
(4) Routinization	(4) Institutionalization or termination	

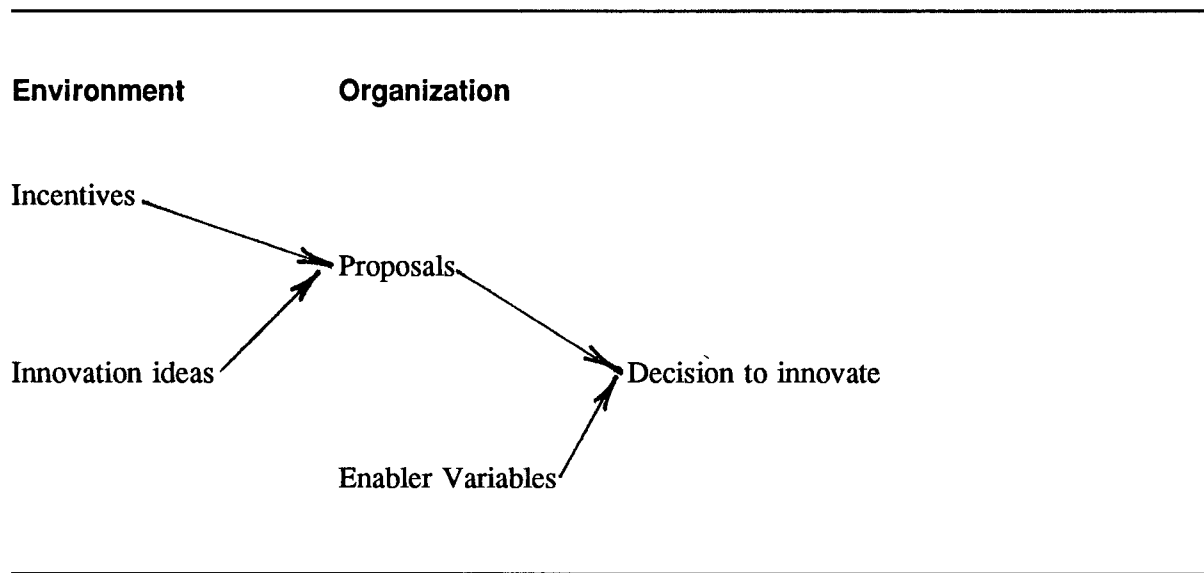
(Sources: Zaltman, Duncan, and Holbeck, 1973; p. 181; and, Levine, 1980; p. 7)

Daft and Becker (1978) presented a "model of organizational innovativeness [that] has the virtue of great generality; it is applicable to all organizations" (p. 18). They further argue:

... that innovativeness is a patterned, predictable phenomenon that is governed by norms of rationality. The adoption of ideas new to the technological environment is hypothesized to be a consequence of three distinct influences -- the incentives to innovate, the presence of innovative ideas as decision alternatives, and the ability of the organization to implement innovations. (p. 15)

Their organizational innovation model (Figure 2.3.3-1) highlights the important role of the *environment* and *organizational structure* on decisions to innovate.

Figure 2.3.3-1 **Factors Affecting Decisions to Innovate**



(Source: Daft and Becker, 1978; p. 16)

General Assessment of the Structural-Functional Paradigm with Respect to Organizational Innovation Research

Many of the organizational innovation studies of the last decade, especially from the organizational behavior and business management tradition, can be viewed as falling in the structural-functional paradigm of organizational sociology. Methodologically and theoretically this seems to be fruitful ground. The Daft and Becker (1978) model, originally applied to innovation adoption in school organizations, could form the basis for research on organizational innovation in the context of higher education institutions.

Several fresh approaches and categories have also been introduced more recently that hold some promise for future directions of research on innovation in organizational settings.

One new approach to type-casting the relationship between innovation and organization has been proposed by Kimberly (1987). He suggests that a framework of five substantively significant types of relationships between innovation and organization could provide "a conceptually meaningful and empirically useful way" (Kimberly, 1986, p. 25) of placing innovation research in organizational settings: (1) the organization as user of innovation; (2) the organization as inventor of innovation; (3) the organization as both user and inventor of innovation; (4) the organization as vehicle for innovation; and, (5) the organization as innovation (Kimberly, 1987, p. 240).

Whenever research is undertaken in an area as complex and broad as *organizational innovation*, choices have to be made by the researcher with respect to perspective and also the level of analysis. Hage (1980) provides another useful methodological and conceptual framework from which to view research concerned with organizations. Hage outlines three analytical levels from which researchers approach analysis of organizations: micro, meso, and macro. Conceptually, the starting point is the *meso level*, the level of the organization. The crucial point of definition of this level is the establishment of organizational boundaries which identify an organization as an input, throughput, and output system. A comparison of definitions and examples of the three analytical levels is provided in Table 2.3.3-2.

Table 2.3.3-2 Comparison of Analytical Levels and Examples

Level	Element and Definition	Examples
Micro	<p>Social positions: sets of activities with a job title</p> <p>Groups: Sets of members with shared activities who define themselves as belonging to the same collective</p>	Sociologist, social worker, union representative, foreman
Meso	<p>Organization: Sets of members with a specific objective to produce a product or provide a service, and with distinctive inputs as in staff, budget, and clientele</p>	School of medicine, cheap car division, naval component of the military, division for chronic schizophrenics, division for paint manufacturing, school district, [<i>community college</i>] (added to the list)
Macro	<p>Multi-organization: Sets of organizations each with their distinctive input, throughput, and output</p> <p>Task environment: All <i>organizations that affect</i> (italics added) either inputs or outputs of a focal organization</p>	Universities, defense departments, mental hospitals, chemical companies

(Source: Hage, 1980, p. 12)

2.3.3.2 Organizational Innovation Research within the Socio-Political Paradigm

Placing innovation research studies in the second major paradigm of organizational innovation, the socio-political framework, is perhaps open to more disagreement than categorization of research studies into the previous paradigm. That should come as no surprise, since the methodology and theoretical basis of this second paradigm is less well articulated. House (1981) identifies the political perspective on innovation as "a matter of conflicts and compromises among factional groups" (p. 23). House (1974), The Politics of Educational Innovation, can be considered as an example of innovation research fitting the socio-political paradigm to organizational innovation.

Baldrige's (1971) frequently cited study on Power and Conflict in the University is a study that fits the context of the socio-political paradigm of organizational change, according to Hage (1980) and Dill and Friedman (1978). Dill and Friedman (1978) voiced a valid criticism of this paradigm; namely, the problem of single case study settings which limit generalizability of the findings. Nevertheless, in organizational theory writings, there are numerous references to socio-political processes and socio-political organizational characteristics that affect organizational change and innovation processes (Cohen and March, 1974; Weick, 1983; Rubin, 1983; Weiner, 1983).

2.3.3.3 Organizational Innovation Research within the Cybernetic-Adaptive Paradigm

The cybernetic-adaptive paradigm in organizational sociology is identified by Hage (1980). Here are some of the characteristics of this paradigm described by Hage:

- (1) With its roots in cybernetics, there is emphasis on similarity of systems, and consequently, a tendency to broad generalizing statements.
- (2) Key concepts include adaptiveness and steering across time, feedback and learning.
- (3) A concern for how organizational units relate to the larger environment.

Hage places Weick's (1976) analysis of "Educational Organizations as Loosely Coupled Systems" within the cybernetic-adaptive paradigm.

In reviewing the organizational innovation research literature, several studies can be viewed as reflecting the characteristics outlined for the cybernetic-adaptive paradigm. Although it may not have been previously put into this category of a research typology, the contribution of Huberman and Miles (1984a) to the large DESSI project (the Study of Dissemination Efforts Supporting School Improvement), can be seen as an example of the cybernetic-adaptive paradigm. Huberman and Miles (1984b) stress systematic qualitative research methodologies and see themselves as innovators in this arena. Their frequent use of feedback loops of information flows in causal networks of

organizational systems interacting with the external environment and the process of adaptive iterations of schools assimilating innovative programs, could be considered as characteristic of a cybernetic-adaptive approach to organizational innovation. Through their *dynamic model* of the implementation process they describe "a series of *accommodative transformations* (italics added) (by which) the innovation is adjusted through user and organizational pressure" (1984a, p. 10). They also point out that "implementation brings about *organizational shifts* (italics added) (for example, when projects entail cross-age grouping, cross-disciplinary teams of teachers, new evaluation procedures, or redelegations of authority)" (1984a, p. 12).

Another group of organizational innovation research studies that fit the cybernetic-adaptive paradigm by nature of their content, are those of the organizational communication research tradition. A major reason for including them in the cybernetic-adaptive paradigm is their emphasis on organizational communication channels and networks and information flows within organizational systems. Three recent studies that have pursued the *communication-information flow* emphasis of organizational innovativeness are: (1) Ebadi and Utterback (1984); (2) Albrecht and Ropp (1984); and, (3) Cheney, Block, and Gordon (1986).

Albrecht and Ropp's study confirms that "communication about new ideas is embedded in the context of strong, developed, and stable interpersonal relationships in organizations" (1984, p. 87). They "also found that individuals who had highly multiplex relationships (work, social, and innovation ties) were the ones who talked most frequently about innovations" (1984, p. 88). Their study also revealed differences in communication about innovations between social service organizations and electronics and engineering firms. The authors themselves include a word of caution about the strength of the linkages in the communication networks examined.

Ebadi and Utterback (1984) report on "an empirical study of the patterns of communication among researchers and among organizations and the effect of these patterns on the success of innovations" (p. 572). Their research confirms the effect of several communication pattern variables on innovation success: frequency of communication, project centrality within the communication network, diversity of communication contacts, and network cohesiveness.

The Cheney, Block, and Gordon (1986) study attempts to build on the previous two research studies and relate differences in *innovation communication* to different types of service organizations. Although this study explores potentially fruitful areas of investigation, it bears methodological limitations.

The studies referred to indicate some further potential for future research. Conceptually, the cybernetic-adaptive paradigm should open up a number of avenues of organizational innovation research. The concepts of systems theory, organizational information processing, communication networks, and organizational cybernetic-adaptiveness through feedback, should prove to be stimulants for framing more research designs on organizational innovation.

2.3.3.4 *Organizational Innovation Research within the Cultural Paradigm*

Although not a new concept, the notion of organizational culture received considerable attention in the eighties through the high profiling of Peters and Waterman (1982). Organizational culture is reflected in a shared values and belief system in an organization that results in behavioral norms for organizational members. "Values (what is important) and beliefs (how things work) interact to cause norms (how we should do things)" (Ivancevich and Matheson, 1987, p. 30). The cultural paradigm has also provided a framework for organizational innovation research.

One published work, The Change Masters, by Rosabeth Moss Kanter (1983), has made a significant contribution to the organizational innovation literature. This major study, representing a culmination of a series of prior research projects which focused on corporate culture, most clearly exemplifies the cultural paradigm to the investigation of organizational innovation. Based on the research of this project, involving more than 100 companies and in-depth examination of 10 core companies, Kanter identifies two types of corporate cultures, *integrative cultures* and *segmentalist cultures*, which differentiate organizations into *innovation-stimulating* and *innovation-smothering* organizations. One of the contributing studies to the overall research effort included an interesting methodological take-off in that it sought nominations from corporations to identify "most innovative" companies (categories and criteria were provided). The "progressive" companies then provided a pool for further study and analysis. From the in-depth examination of some of America's leading *progressive* companies, Kanter (1983) described their organizational structures, their corporate cultures, and their specific strategies.

The cultural paradigm to organizational investigation has also appeared in the literature on higher education. Masland (1983) adds to the definition of the concept, explores its application to the field of higher education, and encourages further research which would apply the concepts of organizational culture to the study of higher education. Although without reference to Masland's paper, Krakower (1987) did just that. His study focuses on "the nature and strength of college and university cultures, and how culture is related to perceptions of organizational performance" (p. 1). Among his findings is reference to a strong positive relationship between *dispersion* of culture typing and innovation.

The existing research suggests that there is a link between organizational culture and aspects of organizational performance. Furthermore, organizational culture is responsive to managerial manipulation and organizational innovation can be viewed as a component of organizational performance. These linkages seem to suggest fruitful ground for further research dealing with organizational innovation in higher education institutions.

2.3.4 Planned Change - Innovation Management Perspective

The third major approach to innovation in the literature is the **planned change - innovation management perspective**. Writings from this perspective abound in journals and publications appealing to managers, administrators, and practitioners in various disciplines. The most common forum for these articles are the business and educational administration and organizational behavior publications. These articles are often of the "how to" nature, prescribing and suggesting "ways of doing" for practitioners. The emphasis of *planned change* is usually on intervention and implementation. Writers may report and lean on research reflecting the innovation management perspective but not necessarily so. Examples of publications of the '*reporting*' and '*how to*' type are: Havelock (1973), Drucker (1985b,c), McGinnis and Verney (1987), Loucks and Zacchei (1983), Quinn (1985), Werner (1987), and many others. Few properly designed research studies have been carried out from the *planned change* perspective. Dill and Friedman (1978) comment on the methodological difficulties besetting the planned change approach to innovation research:

Given the necessity for manipulation in planned change, research logically would vary from the ex-post facto, quasi-experimental designs of the other frameworks, and use field experiments, comparing the outcomes of alternate intervention and implementation strategies. However, for a variety of reasons including the difficulty of controlling experiments of this scale, there has been little research of this type. Instead, research is invariably autobiographical or case-study in design: the report of a single intervention. (p. 16)

This last section of the literature review is deemphasized in scope, largely for reasons that this paradigm is more application- rather than research-oriented and does not provide the avenues of research opportunities sought by the reviewer.

2.4 Concluding Remarks

The innovation research literature covers a broad range of content areas (research traditions), approaches, and methodologies. In this review, three major approaches were identified and briefly described: (1) the diffusion paradigm; (2) the organizational context of innovation; and, (3) the planned change — innovation management perspective. Four paradigms were introduced within the context of organizational innovation. All four paradigms can open doors for fruitful investigation, depending on the questions asked. This overview of the innovation literature then provides a useful starting point from which to explore specific research questions and to relate them to the outlined research approaches and paradigms.

Chapter 3

A Framework for Investigating 'Innovation in British Columbia Community Colleges'

3.1 Formulation of Working Hypotheses

The foregoing review of the innovation literature provided the broad context from which the research question and the hypotheses for this research study were developed. A number of studies, essentially in the corporate environment, have demonstrated that differences in organizational innovativeness exist among organizations. Examples of specific studies will be cited as the formulation of hypotheses unfolds. The same group of studies, as well as the comprehensive work by Hage (1980), Theories of Organizations, provide the impetus for formulating the specific research question and hypotheses of this research study.

Hypothesis 1

H₁ Innovativeness varies among B.C. Community Colleges.

This hypothesis represents one of the key variables in previous studies of innovativeness in an organizational context. Frequently, innovativeness was measured in terms of adopting certain specific innovations within organizations of similar enterprise (Cohn and Turyn, 1984; Ettlie, Bridges, and O'Keefe, 1984; Dewar and Dutton, 1986). It would be very difficult to specify certain innovations which would be universally applicable to the population of B.C. community colleges. A somewhat different approach is being taken in this study in that no specific innovations are expected to occur. The study is designed to focus on innovativeness as a broad and flexible construct. The starting point is simply a generally accepted definition of innovation as *an initiation or implementation of new ideas*,

processes, programs, or services in an organizational context. The premise underlying the acceptance of any and all organizational innovations is one of avoiding the subjective step of considering some innovations as significant while others are ruled out. By simply taking a count of all innovations listed by a reporting institution, a neutral position is taken on the content of innovations and the emphasis is on the number of innovations in the organization. Thus, the premise is, the greater the number of innovation initiations and/or implementations that occur within a specified time period, the more *innovative* the organization.

Hypothesis 2

H_{2a} Innovativeness (innovation initiation and implementation) measures are positively correlated with concentrations of support function specialists in the organization.

Several research studies, in corporate production process-oriented environments (Cohn and Turyn, 1984; Zmud, 1984) and in public sector environments (Moch, 1976; Hage and Aiken, 1967) reveal positive correlations between *organizational complexity* and *innovations*. The concept and measure of complexity refers to organizations employing human resources spanning a great variety of professions and support functions. In the earlier review of the literature, reference was made to studies fitting into the cybernetic-adaptive and the cultural paradigms. Although these studies essentially have a different focus, several revealed the linkage between professional diversity in organizations and innovativeness. In his major synthesis of *Theories of Organizations*, Hage (1980) identifies a major premise relating to change in organizations: *The greater the diversity of knowledge, the greater the amount of change implemented.* In this study, the diversity or organizational complexity is identified by the variable, *Support Function Specialist Concentration*. The importance placed on the *organizational complexity* variable in previous research work gave rise to testing for the hypothesized relationship between innovativeness and support function specialist concentration in organizations.

H_{2b} Innovativeness (innovation initiation and implementation) measures are positively correlated with activity levels of professional cross-fertilization.

This hypothesis is essentially derived from work done within the cybernetic-adaptive and cultural paradigms. In both areas, studies have focused on organizational cultural influences, interpersonal aspects, and linkages among professionals. Especially the Ebadi and Utterback (1984) study confirms the effect of several communication pattern variables on innovation success in organizations. This hypothesis is based on the premise that the more opportunity the people of an organization have to interact professionally with people outside the organization, the greater the potential for exposure to ideas, concepts, processes, and products that would be new to their own organization. Opportunities for professional cross-fertilization and interaction, such as conferences, special workshops and courses, are seen as fertile ground for the spawning of innovation proposals in organizations. It is hypothesized that organizations that provide for higher levels of activity for professional cross-fertilization will have positive correlations with their innovativeness measures. Testing for this relationship will proceed by focussing on two variables that are seen as surrogate measures for professional cross-fertilization: *Travel and Conference Funding* levels in organizations and a calculated *Index of Professional Interaction*.

H_{2c} Innovativeness (innovation initiation and implementation) measures are positively correlated with levels of macro-environmental funding incentives.

"Innovating is easy: You just rub smart people and money together."

Alan Kay (quoted in BYTE, September 1990, p. 242)

This hypothesis is not as deeply based on previous research and theory as the other hypotheses. In one popular report on innovation research in the corporate environment, The Change Masters, Rosabeth Moss Kanter (1983), attention is drawn to budget flexibility as a factor in innovation. In the

review of the *Process of Adaptation* of organizations, Hage (1980) states a premise about the nature of organizations: "*The greater the resource base, the greater the capacity for information feedback and the more likely that eventually the right action is selected*" (p.275). It could be said that innovation is a form of forward looking adaptation of organizations. Hage (1980) also reports on a rate of output innovation doubling in some organizations (especially, in certain public sector organizations: health, education, welfare, etc.) with the influx of money for the Great Society programs during the Johnson administration in the United States. In general, as studies have identified *size* of organizations as a factor influencing innovativeness, mention is often made that perhaps *slack resources* exist more commonly in larger organizations than in smaller ones. The Daft and Becker (1978) study refers to *slack resources* as an enabler variable to innovation. In this study, an attempt was made to get at an injection of special funding into organizations, specifically for the purpose of carrying out innovation projects. The intent of testing for this variable was to link special macro-level funding (from the environment external to the specific organization) to the innovation count or innovativeness quotient.

H_{2d} Innovativeness (innovation initiation and implementation) measures are positively correlated with levels of organizational innovation modality.

The formulation of this hypothesis was especially influenced by the concept of *enabler variables*, discussed by Daft and Becker (1978). One of the relationships hypothesized in their study is an increase in high school innovativeness as the *favorable attitude* of the superintendent and school board toward innovation increases. In the present study, the attempt is made to move away from a measurement of attitude to a variable that is more tangible, *organizational innovation modality* being defined as specific organizational mechanisms and structures designed to foster innovation in an organization. The hypothesized relationship also represents an attempt to integrate some of the research work stemming from the cybernetic-adaptive paradigm (refer to discussion in Chapter 2).

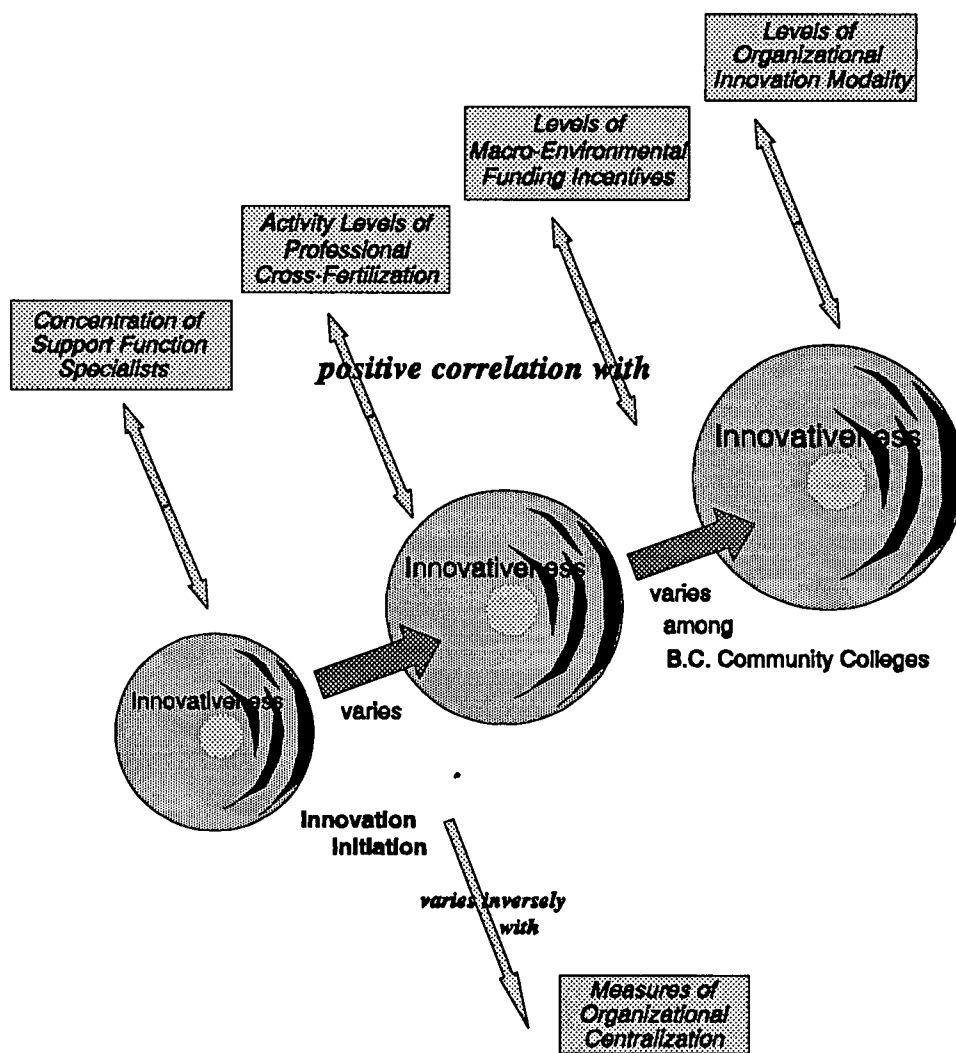
Hypothesis 3

H₃ Innovation initiation measures vary inversely with measures of organizational centralization.

That a distinction should be made between different stages of innovation processes in organizations has been pointed out in theoretical discussions as well as practical investigations of innovation processes in organizations (Hage and Aiken, 1970; Zaltman et al, 1973; Dewar and Dutton, 1986). The reasoning generally pursued is that decentralization of decision making provides the working atmosphere in which initiation and formulation of innovation can flourish, whereas the implementation of innovation decisions is best accomplished in more tightly structured and controlled organizations. This commonly used hypothesis is basically included in this study for replication. The implementation of this hypothesis follows the frequently employed methodology originally developed by Hage and Aiken (1967), usually referred to as the *Hage and Aiken Scale of Personal Participation in Decision Making and Hierarchy of Authority* (Miller, 1983).

The relationships between variables, postulated by the above hypotheses, are illustrated in a schematic diagram in Figure 3.1-1. This schematic diagram portrays the variable of *innovativeness* as variable, expanding or contracting spheres. This representation provides a visual interpretation of the hypothesized correlations between *innovativeness* and the other variables.

Figure 3.1-1 Hypothesized Relationships Between Innovativeness and Selected Variables



3.2 Description of Measurement of Variables and Survey Instruments

A list of definitions and operationalizations of the variables used in the hypotheses of this study was provided in Chapter 1. These variables represent a combination of replications of measures used in previous studies as well as some newly developed or adapted measures, more specifically suited to community college organizational environments.

Innovativeness, the variable representing the main focus of the study, is a *calculated ratio* (quotient) resulting from the number of innovations recorded in a community college organizational setting, during a one-year college fiscal period (April 1, 1988 to March 31, 1989), divided by the Student FTEs (Full Time Equivalents) of that institution, expressed in hundreds. A total institutional innovation count consisting of innovation initiations and innovation implementations was developed through the use of an *Innovation Listing Sheet* which was completed by College Vice-Presidents or Deans of Administration and/or Instruction. A specifically reported innovation, either an initiation or an implementation, was counted as a single innovation for the purpose of developing the *innovation count*. The *Innovation Listing Sheet* (included in Appendix A) collected a listing of innovations under the headings: Innovation Caption/Description; Innovation Influence/Source; Innovation Type (Administrative, Instructional, Human Resource Development). Two further headings were used to distinguish between Innovation Initiation and Innovation Implementation. Institutional data on *Student FTEs (Full Time Equivalents)* were obtained by means of a questionnaire sheet titled: *Institutional Statistics* (Appendix A). The *Innovativeness Quotient* is shown by the abbreviation, *Inn_Q*, in accompanying tables and charts. The hypotheses stated earlier focussed on correlations between the measure of *innovativeness* and a number of variables representing measures of organizational characteristics. The description will now focus on the measurement of these other variables.

Support Function Specialists are professional positions that exist to support the major functions of administration, instruction, and human resource development. Typically, the roles and functions of these positions are *consulting, analysis, research and development*. The level of support at an institution is measured in terms of FTE positions supporting each of the functional categories of administration, instruction, human resources. Part-time positions are expressed in .25 FTE units. The *Support Function Specialists - Tally Sheet* (Appendix A) was completed by Vice-Presidents/Deans of Administration and/or Instruction. An aggregate institutional measure of the number of FTE positions of Support Function Specialists was used to calculate a *Support Function Specialist Concentration* ratio for the organization. This ratio represents a standardized measure of the number of FTEs of Support Function Specialists to the Student FTEs in hundreds. This measure is identified as *SFS_C* in the accompanying tables and calculations.

Professional Cross-Fertilization measures the level of professional interaction of an institution's employees with other professionals during such events as conventions, conferences, workshops, scheduled professional development activities, etc.. Two specific variable measures were developed to assess the level of *professional cross-fertilization* of the employees of an institution:

- (1) **Travel and Conference Funding Measure**, identified as *TC_MEAS* or *TC_MS_RK* in the tables, is derived by calculating a ratio of reported institutional travel and conference funding in relation to reported total institutional expenditures. These institutional figures were collected by means of the *Institutional Statistics* questionnaire sheet (Appendix A). The **Travel and Conference Funding Measure** is a measure which represents an actual indication of institutional spending on travel and conference activities in relation to the institution's operating expenditures. As such, this measure is a direct expression of the funding which supports professional interaction activities.

(2) **Professional Interaction Index**, identified as *PI_IX*, is a calculated index number for each institution. The raw data for this calculated index were collected by means of the *Measure of Organizational Centralization* questionnaire sheet, under the subheading: *Index of Professional Interaction*. This questionnaire sheet was distributed to a randomly selected 10% sample of an institution's total employee base, covering the whole range of employment levels and positions within an institution. Employees responded to four-point rating scales on: (a) annual frequency of professional interaction events; and, (b) rating the institution's provision of professional interaction opportunities. Similarly to the *Aiken and Hage Scale* calculations, averages were calculated for categories of employee groups, with a final institutional average derived from group averages. The final institutional average is the *Professional Interaction Index* (see Appendix A for rating scale details).

External Innovation Support Funding details were collected with the *Institutional Statistics* questionnaire. Institutions were requested to report *External Special Project Grants/Innovation Funds* designated specifically to support some innovation(s) in the organization. The level of external funding reported by the institution is then expressed as a ratio in relation to the Total Operating Expenditure over the same time period. The *External Innovation Support Funding* measure is identified as *XISF_MSR* in the tables.

Organizational Innovation Modality is a total count of the number of organizational mechanisms, structures, and/or arrangements instituted and mandated to foster innovation within the organization. For each institution, an actual count, *MOD_CNT*, would be reported and then converted into a ranked variable for the sample population of institutions, *MDCNT_RK*.

Organizational Centralization measures were calculated by adhering to the procedures outlined in the *Handbook of Research Design and Social Measurement* (Miller, 1983). The questions for the Aiken and Hage Scales of *Personal Participation in Decision Making* and *Hierarchy of Authority* can be viewed by referring to the *Measure of Organizational Centralization* questionnaire (Appendix A). Raw data were collected by randomly sampling 10% of the total employee base of each institution, covering all levels of employment positions. Employees were grouped within the primary and secondary functions of the institution and as groups with different work functions or status roles within the organization (see questionnaire in Appendix A). Average scores were calculated for each employee group, the primary and secondary function groupings, and then the institution as a whole. The overall institutional average scores, consisting of the average of group averages, became the *Index of Personal Participation in Decision Making (DM_IX)* and the *Hierarchy of Authority Scale (HA_SC)*, respectively. A sample calculation spreadsheet, detailing the calculation procedure to develop the two *Organizational Centralization* measures, is provided in Appendix B.

Comments on Instrument Validity and Reliability

As has been indicated in the discussion dealing with the formulation of the hypotheses (Section 3.1 of this chapter), most of the variables employed in this study as well as the hypotheses themselves, are replications of previously conducted research studies. Some comments are in order to establish the validity of the survey instruments and questionnaires used to gather the data on the variables described. Prior to administering any data collection survey questionnaires for actual data collection, drafts of the different questionnaires were circulated to some selected college administrators to establish language and content validity and clarity of the various forms and the questions contained therein. Based on feedback received, a final set of questionnaires was produced as attached in Appendix A. Three colleges were then sampled by means of on-site visits involving face-to-face

interviews which provided opportunity for validation of the survey instruments as appropriate tools for the data gathering process. The concept of pre-testing the instruments for validity throughout the college system did not appear to be a viable option. Participants in the survey research would not have been willing to participate twice in essentially the same time-consuming process of responding to an extensive set of questionnaires. Consequently, testing for instrument validity had to be limited to the steps described. British Columbia community colleges report annually on a set of institutional statistics that also provided the necessary data on several of the variables surveyed (e.g., *Travel and Conference Funding, Operating Expenditures, Student Full-Time Equivalents*). Data collected on these variables should be considered as not only valid but also highly reliable. Some comments could be made with respect to the use and validity of the *Aiken and Hage Scales of Personal Participation in Decision Making and Hierarchy of Authority*. As has already been reported in the review of the literature and the description of the variables, these scales have been employed by a number of researchers who conducted studies dealing with organizational characteristics and variables. Miller (1983), in the Handbook of Research Design and Social Measurement, lists seven research studies that utilized these scales. Additional studies employing the *Aiken and Hage Scales* have already been mentioned: Cohn and Turyn (1984) and Dewar and Dutton (1986). The latter two studies also employed *organizational complexity* variables similar to the data collected on the *Support Function Specialist* variable in this study. Although the *organizational centralization and complexity* variables have been measured by means of the *Aiken and Hage Scales* in a number of studies, no specific reports on measured reliability have been found.

3.3 Research Site and Data Collection

The research site for this study was the community college system of the Province of British Columbia, comprising a population of fifteen (15) community colleges throughout the province. The chief executive officers of all fifteen community colleges in the province were contacted to seek the participation of the institution in the research study (letter of solicitation is included in the questionnaire set in Appendix A). Survey questionnaires were distributed to the colleges in the fall of 1989. The period of study of innovation in community colleges covered the fiscal year of April 1, 1988 to March 31, 1989. Out of the fifteen colleges contacted, eight complete data sets were collected by the end of December, 1989. Several colleges declined to participate in the study. The main reason given was overwork of college personnel and an unwillingness to devote any amount of human resources to the demands of participating in the research project. In the case of two other institutions, the data sets were incomplete to the extent to be unusable in the data analysis process. Thus, the research study on *Innovation in British Columbia Community Colleges* was based on the eight complete sets of data collected in the fall of 1989.

A complete set of survey questionnaires is provided in Appendix A. The organizational structure of each institution was examined for the purpose of selecting individuals in the specific positions to be surveyed at each college. The local administration of each set of questionnaires was typically assigned by the chief executive officer to an executive assistant or institutional research officer. The researcher followed up on progress of completion and collection of survey questionnaires with a number of personal phone calls to the person assigned at each institution. Two institutions were visited in person to gain a first-hand assessment regarding the functioning of the data collection procedures. From the personal discussions in face-to-face meetings with the local participants in the survey research, it was concluded that the formulated process of data collection was in fact workable.

3.4 Data Analysis Procedures

The survey questionnaires (see Appendix A) were designed to collect a variety of data: *innovation listings, innovation influences, innovation modes, Student Full-Time Equivalent statistics, expenditures on travel and conference, Support Function Specialist position measures, other funding and expenditure totals*. These data were partly qualitative and partly quantitative in nature. Qualitative responses (*innovation listings, innovation influences, organizational innovation modality, factors affecting innovativeness stated by CEOs*) were entered into *Lotus Agenda*, an information management and retrieval software package. This program provides the capability to sort, view, and group the information in different ways as well as tallying the number of responses within any given category.

Following data entry into *Lotus Agenda*, the *innovativeness quotient* was calculated in *Systat*, based on the innovation listing count derived from *Lotus Agenda*. The qualitative data stored in *Lotus Agenda* provides opportunities for future investigation of the data. In the case of this research study, analysis of the data was limited to the investigation framework established by the hypotheses. All quantitative raw data were entered into *Systat*, where transformations into the specified variables were calculated. The raw data collected from the survey questionnaires collected from the 10% employee sample (data from responses to the *Aiken and Hage* questions on centralization of authority and the newly developed *Professional Interaction Index*) were entered into a spreadsheet program. Institutional scale and index numbers were calculated by the computer spreadsheet for *Personal Participation in Decision Making, Hierarchy of Authority, and Professional Interaction*. Central to the study were the stated hypotheses of correlation between innovativeness and a number of variables. Correlation coefficients for the hypothesized relationships were calculated with the *Systat* program. Since all variables, with the exception of the *Organizational Innovation Modality*, were in the form of calculated ratio scales, the *Pearson Correlation Coefficient* was calculated for these hypothesized relationships. To accom-

modate *Organizational Innovation Modality*, represented as an ordinal or rank-ordered variable, *Kendall TAU-B Coefficients* were calculated for several appropriate relationships.

To test the stated hypotheses, a *level of significance* of 0.10 was selected. Furthermore, a *two-tailed test* was applied to allow for bi-directional correlations to appear as significant relationships. Since this study was exploratory in nature, in that the research model and methodology applied had not been employed in the setting of community colleges before, the alpha level, $\alpha = 0.10$, was justifiable (Borg and Gall, 1983, p. 380). Even though the hypotheses of the thesis were stated as uni-directional relationships, statistical power was sacrificed for the sake of discovering bi-directional relationships that might otherwise have been ignored by employing the criteria of a one-tailed test.

Chapter 4

Analysis of the Data and Research Findings

Discussion of the analysis of the data and results obtained from the survey research is organized around the working hypotheses. First, several tables are presented that summarize the data collected and the results of the data analyses performed in accordance with the methodology described in the previous chapter.

4.1 Data Analysis

The data collected and the data analyses performed were the result of drawing on completed survey questionnaires from eight (8) community colleges of a total population of fifteen (15) colleges in the British Columbia community college system. Specifically, the institutions that participated in the study and their abbreviations in reporting were:

1. Cariboo College	CAR
2. Douglas College	DC
3. East Kootenay Community College	EKC
4. Fraser Valley College	FVC
5. Malaspina College	MC
6. North Island College	NIC
7. Northern Lights College	NLC
8. Vancouver Community College	VCC

Table 4.1-1, divided into parts 4.1-1A and 4.1-1B, provides a summary of the raw data and transformed data in accordance with the hypothesized relationships and the measures of variables described in Chapter 3. The first set of data in Table 4.1-1A represent the *Innovativeness* measures:

Innovativeness Count (INN_CNT), Innovativeness Quotient (INN_Q), and Innovativeness Rank (INN_RK). The 95% Confidence Limits are provided for the *Mean* and *Standard Deviation* of the

Innovativeness Quotient. Secondly, the institutional statistics of *Student-Full Time Equivalents* (*ST_FTE*) and *Student FTEs in Hundreds* (*ST_FTE_H*) are provided. These statistics are used to standardize other variable measures on institutional size. A summary is given of the specific *Support Function Specialist* measures as well as the total for these and the measure used in the correlation calculation, *Support Function Specialist Concentration* (*SFS_CONC*) and *Support Function Specialist Concentration Rank Order* (*SFS_C_RK*).

Table 4.1-1A **Summary of Collected and Transformed Data:**
Innovation in B.C. Community Colleges

COLL	INN_CNT	INN_Q	INN_Q_RK	ST_FTE	ST_FTE_H
	Innovation	Innovation	Innov. Quotient	Student	Student FTEs
	Count	Quotient	Rank	Full Time Equivalents	in Hundreds
CAR	37	1.318	2	2,807.90	28.08
DC	24	0.600	8	4,001.00	40.01
EKC	11	1.297	3	847.80	8.48
FVC	32	1.693	1	1,889.60	18.90
MC	33	1.061	5	3,111.00	31.11
NIC	16	1.112	4	1,439.10	14.39
NLC	9	1.026	6	876.90	8.77
VCC	66	0.681	7	9,692.60	96.93

Innovation Quotient (INN_Q) Confidence Limits:

Mean	1.10	95%	0.81	to	1.39
Standard Deviation	0.33	99%	0.66	to	1.54

COLL	SFS_A	SFS_I	SFS_H	SFS_TOT	SFS_CONC	SFS_C_RK
	Administration	Instruction	HRD	Total for College	Concentration	Concentration Rank
CAR	1.00	9.30	0.25	10.55	0.37573	4
DC	4.00	6.25	1.50	11.75	0.29368	6
EKC	2.55	2.35	0.00	4.90	0.57797	3
FVC	0.00	1.50	0.00	1.50	0.07938	8
MC	5.50	5.00	1.00	11.50	0.36966	5
NIC	2.00	7.00	1.00	10.00	0.69488	2
NLC	2.00	6.00	1.00	9.00	1.02634	1
VCC	8.50	18.00	1.00	27.50	0.28372	7

Data collected on *Total Annual Institutional Operating Expenditures (TOT_EXP)*, *Travel and Conference Expenditures (TC_EXP)*, *Travel and Conference Funding Measure (TC_MEAS)*, and *Travel and Conference Funding Measure Ranking (TC_MS_RK)* are summarized in Table 4.1-1B. *External Innovation Support Funding* is expressed and summarized as *(XISFUNDS)* and the *External Innovation Support Funding Measure (XISF_MSR)*. The *Organizational Innovation Modality Count (MOD_CNT)* and its calculated institutional ranking (*MDCNT_RK*) are also stated. Lastly, the calculated results are shown for the measures of *Organizational Centralization*, the *Index of Personal Participation in Decision Making (DM_IX)*, the *Hierarchy of Authority Scale (HA_SC)*, and the *Professional Interaction Index (PI_IX)*.

Table 4.1-1B **Summary of Collected and Transformed Data:**
Innovation in B.C. Community Colleges

COLL	TOT_EXP	TC_EXP	TC_MEAS	TC_MS_RK	XISFUNDS	XISF_MSR
	Total Operating Expenditures	Travel/Conference Expenditures	T/C Measure	T/C Measure Rank	External Innovation Support Funding	XIS Funding Meas.
CAR	\$15,980,684.00	\$280,670.00	0.0176	4		
DC	24,874,080.00	328,000.00	0.0132	6	\$1,843,000.00	0.0741
EKC	7,374,617.00	163,808.00	0.0222	3	93,660.00	0.0127
FVC	11,927,114.00	307,926.00	0.0258	2	47,289.00	0.0040
MC	27,219,484.00	302,371.00	0.0111	7	79,896.00	0.0029
NIC	11,000,000.00	158,000.00	0.0144	5	220,000.00	0.0200
NLC	12,168,198.00	388,012.00	0.0319	1		
VCC	64,568,263.00	634,442.00	0.0098	8	362,168.00	0.0056

COLL	MOD_CNT	MDCNT_RK	DM_IX	HA_SC	PI_IX
	Organiz. Innovation Modality Count	Organiz. Innov. Modality Count Rank	Index - Personal Partic. in Decision Making	Scale of Hierarchy of Authority	Professional Interaction Index
CAR	4	4	2.87	2.18	1.76
DC	5	3	2.92	2.13	1.60
EKC	4	4	2.37	2.14	1.43
FVC	7	1	2.99	2.17	2.44
MC	4	4	3.10	2.32	1.51
NIC	6	2	2.41	2.51	1.49
NLC	6	2	2.67	2.03	1.81
VCC	6	2	2.63	2.52	1.33

Variability of Innovativeness among B.C. community colleges, expressed by the *Innovativeness Quotient (INN_Q)*, is shown graphically by Figure 4.1-1.

Figure 4.1-1 Variability of Innovativeness

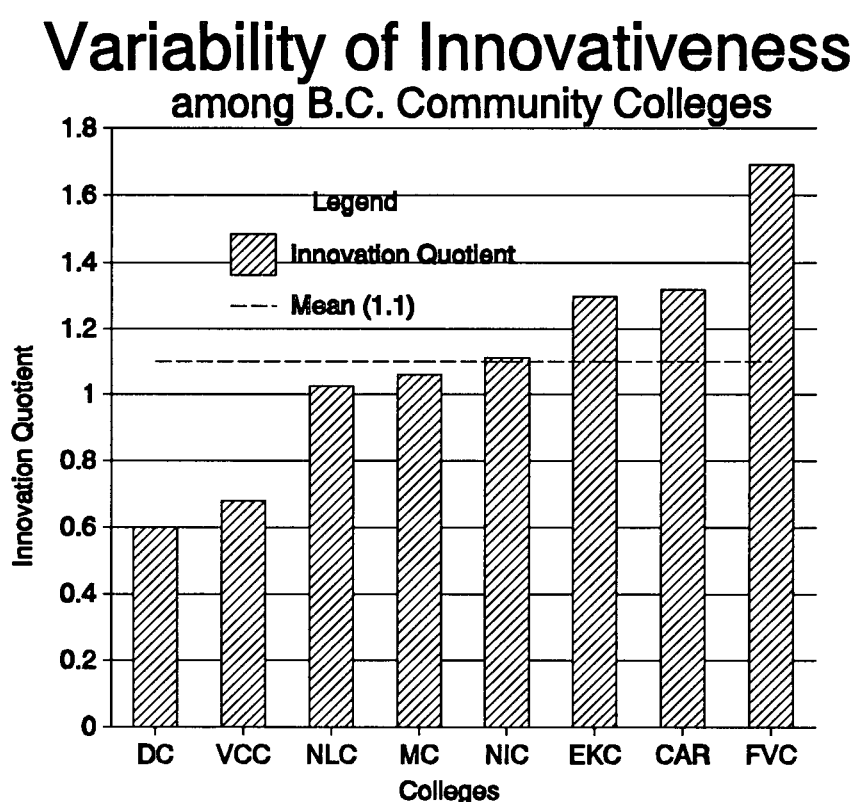


Table 4.1-2, on the following page, represents a *Pearson Correlation Matrix* showing the correlation coefficients of six variables (6), excluding the *External Innovation Support Funding Measure (XISF_MSR)*. A *Matrix of Probabilities*, calculated for non-significance of the correlation coefficients, is also provided. Correlation coefficients with probabilities of 0.10 or lower were determined as significant in this study.

Table 4.1-2 *Pearson Correlation Matrix*
Innovation in B.C. Community Colleges

	INN_Q Innovation Quotient	TC_MEAS Travel/Conference Measure	SFS_CONC Support Function Specialist Concentration	DM_IX Partic. in Decision Making Index	HA_SC Hierarchy of Authority Scale	PI_IX Professional Interaction Index
INN_Q	1.00					
TC_MEAS	0.54	1.00				
SFS_CONC	-0.14	0.46	1.00			
DM_IX	0.07	-0.13	-0.56	1.00		
HA_SC	-0.27	-0.73*	-0.20	-0.25	1.00	
PI_IX	0.70*	0.62*	-0.29	0.47	-0.48	1.00

Matrix of Probabilities

	INN_Q	TC_MEAS	SFS_CONC	DM_IX	HA_SC	PI_IX
INN_Q	0.00					
TC_MEAS	0.16	0.00				
SFS_CONC	0.75	0.25	0.00			
DM_IX	0.87	0.76	0.15	0.00		
HA_SC	0.52	0.04	0.64	0.55	0.00	
PI_IX	0.06	0.10	0.49	0.24	0.23	0.00

* $p \leq 0.10$ (two-tailed test)

Table 4.1-3 presents a *Matrix of Kendall TAU-B Coefficients* for correlated variables in ranked format.

Table 4.1-3 *Matrix of Kendall TAU-B Coefficients*

	INN_Q_RK Innovation Quotient Rank	TC_MS_RK Travel/Conference Measure Rank	SFS_C_RK Support Function Specialist Conc. Rank	MDCNT_RK Modality Count Rank
INN_Q_RK	1.00			
TC_MS_RK	0.43	1.00		
SFS_C_RK	-0.07	0.36	1.00	
MDCNT_RK	0.00	0.16	-0.24	1.00

4.2 Limitations of the Data

Although considerable care was taken to construct a set of survey questionnaires that would gather data which should have been available at all the surveyed institutions, some difficulties manifested themselves in the data collection process. Not all respondents at all institutions were able to supply accurate data on all the variables surveyed. Consequently, the following limitations with respect to the data gathering process need to be identified.

The first limitation is a lack of distinction between innovation initiation and implementation. Although the *Innovation Listing* questionnaire sheet provided for a distinction, respondents basically did not perceive the need for making a clear distinction between these two stages of the innovation process. The only hypothesis especially affected by this lack of distinction was: *3. Innovation initiation measures vary inversely with (a) measures of organizational centralization.*

The second limitation of the data gathering process relates to the ability of some respondents in some institutions to accurately measure and/or provide data on two specific variables: (1) *Support Function Specialist* and (2) *Macro-Environmental Funding Incentives*. Respondents at most institutions attempted to provide data on *Support Function Specialists* positions in the organization. However, some wrote specific comments which indicated some difficulty in measuring this variable accurately. The difficulty in many organizations is one of clearly separating the different support functions from other responsibilities assigned to individuals who also perform the support functions. For example, an individual faculty member may teach half-time and act as a curriculum or professional development consultant the remaining time. In some other cases, such individuals may have even more diversified roles to fulfill (computing skill development, etc.). The problem of estimating part-time responsibility allocations is most evident in smaller institutions. The other variable for which similar problems were

encountered is the *External Innovation Support Funding Measure (XISF_MSR)*. In many institutions, funds which may have come into the college for innovation purposes, are not tracked separately by computerized accounting systems to easily identify and track them from year-end financial statements. Thus, reporting on this variable was less than satisfactory. The figures provided could not be considered as highly accurate in being tied specifically to innovative activities. Most colleges do not have an equivalent to industry and private sector budgets for *Research and Development (R&D)* and the specific sources of such *R&D* funds. Due to the difficulty of obtaining accurate data for this variable, it was omitted from the procedure of correlating it with the *Innovation Quotient*.

The last variable for which a disclaimer must be made is the *Organizational Innovation Modality Count (MOD_CNT)*. This variable did not suit itself to producing enough variability among institutions to be of particular value. The count (*MOD_CNT*) varied only from 4 to 7 (see Table 4.1-1), with several organizations tying for the same count.

From the above discussion, it is evident that several hypotheses fall into the category of being affected by the limitations of the data gathering process, perhaps not unexpectedly for an exploratory study. The framework for the study, which was derived from studies conducted in a totally different sector, the private industrial economic sector, needed to be explored and tested for compatibility in the tertiary economic sector, the post-secondary colleges. Some of the limitations of the data gathered could be eliminated in future studies by redesign of the data gathering instruments.

4.3 Summary of the Results

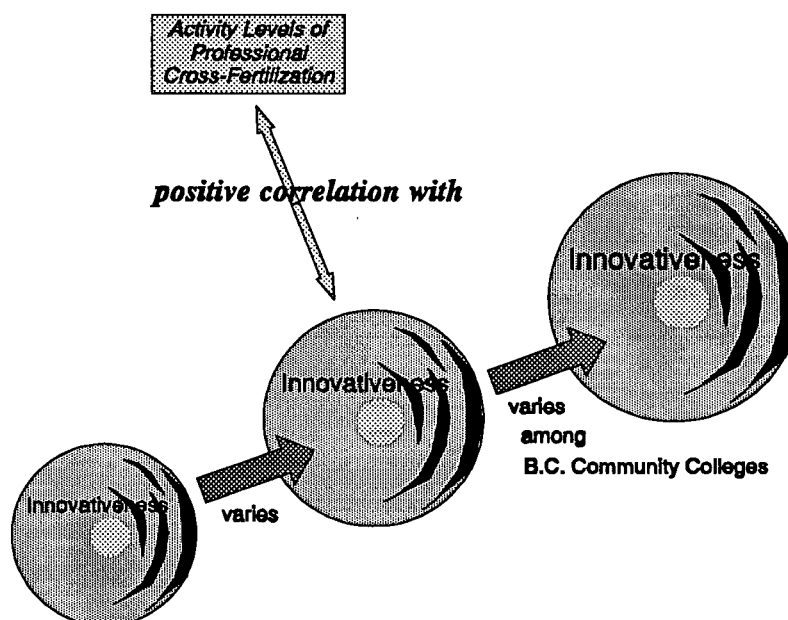
The correlation coefficients for the hypothesized relationships are presented in the *Pearson Correlation Matrix*, Table 4.1-2. For the most part, the coefficients do not confirm the hypotheses stated for this study. The previous section on the *Limitations of the Data* provided some of the reasons for this situation. However, there are some encouraging results. The correlation coefficients of two variables, the *Professional Interaction Index (PI_IX)* and the *Travel and Conference Funding Measure (TC_MEAS)* support a significant relationship with the *Innovativeness Quotient (INN_Q)*. The key correlate with *Innovativeness* in B.C. Community Colleges, as revealed from this study, is the factor of *Professional Interaction* (correlation coefficient of .70, $p < 0.10$ in a *two-tailed test*). The coefficient for the *Travel and Conference Funding Measure* of .54 with an error probability of .16, is a related variable which can also be considered as somewhat supportive. Since the *TC_MEAS* coefficient falls outside the probability limits set ($\alpha = 0.10$), it is not significant statistically. These two variables are definitely a related pair (the *PI_IX* and the *TC_MEAS* correlate with a coefficient of .62) and together support the hypothesized relationship: *Professional Cross-Fertilization* is positively correlated with *Innovativeness*. This research finding fits the theoretical framework outlined earlier under the heading of *Organizational Innovation Research within the Cybernetic-Adaptive Paradigm* (Section 2.3.3.3). The positive correlation between *Professional Cross-Fertilization* and *Innovativeness* is a relationship that makes perfect sense. When members of the college community participate in events where professional interaction takes place (workshops, conferences, meetings, etc.), new ideas, processes, ways of doing things, programs are discussed and brought back to the home institution. By applying a *two-tailed test* to the correlation coefficients for the hypothesized relationships, the *Hierarchy of Authority Scale (HA_SC)* and the *Travel and Conference Measure (TC_MEAS)* appear as a significant inverse relationship ($r = -0.73$). Although this relationship was not one of the formulated hypotheses, it is a finding of some interest. The negative correlation coefficient essentially supports the notion that

organizations that exhibit a high degree of centralization of authority would appear to be characterized by lower levels of travel and conference funding.

The *Matrix of Kendall TAU-B Coefficients* (Table 4.1-3), calculated for various ranked variables, reveals no significant relationships.

In summary, the results of the study support *Hypothesis 2. (b)*, that a positive correlation exists between the variable *Professional Cross-Fertilization* and *Innovativeness* in B.C. community colleges. The other hypotheses stated for this study are not supported by the research findings. Figure 4.3-1 illustrates the major finding of the research study in schematic form. This figure shows *innovativeness* as varying sizes of spheres correlating with *Activity Levels of Professional Cross-Fertilization*.

Figure 4.3-1 Supported Relationships Between Innovativeness and Selected Variables



Chapter 5

Conclusions, Recommendations, Implications

5.1 Conclusions

This study set out to investigate to what extent innovativeness varies among B.C. community colleges and to what degree specific organizational characteristics correlate with institutional innovativeness. The research methodology used in this study followed research investigations that largely focussed on private sector organizations. The hypotheses were formulated from an existing body of theory with a focus on the organizational context of innovation. This study was exploratory in nature, in that the existing studies were conducted in a different organizational milieu. One of the outcomes was to be some indication as to the comparability of influence of organizational variables on innovativeness in colleges as public institutions versus private sector organizations. The results already discussed do not provide a totally clear answer to this aspect of the research.

With respect to the hypotheses that were stated to answer the research question, the following conclusions can be drawn from the study of *Innovation in British Columbia Community Colleges*.

Hypothesis H₁

Innovativeness varies among B.C. community colleges.

Considerable variation exists in innovativeness among community colleges. This in itself is an important finding, because it makes it possible to investigate factors and variables that would account for this variability.

Hypothesis H_{2a}

Innovativeness measures correlate positively with concentrations of support function specialists in the organizations.

This hypothesized relationship could not be supported from this study. Reference has already been made to difficulties encountered with the data collection with respect to this variable. Even in studies carried out previously, this specific variable has received mixed results in reported findings: Dewar and Dutton (1986); Ettlie, Bridges and O'Keefe (1984).

Hypothesis H_{2b}

Innovativeness measures correlate positively with activity levels of professional cross-fertilization.

A significant positive relationship between *innovativeness* and at least one of the variables measuring *professional cross-fertilization*, was identified. This is an important finding. Not only is it a confirmation of a theoretically based variable but it is also an important contribution to existing knowledge about innovativeness in educational organizations. The *Professional Interaction Index*, one of the surrogate measures of *Professional Cross-Fertilization*, showed a significant positive correlation with *innovativeness* in B.C. community colleges. Although the correlation coefficient for the other surrogate measure, *Travel and Conference Funding*, was not statistically significant at the alpha level, $\alpha = 0.10$, the findings support the hypothesized relationship in terms of directionality and a coefficient value that is close to being significant ($p = 0.16$) in a bi-directional test. These findings are corroborated by such previous research as Allen (1970), Utterback (1974), Cohn and Turyn (1984), and Ebadi and Utterback (1984), all of which drew attention to such factors as *participation in extra-organizational professional activities* and *communication frequency* with respect to knowledge related to innovations. The relationship between organizational innovativeness and outside professional interaction as well as the positive correlation between the *Professional Interaction Index (PI_IX)* and

the *Travel and Conference Measure (TC_MEAS)* ($r = .62$), can be viewed as having relevance for the college environment.

Hypothesis H_{2c}

Innovativeness measures correlate positively with levels of macro-environmental funding incentives.

This hypothesis was not supported for similar reasons as *H_{2a}*. As was reported in Chapter 4, due to the difficulty of obtaining accurate data for this variable, it was omitted from the procedure of correlating it with the *Innovation Quotient*.

Hypothesis H_{2d}

Innovativeness measures correlate positively with levels of organizational innovation modality.

This relationship was not supported. The range of the *modality count (MOD_CNT)* was too small to be of value in distinguishing among institutions.

Hypothesis H₃

Innovation initiation measures vary inversely with measures of organizational centralization.

Again, this hypothesized relationship could not be supported for reasons of limitations in the data collection process. Respondents did not make a clear distinction between the two stages of the innovation process, initiation versus implementation.

For most of the variables under investigation, the study could not provide clear evidence whether the hypothesized relationships would be supportable. This situation may be accounted for from two perspectives. Firstly, the study was limited in scope. It did not have the kind of resource support

necessary to conduct intensive interviews which characterized some of the studies on which this research was modelled. Secondly, the data collection process revealed that the community college sector does not have the same data readily available on which studies in the private sector relied. For example, budget allocations or costs in the private sector relating to research and development (*R&D*) do not have an equivalent counterpart and are not as clearly identifiable in educational settings.

If a general conclusion is to be drawn from this study it would be that *outside professional cross-fertilization* indicates a strong positive relationship with *organizational innovativeness*. The other variables examined do not support any significant relationships with innovativeness.

Even a confirmation of only one significant positive correlation out of the hypotheses posed for this study is an important outcome that provides for colleges some additional theoretical basis for strengthening innovative activity. It can now be suggested with some degree of confidence that a connection exists between innovativeness and the development of human resources in institutions through such activities as participation in workshops, conferences, and professional meetings.

Additional Conclusions

In addition to the conclusions reached with respect to the hypothesized relationships, two other significant correlations warrant comments: (1) between *Professional Interaction Index (PI_IX)* and *Travel and Conference Funding Measure (TC_MEAS)*; and, (2) between *Hierarchy of Authority Scale* and *Travel and Conference Funding Measure (TC_MEAS)*. A significant correlation coefficient of 0.62 ($p = 0.10$) supports the choice of the two surrogate measures, the *Professional Interaction Index* and the *Travel and Conference Funding Measure*, to express the variable used in H_{2b} for *Professional Cross-Fertilization*. Thus, not only are *Travel and Conference Funding* and the *Professional Interac-*

tion Index directly related but they also directly relate to *Innovativeness*. The second additional finding is of some interest. The inverse relationship between the *Hierarchy of Authority Scale* and the *Travel and Conference Funding Measure* ($r = -0.73$) leads to the conclusion that institutions with highly centralized and controlling hierarchies of authority are characterized by lower *Travel and Conference Funding Measures*.

As with all correlation studies, attention should be drawn to the duality of interpretations possible with respect to significant correlations. Significant correlations certainly are *NOT* cause and effect relationships. Such interpretation of correlations would indicate stepping beyond the bounds of the methodology employed. Thus, the significant relationships that have been discussed, could be viewed from two differing perspectives. On the one hand, the relationship of *Professional Cross-Fertilization* and its positive correlation with *Innovativeness* could be viewed as innovativeness varying as professional cross-fertilization varies. The other interpretation might be that as organizational innovativeness varies, so does professional cross-fertilization. To put this somewhat differently, it could be said that as the variable of *Professional Cross-Fertilization* is bolstered in an organization, then *Innovativeness* will vary along with it. The other view would be that as an organization demonstrates higher measures of innovativeness, the levels of professional cross-fertilization will increase along with that change in institutional character. Previous research studies which influenced this project, such as the Cohn and Turyn (1984) study and the Ebadi and Utterback (1984) study, tend to lend support to the first interpretation of the correlations shown to be significant.

The conclusions drawn from the results of the study should be considered as applicable to the British Columbia community college system. Since the data sample was drawn only from the B.C. college system, the generalizations cannot be extended to a larger population of colleges than the B.C. system.

However, it should be reiterated that the primary conclusion drawn from the study corroborates an existing body of theory. This would lend credence to broader acceptance of the main conclusion of a *direct linkage between innovativeness and professional cross-fertilization* within the organizational context of community colleges.

5.2 Recommendations for Further Research

Research studies such as this one not only provide value from the direct outcomes of the hypotheses that were tested but also from the process of the investigation itself. Thus, several recommendations arise from this study. The first strong recommendation is to continue research on the theme of innovation in community colleges. There was a consistently high level of interest in arriving at new insights with respect to innovation on the part of those who had contact with this study. This study must be viewed as opening the door for further research to be carried out in the area of innovation within the organizational context of community colleges. Since variation in innovativeness between institutions has been established by this study, future research, with larger sample sizes, could take the approach of multi-variate analysis to provide further insights into important relationships that are positively linked with innovativeness in colleges. Another recommendation is to refine the measurement and data collection process to resolve some of the open questions relating to several variables of this study: *concentration of support function specialists, funding influences, and centralization factors*. The data collection process employed also yielded a variety of *soft data* or qualitatively loaded information on innovations initiated and implemented within colleges. These details provided the *innovation counts* used in this study but the data collected could be utilized in further research of a qualitative nature rather than the approach taken in this study, that of a quantitative analysis and testing of the hypothesized relationships. Although the qualitative data are readily available, analysis and use of the same was beyond the framework of investigation established for this study.

5.3 Implications for the Community College System

At the outset of this study, in Chapter 2, attention was drawn to *The Imperative of Innovation*. Not only British Columbia community colleges but the whole post-secondary educational system of Canada must be assessed in a global arena. The reality of a global village of educationally advanced nations that interact in competitive world markets where creativity and innovativeness provide the edge for a comparative advantage, provides challenges to educational systems to respond with flexibility and adaptability. The major finding of this study, that there is a positive relationship between *professional cross-fertilization* and *innovativeness*, has implications that relate to the capabilities of educational institutions to foster innovativeness. Assuming a positive linkage between innovativeness and outside professional interaction, the response of shrinking or eliminating *travel and conference funding* which accompanied the decade of restraint of the mid '70s to mid '80s would seem quite inappropriate to meet the challenges of global competition in the knowledge industries. The findings of this study would lend support to policies in the college system that are oriented towards human resource development through workshops, conferences, and professional meetings. To put it more directly, if college personnel and college leaders desire innovativeness, professional activities that provide stimulation through interaction with other professionals would constitute an important link in the process.

In light of the inverse relationship that was established between *travel and conference funding* and *strongly hierarchical institutions*, different constituencies of community colleges may want to probe this relationship further to clarify these linkages and their effects upon professional cross-fertilization outside the institution and organizational innovativeness.

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Appendix A

Survey Questionnaires

The following pages are copies of the survey questionnaires used to collect data in this research study.

Innovation in B.C. Community Colleges
Survey Questionnaire
CHIEF EXECUTIVE OFFICER QUESTIONNAIRE

Name of Institution

Chief Executive Officer

Thank you for taking a few moments to complete this short questionnaire. Your participation is valued and appreciated.

1. Rank Ordering of B.C. Colleges on Innovativeness

Definition:

An *innovation* is the initiation or the implementation of *new* ideas, processes, programs, or services in an organizational context. To qualify as *new*, the innovation simply has to be *perceived as new* in the organization.

Innovativeness is defined as the degree or level at which innovation initiation and/or implementation occur in an organization.

From your knowledge of the Community College System in B.C., identify and rank as 1, 2, 3, the three colleges which you consider to be the most innovative of all the B.C. colleges. You may include your institution in the top ranking. All rank scores will be aggregated.

___ <i>Camosun College</i>	___ <i>Malaspina College</i>
___ <i>Capilano College</i>	___ <i>North Island College</i>
___ <i>Cariboo College</i>	___ <i>Northern Lights College</i>
___ <i>College of New Caledonia</i>	___ <i>Northwest Community College</i>
___ <i>Douglas College</i>	___ <i>Okanagan College</i>
___ <i>East Kootenay Community College</i>	___ <i>Selkirk College</i>
___ <i>Fraser Valley College</i>	___ <i>Vancouver Community College</i>
___ <i>Kwantlen College</i>	

2. Factors Affecting Innovativeness In YOUR Institution

Please list the factors which you consider to have the greatest influence on *innovativeness* in your institution. After listing, please assign rank order of importance to these factors (1 = most important).

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Innovation in B.C. Community Colleges
Survey Questionnaire
INSTITUTIONAL STATISTICS

Name of Institution _____

Completed by: _____

Comptroller/Institutional Researcher _____

Name _____

To assist in the completion of this questionnaire, please refer to the accompanying sheet, *Definition of Terms*. The institutional statistics requested, should refer to the most recent fiscal year: April 1, 1988 to March 31, 1989.

A. Measure of Institutional Size

Student FTEs (*Ministry-Funded FTEs*)

(*excluding Non-Credit Continuing Education Programs*)

Institutional Total - Fiscal Year 1988/89: _____

B. Surrogate Measure for Professional Interaction (*Travel/Conference Funding*)

Travel and Conference Funding will be utilized as a surrogate measure for the variable of Professional Interaction (*i.e., Conferences, Conventions, Seminars, Workshops, Training Sessions*) Please provide:

(1) Institutional Total of
Travel and Conference Funding - Fiscal Year 1988/89: _____

(2) Total Institutional Expenditures - Fiscal Year 1988/89: _____

C. EXTERNAL INNOVATION SUPPORT FUNDING

(*Macro-Environmental Funding Incentives to support innovation*)

External Special Project Grants/Innovation Funds designated specifically to support some innovation(s) in the organization

(*Special Innovation Project Funding will be related to Total Expenditures for the institution.*)

Institutional Totals:

Total of External Funding
designated to Innovation Projects
Fiscal Year 1988/89: _____

Total College Expenditures
Fiscal Year 1988/89: _____

Innovation in B.C. Community Colleges

Research Study

MEASURE OF ORGANIZATIONAL CENTRALIZATION

This questionnaire is part of a study on *Innovation in B.C. Community Colleges*. Your assistance in completing this questionnaire to assess *Personal Participation in Decision Making* and the *Hierarchy of Authority* in your institution, is very much appreciated. Your personal identity is NOT required. This completely anonymous survey can only succeed, if you can be counted on to return this completed questionnaire to the College's Personnel Office, so that the statistically required number of returns can be attained. **Please complete and return immediately. Thank you.** *The Researcher.*

Please CHECK the appropriate level of your position in the organization within one of the two categories:

Primary Functions of the Institution Instructional Function Position Levels

Faculty/Instructor

Dept. Hd./Coordinator

Div. Chair/Progr. Director

Educ. Dean/V.P.

Secondary Functions of the Institution Support Function Position Levels

Support Staff (clerical, secretarial
Progr./Instr. Assist., receiver,
Student Services staff, etc.)

Middle Management/
Supervisory Position
Dean/Dir./V.P. of
Support Services

Aiken and Hage Scale of Personal Participation in Decision Making

Index of Actual Participation

Check one of the five responses for each of the following questions.

	Never	Seldom	Sometimes	Often	Always	Do NOT use this column
1. How frequently do you usually participate in the decision to hire new staff?	_____	_____	_____	_____	_____	_____
2. How frequently do you usually participate in the decisions on the promotion of any of the professional staff?	_____	_____	_____	_____	_____	_____
3. How frequently do you participate in the decisions on the adoptions of new policies?	_____	_____	_____	_____	_____	_____
4. How frequently do you participate in the decisions on the adoptions of new programs?	_____	_____	_____	_____	_____	_____

Hierarchy of Authority Scale

Check one of the four responses for each of the following questions.

	Definitely False	False	True	Definitely True	_____ /4
1. There can be little action taken here until a supervisor approves a decision.	_____	_____	_____	_____	_____
2. A person who wants to make his or her own decisions would be quickly discouraged here.	_____	_____	_____	_____	_____
3. Even small matters have to be referred to someone higher up for a final decision.	_____	_____	_____	_____	_____
4. I have to ask my superior before I do almost anything.	_____	_____	_____	_____	_____
5. Any decision I make has to have my superior's approval.	_____	_____	_____	_____	_____

Index of Professional Interaction

Check one of the four responses for each of the following questions.

	<once/yr	once/yr	2-3 times/yr	>3 times/yr	_____ /5
1. On average, the annual frequency of my participation in professional or occupational development activities <u>where interaction with others occurred</u> (events such as: <u>conferences, conventions, workshops, seminars, specialist meetings, etc.</u>) is best expressed as:	_____	_____	_____	_____	_____
2. At my institution, the <u>level of providing opportunities</u> for professional and occupational development activities <u>where interaction can occur with others for the purpose of professional growth</u> , is best rated as:	_____ none	_____ low	_____ adequate	_____ generous	_____

Innovation in B.C. Community Colleges
Survey Questionnaire
 INNOVATION LISTING SHEET

Name of Institution _____

Completed by:

Position

Name _____

*** To assist in the completion of this questionnaire, please refer to the accompanying sheet, *Definition of Terms*.

The listing of *innovations* in the table below, should refer to the most recent fiscal year: April 1, 1988 to March 31, 1989.

[illegible]

INNOVATION LISTING SHEET # _____ of _____ sheets.

For more listings, please use additional sheet(s).

Innovation in B.C. Community Colleges
Survey Questionnaire
SUPPORT FUNCTION SPECIALISTS - TALLY SHEET

Name of Institution _____

Completed by: _____

Position _____

Name _____

Support Function Specialists - are professional positions defined by the following roles and functions:
consulting, analysis, research, development.

Position titles typically reflect these roles: *consultant, analyst, researcher, developer, coordinator (of a specialized support function).*

A listing of typical professional Support Function Specialist positions is provided in three major functional categories of colleges. Please identify specific individuals serving in these positions (last name and initial). Approximate the FTE (Full Time Equivalency - expressed in .25 intervals) of the position dedicated to the described specialist functions (1 FTE = a Full Time Equivalent position).

Please add other professional specialist positions that may not have been identified but which fit the definition provided.

Professional specialists supporting ...

Administrative Functions

Descriptive Titles:	Init'ls of Indiv'ls:	FTE
Computer Systems Analyst(s)	_____	_____
Institutional Researcher(s)	_____	_____
Inst'l/Strategic Planner(s)	_____	_____
Other professional Support Function Specialists:	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Instructional Functions

Descriptive Titles:	Init'ls of Indiv'ls:	FTE
Program/Curr./Instruct. Development Consultant(s)	_____	_____
Instruct. Computing Resources Coordinator	_____	_____
Program Review/Evaluation Specialist(s)	_____	_____
Learning Assistance Specialist(s)	_____	_____
Testing/Learn. Assessm't Specialist(s)	_____	_____
Other professional Support Function Specialists:	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Human Resource Development Functions

Descriptive Titles:	Init'ls of Indiv'ls:	FTE
HRD Consultants/Coord's Professional Development Coord./Animateur	_____	_____
Personnel Trainer(s)	_____	_____
Other professional Support Function Specialists:	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Organizational Innovation Modality refers to specific organizational arrangements, mechanisms, and structures that have been instituted and mandated to foster innovation in the organization.

Please provide a listing with a caption/description of such organizational arrangements to foster innovation:

(1) _____ (3) _____

(2) _____ (4) _____

(if more than four, use back of page)

Definition of Terms Used in the Survey Questionnaire:

Innovation Definition

An *innovation* is the initiation or the implementation of *new* ideas, processes, programs, or services in an organizational context. To qualify as *new*, the innovation simply has to be *perceived as new* in the organization.

Innovation initiation is a *formal proposal* (a written submission of an innovation type) to or by organizational managers at the level of director, dean, or higher within the organizational structure (within primary or support functions of the organization).

Innovation implementation is an innovation proposal translated into *tangible action* in the form of: (1) a written policy- or procedure-change directive or communication by a director, dean, or higher level of organizational manager to result in the implementation of the accepted proposal; and/or, (2) the establishment of a new budget allocation (budget line) enabling the implementation of the accepted proposal.

Support Function Specialists are professional positions that exist to support the major functions of administration, instruction, and human resource development. Typically, the roles and functions of these positions are *consulting, analysis, research and development*.

The level of support is measured in terms of FTE positions supporting each of the functional categories of administration, instruction, human resources. Part-time positions are expressed in .25 FTE units.

Professional Interaction (participation in professional or occupational development activities where interaction with others occurs) is measured by a surrogate variable, *Travel and Conference Funding*. The *Organizational Centralization Questionnaire* also contains two questions to assess the institutional level of professional interaction.

Macro-Environmental Funding Incentives are *External Special Project Grants/Innovation Funds*, designated specifically to support some innovation(s) in the organization. This variable will be expressed as the sum of all special innovation funding during the most recent fiscal year.

Innovation Typology

Innovations should be considered within the following three categories:

1. **Administrative System (A)**
The administrative system consists of those functions that support the primary function of instruction but are not directly involved in instructional processes. Typical examples of functions considered as part of the administrative system are:
accounting and budget planning; purchasing; facilities; management computing support (MIS); public relations, marketing, advertising; student admissions, registration and records; printing; institutional research.
2. **Instructional Methodology, Delivery, and Supervision (I)**
Along with all direct instructional functions, this category includes such as: learning resources and assistance functions; counselling; curriculum and program development; instructional computing; instructional skills development and consulting functions.
3. **Human Resource Management (H)**
Along with typical personnel functions, the following should be considered: human resource development and training.

Organizational Innovation Modality refers to specific organizational mechanisms, structures, arrangements instituted and mandated to foster innovation in the organization. For example, in some institutions certain committees are given the mandate to initiate and/or implement innovations. Only if some specific reference to an innovation mandate exists, should the arrangement be listed.

Organizational Centralization measures the extent to which decision-making power is concentrated at the top of the organizational hierarchy. This survey will utilize the Hage and Aiken (1968) *Scale of Personal Participation in Decision Making and Hierarchy of Authority*. The special survey questionnaire requires distribution at different levels of the organization: management, instructors, support staff, etc..

Appendix B

Calculated Data

Sample Spreadsheet Printout

The following page provides a printout of the

Calculation of

- *Index of Personal Participation in Decision Making*
- *Scale of Hierarchy of Authority*
- *Professional Interaction Index*

Sample Spreadsheet Printout

Research Study: Innovation in B.C. Community Colleges

Institution: Vancouver Community College

Date: Sept/89

Position Categories	Index of Personal Participation in Decision Making					Scale of Hierarchy of Authority						Professional Interaction Index		
	Q-1	Q-2	Q-3	Q-4	Avg	Q-1	Q-2	Q-3	Q-4	Q-5	Avg	Q-1	Q-2	Avg
PF1	1.00	1.00	2.00	2.00	1.50	2.00	2.00	1.00	1.00	1.00	1.40	0.00	2.00	1.00
PF1	4.00	1.00	4.00	3.00	3.00	2.00	2.00	1.00	1.00	1.00	1.40	3.00	2.00	2.50
PF1	5.00	1.00	1.00	3.00	2.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
PF1	3.00	2.00	2.00	1.00	2.00	4.00	2.00	3.00	4.00	4.00	3.40	2.00	3.00	2.50
PF1	1.00	1.00	2.00	1.00	1.25	3.00	3.00	3.00	2.00	2.00	2.60	2.00	2.00	2.00
PF1	1.00	2.00	4.00	3.00	2.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
PF1	3.00	2.00	4.00	3.00	3.00	2.00	1.00	1.00	2.00	2.00	1.60	2.00	2.00	2.00
PF1	5.00	1.00	3.00	1.00	2.50	4.00	2.00	2.00	2.00	2.00	2.40	1.00	1.00	1.00
PF1	4.00	2.00	5.00	4.00	3.75	3.00	1.00	1.00	1.00	3.00	1.80	1.00	1.00	1.00
PF1	2.00	1.00	3.00	1.00	1.75	1.00	2.00	2.00	2.00	2.00	1.80	0.00	0.00	0.00
PF1	1.00	1.00	1.00	1.00	1.00	4.00	3.00	4.00	3.00	3.00	3.40	2.00	1.00	1.50
PF1	5.00	4.00	4.00	3.00	4.00	3.00	3.00	2.00	2.00	2.00	2.40	0.00	0.00	0.00
PF1/S	Group Averages				2.40						2.18			1.46
PF2	1.00	1.00	3.00	3.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00
PF2	4.00	2.00	2.00	2.00	2.50	2.00	2.00	1.00	1.00	2.00	1.60	1.00	2.00	1.50
PF2	1.00	1.00	1.00	1.00	1.00	2.00	2.00	3.00	2.00	2.00	2.20	0.00	0.00	0.00
PF2	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	0.00	2.00	1.00
PF2	1.00	1.00	1.00	1.00	1.00	3.00	3.00	3.00	3.00	3.00	3.00	1.00	1.00	1.00
PF/2	3.00	3.00			3.00	3.00	2.00	3.00	3.00	3.00	2.80	1.00	1.00	1.00
PF2/S	Group Averages				1.75						2.27			0.92
PF3	1.00	1.00	2.00	1.00	1.25	4.00	2.00	3.00	3.00	3.00	3.00	1.00	2.00	1.50
PF3	1.00	2.00	4.00	4.00	2.75	4.00	2.00	3.00	3.00	3.00	3.00	0.00	2.00	1.00
PF3/S	Group Averages				2.00						3.00			1.25
SF1	3.00	1.00		1.00	1.67	3.00	3.00	4.00	3.00	2.00	3.00	0.00	0.00	0.00
SF1	3.00	4.00	5.00	4.00	4.00	1.00	1.00	1.00	1.00	1.00	1.00	3.00	3.00	3.00
SF1	1.00	1.00	1.00	3.00	1.50	2.50	2.50	2.50	2.50	2.50	2.50	1.00	1.50	1.25
SF1	3.00	3.00	5.00	4.00	3.75	2.00	2.00	1.00	1.00	2.00	1.60	1.00	1.00	1.00
SF1	4.00	5.00	5.00	5.00	4.75	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00
SF1	1.00	1.00	1.00	1.00	1.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00	1.00	0.50
SF1	1.00	1.50	4.00	4.00	2.63	2.00	5.00	5.00	2.00	1.00	3.00	0.00	0.00	0.00
SF1	1.00	1.00	2.00	1.00	1.25	4.00	3.00	4.00	3.00	3.00	3.40	2.00	1.00	1.50
SF1	1.00	1.00	2.00	1.00	1.25	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00
SF1	3.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00
SF1	4.00	4.00	4.00	1.00	3.25	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
SF1	5.00	4.00	3.00	2.00	3.50	2.50	2.50	2.50	2.00	2.50	2.40	3.00	1.00	2.00
SF1	2.00	3.00	5.00	1.00	2.75	2.00	3.00	3.00	2.00	2.00	2.40	2.00	1.00	1.50
SF1	3.00	4.00	4.00	4.00	3.75	3.00	3.00	2.00	2.00	2.00	2.40	2.00	2.00	2.00
SF1/S	Group Averages				2.65						2.34			1.27
SF2	3.00	3.00	2.00	1.00	2.25	4.00	4.00	4.00	4.00	4.00	4.00	0.00	1.00	0.50
SF2	4.00	2.00	5.00	5.00	4.00	2.00	3.00	2.50	2.00	2.00	2.30	2.00	1.00	1.50
SF2	5.00	3.00	4.00	5.00	4.25	4.00	4.00	3.00	3.00	3.00	3.40	2.00	2.00	2.00
SF2/S	Group Averages				3.50						3.23			1.33
SF3	5.00	5.00	5.00	5.00	5.00	3.00	2.00	2.00	2.00	2.00	2.20	3.00	2.00	2.50
SF3	1.00	1.00	3.00	3.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00
SF3/S	Group Averages				3.50						2.10			1.75
Institutional Averages					DM_IX						HA_SC	PI_IX		
					2.63						2.52	1.33		