Chapter III
Technology Development and Innovative Practice

INTRODUCTION

This chapter on innovative practice supporting technological development has several thematic overlays that show some consistency in terms of patterns, but also some diversity in terms of strategies that researchers have employed in this area. Beginning with Hage and Aiken's (1969) seminal work on routinization and how the social structures of organizations affect technological development and innovation, readers will see two general trends in terms of approach: the statistical and the sociological. Whether it is Aldrich's (1972) use of path analysis to study the nature and effects of organizational variables on innovative practice, or Rothwell et al.'s (1974) identification of innovation success factors, or Downs and Mohr's (1976) defining of innovation through factors of variability, quantitative methods are shown to be increasingly powerful tools in identifying the nature of innovation and technology development. Nelson and Winter (1977) continue in this vein by establishing an inclusive theoretical structure for innovation, Dewar and Hage (1978) identify variables of structural differentiation and complexity that affect this domain, and Kimberly and Evanisko (1981) suggest variables to follow that come from both within individual organization units and their wider contexts. Pavitt (1984) uses sectoral pattern analysis to describe how a combination of technology sources, user requirements, and potential technology appropriation affect how we understand technical change and the structural relationships between technology and industry. Fisher and Fry (1971) end the quantitatively based section with a discussion of their substitution forecasting model.

From a more qualitative orientation, Abernathy and Clark (1985) introduce "transilience," or a set of categories of technological change that is aligned with evolutionary developments that are altered by varying managerial environments. Anderson and Tushman (1990) continue on the evolutionary track with an explanation of their cyclical model of technological change. Their model shares some basic affinities with Clark's (1985) evolutionary based view of technological change shaped by customer demands. Barley (1986, 1990) presents two sociologically oriented sets of ideas, one examining patterns of action and interaction, and the other presenting the benefits of examining the interaction between social action and social form in technologically innovative organizations. Dosi (1982), concluding this chapter, invokes the Kuhnian paradigm to demonstrate the strength of identifying patterns of continuous changes and moments of discontinuity in technologically innovative environments.

QUANTITATIVE PERSPECTIVES ON TECHNOLOGY DEVELOPMENT AND INNOVATIVE PRACTICE

Fundamental Voices in Organizational Analysis

Hage and Aiken (1969) are two of the earliest researchers to examine the role of technology as an explanatory element in organizational analysis. Previous researchers view technology as contributing to "different levels of alienation in American industry" and affecting "different aspects of the organization's structure and goals." Their paper explores the "connection between routine work [involving technology], organizational structure, and goals" as it appears in "people-processing organizations," as opposed to "continuous process or assembly-line" workflows (pp. 366-367). What are the relationships among "the degree of routineness of work, and the social structure and goals of health and welfare organizations"? Their analyses of data related to "sixteen social welfare and health organizations located in a Midwestern metropolis in 1967" indicate that the "social structure of organizations with more routine work are found to be more centralized, more formalized…but no relationship with stratification is found. Organizations with routine work are further found to emphasize goals of efficiency and the quantity of clients served, not innovativeness, morale, or quality of client services" (p. 366).

A routine workflow is defined as one in which "clients are stable and uniform and much is known about the particular process of treatment" (p. 366). The degree of routineness is a measurable dimension of technology "that can be applied equally to people-processing, industrial, and other kinds of organizations," as well as "provide the basis for general propositions that can be tested in many organiza-

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