ORGANIZATIONAL ASPECTS OF TECHNOLOGICAL CHANGE

1. INTRODUCTION

This paper discusses the organizational dimensions of two kinds of technological change. The first concerns how modern industrial organizations manage technological change, and the second concerns the development of new forms of organizations and how these new forms appear to be connected with the development of a new technology.

The words 'technology' and 'technological change' are found frequently in the organizational literature. However, the meaning attached to these words differs from the way they are used by other authors in this volume. Organizational theory has not focused on the production and use of technology, per se. Instead, not surprisingly, it has focused on the interrelations of social roles and jobs that are structured by technology.¹ Technology is most commonly treated as a set of conditions that constrain and influence social organization.

Another disparity exists between the way technological matters are treated in this volume, and in organization theory. Very broad classifications are used by organizational theorists. Thompson's classification is one of the most often cited and employed.² According to Thompson, some technologies are 'long linked' in that tasks is performed in a technically determined sequence. Other technologies are 'mediating' so that an array of tasks is performed in parallel. Finally, some are 'intensive' with mutually interdependent tasks. To give examples, an assembly line employs a long linked technology, a bank uses mediating technology, and operating surgery uses intensive technology. While these are useful distinctions to make if one is interested in trying to explain organizational structure, they are less satisfying for studying technological change. For example, the long linked category would include almost all manufacturing technology, from the small, custom job shop to the huge assembly facility in the automobile industry. While these technologies

share sequential task structure, the methods used to create new job shop or assembly line technologies are different. To examine technological change in organizations, it is necessary to look more closely at specific technologies, and at the risk of losing generality, at specific types of organizations.

Much of this paper is based on personal experience and inquiry. Where it is possible to support observations with references from the research and scholarly literature, it has been done. Thus, many of the ideas offered must be considered speculative; they have not been subjected to the test of systematic research.

2. TECHNOLOGICAL CHANGE AS STANDARD OPERATING PROCEDURE

When technology is considered as an organizational activity rather than as a set of organizational constraints, a different picture emerges. Technological change appears to be an inherently organizational social process. While single individuals invent technologies, it is seldom the case that an individual can personally implement a new technology by, for example, bringing a new product to market. Let us examine the nature of technology and the basis of this organizational linkage more closely.

First, technology is one of the products of human rationality. It results from the rational problem solving effort required to produce a means with which to meet some societal goal or need. Second, technology extends the limited biological or physical capabilities of human beings. Tools enable people to cope more effectively with both the natural and man-made environment. Whether the tool is a hammer, a bulldozer, or a digital computer, the use of that tool improves the ability to do something, i.e., to meet some goal. While people can break rocks and move earth without hammers and bulldozers and can process information without computers, the appropriate tool augments our limited physical and mental capacities to achieve goals and meet needs with more satisfying results. Finally, technology is both a cause and a consequence of social organization. The production and the use of technology almost always involve the division of labor, whether we are talking about the two-man buck-saw or the automobile assembly line. Each of these sample technologies involves a sequence of technologically defined tasks which is mirrored