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PARADISE DELAYED: THE IMPACTS OF IT ON PERFORMANCE AND WORKERS

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Extended Abstract¹

Over the past decade, the relationship between IT and performance has been one of the most actively researched topics in MIS. Since Robert Solow quipped that “You can see the computer age everywhere but in the productivity statistics,” over 50 empirical studies have investigated IT’s impacts on productivity and performance. These studies have been motivated by the economic paradox implicit in Solow’s statement and the high risk of IT investments. While some firms have exploited IT to transform their operations, generating spectacular operational and strategic benefits (Kraemer et al. 1999), others have experienced equally spectacular failures (*Financial Times* 1998).

One moderating factor that has received significant attention is the direct labor practices implemented in conjunction with ITs. These practices can transform both workers’ daily lives and the benefits obtained from IT. Several studies have identified the emancipatory potential of IT and suggest that participatory, upskilling practices for managing workers are necessary to fully exploit IT (e.g., Adler 1992; Hirschhorn 1984; Walton 1985; Zammuto and O’Connor 1992; Zuboff, 1988). These arguments have been adopted by the most recent econometric studies (e.g., Bresnahan et al. 2000; Hitt and Brynjolfsson 1997). In searching for a relationship between aggregate measures of IT and performance that holds across types of IT and industries, they investigate direct labor practices and find that a combination of participatory practices and high IT use improves performance.

The purpose of this paper is to present and empirically test a typology of ITs and direct labor practices that provide insight into how each individually affects manufacturing performance, and how the two interact in a highly dynamic setting. This addresses the concern of Orlikowski and Iacono (2001, pg. 121) that “the field of IS...has not deeply engaged the IT artifact [and that it continues] to be under theorized,” and their call for theoretical investigation of “how people engage with various technological artifacts in the course of working, learning, communicating, shopping, or entertaining themselves” (pg. 132). The former is particularly true of research investigating IT’s performance impacts, where the vast majority of studies have treated the internal operation of the firm as a black box.

The study builds on Galbraith’s (1977) information processing view to propose an integrated contingent model of IT and direct labor practice use in manufacturing value chains. It classifies a variety of ITs and practices as conformance or coordination mechanisms, and proposes that these types have different impacts on four dimensions of manufacturing performance. Conformance mechanisms increase physical conformity and reduce the need for information processing and transfer, and include automation ITs. Conformance mechanisms also include top down practices that induce conformity in action by workers, such as formalized procedures and incentives to comply with these procedures. Coordination mechanisms enhance the ability to transfer and process information. This includes ITs that transfer information between processes and functions within the manufacturing plant, and between the plant and its customers and suppliers. It also includes participatory direct labor practices that increase workers’ intellectual skills and their participation in the production process.

¹**Keywords:** IT productivity, social impacts, manufacturing, CAD, contingency theory, human information processing theory, types of information systems.

These types are presented as complementary rather than mutually exclusive, in contrast to prior literature in MIS, which rarely addresses this distinction for ITs, and prior literature in organizational behavior, which presents them as mutually exclusive alternatives for practices. Galbraith does not address the interaction between use of ITs and direct labor practices, however Hirschhorn, Zuboff, and others suggest that higher levels of IT provide an opportunity for workers to increase their skill levels and decision making capabilities (i.e., to become “informed”), and ultimately may emancipate workers from dominating work structures. Zuboff and Zammuto and O’Connor further argue that intellectual upskilling of front-line workers is necessary to allow firms to fully exploit IT and compete in dynamic, complex and globally competitive industries. This hopeful view portrays IT as a potential catalyst for transformation of laborers into knowledge workers, consistent with Drucker’s (1988) forecast of the coming of the new organization.

Hypotheses are tested using objective measures of manufacturing plant performance, and survey and in-depth interview data gathered from the disk drive industry. This industry is an exemplar of globally competitive innovation and competition in manufacturing. Product life cycles last nine to twelve months, and the price/performance ratio of disk drives has improved 40% per year since the late 1970s. Thirty-two plants comprising 40% of the industry’s value-added and 50% of its employment are examined in the study.

Conformance and coordination mechanisms are found to have significant but very different direct impacts on the four measures of performance. Conformance oriented practices are related to performance as hypothesized. Participatory labor practices are also related to performance, but not as predicted by emancipatory accounts in the quality of worklife literature (e.g., Walton 1985). Work forces are becoming more flexible, but their skill levels are increasing only marginally, leaving Drucker’s paradisaical vision in the distance. In addition, it appears that conformance and participatory/coordination oriented practices are not alternatives, but complements. Managers must adopt both types of practices to achieve high levels of performance on multiple dimensions of performance.

The data also indicate that IT use is not associated with participatory workplace practices, and the two have no interactive effect on performance at the individual worker level. Instead, engineering staff and managers use the information provided by IT. This appears to generate an interactive effect on performance at the plant level based on the ability of workers to flexibly adopt the stream of changes directed by engineers and managers. This lack of substantive worker upskilling occurs because of the persistence of physical work despite the introduction of IT and institutional barriers arising from cultural norms. The vast majority of workers are women in their early 20s with a three to five year employment outlook, ending with plans to start a family. The lack of worker upskilling is not a result of managerial myopia or desire for power, as Zuboff found. Although IT improves manufacturing performance, paradisaical work settings will be delayed until both physical work requirements and cultural barriers to upskilling are reduced.

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