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Chapter V

An Empirical Analysis of Productivity Gains from Information Technology's Reduction of Coordination Costs[1]

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Most information systems (IS) research has examined the impact of information technology (IT) on the organization of economic activities by starting from the theoretical speculation that IT reduces coordination costs and improves coordination of economic activities. This theoretical speculation, however, has not been empirically analyzed in the IS field. The value of IT for reducing coordination costs has also not been considered in the studies on IT productivity gains. This study empirically examines the relationship between IT and coordination costs, and the relationship between IT and firm productivity by considering coordination as a factor of production. The results indicate that IT is strongly associated with a decline in coordination costs and that IT and coordination make a substantial and statistically significant contribution to

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firm output. The results show that IT contributes to firm output by reducing coordination costs and improving coordination; that is, by making a higher level of coordination more efficient.

INTRODUCTION

Information technology (IT) has profoundly changed the way that business is conducted. With the use of IT, organizations can radically redesign their business processes. IT is also radically restructuring the market by altering customer–supplier relationships. These changes have occurred because IT enables better information processing, sharing, and faster responsiveness, thereby improving coordination of economic activities between separate units of an organization and across organizations. Most information systems (IS) research (Bakos and Brynjolfsson, 1993; Brynjolfsson et al., 1994; Clemons & Reddi, 1992; Gurbaxani & Whang, 1991; Malone et al., 1987, 1989) has examined the impact of IT on the organization of economic activities by starting from the theoretical speculation that IT reduces coordination costs and improves coordination of the economic activities critical to the best use of resources and the delivery of goods and services. This theoretical speculation, however, has not been empirically analyzed in the IS field.

Most previous studies on IT productivity gains have considered only the value derived from IT that improves capital and labor efficiency (Brynjolfsson & Hitt, 1993, 1996; Lichtenberg, 1993; Loveman, 1994). The value derived from IT that improves coordination of economic activities has not been considered in the studies. But, the ability of IT to reduce coordination costs and improve coordination of economic activities can contribute to firm productivity. Since coordination is necessary for a given level of firm output, and a higher level of coordination can contribute to an increase in firm output, IT contributes to firm productivity by reducing coordination costs and improving coordination of economic activities – that is, by making a higher level of coordination more efficient. Thus, the value derived from IT's reduction of coordination costs and its improvement of coordination among economic activities should be considered when examining the relationship between IT and firm productivity.

This paper provides an empirical analysis of the relationship between IT and coordination costs, based on the previous IS research. This paper also uses the information processing theory (Galbraith, 1973, 1977) to provide an empirical analysis of the impact of IT on firm productivity by considering coordination (costs) as a factor of production. Using the microeconomic production theory, an equation model is derived for the empirical analysis of IT impact on firm productivity.