

December 1998

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## Recommended Citation

Im, Kun, "Information Technology, Coordination Costs, and Firm Size" (1998). *AMCIS 1998 Proceedings*. 413.  
<http://aisel.aisnet.org/amcis1998/413>

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# Information Technology, Coordination Costs, and Firm Size

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## Objective and Background

Understanding the impact of information technology (IT) on organizational structure has been an important area of investigation in Information Systems (IS) field (e.g., Attewell and Rule, 1984; George and King, 1991; Gurbaxani and Whang, 1991; Orlikowski and Robey, 1991; Malone et al., 1987; Markus and Robey, 1988; etc.). However, few studies have attempted to empirically examine the relationship between IT and organizational structure. As an effort to understand the impact of IT on organizational structure, a question "does IT lead to smaller firms?" is again addressed in this study.

The primary objective of this study is to empirically examine the impact of IT on firm size - a principal determinant of organizational structure. Our study is based on microeconomics theory and transaction costs theory. In microeconomics theory IT is viewed as a factor of production that can be freely substituted for capital and labor. As the cost of IT falls, it is substituted for labor that historically has a rising cost. Hence, IT should result in a decline in the number of middle managers and clerical workers (i.e. firm size) as IT substitutes for their labor (labor substitution effect).

Another possible explanation for why IT can be related to firm size comes from transaction cost theory. Transaction cost theory is based on the idea that a firm incurs transaction (or coordination) costs when it buys on the marketplace what it does not make itself. Because of coordination costs such as locating and communicating with distant suppliers, monitoring contract compliance, buying insurance, obtaining information on products, and so forth, using markets is expensive (Williamson, 1975). Therefore, firms traditionally sought to reduce coordination costs by getting bigger. However, IT could help firms lower the coordination costs, making it worthwhile for firms to contract with external suppliers instead of using internal sources of supply. Therefore, as coordination costs decrease, firm size should shrink because it becomes easier and cheaper for the firm to purchase goods and services in the marketplace rather than to make them inside (Gurbaxani and Whang, 1991). Malone and his colleagues (1987) also argue that IT reduces coordination costs more than it reduces production costs and then it would still favor outsourcing rather than in-housing. As a result, it can be expected that if in almost all firms, IT can reduce the costs of the information intensive activities involved in coordination, more outsourcing will occur and then the firm size will decrease (outsourcing effect).

To accomplish the primary objective of our study, we extend and complement Brynjolfsson et al.'s study (1994) as follows:

1. Using firm-level IT spending data;
2. Measuring coordination costs and employing them as a mediator between IT and firm size;
3. Examining a possible reverse causality between IT and firm size; and
4. Investigating time lag impacts of IT on coordination costs and firm size.

## Methodology and Econometric Model

The basic technique used for this analysis is OLS regression analysis. The data for all industries over the time period are pooled and corrections are made for heteroskedasticity.

The econometric model for analyzing the primary research model is:

$$SIZE_t = \alpha_0 + \beta_1 IT_t + \delta_1 COOR_t + \gamma_t CONTROL_t + \varepsilon_t \quad (1)$$

$$COOR_t = \eta_0 + \nu_1 IT_t + \varepsilon_t \quad (2)$$

where  $SIZE_t$  = firm size in year  $t$ ,

$IT_t$  = IT investments in year  $t$ ,

$COOR_t$  = coordination costs in year  $t$ , and

$CONTROL_t$  = control variables in year  $t$  such as diversification, vertical integration, industry effects, and time effects. In addition, we investigate the possible reverse causality between IT and firm size using a time-lagged model and a path analysis.

## Contribution and Limitations

Our study follows a cumulative tradition in that it extends and complements the previous IS research by using other data sets and suggesting the revised research models. Also, our study can motivate IS researchers to investigate the relationship between IT and organizational structure by using more refined data analysis methodologies.

However, our study has some limitations. First of all, measure for coordination costs and other variables has to be validated. Second, our results could not be validated if other data sets are used. Finally, our revised model is only one of many possible models.

## References

References available upon request from author.