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John McIntosh
University of Nebraska Lincoln

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A Comparison of Patterns of Information Technology Use among American, Korean, and Swedish Global Manufacturers

John C. Mc Intosh

University of Nebraska, Lincoln

Abstract

This paper attempts to shed light on the debate between the “cultural imperative” approach which argues that the enduring nature of organizational and national cultures will idiosyncratically influence the way firms use IT, and the “global convergence” approach which contends that common pressures in global markets and the ongoing worldwide convergence in information technologies will force firms to use IT in similar ways. Our theory predicts that global firms will use IT in similar ways but will derive different levels of competitive benefit. We predict that this disparity will arise from two fundamental sources 1) mismatches between organizational structure and the intent of IT applications and 2) the influence of path dependencies arising from historical business practices. We test our theory by comparing patterns of IT use and relative levels of IT benefit across a sample of American, Korean, and Swedish global manufacturing firms. In particular we examine how these firms use IT to support the ubiquitous strategies -- mass customization and time-based competition. Findings regarding IT use to support time-based competition support the theory’s predictions while findings regarding mass customization only partially support our predictions.

Introduction

Competitive pressures in today’s global economy increasingly demand that firms quickly create technologically advanced, customized products at relatively low cost. These objectives often require execution of complex, contradictory tasks such as simultaneously achieving global scale and scope economies while developing differentiated, world-class products. Firms have satisfied these objectives by managing a flexible network of global scale value chains composed of geographically far-flung subsidiaries, suppliers, and venture partners.

Smooth operation of these chains pose substantial managerial challenges. Sophisticated information processing capabilities are necessary for handling large volumes of business transactions and exchanging huge quantities of information across national boundaries. Additionally, significant activity coordinating capabilities are required to orchestrate the efforts of many culturally diverse actors in the firm’s far flung, highly interconnected web of partners. For example, producing some global products entails surveying customers in diverse geographic contexts to identify the most desirable product features; disseminating this information to, and coordinating the efforts of, often far-flung product design teams; orchestrating the activities of suppliers to ensure that products are created in a timely fashion and at reasonable cost; and providing integrated logistics, inventory management, and order fulfilment to customers worldwide.

Interpretations of Patterns of IT Use

The foregoing extensive and often contradictory requirements can be facilitated by standardizing managerial practices and hardware and software requirements worldwide. This economically rational action implies that firms, irrespective of national origin, will begin to use IT in similar ways. Despite this intuitively appealing argument, proponents of the “cultural imperative” such as Hofstede (1993) contend that national and organizational cultures change very slowly. As a result, firms will use culturally determined business practices despite global convergence in information technologies. In contrast, our theory predicts that the common competitive pressures confronting global firms and convergence in information technologies will cause firms to use IT in similar ways. Firms will only exhibit differences in the levels of benefit from IT because of difference in the amount of time they have used the technology. Thus, we may expect American firms to derive higher levels of benefit than Swedish and Korean counterparts.

We attempt to unravel this contradiction by comparing how American, Korean, and Swedish global manufacturing firms use IT in pursuit of mass customization and time-based strategies. We chose firms from these countries for the following reasons. First, because American firms with a traditionally strong orientation to markets have largely pioneered IT applications. Thus, IT applications evolved to leverage resources in an open market context. Competitive benefits for American firms may be used as a benchmark for comparing IT benefits in firms with different (culturally and historically conditioned) approaches to conducting business. Second, Korean global players are dominated by the Chaebol organizational form which places strong emphasis on hierarchies. This is in marked contrast to American firms which emphasize market mechanisms. Many IT applications are designed to confer strategic flexibility by allowing quick access to the resources and capabilities of other firms in an open market environment. We would therefore expect Korean firms to realize far smaller benefits from IT because of the

mismatch between organizational structure and the intended purpose of IT. A comparison of patterns of IT use across firms with such different orientations would help to resolve the “cultural imperative versus global convergence” debate. Third, Swedish multinationals, enjoying a long history of global manufacturing which dates back to the late 1800s, operate with cultures that are finely tuned to conducting business with a geographically dispersed network of partners. One could reasonably argue that cultural inertia, reinforced by path dependencies would lead to different patterns of IT use.

Variable Development

For time-based competition, we created two variables *product development time* (DEVTIME) and *manufacturing time* (MFGTIME), that measure how IT leverages inputs into the process of reducing the cycle times of key value chain activities. DEVTIME, which relates to product design activities, is measured by survey items which assess the role of the firm’s information system in reducing time for prototype development and product introduction (Clark and Fujimoto, 1991; Pine, 1993). MFGTIME, a variable concerned with the speed of product manufacture, is measured by survey items which assess the information system’s role in reducing time for machining, fabrication, and assembly (Chang, 1993; Gerwin, 1993).

For mass customization, we developed variables *customer knowledge* (CUSTKNOW) and *market expeditioning* (EXPEDIT) that measure how IT increases the firm’s knowledge of market needs and technologies that may be used to satisfy those needs. CUSTKNOW relates to IT’s impact on the firm’s ability to gather information regarding tastes and preferences of *existing* customers (Wiseman, 1985). It is measured by items which assess the information system’s ability to identify desires among existing customers for additional product features and higher levels of product performance. Firms engaged in mass customization may use this information to create product options that are finely targeted at customer needs.

Mass customizers often actively prospect for new customers, new markets, and new product applications to appeal to those prospective customers. EXPEDIT refers to IT’s impact on the firm’s ability to gather information from *potential* customers. It is measured by items that assess the information system’s ability to discover new product categories, and new product applications (McFarlan, 1984); to discover opportunities to customize existing products to attract potential customers (Bakos, 1987); and to find new customers and emerging markets. These activities are important because many firms face pressures to increase market share under conditions of increasingly fickle customer tastes and declining brand loyalty.

Methods

A survey was used to gather data concerning firms’ information system, patterns of information technology resource use, and the resulting competitive outcomes. Responses were obtained from one high level information systems executive from 74 American, 52 Swedish, and 81 Korean global manufacturing firms.

Interpretation of Results

Table 1 presents mean scores of variables leveraged by IT to pursue time-based competition and mass customization. The number in parentheses next to each mean score represents that variable’s rank for firms from a particular country. The variable CUSTKNOW (.081) was not included because it was not statistically significant at the .005 level. For time-based competition, DEVTIME and MFGTIME ranked first and second, respectively, across all firms. It appears that sample firms from all countries recognize the importance of time as a competitive weapon and place the same relative emphasis on using IT to support time based competition. This finding is consistent with our prediction that global firms, irrespective of national origin will exhibit similar patterns of IT use. It is also interesting to note that in both cases DEVTIME appears ahead of MFGTIME. This relative emphasis is consistent with the product development literature which notes that the development stage is longer than the manufacturing stage in creating products (Womack, Jones, and Roos, 1990). In regard to mass customization, all firms ranked the market expeditioning variable (EXPEDIT) third. Identical rankings suggest that global firms, regardless of country of origin, place the same relative priority on the three variables. This is not a surprising outcome because global firms, operating in the same environment, typically face similar competitive pressures.

Our theory also predicts that firms will derive different levels of benefit from IT. In particular, Korean firms would derive the smallest benefit because of a mismatch between IT’s emphasis on leveraging resources in open markets the Chaebol’s emphasis on leveraging resources in hierarchies. Swedish firms will exhibit an intermediate level of benefit because their historical pattern of selectively leveraging resources of host country suppliers represents an intermediate form between markets and hierarchies. If we assume that comparisons of mean variable scores across nations indicate relative levels of competitive benefit, we note that for the variables MFGTIME and DEVTIME U.S. firms derive the highest benefit, followed by Swedish firms, and then Korean firms. These findings are consistent with our theory’s predictions. Results for the variable EXPEDIT only partially supports our predictions. American firms derive the greatest benefits, followed by Koreans, and then Swedes. The middle ranking of Koreans may be explained by recent initiatives among Chaebols to replace their traditional imitation strategy with one driven by innovation Table 1. ANOVA results for mean variable scores by country.

Table 1

Variable	SWEDEN		U.S.		KOREA		ANOVA
	(N=52)		(N=74)		(N=81)		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	F
MFGTIME	4.75(2)	0.99	5.55(2)	.93	4.56(2)	.97	22.19***
DEVTIME	5.00(1)	0.98	5.58(1)	.89	4.57(1)	.97	22.26***
EXPEDIT	3.85(3)	1.05	4.47(3)	.72	4.38(3)	.89	8.37***

***p < .001

References

- Bakos, Y.J.. "Dependent variables for the study of firm and industry-level impact of information technology," *Proceedings of the Eighth Conference Systems*, 1987, pp.10-23.
- Chang, M. "Flexible manufacturing, uncertain consumer tastes, and strategic entry deterrence," *Journal of Industrial Economics*, (41:1), 1993 pp. 77-90.
- Clark, K. B. and T. Fujimoto. *Product Development Performance*. Harvard University Press, Cambridge, MA, 1991.
- Gerwin, D. "Manufacturing flexibility: A strategic perspective", *Management Science*, 39, 1993, pp. 395-410.
- Hofstede, G. H. "Cultural constraints on management theories," *Academy of Management Executive*, (7:1), 1993, pp. 81-94.
- McFarlan, F. "Information technology changes the way you compete," *Harvard Business Review*, (63:3), 1984, pp. 98-103.
- Pine, B. J. *Mass Customization--The New Frontier in Business Competition*. Harvard Business School Press, Boston, MA, 1993.
- Wiseman, C. *Strategy and Computers: Information Systems as Competitive Weapons*. Dow Jones-Irwin, Homewood, Illinois, 1985.
- Womack, J. P., Jones, D. T. & Roos, D. *The Machine that Changed the World*. Harper Perennial, NY, 1990.