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The Hypercube Model of E-Commerce Strategies

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Abstract

Embracing the Electronic Commerce (EC), many firms have vigorously aligned their business strategies to leverage on the enormous market potential while at the same time enhancing business processes and redefining business governance. Yet, these firms' performances to date have been mixed with little evidence that their technological investments had borne any dividends. This paper aims to examine this EC paradox by proposing a hypercube model that can be used to analyze firms' EC strategies in relation to the variability of the virtual organization structure, the activity development and technology cycle, and the strategic orientation of key decision-makers towards the market.

Introduction

The EC or business transaction on the Internet is projected to be about US\$154 billion in the year 2002 (OECD, 1999). This lucrative prospect, coupled with the aggressive Internet-driven development of TCP/IP-based products, has inevitably led to organizations jumping onto the EC bandwagon. Driven by the seemingly vast economic benefits, firms are channeling resources to put the infrastructure in place or replace incompatible proprietary networks in order to tap into this 'live wire'. These firms have vigorously begun to align their business strategies, enhance their business processes and redefine their business governance so as to transform their existing business processes to leverage on the enormous market potential. Brannback (1997) attributed this phenomenon to a paradigm shift arising from a fusion of marketing and Information Technology (IT).

Yet, the outcomes that many of these firms are hoping for have not been realized. Not only is there a variance in performance, but the paradigm shift in the "marketplace" has even been detrimental to some firms (Rayport and Sviolka, 1997). By jumping onto the EC bandwagon, many companies become more concerned with assigning resources to be on it than coming up with any strategy for harnessing the potentials. The outcome is an EC paradox where returns do not commensurate with investments.

This paper proposes a hypercube model that can be used to understand this EC paradox. It argues that a firm's EC strategies need to be analyzed in relation to the variability of the virtual organization structure, activity development and technology cycle, and the strategic orientation of key decision-makers towards the market.

Impact of Information Technology (IT) on EC Strategies

In EC, IT plays the key role in a firm's strategy. Venkatraman (1994) showed that IT could strategically transform a firm at five levels: localized exploitation, internal integration, business process redesign, business network redesign and business scope redefinition. The first three levels emphasize intra-organization activities for efficiency enhancement while the next two levels focus on the need to redesign the business logic and leverage IT to create the appropriate organizational arrangement to support the initiatives. These five levels of transformation will bring a firm from integrating computerized system to redesigning of business processes to integrating network of business relationships and ultimately, to reinventing the business landscape. Given that the EC is essentially a networked system, internal integration is implied in the model. The focus in this paper will be on the other four levels of transformation. In localized exploitation and business process redesign, an *Intranet*-driven strategy is more appropriate for appropriating internal productivity. For the other two transformations, an *Internet*-driven strategy is needed to leverage on the external networks of business relationships.

Innovative Activities & the Technology Cycle

Fujita (1997) posited that the EC "has the potential to greatly change commercial transactions and stimulate economic activity," since the Internet offers a dynamic infrastructure for the development of innovations. It is therefore possible for a paradigmatic shift from the transactional activities and market as we presently know them to an e-market where the fusion of technology with marketing practices (Malone, et al., 1987) makes available a myriad of innovative commercial activities. This e-market offers a virtual organizational structure where commercial transactions among firms and individuals are electronically executed, and barriers to entry or exit are non-existent (Hawkins, 1998).

The development and subsequent proliferation of these EC activities need to be understood in the context of the technology and the standards' formulation. Specifically, the focus is on the developmental nature of EC activities and the technological cycle of the platform technology.

Initially, various innovative EC activities that are technologically dependent exist. Over time, some of them become dominant and either destroy or enhance the existing competence. When these dominant activities are established, the “new” market will be put in place followed by new firms seeking to exploit the possible opportunities offered.

These dominant EC activities are also determined by the technology standard formulation. Following Anderson and Tushman’s technology cycle (1997), many technologies exist during the ferment period. This is then followed by a technological discontinuity where selection of the technology standard is done. The discontinuity is marked by the eventual emergence of the dominant technological design.

Cognitive Orientation of Decision-Makers

Prahalad & Bettis (1996) and Hall (1996) argued that decision-makers rely on their cognitive orientation where “the environment is perceived, interpreted and evaluated by human actors in organization. The perception becomes the reality, and the environmental conditions are only important as they are perceived by organizational decision-makers.” (Hall, p.290)

Therefore, the EC strategy depends on not just whether decision-makers perceive the innovative Internet activity, but whether it is seen as competence-destroying or competence-enhancing (Anderson and Tushman, 1997). A *competence-destroying* innovation obsolesces existing know-how and firms will need to radically transform their business processes as well as introduce new business scope. On the other hand, a *competency-enhancing* innovation will continue to build on existing know-how.

Given the increasing need to respond more quickly to changes in the business environment and customer demands, firms may even attempt to influence the standards of the dominant design for possible competitive advantage and head start in market exploitation.

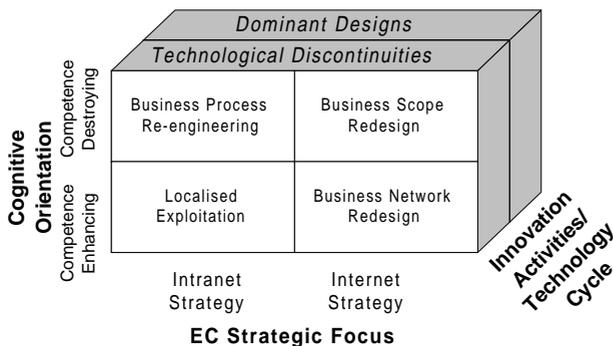


Figure 1. The Hypercube Model of E-Commerce Strategies

A Hypercube Model for EC Strategies

By putting the dimension of cognitive orientation (competence-enhancing vs. competence-destroying) with that of EC strategic focus (Intranet vs. Internet), a firm could use four possible strategies to achieve competitive advantages (See Figure 1). The specific strategy would depend on the dominant innovative activities and whether the technology is a discontinuity or dominant design. We also posit that the dominance of innovative activities will be affected by the imposition of technical and technological standards to encourage and facilitate global EC.

The cognitive orientation and the EC strategic focus will create greater awareness of the various EC strategies while understanding the dominant innovative activities and the technology cycle will enable effective resource allocations to the specific EC activities. The use of this hypercube model is illustrated with data drawn from two cases.

a. A Case for World Wide Web (WWW)

Various Internet protocols, such as SMTP, FTP, Telnet, Gopher, Archie, WWW, and others, have been defined during the era of ferment, to allow networked users to come together. Each protocol was designed to cater to a specific function on the Internet, e.g., SMTP was catered for Internet Mail. Over time, file transfer, email, information retrieval, and other capabilities were subsequently added. The WWW protocol eventually became the dominant design and used as the cornerstone for present Internet and Intranet commerce activities.

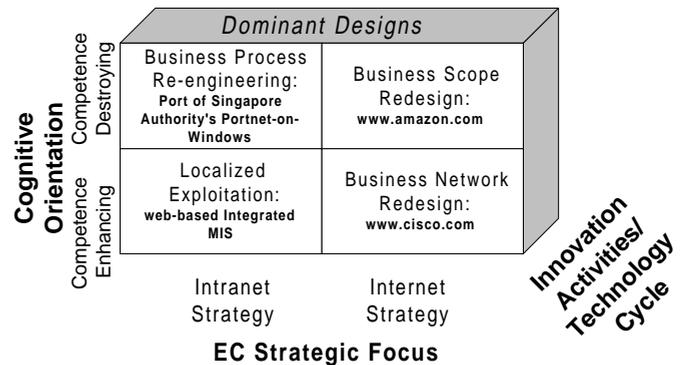


Figure 2. The Dominant Design of Web Driving EC

With the establishment of the dominant design, firms began to integrate otherwise incompatible technologies to enhance their Information Systems capabilities. Some like Amazon.com proceeded to revamp their business processes to take advantage of such infrastructure. Amazon.com successfully used the WWW to transform

the book industry. Its dominant innovative activities included personalizing customer services through specialty searches and providing access to the world largest collection of book titles. Likewise, Cisco Systems achieved a sustainable, competitive advantage through improved business network redesign on the web: 64% of Cisco's orders were placed via the Web, amounting to US\$5.6 billion for 1997 (CISCO, 1998). Figure 2 highlights the various firms' EC strategies adopted based on the dominant design of the WWW.

b. The Case of MP3

The hypercube model can also be used to analyze the impact of MP3 (MPEG-1, Level 3) on music industry. In this case, the technological standard driving Business-to-Business EC is still in the ferment stage. Without a dominant design, there are unresolved risks involved (Backhouse, 1998; Borenstein, 1996; Lichtenstein, 1998; Ratnasingham, 1997).

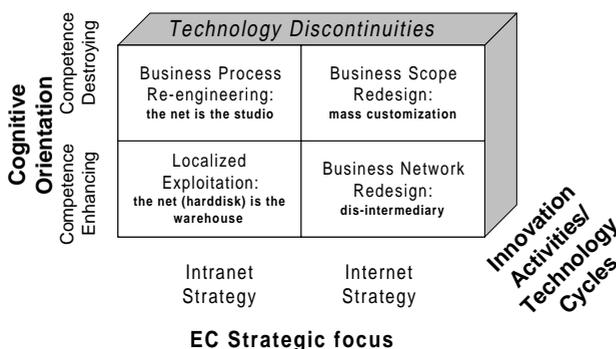


Figure 3. The Impact of MP3 on Music Industry

The MPEG standard was initially formulated to compress sound and picture information stored digitally into a much smaller space. Although, the MP3 audio format threatened the music industry, it also presented an opportunity for the industry to re-define itself to take advantage of the ubiquitous Internet (See Figure 3). Aspiring firms may align their EC strategies to develop and define new technologies and standards respectively for the industry.

Conclusion

Often, firms' EC strategies produce mixed results. The proposed hypercube model provides a framework for firms to better understand the consequences of their strategies. It forces decision-makers to explicitly reflect on their own cognitive orientation, align their strategies to the firm's strategic focus, and at the same time take into consideration the innovative activities/technology cycle. The hypercube model is developed from our ongoing research to understand the impact of EC on firms' strategies. It is envisaged that the hypercube will provide

further insights upon empirical assessment by qualitative and quantitative data.

References

- Anderson, P. and Tushman, M.L. "Managing Through Cycles of Technological Change," *Research/Technology Management* (May/Jun), 1997, pp. 26-31.
- Backhouse, J.P. "Security: The Achilles heel of electronic commerce," *Society* (35:4), 1998, pp. 28-31.
- Borenstein, N.S. "Perils and pitfalls of practical cybercommerce," *Communications of the ACM* (39:6), 1996, pp. 36-44.
- Brannback, M. "Is the Internet changing the dominant logic of marketing?," *European Management Journal* (15:6), 1997, pp. 698-707.
- CISCO "The New Economy is the Internet Economy: An Overview," White Paper CISCO Systems, September 1998.
- Fujita, H. "Electronic commerce for new management and information system infrastructure," *Electronics Information & Planning* (25:3), 1997, pp. 151-154.
- Hall, R.H. *Organizations: Structures, Processes, and Outcomes*, Prentice Hall, 1996.
- Hawkins, R. "Creating a positive environment for Electronic Commerce in Europe," FAIR Working Paper 36, SPRU, University of Sussex, March 1998.
- Lichtenstein, S. "Internet risks for companies," *Computers & Security* (17:2), 1998, pp. 143-150.
- Malone, T.W., Yates, J. and Benjamin, R.I. "Electronic Market and Electronic Hierarchies," *Communications of the ACM* (30:6), 1987, pp. 484-497.
- OECD *The Economic and Social Impact of Electronic Commerce: Preliminary Findings and Research Agenda*, OECD, Paris, 1999.
- Prahalad, C.K. and Bettis, R.A. "Dominant logic," In *Managing the multibusiness company: strategic issues for diversified groups*, M. Goold and K. S. Luch (Ed.), Routledge, London, 1996, pp. 459.
- Ratnasingham, P. "EDI security - Re-evaluation of controls and its implications on the organizations," *Computers & Security* (16: 8), 1997, pp. 650-656.
- Rayport, J.F. and Sviolka, J.J. "Marketspace: The New Locus of Value Creation," In *Intelligent environments: spatial aspects of the information revolution*, P. Droege (Ed.), Elsevier, 1997, pp. 140-151.
- Venkatraman, N. "IT-Enabled Business Transformation: From Automation to Business Scope Redefinition," *Sloan Management Review* (35:2), 1994, pp. 73-87.