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Competition, Technology, and Planning for Libraries and Information Services

Theorists, Critics, and Commentators

Eric Flower, Librarian, University of Hawai'i-West O'ahu, USA



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Competition, Technology, and Planning for Libraries and Information Services

Theorists, Critics, and Commentators

Eric Flower, Librarian, University of Hawai'i-West O'ahu, USA

Abstract

Models of business competition and technology may be applied to both library and corporate information services in today's information economy. The works of business competition theorists, critics, and commentators will combine with the technology of Moore's Law, Metcalfe's Law, and the Bandwidth Scaling Law to create a new non-mediated, low transaction cost, media-rich networked information environment. Ten critical planning questions are presented.

Keywords: Bandwidth Scaling Law, Competition, Information delivery, Libraries, Metcalfe's Law, Moore's Law, Technology.

The late twentieth century standard business model for studying and responding to competitive forces was presented by Michael Porter in *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, NY: The Free Press, 1980. In it Porter described five competitive forces acting on the firm: the threat of new entrants into the industry; the threat of substitutes; the bargaining power of buyers (customers); the bargaining power of suppliers; and, the rivalry among current competitors. Porter also identified three potentially successful generic strategies when dealing with competitive forces in an industry: 1) differentiation—creating the perception that the firm's product is unique industrywide, typically by competing on the basis of product quality or quality of service, so that customers will pay a premium to cover higher costs; 2) overall cost leadership—offering products or services at the lowest cost; while quality and service are not unimportant, cost reduction is the aim of the organization; and, 3) focus—a clear strategy that concentrates on particular buyer groups, industry segments, product lines, geographic markets, etc. Porter concluded that, “the firm failing to develop its strategy in at least one of the three directions—a firm that is “stuck in the middle”—is in an extremely poor strategic situation.”¹

Over time, critics and commentators have added to the body of literature on Porter's Five Forces Model. Today, Porter's relatively simple but effective drawing² has been elaborated into a system like the one illustrated in Figure 1 (see Appendix) from the QuickMBA web site at <http://www.quickmba.com>. Libraries and corporate

information services, with their increasing emphasis on cost, service, and electronically processed information, may be fit to this model.

New Entrants: “New entrants to an industry bring new capacity, the desire to gain market share, and often substantial resources.”³ Libraries and other information providers face a variety of new entrants into their traditional service mix including Internet search engines and portals (Google, Yahoo, MSN, AOL, etc.), document delivery services providing information directly to end users, and expanding offerings from major online services. Google has Answers.Google.com, a service where, “More than 500 carefully screened Researchers are ready to answer your question for as little as \$2.50—usually within 24 hours. Your satisfaction is completely guaranteed.” Though few librarians would be willing to compete on either price or guarantee, they have not been reluctant to comment on the service in professional publications. Yet the most comprehensive comparison to date of Google's service with the work of reference librarians concluded among other things that:

... academic libraries should make a practice of regularly monitoring developments in the broader information landscape. These developments will not only have a pronounced impact on information provision but they can also help reference librarians assess their own programs. Although it is still early days, we can envision a point in the future where some forms of reference service will be outsourced in a manner similar to the outsourcing of other library functions, such as copy cataloging. If for instance, an outside provider can adequately address simple reference questions at one-fifth the cost of doing so in-house, why duplicate the service? Reference librarians need to analyze more thoroughly how much time is spent by function

¹ Michael Porter, *Competitive Strategy: Techniques for Analyzing Industries and Competitors* (New York: The Free Press, 1980), 41.

² *Ibid.*, 4.

³ *Ibid.*, 7.



performed. By freeing themselves from more routine tasks, they can focus their efforts on aspects of complex information discovery and use in which they clearly excel.⁴

More recently Amazon and Google have entered the market in a different way. Each has begun to index and link to full-text excerpts of in-print books. The Amazon product, "Search Inside the Book," began on October 23, 2003 and gave readers access to the complete text of more than 120,000 books, some 33 million pages in all. "Remarkably, Amazon was already doing so much data processing in its regular business that the huge task of reading the images of the books and converting them into a plain-text database was handled by idle computers at one of the company's backup centers."⁵ In one fell swoop, Amazon, in its spare time, had done more for full-text access to material in current, copyrighted books than virtually anyone before. In December 2003 Google answered Amazon with its own full-text product, Google Print Beta. Google Print lets searchers call up brief excerpts from books, reviews, bibliographic and author's notes, and, in some cases, a picture of the book jacket.

On the journal side, how will libraries or information providers compete with the Microsoft Network's eLibrary if they become serious about the product and advertise broadly and directly to end users? What if they offer direct access into EBSCOHost, LexisNexis, ScienceDirect, or similar databases? What if Microsoft bypasses the aggregators altogether and licenses content directly from publishers?

Substitutes: "All firms in an industry are competing, in a broad sense, with industries producing substitute products."⁶ Library users and corporate information service clients may seek information from the Internet, document delivery services, or other information providers offering virtually the same mix of services and resources.

Bargaining power of customers: "Buyers compete with the industry by forcing down prices, bargaining for higher quality or more services, and playing competitors against each other—all at the expense of industry profitability."⁷ Library users and information service clients, being rational buyers, want low prices for information services, document delivery, photocopying, printing, etc.

Bargaining power of suppliers: "Suppliers can exert bargaining power over participants in an industry by threatening to raise prices or reduce the quality of purchased goods and services."⁸ Buyers acting alone generally are in a poor position when bargaining with much larger vendors of books and journals, online databases, or document delivery services. Librarians have responded to this mismatch by entering into cooperative buying agreements and by supporting new publishing ventures. For example, as Dan Tonkery noted in his work on mergers and acquisitions in the library marketplace, "There is a clear concentration of publishers in the STM [Science, Technology, Medicine] area and such a strong feeling of monopolistic pricing patterns among librarians that the marketplace is looking for publishing alternatives. A number of new experiments are under way for the distribution of scientific and technical information, with various groups trying to reinvent new publishing ventures. These experiments include BioOne, PubMedCentral and SPARC."⁹ A more radical approach has been taken by the Public Library of Science (PLoS). "As a grassroots movement, PLoS aimed to catalyze change by urging individual scientists to take back control of their scholarly work by boycotting high-priced, pay-for-access journals; by stepping down from editorial boards; and by refusing to submit or to review papers for such journals."¹⁰

Existing competitors: "Rivalry among existing competitors takes the familiar form of jockeying for position—using tactics like price competition, advertising battles, product introductions, and increased customer service or warranties."¹¹ Most of the products libraries and corporate information services offer are duplicative, the differences mainly in depth and breadth of collections and staff, or ease of use and ease of access. Levels of customer service, customer relations management, and price may be major differentiators however.

Porter's Model and Technological Change

Porter's model assumes identifiable competitors, partners, and customers who engage in more or less predictable ways in environments that remain relatively static with only occasional disruptive changes and rare paradigm shifts. Critics have noted that these relatively static structures do not fit well with today's rapid changes in technology, and no greater technological changes are to be found than

⁴ Anne R. Kenney, Nancy Y. McGovern, Ida T. Martinez, Lance J. Heidig, "Google Meets eBay: What Academic Librarians Can Learn from Alternative Information Providers," *D-Lib Magazine* 9 (June 2003). Online at: <http://www.dlib.org/dlib/june03/kenney/06kenney.html>. Retrieved April 30, 2004.

⁵ Gary Wolf, "The Great Library of Amazonia," *Wired* 11 (December 2003): 218.

⁶ Porter, *Competitive Strategy*, 23.

⁷ *Ibid.*, 24.

⁸ *Ibid.*, 27.

⁹ Dan Tonkery, "Mergers and Acquisitions in the Library Marketplace: Opportunity or Threat?" *Serials Review* 27 (Autumn 2001): 46-47.

¹⁰ Helen J. Doyle, "The Public Library of Science," *College & Research Libraries News* 65 (March 2004): 135.

¹¹ Porter, *Competitive Strategy*, 17.

those in computer processors and computer networks.

In 1965 Gordon Moore observed an exponential growth in the number of transistors per integrated circuit and predicted this trend would continue for the foreseeable future. What it means to us today is that computing power doubles about every 18 months. Metcalfe's Law, coined by Robert Metcalfe, inventor of the Ethernet network architecture, posits that the potential value of a network equals the square of the number of nodes connected to it. A network with two users has a potential value of 4; a network of four users has a potential value of 16; a network of eight users has a potential value of 64, and so on. The Bandwidth Scaling Law, described by Jack M. Wilson, then Professor of Physics, Engineering Science, Information Technology, and Management, Rensselaer Polytechnic Institute holds that the bandwidth of communication on optical fibers is increasing exponentially, just as is the power of the microprocessor, and that this bandwidth doubling also will continue into the foreseeable future. Further, there is a glut of optical fiber backbone capacity. TeleGeography Research Group (Washington DC) estimates that only 1% of the channel capacity is being used in the United States while only 1.8% of potential fiber capacity is lit in Europe.¹²

Taken together, Moore, Metcalfe, and The Bandwidth Scaling Law have come together to create powerful ubiquitous (pervasive) high speed wired and wireless networks that are more or less secure and reliable. These networks also offer seamless access to data and networked resources once the user has been authenticated. Moreover, in an online environment, the laws can work together to drive transaction costs down. These costs may approach zero in large organizations with large numbers of non-mediated transactions. In business this may lead to concentration and centralization or bankruptcy; in libraries it may lead to concentration, centralization, and cooperation, or irrelevance and ultimate failure of institutional mission. As Ronald Coase concluded in his Nobel prize winning work, firms are created because the additional cost of organizing them is cheaper than the transaction costs involved when individuals conduct business with each other using the market.¹³ This is equally true of libraries, library cooperative agreements, and corporate information delivery services.

"There are certainly formidable barriers to the consolidation of high tech, but the same was true of defense, banking, automobiles, petroleum, and indeed every sector that has restructured.

Fundamental economic forces ultimately prevailed, however. In high tech too, the barriers are starting to erode. While they might delay change a little longer, restructuring is inevitable—and likely to happen sooner rather than later."¹⁴ This consolidation is complete in at least one high tech industry—personal computers.

... Dell and Hewlett-Packard are now the only computer companies that offer products designed for every market—large organizations with central IT management, small businesses, consumers, and enthusiasts. And their product lines are more extensive than that of any other company, with desktops, notebooks, servers, handheld devices, printers, and storage systems.

Dell achieved this through its direct-selling model and by carefully managing expenses and supply chains to become incredibly efficient. HP got there through years of technical innovation and last year's acquisition of Compaq, which had already bought Digital Equipment Corp. and Tandem. Dell is known for efficiency and low costs; HP's reputation rests on the company's imaging and enterprise products and services.¹⁵

Media-rich Net-centric Environments

Powerful processor technologies and powerful networks also facilitate the development of elaborate networked media-rich working environments like the real world National Center for Supercomputing Applications Cave Automatic Virtual Environment (NCSA CAVE, 1991) and the visions of the future shown in videos by Apple ("Knowledge Navigator," 1987), Microsoft ("Information At Your Fingertips: 2005," 1994), and Sun ("Starfire: A Vision of Future Computing," 1995). More recent examples of these speculative environments include Microsoft's 3D desktop "TaskGallery" (1999), the IBM/Steelcase "BlueSpace" office workspace collaboration (2001), and Microsoft's expansive "BroadBench" (2002) desktop. Powerful technologies and networks also facilitate the growth of mobile computing environments that are not tied to place.

The central problem for librarians and information service providers today is that the products they offer do not incorporate the kinds of media-rich environments or mobility users expect. Think how inaccessible library catalogs or information services may be via a "smart" cell phone, personal digital assistant, or handheld PC. Further, they provide few, if any, opportunities for personalization or customization.

¹² Jeff Hecht, "An Unsolved Mystery: Optical Networking: What's Really Out There?," *Laser Focus World* 39 (February 2003): 87.

¹³ Ronald Coase, "The Nature of the Firm," *Economica New Series* 4 (1937): 386-405.

¹⁴ Bertil E. Chappuis, Kevin A. Frick, Paul J. Roche, "High-tech Mergers Take Shape," *McKinsey Quarterly* Issue 1 (2004). Online in Business Source Premier database, (AN 12163227). Retrieved April 30, 2004.

¹⁵ Michael J. Miller, "And Then There Were Two..." January 9, 2003. Online at: http://www.pcmag.com/print_article/0,1761,a=35331,00.asp. Retrieved April 30, 2004.

Critique of Porter's Model: Three New Forces

In "Beyond Porter," Larry Downes, author of *Unleashing the Killer App: Digital Strategies for Market Dominance* (Harvard Business School Press, 1998), described three new forces that are disruptive to existing operations and planning—digitization, globalization, and deregulation. "The New Forces, whose effect can be seen most visibly in the movement of business activities from the physical world to the world of global computer networks like the Internet, require a new strategic framework and a set of very different analytic and business design tools. Here's how the New Forces change everything."¹⁶

Digitization: Electronic information will be provided by a variety of traditional and newer non-traditional sources. This information may well be provided to new and diverse groups of users.

As computing power and communications bandwidth become cheap enough to treat as disposable, you'll soon have far more information about your competitors, suppliers, and customers. The rise of public networks will make that information more widely available, increasing the possibilities for collaborating and competing.

The result of this information explosion won't just be more/better/faster. Instead, the result will be vastly changed markets that involve unfamiliar, unpredictable competitors and partners that mutate even before you get comfortable with them.¹⁷

Globalization: Information seekers will gather information from sources that prove to be reliable, cost efficient, and accurate over time. As fast secure networks become ubiquitous, these users will demand access from almost anywhere.

The world is rapidly migrating to one very large network, whose attraction is irresistible. Improvements in distribution logistics and communications have allowed many local businesses to become global ones overnight—including discount distributors of everything from contact lenses to bathroom tiles. It is also now common for companies to draw on a global network of partners and suppliers. Customers, meanwhile, are happy to engage in border-less shopping for everything from entertainment to software to cars and electronics.¹⁸

Deregulation: Deregulation and open markets frequently lead to new ventures that show little regard for traditional relationships or enterprises. For example, librarians have been involved in the

development of a number of non-traditional publishing ventures (BioOne, PubMedCentral, SPARC, PLoS) while commercial ventures like Amazon and Google have provided access to published material previously unavailable without prior purchase.

The current mania for deregulation reflects a belief by governments and regulated industries alike that the disease (open, international competition) is better than the cure (laws to protect local economies). . . . The open market, which adopts information technology more quickly than did industries with a legacy of regulation, is becoming a viable alternative for many activities. The change is contributing to the radical shrinking, outsourcing, and restructuring of traditional enterprises.¹⁹

Downes concluded that, "Executives in every department must learn that technology has become far more than an enabler of new business strategies. Technology has become the essential disrupter of markets and operating models. Technology, in other words, isn't the solution. It's the problem."²⁰ The task for planners, managers, and implementers is to turn this notion around; to understand, explain, and implement "disruptive" technology for the betterment of their organizations and the advancement of their missions. This may not be as difficult as it appears. For example, *InfoWorld* identified ten major disruptive technological forces in its January 6, 2003 issue including:

1. 10Gigabit Ethernet
2. Digital Identity
3. Mac OS X
4. Office 11 XML
5. Open Source Applications / Open Standards
6. Self-service Customer Relations Management (CRM) technologies
7. Virtualization
8. Weblogs
9. Web services
10. Wi-Fi²¹

Eighteen months later the *InfoWorld* list looks hopelessly outdated as many libraries and information providers have incorporated some or all of these "disruptions" into their technological strategies.

New Strategies

In "Beyond Porter — A Critique of the Critique of Porter," Dagmar Recklies of the Recklies Management Project GmbH (<http://www.themanager.org>) noted that "... global

¹⁶ Larry Downes, "Beyond Porter," *Context Magazine* Premier Issue (Winter 1997). Online at <http://www.contextmag.com/archives/199712/technosynthesis.asp>. Retrieved April 30, 2004.

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Ibid.

²¹ Ephraim Schwartz, "Disruptive Technologies," *InfoWorld* (January 6, 2003): 16.

and networked markets impose new requirements on organizations' strategies. It is not enough any more to position oneself as a price-leader or quality-leader (like Porter suggests in his Generic Strategies model). Rather competitive advantages emerge now from the ability to develop lasting relationships to more mobile customers and to manage far-reaching networks of partners for mutual advantage."²²

This is especially true in an online information environment. Traditional economics are based on the concepts of scarcity and demand; goods are valuable either because of their use and/or scarcity. In short, it's "use it and lose it." On the other hand, online information is non-rival and non-excludable. It can be shared, it does not get used up, and it is inexpensive to provide because the costs of distribution, over the Internet, are spread globally.

... many readers can use the same digital article without ever "using up" the information; unlike a physical object, information cannot be exhausted. When produced and distributed digitally, information can retain its non-rival, non-excludable form. Information is not a material object, and the explosion of the Web has demonstrated that information is simply evanescent bits of data that are not subject to the conventional laws of economics.²³

Planning for Tomorrow's Information Environment: Critical Questions

Downes, Recklies, and many others have advised that we now use Porter's model as a starting point for further analysis and then plan and develop cooperatively. Today we also have to factor in changes in technology and computing environments brought about by Moore's Law, Metcalfe's Law, and the Bandwidth Scaling Law as well as the individual's desire for personalization of goods normally made for mass consumption. A successful planning process for online information delivery in the early 21st century must ask and answer the following questions:

Competition

1. What competitive forces are acting on your library or corporate information service? Who are your existing rivals, potential new entrants, substitutes, customers, and suppliers?
2. How do you deal with the added forces of digitization, globalization, deregulation, and personalization?
3. What strategies do you pursue to meet these old and new competitive forces?

Technology

1. What technologies do you have in place? Do you have a strategic plan for information technology?
2. Who do you connect to, who connects to you, and how fast are your network connections to and from the outside world?
3. Do you offer a media-rich Net-centric environment? Can you reformat your online environment for presentation and interaction with a wide variety of personal handheld devices?
4. How do Moore's Law, Metcalfe's Law, and the Bandwidth Scaling Law impact you?

Planning

1. How will you drive down the costs of the information, communications, and services you provide while maintaining, or improving, quality of service?
2. How will you deal with "disruptive" technologies?
3. Finally, and most importantly, will you offer the right mix of services, and enter into the kinds of agreements that develop and maintain lasting relationships with both your clientele and partners?

How you address these questions may well determine whether you thrive or merely survive as an information provider in the digital world. After all, materials currently in many different physical forms are now, or soon will become, electronically processed or reprocessed information. Be sure to create the proper relationships as well as provide the applications and services required to succeed in a high-bandwidth media-rich Net-centric environment. Don't be "stuck in the middle" without a strategy to deal with the competitive and technological forces around you.

²² Dagmar Recklies, "Beyond Porter—A Critique of the Critique of Porter," Recklies Management Project GmbH, (June 2001):1. Online at <http://www.themanager.org/pdf/BeyondPorter.PDF>. Retrieved April 30, 2004.

²³ David J. Staley, "The Future of the Book in a Digital Age," *The Futurist* 37 (September/October 2003): 19-20.

About the Author

Eric Flower (BA, MA Economics; MLS) is the Librarian at the University of Hawai'i-West O'ahu, Pearl City, HI, USA where he is also an adjunct lecturer in the Professional Studies Division. He was Editor-in-Chief of *Computers in Libraries* magazine from 1990 to 1992 and from 1993 through 2002 wrote the Wintel industry review and forecast for the annual buyer's guide issue.

Appendix

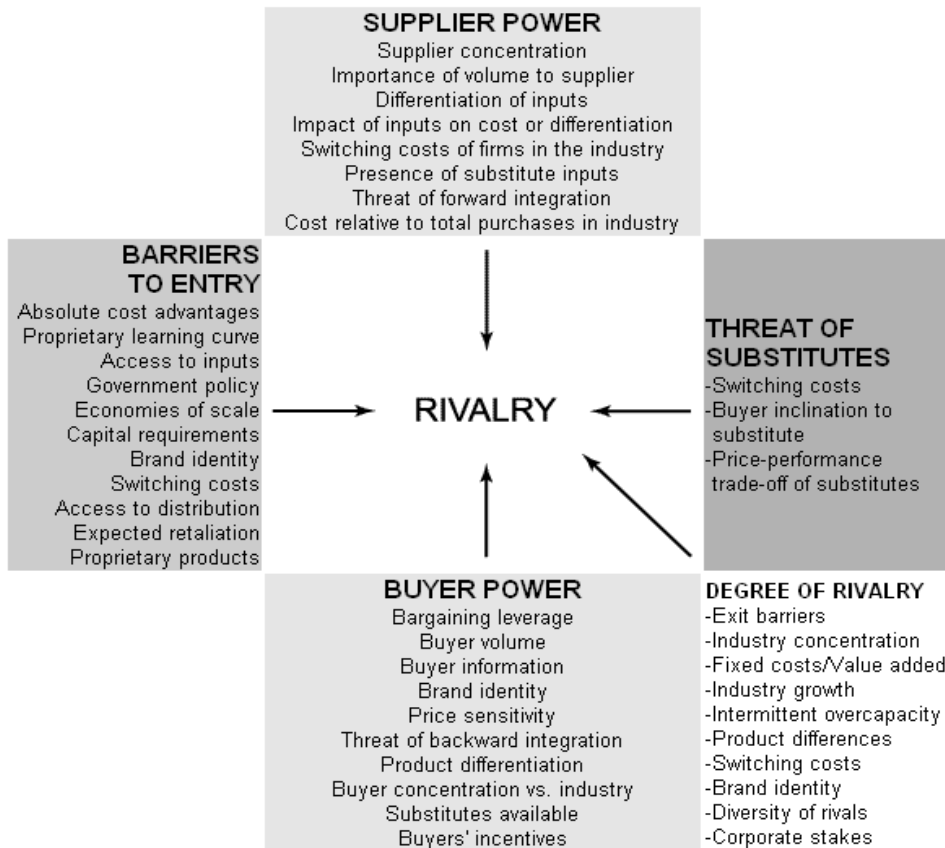


Figure 1

Porter's Five Forces: A Model for Industry Analysis <http://www.quickmba.com/strategy/porter.shtml>