

**Managing Innovation in the Real Estate Industry:
A Theory of Disruptive Innovations**

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ABSTRACT

Management teams in real estate firms are in a precarious position as they struggle to manage innovation without much experience in planning and executing technology-driven strategies. Real estate technology is in its infancy. The growth trajectories of innovations and the impacts of novel technologies on the future of the real estate industry have yet to be seen. This is an important time for board members and senior managers of leading real estate firms because innovation is a double-edged sword. A sound technology policy can be highly lucrative, while a failed technology strategy can prove positively fatal.

This thesis studies the complexities of managing innovation in the real estate industry. It builds on the study of innovation and strategic management in other industries to provide insight into the future of the real estate industry. Managing innovation is not a new problem – there is a significant body of scholarship on the topic that has been developed through rigorous study of several industries ranging from disk drives to retailing. Researchers have produced a set of analytical frameworks and detailed case studies that explore the interaction between innovation and firm-level strategic management. This paper applies some of these analytical tools to study the nature of innovation in the real estate industry and uncover potential opportunities and pitfalls facing managers in the future

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Introduction. The Challenge of Innovation

“All progress is initiated by challenging current conceptions, and executed by supplanting existing institutions.” **George Bernard Shaw**¹

Managers of successful firms are today facing challenges that would have been unimaginable to many of their predecessors a decade ago. The advent of information technology and electronic commerce has brought with it a significant paradigm shift in the business world.² Innovation has now, more than ever become synonymous with success. There is no shortage of examples of “New Economy” investors richly rewarding innovative firms and harshly punishing firms that are either unable or unwilling to adapt their business models to capture value from change.³ As a result, management teams are under intense scrutiny from shareholders to identify and capitalize on new market opportunities arising from technological innovations. Technology-driven strategic management is no longer confined to “high-tech” areas like the software, biotechnology, and consumer electronics industries. Established firms in mature industries such as banking, retailing, transportation, and health care are increasingly focused on building their competitive strategies around technological innovations.⁴ In this environment,

¹ Quote was taken from an online collection of George Bernard Shaw’s quotes. The quote itself can be found in “Man and Superman”:

² H. Mendelson and J. Ziegler, *Survival of the Smartest: Managing Information for Rapid Action and World Class Performance* (New York: Wiley and Sons, 1999).

³ A recent example of this phenomenon is the story of Border’s Books, whose stock price has been languishing despite the fact that it is the most profitable retail bookseller in the industry. Investors have been punishing the company because of its inability to sell books online. For further information, see “Retailing in the Age of the Web, a Book Chain Flounders,” *The Wall Street Journal*, 2/22/99.

⁴ See *Forbes*, February 2000, “The Evolution of Business”, and *Fortune*, “Strategies for the Millennium,” January 2000, and *The Wall Street Journal*, “The Collapse of Sears,” March 14, 2000.

innovation has evolved from a source of competitive advantage to a basis for survival as firms strive to meet and exceed the technological advances of their counterparts.⁵

Managers in the real estate industry have certainly not overlooked the awesome strategic significance of technological innovations. The management teams of public real estate firms, fueled as they are by shareholder demands and public scrutiny, are directing an increasing amount of time and resources to develop sound strategies for innovation.⁶ That innovation is currently a 'hot topic' for industry analysts and participants and is reflected in the fact that major industry associations such as the Urban Land Institute, the International Council of Shopping Centers, the Building Owners and Managers Association, and the National Association of Real Estate Investment Trusts, have been holding a growing number of regional and national conferences dedicated to technology and its effects on real estate.⁷ The trade publications (*Urban Land*, *Shopping Centers Today*, *National Real Estate Investor*, *Homebuilder*, and *Multifamily Investor*) have each featured at least one article on technological innovation in more than 80% of their issues since January 1999.⁸ New publications and websites on real estate technology are sprouting up at an impressive rate according to Peter Pike, whose website, Pikenet, is the leading Internet news source for the real estate industry and lists well over 200 different

⁵ The emergence of online stock brokerages presents an excellent case study. For example, see Merrill Lynch's struggle to develop an online business, such as "Merrill's E-Battle," *Business Week*, 11/15/99.

⁶ This information is drawn from an industry panel report entitled "The Real Estate Landscape in 2000-Challenge and Opportunity," Industry Report, Deutsche Banc Alex. Brown, June 15, 2000.

⁷ Promotional material sent to the authors directly from these organizations. For further information, see the association websites: www.uli.org for Urban Land Institute, www.icsc.org for International Council of Shopping Centers, www.nareit.org for National Association of Real Estate Investment Trusts, and www.boma.org for Building Owners and Managers Association.

⁸ Information gathered by authors. Several minor trade publications, such as regional newspapers and magazines have also featured several articles on technology.

news websites reporting real estate content.⁹ The mainstream business media is tracking the impact of information technology in the real estate industry as well. As of July 2000, The Wall Street Journal has printed five feature articles and more than 30 coverage pieces about technology developments in the real estate industry.¹⁰ Management scholars, real estate consultants, and managers from leading firms agree that the industry is ripe for large-scale innovations within the next five years.¹¹

The fact still remains, however, that the real estate industry is not a 'technology-intensive' business. The link between real estate and innovation is not as straightforward as in other industries that have traditionally relied on technological innovations to produce new generations of products and services. Although the industry clearly perceives that innovation is significant, the reality is that technological innovations have not yet directly and significantly affected the functions and operations of most real estate firms.¹² The CEO of a major international brokerage firm commented that to his brokers, technology is nothing more than, "e-mail, cellular phones, computer terminals, and wires."¹³ When asked about the impact of technology on the development of strip shopping centers, a Vice President of the largest private retail development firm in

⁹ See Pikenet's website, www.pikenet.com for further information.

¹⁰ The Wall Street Journal, dates of featured articles, 7/8/99, 4/26/00, 5/4/00, 6/6/00, 7/17/00, see bibliography for full references and citations of coverage pieces.

¹¹ Face-to-face Interviews by the authors with Professor Jim Short of the London Business School and Massachusetts Institute of Technology Sloan School of Management, and Andrew Florance, CEO, Costar Group at the MIT Disintermediation Forum, 5/12/00, and James Hime, CEO, tenantcity.com, 5/27/00, and excerpts from published interviews with Chris Peacock, CEO Jones Lang Lasalle, and Jeffrey Bucksbaum, CEO General Growth Properties, see bibliography for further references.

¹² Telephone interviews with employees from Colliers International (4/3/00 through 5/1/00), Boston Properties (9/28/99), and The Kutzer Company (1/18/00), a commercial property management firm in Los Angeles.

¹³ Face-to-face interview with John McLernan, CEO, Colliers, Macaulay, Nichols, Inc., 5/3/2000.

Illinois commented, “We don’t have a concrete technology policy... We just build to the specs of the retailers.”¹⁴

Management teams are in a precarious position as they struggle to manage innovation without much experience in planning and executing technology-driven strategies. Real estate technology is in its infancy. The growth trajectories of innovations and the impacts of novel technologies on the future of the real estate industry have yet to be seen. This is an important time for board members and senior managers of leading real estate firms because innovation is a double-edged sword. A sound technology policy can be highly lucrative, while a failed technology strategy can prove positively fatal.

This thesis is about managing innovation in the real estate industry. It builds on the study of innovation and strategic management in other industries to provide insight into the future of the real estate industry. Managing innovation is not a new problem – there is a significant body of scholarship on the topic that has been developed through rigorous study of several industries ranging from disk drives to retailing. Researchers have produced a set of analytical frameworks and detailed case studies that explore the interaction between innovation and firm-level strategic management. This paper applies some of these analytical tools to study the nature of innovation in the real estate industry and uncover potential opportunities and pitfalls facing managers in the future.

¹⁴ Interview with Norris Eber, Vice President, Joseph Freed and Associates, 5/23/2000.

The first chapter presents some of the latest academic scholarship on managing innovation. The focus of this chapter is on the theory of “disruptive technologies,”¹⁵ a state-of-the-art theory, which explores how and why certain types of innovations have the power to change the competitive landscapes of strong industries and destroy the positions of market leaders.¹⁶ The basic principles of the theory originate from the study of ‘high-tech’ firms by management scholars Richard Foster, Rebecca Henderson, Kim Clark, Richard Rosenbloom, and Clayton Christensen.¹⁷ Recently, the focus of research on disruptive technologies has expanded to include several ‘low-tech’ industries such as health care and banking, which are not technologically dissimilar to the real estate industry. The review of the research is then used to build an analytical ‘innovation framework’ based on the principles of disruptive technologies.

Chapter 2 considers technological innovations in the real estate industry from the perspective of the theories presented in chapter 1. To facilitate discussion of recent innovations in the broad and diversified industry, analysis is grouped among one of three functional sub-sectors: service, construction, and owner/developer. Service firms are companies that are engaged in the brokerage, lending, professional services, and property management functions. The construction grouping includes architectural, engineering, and construction companies. The owner/developer group consists of public and private firms that act as principals in the ownership and development of commercial and

¹⁵ Also called “disruptive innovations” and “discontinuous technologies”.

¹⁶ See Richard J. Foster, *Innovation: The Attacker’s Advantage* (New York: Summit Books, 1986), and Clayton M. Christensen, *The Innovator’s Dilemma* (Boston: Harvard Business School Press, 1997).

¹⁷ See Works Cited section for full citations on some of these scholars’ works.

residential real estate. Innovations in each of the sub-sectors are analyzed using the innovation framework developed in the first chapter.

In the third chapter, the innovation framework is used to analyze the retail development sub-sector of the real estate industry. This section consists of a detailed review of technological innovations in retail development over the past 70 years. The analysis begins with the development of downtown shopping districts and includes famous innovations like the suburban strip shopping center, the regional mall, the power center and the outlet center. The review concludes with a discussion of electronic-commerce as a disruptive technology for retail real estate developers.

Chapter 4 analyzes the technology initiatives of the Simon Property Group, the nation's leading retail development firm. Building on the analysis from the previous chapter, this section focuses on the actual policies of one of the real estate industry's most respected and innovative management teams. A number of Simon's major technology initiatives are dissected and evaluated using the innovation framework in order to understand how the firm perceives the industry landscape and how they plan to retain their leadership position.

Thus, the analysis telescopes downward through the second, third, and fourth chapters from real estate on the industry level (chapter 2), the industry sub-sector level, (Retail – Chapter 3), and the firm level, (Simon Property Group – Chapter 4).

The conclusion ties the lessons from the first four chapters together and considers the applicability of the innovation framework approach to real estate. It summarizes what we have learned by studying real estate from a technology perspective. The thesis concludes with some suggestions about further research on the topic.

The next section presents the methodology used in conducting the research for this thesis.

Methodology

Real estate management is a field of study that has not yet developed a large body of technology-focused academic literature. This thesis approaches the problem of managing innovation in real estate by developing an analytical innovation framework based on existing academic literature drawn from the study of other industries and applying that framework to the real estate industry. In order to provide sufficient depth and breadth to the analysis, the framework is first applied across the entire industry, then to the retail development sub-sector, and finally to the leading firm within that sub-sector. The idea behind this layered approach is to suggest how a leading firm in the real estate industry might approach the problem of innovation – by studying the impacts of new technologies on other industries, by considering innovations in other parts of the real estate industry, and by looking carefully at the role of innovation in the firm’s specific line of business. The research for this thesis consists of information gathered from books, case studies, articles, and both face-to-face and telephone interviews conducted by the authors.

Innovation Literature

The literature used to construct the innovation framework was principally based on the research conducted in two important books on managing innovation, *Innovation: The Attacker’s Advantage*, and *The Innovator’s Dilemma*.¹⁸ These works presented important milestones in the study of innovation management and spawned several

¹⁸ See Richard J. Foster, *Innovation: The Attacker’s Advantage* (New York: Summit Books, 1986), and Clayton M. Christensen, *The Innovator’s Dilemma* (Boston: Harvard Business School Press, 1997).

academic articles and case studies on innovation issues from a wide range of industries. In the first chapter, these articles and case studies are employed to flush out the major components of modern innovation theory and provide some real-world examples of the impacts of innovation.

Real Estate Industry

The research for the real estate industry primarily consists of articles and interviews conducted by the authors. Articles were gathered from mainstream business media and trade publications in both print format and electronic format. Three websites were particularly helpful in providing articles on technology matters in the real estate industry: www.wsj.com, the online edition of The Wall Street Journal; www.pikenet.com, the leading source for real estate news on the Internet; and www.icsc.org, the official site of the International Council of Shopping Centers. Each of these websites provided several articles from the past and present that were used to sketch the portrait of innovation in the real estate industry. The numerical data used in Chapter 3 was collected from a variety of sources including the International Council of Shopping Centers, the Urban Land Institute, the United States Department of Commerce, and the United States Treasury. The authors interviewed managers from real estate firms engaged in ownership, management, development, brokerage, construction, lending, online services, and real estate finance. Thirty individual interviews were conducted in person, by phone, and by email. Twenty interviews were conducted in person at two industry events: the Real Estate Services Disintermediation Forum held at MIT on May 12, 2000, and the International Council of Shopping Centers Spring Convention held

from May 23 through May 27, 2000, in Las Vegas, Nevada. Another ten interviews were conducted in June and July of 2000 through telephone conversation and electronic mail. Interviewees were asked to share their opinions about which innovations have most impacted the real estate industry and their experiences with specific innovations that impacted their markets. Five interviews with experts from outside the real estate industry helped round out the analysis with some unique perspectives on how innovations change business models within firms and across industries.¹⁹ The articles and interviews together provide a preliminary understanding of the nature of innovation in the real estate industry.

Analytics

The analysis that results from applying the theories of innovation to the real estate industry is entirely original. It is not intended to be a definitive approach to the topic, just a fresh look at the nature of innovation in real estate. Market realities are rapidly changing and with the growing significance attached to innovation by managers of real estate firms, we can expect an upsurge in this kind of research in the future. A major motivation behind this thesis is to encourage further study into the field of innovation by future scholars of real estate management.

With that aim in mind, we proceed with the first chapter and an analysis of modern theories of innovation.

¹⁹ Specifically, face-to-face interviews conducted by authors with management professors Jim Short of London Business School (5/13/00) and Henry Chesbrough of Harvard Business School (10/12/99), and venture capitalists Vishnu Menon of Accel Partners (1/14/00) and Andrew Van der Laan of Credit Suisse First Boston (2/10/00).

Chapter 1. The Art of Managing Innovation

Innovation is widely regarded by economists as the fundamental driver of long-run economic growth and the primary determinant of increasing standards of living.²⁰ For students of management, however, innovation is a powerful and unpredictable force that often challenges the accepted principles of sound management.²¹ The growing field of managing innovation started in the mid-1980s with studies on competition during the evolution of the computer industry from the late seventies to the early nineties.²² This period stands out in the history of business as one of the most remarkable displays of the power of technological innovation – every new technology brought with it a new set of leading firms that quickly displaced the existing leaders and, in turn, were quickly displaced by the next generation of leading firms touting a new technology.²³ This frenetic pace of change inspired management scholars to explore the relationship between technology and management strategy. From the earliest work in the field, researchers sought to understand the destabilizing effects of innovation – why certain innovations break down existing market systems and cause the failure of leading firms.²⁴ Recent studies have continued to explore the destabilizing effects of innovation and expanded the

²⁰ For an economic perspective on the significance of technological innovation, refer to the work of Robert Solow, a Nobel-prize-winning economist from MIT. The “Solow-Swan growth model” identifies technology as the fundamental source of gains in labor and capital productivity, which together determine the long-run rate of economic growth. See Robert M. Solow, *Growth Theory: An Exposition* (London: Oxford University Press, 2000).

²¹ See Richard J. Foster, *Innovation: The Attackers Advantage* (New York: Summit Books, 1986).

²² This definition of the field is drawn from the introductory lecture to a course entitled “Managing Innovation” that was taught by Professor Henry Chesbrough at the Harvard Business School in fall of 1999.

²³ For a fascinating and detailed history of the evolution of the disk drive industry, see Clayton M. Christensen, “The Rigid Disk Drive Industry: A History of Commercial and Technological Turbulence,” *Business History Review* (67), Winter, 1993, 531-588.

²⁴ See the introduction to Foster, note 20 above.

research to a wide array of industries from the manufacturing and service sectors.²⁵ This chapter explores some of the latest research in the field and presents an analytical ‘innovation framework’ that is used in later chapters to study the real estate industry.

It is helpful to define some basic terminology before proceeding with an analysis of the literature. ‘Technology’, as used in this thesis, means the processes by which a company “transforms labor, capital, materials, and information into products and services of greater value.”²⁶ Every type of firm has a technology or a set of technologies. A retailer like Sears uses a particular technology to purchase, present, sell, and deliver products to its customers, while a discount warehouse like PriceCostco employs a different technology.²⁷ The term ‘innovation’ refers to a shift or change in a technology. Innovations are either ‘radical’ or ‘incremental’, based on the degree to which the new technology resembles its predecessor.

Why Market Leaders Fail

Most recent theories about why great companies fail are drawn from research on the manufacturing sector and can be categorized as either ‘organizational theories’ or ‘capabilities theories’.²⁸ Organizational theories suggest that leading firms are not able to capitalize on new technologies when these innovations call for major changes in firm organization and management structure. In their study of manufacturing firms, Kim

²⁵ See H. Kent Bowen, Kim B. Clark, Charles A. Halloway, and Steven C. Wheelwright, “Make Projects the School for Leaders,” *Harvard Business Review*, September-October 1994, 131-140.

²⁶ See Clayton M. Christensen, *The Innovator’s Dilemma* (Boston: Harvard Business School Press, 1997) 15.

²⁷ *Ibid.*, xiii.

²⁸ This distinction is drawn by Christensen, *The Innovator’s Dilemma*, 12-13.

Clark and Rebecca Henderson find that because most leading firms base their organizational structures on the architecture of their dominant products, firm structures facilitate component-level innovations instead of product-level innovations.²⁹ Thus, when faced with an innovation that changes product architecture, the firm is not able to adapt its management structure fast enough or well enough to capture the opportunity. Capabilities theories argue that leaders fail when they encounter certain ‘radical’ innovations that are not well suited for the firm’s core technological competencies. In his study of the history of the auto industry, Clark discovers that leading firms build technological capabilities incrementally and based on their experience with a particular product or service.³⁰ When these firms are confronted with innovations that call for new competencies, they are unable or unwilling to develop the technical ‘know-how’ required to bring such products to market.³¹

In his landmark study on the impacts of innovation on several different industries, Clayton Christensen finds that neither organizational theories nor capabilities theories are sufficient to explain the failure of leading firms.³² The leading firms in his study had flexible management structures, broad technological capabilities, and were commended by analysts as standard-bearers of management excellence. “What this implies,” Christensen points out, “is that many of what are now widely accepted principles of good

²⁹ Auto manufacturers are typically organized around their products – engine department, transmissions group, electronics team, etc. See Rebecca M. Henderson and Kim B. Clark, “Architectural Innovation: The Reconfiguration of Existing Systems and the Failure of Established Firms,” *Administrative Science Quarterly* (35), 9-30.

³⁰ See Kim B. Clark, “The Interaction of Design Hierarchies and Market Concepts in Technological Evolution,” *Research Policy* (14), 1985, 235-251.

³¹ See Philip Anderson and Michael Tushman, “Technological Discontinuities and Dominant Designs,” *Administrative Science Quarterly* (35), 1990, 604-633.

³² Christensen, xviii.

management are, in fact, only situationally appropriate.”³³ Each of the firms studied by Christensen invested in research and development, stayed close to their customers, planned well and worked hard to build their leadership positions among fierce competition. He argues that these great firms failed because of their inability to capture value from “disruptive technologies,” or simple innovations that give rise to cheap products or services that initially cater to lower tiers of the market but eventually grow to capture mainstream customers.³⁴

The theory of disruptive technologies is an analytical framework consisting of three interdependent notions: the notion of disruptive technologies, the notion of performance overshooting, and the notion of value networks. Each of these notions is briefly described below using analytical tools developed by Christensen and other experts in the field of technology strategy. The presentation of the theory is followed with an illustrative example of the impact of innovation on the retail industry.

Disruptive and Sustaining Technologies

Most innovations within a given industry improve the performance of established products and services along the specific measures of performance that mainstream customers in significant markets consider valuable. Christensen terms these innovations “sustaining technologies” because they sustain the existing dimensions of product performance.³⁵ Sustaining technologies can be radical or incremental, based on the differences between the new technology and its predecessor. Some examples of simple

³³ Ibid., xii.

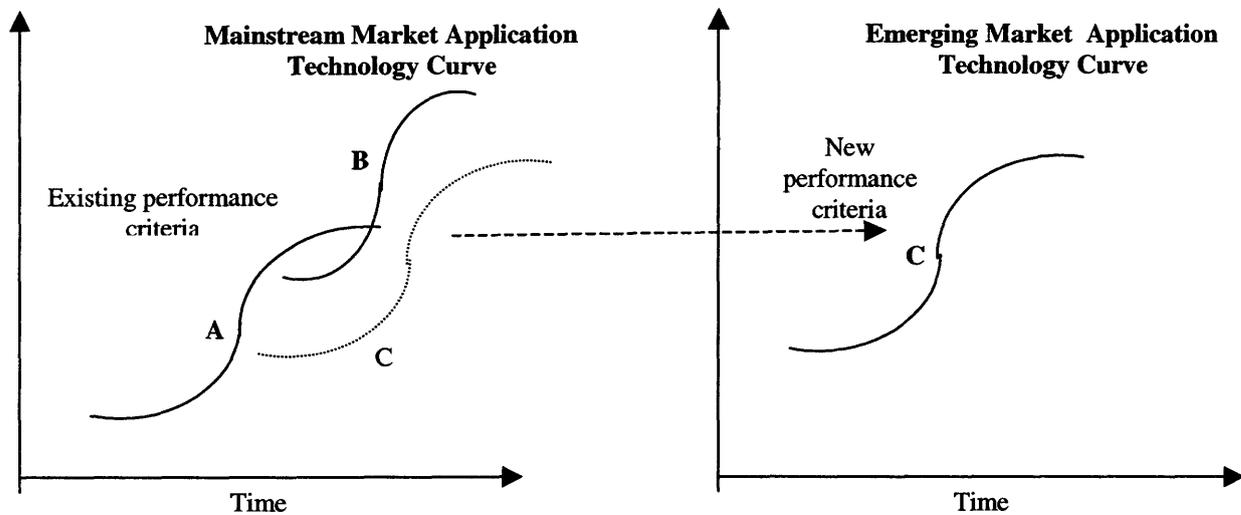
³⁴ Ibid., x.

sustaining technologies are: lead-free pencils (incremental), ready-made meals at the local supermarket (incremental), longer-lasting batteries (radical), and faster computer processors (radical). Disruptive technologies, on the other hand, “bring a very different value proposition to the market than was previously available.”³⁶ A disruptive innovation measures different attributes of performance than those relevant in established markets. Almost always simpler and cheaper versions of existing innovations, disruptive technologies under perform established technologies in mainstream markets, but have features that are valued by new customers in emerging markets. Examples of disruptive counterparts to the sustaining innovations listed above are: mechanical pencils, web-based supermarkets, solar-powered appliances, and palm-held computers. These are disruptive technologies because they offer customers new criteria from which to judge product performance – electric vehicles don’t accelerate as well as gasoline vehicles, but they are more friendly to the environment; online supermarkets don’t offer as wide a range of products as conventional supermarkets, but they are more convenient; solar-powered flashlights are not as reliable as battery-powered flashlights, but they are cheaper to own and operate; and palm-held computers are not as powerful as desktop computers, but they can fit in your pocket. Thus, the distinction between disruptive and sustaining technologies is a market distinction more than a technical distinction. The following figure helps visualize this distinction.

³⁵ Ibid., xi.

³⁶ Ibid., xii.

Figure 1. Disruptive Technology S-Curves



Source: C.M. Christensen, *The Innovator's Dilemma*, p.40-41

The graph above contains three technology S-curves, which measure performance increases over time. S-curve theory, which is an analytical tool used by scientists to predict the performance of new technologies, suggests that throughout a particular innovation's life cycle, its performance improves at a decreasing rate.³⁷ In other words, as a technology matures, its performance growth decelerates. The first curve (A) represents an existing technology in a mainstream market. Incremental sustaining technologies, such as improvements in an existing product, can be thought of as points along the curve (moving up with each new innovation). A radical sustaining technology, such as a next-generation product, is represented by an upward shift from curve A to curve B.³⁸ Though the curve has shifted, it remains in the graph on the left side – this means that the innovation is commercialized in the mainstream market application. The

³⁷ Clayton M. Christensen, "Exploring the Limits of the Technology S-Curve," *Production and Operations Management* 1, no. 4 (Fall 1992): 334-366.

³⁸ The figures and analysis are adapted directly from *The Innovator's Dilemma*, 40-43.

disruptive technology represented by curve C, consists of a shift to the emerging market application on the right. With this shift comes a change in the performance criteria (the y axis) for the given technology. From the perspective of mainstream customers on the left side, the new sustaining technology performs better than the disruptive technology along the attributes they value (the dashed C curve is drawn in on the left graph to illustrate this point). But for customers in the emerging market on the right side, the disruptive technology offers them superior performance along the dimensions that they value.

Technology Overshooting: How Disruptive Technologies Enter Mainstream Markets

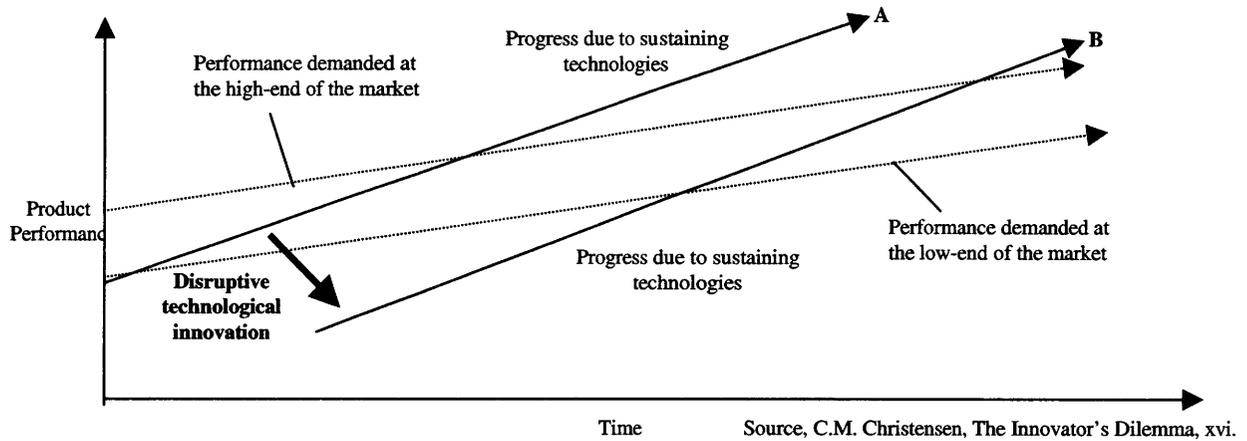
Managers of leading firms in mainstream markets concede the initially insignificant emerging markets to firms touting disruptive technologies, and focus on improving their products and services for their major customers using sustaining technologies.³⁹ But as Christensen points out, product performance grows at a faster rate than market demand for performance.⁴⁰ This occurs for two reasons: (1) leading firms are under intense pressure from competitors and investors to produce better products, and (2) some consumers with a high demand for cutting-edge technology are willing to pay significant premiums for new products.⁴¹ The result of a strategy to consistently move up-market for higher margins and profits, is what Henry Chesbrough calls ‘technology overshooting’.

³⁹ Gary Pisano and Maryam Golnaraghi, “State Street Bank and Trust Company: New Product Development,” Harvard Business School Case Study 696-087, 1997.

⁴⁰ The actual rates vary depending on the industry, but this has to be true in all cases. When leaders do not stay ahead of competitors, they are soon displaced. See Christensen, *The Innovator’s Dilemma*, 31-41.

⁴¹ Geoffrey K. Gill and Steven C. Wheelwright, “Motorola, Inc.: Bandit Project (Abridged),” Harvard Business School Case Study 692-069, 1991.

Figure 2. Technology Overshooting



The trajectory map above illustrates the phenomenon of technology overshooting. Market demand for technology is represented as the area between the two dashed lines. The market leader produces goods and services along a technology performance trajectory determined by sustaining innovations (curve “A”). Over time, as product performance improves, the firm begins to climb into the higher reaches of market demand – the northeast corner of the trajectory map, where the highest margins reside.⁴² But the pace of innovation on the product level grows at a faster rate than the market demand (even the high-end of the market) and, as a result, the supply of technology overshoots the demand.⁴³

A disruptive innovation (curve “B”) is not initially performance competitive with the mainstream technology even at the lower-end of market demand. However, as time

⁴² Christensen, *The Innovator's Dilemma*, 16-18.

⁴³ This phenomenon is observed on a daily basis by shoppers, who are bombarded by a new model personal computer every six months or are forced to choose from 140 different types of salad dressing at the local supermarket. See Philip B. Evans and Thomas S. Wurster, “Strategy and the New Economics of Information,” *Harvard Business Review*, September-October 1997, 71-82.

passes and the product performance improves at a faster rate than market demand for performance grows, the disruptive product begins to ascend into the mainstream market.⁴⁴ Once it penetrates the mainstream market, the disruptive product ultimately becomes performance-competitive with the dominant product from the market's perspective.⁴⁵ This is reflected on the graph as curve "B" travels up the performance trajectory and intersects first low-end and then high-end market demand. Once the disruptive product becomes performance-competitive with the dominant product, the basis for performance changes. The market begins to consider other attributes such as convenience, design, efficiency, and ultimately price.⁴⁶ At this point, the disruptive product captures a majority of the market because it is simpler, more convenient, and cheaper.⁴⁷

Value Networks: Why Leading Firms Don't Invest in Disruptive Technologies

Established firms don't invest in disruptive technologies because, Christensen argues, disruptive technologies lie outside existing "value networks". Value networks can be defined as, "the context within which a firm identifies and responds to customers' needs, solves problems, procures input, reacts to competitors, and strives for profit."⁴⁸ Firms judge the economic potential of new technologies from the perspective of their value networks. When an innovation lies outside a particular value network, it is difficult

⁴⁴ Christensen, *The Innovator's Dilemma*, 20-24.

⁴⁵ Drawn from numerous case studies. See Harvard Business School case studies, *Eli Lilly and Company: Innovation in Diabetes Care*, *Hewlett-Packard: The Flight of the Kittyhawk*, *Hydrocision, Inc.*, *Managing Innovation at Nypro, Inc.*, *Hewlett-Packard's Merced Division*, *State Street Bank and Trust Company: New Product Development*, *Motorola, Inc.: Bandit Pager Project (Abridged)*. For full citations see bibliography.

⁴⁶ Foster, 41-53.

⁴⁷ See note 25.

for established companies to ascribe value to that technology. Subsequently, managers within established firms tend to allocate resources toward sustaining innovations and away from disruptive innovations.⁴⁹

The theory of value networks is closely related to the organizational and capabilities theories (mentioned at the beginning of the chapter): “As firms gain experience within a given network, they are likely to develop capabilities, organizational structures, and cultures tailored to their value network’s distinctive requirements.”⁵⁰ But the value network model is more robust than its predecessors because it includes the theory of resource dependence. In her study of resource dependence, Rebecca Henderson argues that market leaders do not invest in disruptive innovations because they are dependent on their investors and major customers for capital.⁵¹ Specifically, investing in disruptive technologies is not a rational financial decision for established competitors for four reasons. First, disruptive products are, by definition, simpler and cheaper than existing products, yielding lower margins. Second, disruptive technologies are first commercialized in small emerging markets – small markets with low margins translate into low profits. Third, the cost structures of established firms dictate the gross operating margins and economies of scale that are necessary to make a technology viable.⁵² Finally, the leading firms’ biggest customers typically do not want or cannot use

⁴⁸ Christensen, *The Innovator’s Dilemma*, 32. This notion is adapted by Christensen from Giovanni Dosi’s pioneering work on “technological paradigms”. See Giovanni Dosi, “Technological Paradigms and Technological Trajectories,” *Research Policy* (11), 1982, 147-162.

⁴⁹ *Ibid.*

⁵⁰ Richard S. Rosenbloom and Clayton M. Christensen, “Explaining the Attacker’s Advantage: The Technological Paradigms, Organizational Dynamics, and the Value Network,” *Research Policy* (24), 1995, 233-257.

⁵¹ See Rebecca M. Henderson, “Keeping Too Close to Your Customers,” Massachusetts Institute of Technology Sloan School of Management working paper, 1993.

disruptive products.⁵³ For these reasons, managers in leading companies cannot make a case for investing in disruptive innovations until it is too late.

Innovation in Retail: A Tale of Two Stores

To better understand the theory of disruptive technologies, it is helpful to consider a real-world example of the impact of a disruptive innovation. With this end in mind, few industries are better suited to demonstrate the pervasive impact of disruptive technologies than retailing, where discount retailers seized market dominance from traditional department and variety stores.⁵⁴ The innovation of discount retailing was a disruptive technology because it challenged the existing metrics of quality retailing. The first discount stores appeared in the greater Manhattan in the mid-1950s, operating at the lowest end of the market by selling brand name goods at 20 to 40 percent discounts to department store prices.⁵⁵ The product selection in these stores was very limited – inventories mostly consisted of items that every customer knew how to use, such as brand-name hard goods (hardware, small appliances, and luggage).⁵⁶ By selling simple and well-known items, the discounters were able to keep overhead low by eliminating the need for expensive advertising efforts and highly skilled salespeople. Significantly, discount stores catered to the very customers that mainstream retailers found least attractive: “young wives of blue collar workers with young children.”⁵⁷ These customers valued the price and convenience of discount outlets more than the prestige and broad

⁵² Christensen, *The Innovator's Dilemma*, 37-39.

⁵³ Henderson.

⁵⁴ Christensen, *The Innovator's Dilemma*, 110-111.

⁵⁵ *Ibid.*, 111.

⁵⁶ See Richard Tedlow, *New and Improved: The Story of Mass Marketing in America* (Boston: Harvard Business School Press, 1996). This book contains first-rate scholarship on the history of discount retail.

selection of products offered by the mainstream retail formats of the age. Thus, discount retailing met the initial criteria of disruptive innovations – it was a cheaper and simpler way to sell products, and it focused on the fringes of the mainstream market.

To be truly considered disruptive, however, a technology must offer new and different measures of product performance. In the case of discount retailing, this was achieved through the model of low gross margins and high inventory turnover.⁵⁸ As displayed in Table 1, discount retailers achieved returns that were comparable to mainstream retailers, even though they captured significantly lower margins.⁵⁹ Once they were established in the fringe markets, discount retailers used their low cost structures to climb into the higher tiers of the market and steal share from mainstream retailers. As customer demographics changed and mainstream retailers continued to adopt innovations aimed at their highest-margin customers (in-store fashion shows, new ways to display products, innovative promotional schemes, expanded product lines, branded goods), they inadvertently overshot their markets.⁶⁰

Table 1. Retail Technologies: 1960

Retail Technology	Leading Firm Example	Typical Gross Margins	Average Inventory Turnover	Return on Investment
Department Stores	Sears	40%	4x	160%
Variety Stores	F.W. Woolworth	36%	4x	144%
Discount Stores	Kmart	20%	8x	160%

Source: C.M. Christensen, *The Innovator's Dilemma*, 112.

⁵⁷ "Harvard Study on Discount Shoppers," *Discount Merchandiser*, September, 1963, 71. This research is provided by Christensen. See Christensen, *The Innovator's Dilemma*, 111.

⁵⁸ *Ibid.*, 112.

⁵⁹ This analysis and the chart are adapted from Christensen, *The Innovator's Dilemma*, 112-118.

⁶⁰ Tedlow, 125.

According to Clayton Christensen, “Their [discount retailers] share of retailing revenues in the categories of goods they sold rose from 10 percent in 1960 to nearly 40% a scant six years later.”⁶¹ This tremendous growth rate in goods sold, coupled with the growth in the types of goods that discounters were selling, should have alarmed mainstream retailers. But none of the major retail chains (Sears, Montgomery Ward, J.C. Penney, R. H. Macy), with the exceptions of Dayton Hudson (Target), F.W. Woolworth, and S.S. Kresge (Kmart), made an attempt to build a discount business. Comfortably and firmly ensconced in their value networks, the highly respected management teams of these great companies were both unwilling and unable to invest in this disruptive technology until it was too late to build a successful discount franchise. With high overheads and choosy clientele, the mainstream leaders were trapped in golden handcuffs.

Of the firms that did invest in building a discount business, Kresge and Dayton Hudson succeeded because, “they both created focused discount retailing organizations that were independent from their traditional businesses.” Realizing that the disruptive technology did not fit into their established value networks, these firms created entirely new value networks around discount retailing.⁶² Woolworth tried to build a discount business from within their existing variety store value network. As predicted by the theory of disruptive technologies, the firm was unable to direct resources away from innovations that sustained their position as a variety store towards their position as a

⁶¹ *Ibid.*, 112.

⁶² In fact, Kresge dropped out of the variety store business and focused all of its resources on Kmart.

discount retailer.⁶³ Their commitment to their mainstream customers did not allow them to build a value network around new customers from within the same organization. In the mid-1960s, Sam Walton brought a disruptive merchandising technology to market and seized the leadership position, changing the face of retailing once again. To lend some perspective to the discussion of the impacts of disruptive innovations on the retail industry, as of July 2000, the combined market capitalization of the three leading discount retailers is more than 50 times larger than the combined market capitalization of Sears, Federated Department Stores (parent of Macy's), Montgomery Ward, and J.C. Penney, combined.⁶⁴

A Framework for Innovation

The lessons learned from the retail industry, and the dozens of other industries that felt the impacts of disruptive innovations can be distilled into four observations, which Christensen calls “principles of disruptive innovation.”⁶⁵ These principles together form a framework for thinking about how innovations affect firms and industries. They are briefly summarized below as tools for thinking about innovation in the real estate industry, and are the subject of the next three chapters:

1. **Companies depend on customers for resources.** Firms that succeed, do so because they successfully build effective value networks around core products and services. Within these networks, major customers effectively control the

⁶³ For a sharp rendition of the Woolworth debacle, see Christensen, *The Innovator's Dilemma*, 111-114.

⁶⁴ The top three discount retailing firms measured by market capitalization, are Walmart Stores, Dayton Hudson, and Kmart. Industry data provided online by www.schwab.com on 7/26/00.

⁶⁵ Christensen, *The Innovator's Dilemma*, 97.

allocation of resources through their ability to influence revenues. Resources are directed towards sustaining technologies because major customers don't need disruptive technologies. This implies that managers of established firms seeking to invest in disruptive innovations are best advised to embed these projects within independent organizations that have customers who need such innovations and managers that are focused on and rewarded for addressing these customers. Innovations must be aligned with customers.⁶⁶

2. Small markets don't solve the growth needs of large companies. Leading firms initially reject disruptive technologies because they are commercialized in emerging markets. Because emerging markets are young, they don't offer large firms sufficient near-term growth opportunities. By the time these markets become large enough to be interesting, it is often too late to build a new business. Thus, to develop a disruptive technology, an industry leader should invest in an independent organization that is, "small enough to get excited about small opportunities and small wins."⁶⁷ The size of the firm must match the size of the market.

3. Markets that don't exist cannot be analyzed. Sound market research leads to successful strategies to commercialize sustaining technologies, but failed approaches to disruptive technologies. This is because the ultimate market application for a disruptive technology cannot be known in advance – the

⁶⁶ Ibid., 98.

⁶⁷ Ibid., 99.

evolution of a successful product is almost always the result of an iterative trial-and-error process. This implies that established firms should, “plan to fail early and inexpensively in the search for the market for a disruptive technology.”⁶⁸

4. Technology supply may not equal market demand. Disruptive technologies are often unattractive to mainstream markets for the very same reasons that they are attractive to emerging markets. This suggests that managers who invest in disruptive technologies must find or develop new markets that value the attributes of disruptive technologies, rather than look for ways to commercialize these innovations in established markets.⁶⁹

Having reviewed some major cutting-edge theories on managing innovation that were developed through the study of other industries, Chapter 2 presents an analysis of the real estate industry from the perspective of the innovation framework.

⁶⁸ Ibid., 100.

⁶⁹ Ibid.

Chapter 2. Real Estate Disrupted

While few observers consider the real estate industry to be a forward thinking, fast-moving, and technologically dynamic industry, the industry does have a number of points in common with the fast-paced high-tech industries discussed previously. Throughout the industry's history, successful owners/developers, service providers (brokers, financiers, property managers, etc.), and constructors have evolved through the adoption of a series of sustaining innovations. These innovations range from incremental improvements in tools used in the industry to fairly radical changes in construction techniques.⁷⁰ The key is that these sustaining technological innovations were created to modify or enhance the existing way that these groups do business.

More recently, this industry once characterized by back of the envelope deals, inordinately long negotiation periods, and territorial brokers, has been flooded by very specific, potentially disruptive technologies that are changing the manner in which the industry operates. According to a recent study by Credit Suisse First Boston, there are over 214 internet technologies that are currently being adapted to service the real estate industry. The study further states that these, along with other technological innovations will change the very nature of the real estate industry. The study indicates that roughly

⁷⁰ Scholars often measure technological progress in terms of incremental and radical advances. Incremental advances are those innovations that improve upon existing components and refine current system design. Radical advances, on the other hand, are new technologies that will enhance the existing process. See Clayton M. Christensen, "Exploring the Limits of the Technology S-Curve," *Production and Operations Management* (1), 1992, 334-336.

80% of the real estate Internet ventures are targeting new or emerging markets and are departing from traditional real estate practices.⁷¹

How much of an effect will these new, potentially disruptive technologies have on the real estate industry? We look at three groups within the industry, namely, service providers, constructors, and owners/developers, to assess how technology has changed the way business is conducted within the industry. We further assess the nature of the technologies that have incited the change (sustaining vs. disruptive) and will discuss the origins of these technologies.

The Service Industry

The real estate brokerage, mortgage brokerage, and property management industries historically have been relationship-based industries. The service industry's value network has designated people (brokers and managers) as the facilitators of relationships, listings, transactions, etc. Therefore, a number of the established service providers have been reluctant to venture outside of their value networks to explore potentially disruptive technologies that may add value to their existing business paradigms. The service group has also adopted the terms of "secretive and territorial" as a part of their value networks.⁷² This facet of the value network has further impeded the exploration of disruptive technologies that may threaten the groups existing revenue models, namely commissions. Despite the established firms' best efforts to thwart the

⁷¹ Interview with Jason Alexander, Real Estate Group, Credit Suisse First Boston, 6/7/2000.

⁷² Information taken from telephone interviews with 4 brokers, Grubb and Ellis, 4/22/2000.

introduction of potentially disruptive technologies, a number of start-ups have embraced the new technologies and are forcing changes among all players in the service group.

Real estate brokers have earned the moniker as the most “cantankerous” individuals to work with within the real estate industries. Likewise, their area of the service sector has been the recipient of a firestorm of technological innovations. These innovations have been viewed as “threatening” by a large portion of the brokerage industry as they may replace some of the services typically provided by brokers.⁷³ Initially, the industry was satisfied with incremental, sustaining technological innovations that would enhance their existing business models and give them an air of technological advancement. For example, Colliers International built a website that acted as an intranet for their brokers. This allows brokers to network, via the web, with their co-workers. Further, Colliers created an online, information based service for their clients, which allows them to view bios and listings of the participating brokers. These initial innovations were attractive, but didn’t drastically change the way in which the brokerage industry functions.⁷⁴

In 1995 Dennis DeAndre, founder of Loopnet.com, set out to unify what is a very fragmented industry. His goal was to create an online Multiple Listing Service that would enable brokers and the general public to have access to listings nationwide. The industry leaders (Insignia, Colliers International, Cushman & Wakefield, Grubb & Ellis,

⁷³ Interview with John McLernan, CEO, Colliers, Macaulay, Nichols, Inc., 4/3/2000.

⁷⁴ For further information concerning Colliers and their current online initiatives, see www.colliers.com.

and Jones Lang LaSalle) bought into the vision and partnered with Loopnet.⁷⁵ The hope was to transform the industry; however, the result was an incremental modification in the way brokers accessed listings. Initially, the idea was a success and a number of large-scale brokerages bought into the model. Brokers were excited and motivated and put their best listings with Loopnet. However, due to unknown reasons, traffic to Loopnet dropped off considerably. Brokers pulled their premier “pocket” listings from the site leaving their “dogs” there.⁷⁶

This was, however, an important step. The Loopnet innovation caught the attention of the major players in the brokerage industry. They witnessed the excitement that Loopnet initially generated and realized the potential that a sound, online business model carried. Driven by hopes to strengthen their competitive advantage, the major brokerages put their own technological initiatives at the top of their priority lists. They weren’t prepared, however, to venture past their traditional models and risk disappointing their traditional client base by stepping into the realm of disruptive technologies. There were smaller groups that were willing to take the plunge and they would ultimately shape the markets growth curve in the years to come. Groups such as Zethus came into the brokerage market with much more aggressive initiatives.⁷⁷ They weren’t looking to improve upon existing value networks, but to change the way business was conducted altogether. Zethus looked to get away from the simple posting of listings online and the matching of brokers with clients. They set out to create a forum where properties could

⁷⁵ For further information, see the “History of Loopnet” at www.loopnet.com.

⁷⁶ Interview with John McLernan, CEO, Colliers, Macaulay, Nichols, Inc., 4/3/2000.

⁷⁷ Zethus.com is a Cushman & Wakefield project. For more information see www.cushmanwakefield.com/.

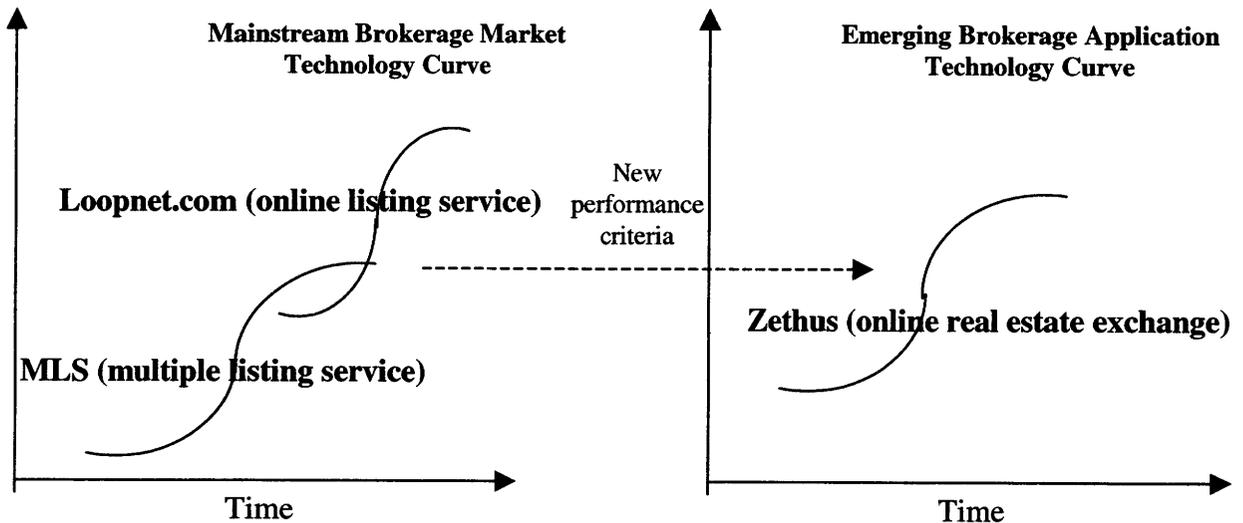
be bought and sold online. The entire process would take place online in virtual exchange. The idea of cutting the traditional broker and buying/selling process out completely was so radical, and maybe threatening, that Julien J. Studley, CEO of Studley Inc., commented on the new brokerage model saying, “there are too many twists and turns in large commercial contracts/leases to trade commercial space like winter wheat”.⁷⁸ Indeed, Zethus’ early days of inception were rough. In addition to fending off angry brokers, they were having a difficult time convincing buyers that an online real estate exchange was an acceptable forum to transact these deals. A new market of radical, forward-thinking property owners and tenants emerged paving the way for the success of Zethus. This opened the floodgates as Goldman Sachs eagerly financed the enhancement of the venture with \$40 million.⁷⁹ Soon Zethus was being courted by some of the major, established brokerage groups who finally realized that to safeguard their current market share and eventually move into the emerging market fueled by the new economy they would have to adopt some of these disruptive technologies into their value networks. Cushman & Wakefield was the successful courtier and will co-brand with Zethus in this new venture.⁸⁰ This disruptive technology has grabbed the attention of the brokerage community and may change the manner in which the brokerage industry functions. The end result may be a shift in the S-Curves, which, in essence, would create a new brokerage market. The following figure illustrates the shift that would occur in the brokerage market’s S-Curves if the Zethus technology proves to be disruptive (See Figure 3).

⁷⁸ “Commercial Property: Trading Real Estate Like Winter Wheat”. *The New York Times*, 7/25/2000.

⁷⁹ See www.cushmanwakefield.com for information concerning Zethus and their financial partners.

⁸⁰ For further information regarding Zethus and online real estate exchanges visit www.cushmanwakefield.com.

Figure 3. Disruptive Technology S-Curves in the Real Estate Brokerage Industry



The mortgage brokerage industry has also undergone serious changes as a result of technological advances. In the beginning, mortgage brokers used the internet as a dating service of sorts. They would shop their mortgages and bios, and hope for a consumer to contact them to transact the mortgage. This process evolved into a true online matching service with groups like EquityCity.com matching consumers looking for financing and brokers offering acceptable financing.⁸¹ The two parties would then interact offline to complete the transaction. These technological advances while helpful, only modified the way in which the financing process took place.

A disruptive technology was just around the corner. In June of 2000, CapitalEngine.com completed the first widely known financing of a real estate project

⁸¹ For further information on online finance matching services see www.equitycity.com.

online from start to finish.⁸² The group used a new “digital handshake”⁸³ technology patented by iLumin that facilitates the legal, contractual transaction online in a secure setting. This new technology facilitating the start to finish transaction of real estate financing online will invariably change the way property is financed.

The property management sector within the services group has been slow to react to the rush of technological advances in the real estate industry. However, a number of aggressive new groups have thrown their hats into the management/maintenance industry with the objective of changing the way properties are managed. In the past the extent of the technology utilized by property management groups was an online customer support function allowing tenants to submit complaints/requests online. The general feeling was that the property management industry was technologically deficient and would require significant advancements to service tenants and properties in the new economy.⁸⁴ Groups such as EggSystems.com would change the very way managers watched over properties and interacted with their tenants. The majority of tenant/manager interaction and virtually all necessary transactions would be completed online. Lease payments, the monitoring of building systems, online work orders, property surveillance, and online communities are just a few of the services that would be conducted online. The combination of the technologies is disruptive and changes the manner in which properties are managed, allowing an east coast management group to manage a west coast property

⁸² For further information regarding online transaction of mortgages see www.capitalengine.com.

⁸³ For further information regarding the “digital handshake” see www.ilumin.com.

⁸⁴ Interview with Terrence Diafario, VP eCommerce, eggsystems.com, 7/3/2000.

and maintain the efficiency and effectiveness demanded by the tenants and property owners.⁸⁵

The Construction Industry

Not unlike the real estate service industry, the construction group has also been the recipient of a number of creative innovations that are catching the industry's attention. The work of the construction group (includes architects, engineers, and constructors) has always been considered technical in nature. However, until recently their business has been typified by very non-technical innovations such as drafting tables, scales, tool belts, and hand-written work orders. This has changed dramatically since 1999 as more than 250 internet start-ups with more than \$300 million dollars of financing have turned their focus to the construction industry.⁸⁶

Traditional architects and engineers had their worlds turned upside down when a couple of small software companies introduced CAD software that would enable the architect or engineer to complete their drawings in a fraction of the time it took to draft and would allow for flexibility in the modification of the drawings. Drafting tables are swiftly becoming a novelty in architectural and engineering firms. They have, for the most part, been replaced by computer tables.⁸⁷

⁸⁵ For further information on complete online property management solutions see www.eggsystems.com.

⁸⁶ See www.cephren.com for a complete listing of press releases concerning innovation in the construction industry.

⁸⁷ Information concerning the CAD industry was taken from a face-to-face interview conducted by Tyler Thompson with Martin Knopken, General Counsel, Autodesk Inc. 6/22/1999.

A recent web based architectural innovation promises to challenge the current architectural process. ePlans.com offers a unique service to the general public. The web-based system allows the public to browse thousands of previously drafted residential plans and further lets them modify the interiors and exteriors of the plans once they've chosen a set. The plans can then be purchased online for a fraction of the cost that a traditional architect would charge for the delivery of a custom plan.⁸⁸ This technology could be potentially disruptive in that it allows the public to create a custom set of architectural plans for a fraction of the price of those produced by traditional architects. The innovation is new, however, eplans.com boasts over 1 million plans being sold from 1999-2000.

The construction industry has also been shocked by the recent wave of technical innovations that have set out to streamline and expedite an integral part of the construction process, namely project management and the securing and delivery of construction supplies/materials. Cephren.com, founded in 1999, has come to the forefront as the premier online project management solution and portal for securing all necessary building materials. Despite a rocky start in the U.S. in 1999, Cephren found success in emerging markets such as Taiwan, Brazil, and the UK. They have since captured the attention of the U.S. market and have coordinated services for construction in 2000 totaling \$40 billion. The technology has provided a more efficient project

⁸⁸ ePlans.com is a Hanley-Wood, LLC venture. For more information concerning online architecture, see www.eplans.com. The eplans.com price for a set of custom plans (3 working plans) is \$695.

management solution and allows constructors to bypass the traditional, arduous process of securing building materials.⁸⁹

The construction industry has recently become the benefactor of the marriage of two disruptive technologies within the industry. This marriage may prove to be a turnkey solution for the construction planning and material procurement processes. The innovator is CADalist.com. They have created a web-based system that will combine CAD technologies that will seamlessly flow into estimates, project timelines, project management, and delivery of materials. The entire process is managed from one site. The technology should prove to be more cost effective, accurate, and efficient. The early critics are predicting the creation of a new market and a new standard for the industry.⁹⁰

Owners/Developers

Each of the technologies discussed in the service and construction groups has changed the way in which owners/developers operate. Online forums such as Pikenet.com and BOMA.org have long allowed developers to stay in touch with market trends, their employees, and development organizations.⁹¹ However, as a result of the disruptive technologies being introduced into the industry, a new breed of developer has emerged, the “armchair developer”. In a study conducted by an NYU graduate student, an entire hypothetical development in Los Angeles was virtually orchestrated from a one-

⁸⁹ Cephren.com formerly operated as eBricks.com. For more information see www.cephren.com.

⁹⁰ Further information concerning CADalist.com is currently unavailable as they are in the beta testing stages of their technology.

⁹¹ For more information about existing online developer/owner resources visit www.pikenet.com or www.boma.org (the Building Owners and Managers Association).

bedroom apartment in Manhattan.⁹² Every aspect of the development process from the purchase of the property, planning, financing, building, leasing, and managing was coordinated and conducted online. The only part of the process that couldn't be transacted online was the entitlement process (permitting, etc.). However, both Cephren.com and CADalist.com are currently beta testing technologies that would enable developers and constructors to submit applications for permits online and would further enable government agencies to grant or reject the permits online.⁹³

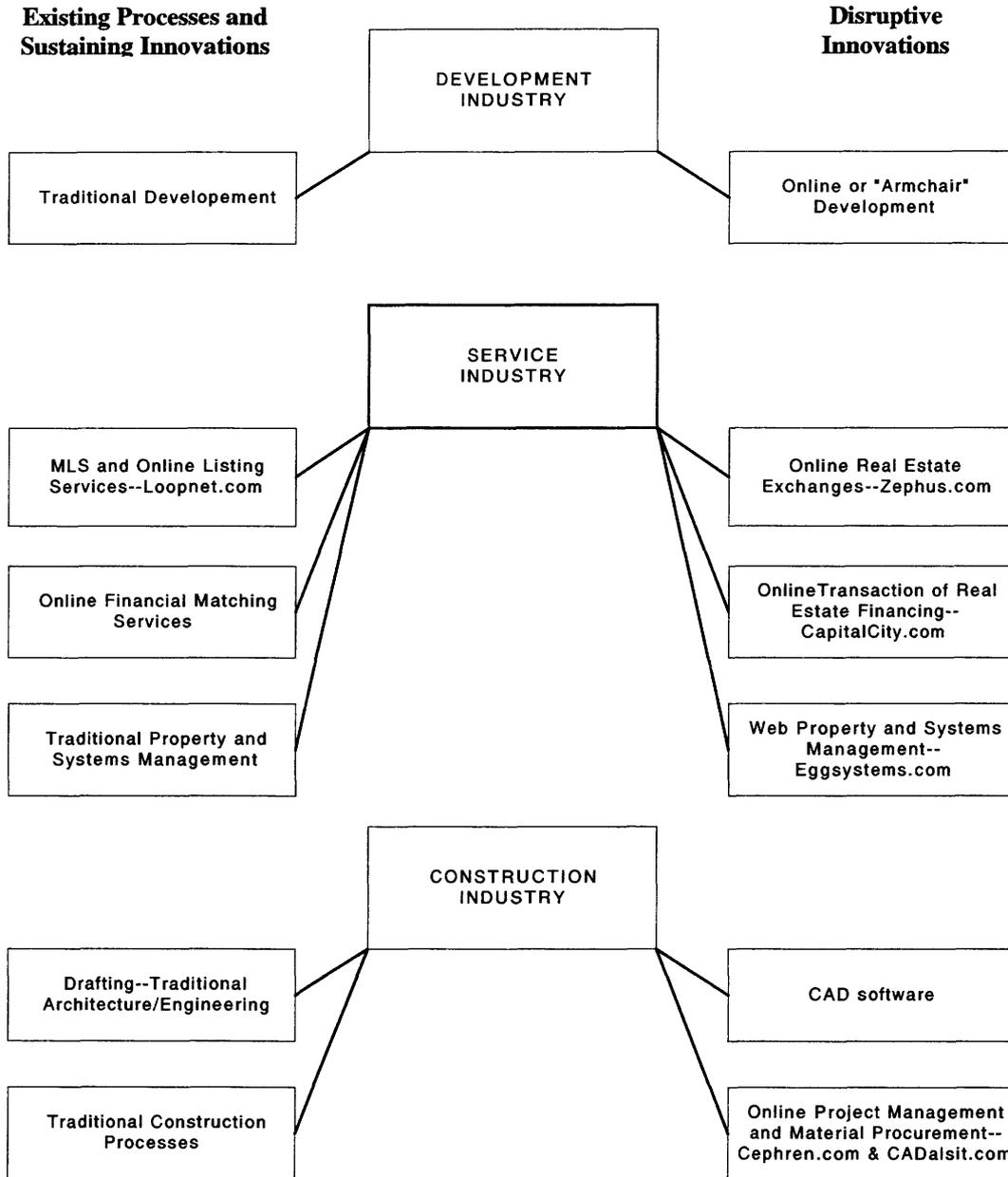
The barrage of disruptive technologies has given owners/developers to develop worldwide in a cost effective, secure, and efficient manner. The innovations have also opened the door to newcomers, allowing them to enter the ferocious world of development and to try their hand.

In each of the three sub-groups of the real estate industry, the core value networks have changed with the introduction of disruptive technologies. The following is a figure representing the changes in the development, service, and construction value networks (Figure 4).⁹⁴

⁹² A brief synopsis of the study was found in "Armchair Real Estate". *Metro Market Facts*. (1999). The authors were unable to obtain a copy of or citation for the actual study.

⁹³ See www.cephren.com for further information on their current online initiatives.

**Figure 4. Real Estate Value
Networks**



⁹⁴ The real estate innovation diagram is adapted from a framework established by Clayton Christensen and Richard Rosenbloom in "Explaining the Attacker's Advantage: Technological Paradigms, Organizational Dynamics, and the Value Network."

The Origin of Disruptive Innovation

With the attention generated by disruptive technologies, and the opportunities for new market share that subsequently arise, the question often asked is , “If the end result of these disruptive technologies is potential increased market share and profits, why don’t established firms spend more of their time and efforts to create and exploit these technologies?” Disruptive technologies almost always exist outside of the organizations existing value network. Often any action outside of an organization’s existing value network is worrisome to clients, partners, and investors. Therefore, organizations often shy away from any innovations outside of their value networks.⁹⁵ This explains why disruptive technologies such as those presented by Zethus, Eggsystems, Cephren, and CADalist all originated in small start-up or break-off groups. Of all the disruptive innovations listed in the previous figure, all but one originated in start-up or break-off groups. Larger, established companies are now supporting, using, or partnering with each of the disruptive innovations. In order to better understand the origin of these technologies, an example of a typical decision process is outlined below.

Step 1: Disruptive Technologies Are First Developed/Conceived Within Established Firms—It is often the case that disruptive technologies are conceived within established firms. However, sustaining projects that meet the needs of the firms existing clients, partners, investors, and workforce almost always preempt disruptive projects that may service smaller and

⁹⁵ For more information regarding *Managerial Decision-Making and Disruptive Technological Change*, see Clayton Christensen’s “The Innovator’s Dilemma”.

poorly defined markets. For example, Cushman & Wakefield first conceived the notion of an online real estate exchange. The project, however, was shelved as it threatened the group's existing value network.⁹⁶

Step 2: Established Firms Step Up the Pace of Sustaining Technological Development—After the disruptive technologies are shelved as a result of the negative response they receive from those associated with the firm's value network, the firm will often refocus their efforts on the innovation of new sustaining technologies. Cushman & Wakefield followed suit after shelving the idea of a real estate exchange. They turned their attention to technologies that would reinforce their existing value network and in turn satisfy those associated with the network. They announced their partnership with Loopnet.com and proceeded to build out CushmanWakefield.com, an online information based brokerage community.

Step 3: Start-Up and Break-Off Groups are Formed, and Markets for the Disruptive Technologies are Found—New groups form with the sole goal of exploiting disruptive technologies and the markets they represent. These new, smaller groups are often in a better position to explore disruptive

⁹⁶ Interview with John McLernan, CEO, Colliers, Macaulay, Nichols, Inc., 4/3/2000.

technologies as their value networks are new and flexible. They are not beholden to the same extensive client, partner, investor, and employee bases. The group that would soon be known as Zethus started bouncing their idea of an online real estate exchange off forward-thinking individuals in the market.

Step 4: The New Entrants Move Upmarket—Once these new groups discover that they have sparked an interest in an emerging market, they often set their sights on the established markets within their industries. With the addition of sustaining technologies to enhance their disruptive technologies, the new entrants establish themselves and their value networks as viable alternatives. Zethus, with the aid of sustaining technologies such as online certification and verification, established itself as a viable alternative to the traditional method of buying and selling real estate.⁹⁷

Step 5: Established Firms Belatedly Jump on the Bandwagon to Defend Their Market Share—Often in a panic, as these new entrants successfully penetrate the established markets, established firms scramble to either duplicate the disruptive technology or partner with the new entrant. In Cushman & Wakefield’s case,

⁹⁷ For more information about Zethus’ strategic sustaining partnerships, see www.cushmanwakefield.com.

they went from initially rejecting the concept and technology to fully embracing it with a new partnership with Zethus.⁹⁸

The goal in presenting the above information is to paint an illustrative picture of what is currently driving the real estate industry. It is apparent that although important to the industry's longevity, sustaining technologies aren't the driving force. The face of the industry is changing as a result of disruptive technologies. These disruptive technologies result in a shift in the industry's S-Curves, which in turn creates a new market or expands an existing market and invariably changes the way business is conducted. It is also apparent that the groups that are most successful and able to introduce these disruptive technologies are small, start-up or break-off groups that have flexible value networks and are able to experiment in emerging markets.

The following chapter will, using the frameworks and theories discussed in the previous chapters, explore the specific impacts that both sustaining and disruptive innovation have had on the retail sector of the real estate industry.

⁹⁸ The Cushman & Wakefield/Zethus narrative in *the Managerial Decision-Making and Disruptive Technological Change* description came from 3 telephone interviews conducted with 3 C&W brokers, 3/2000-4/2000.

Chapter 3. Innovation in Retail Development

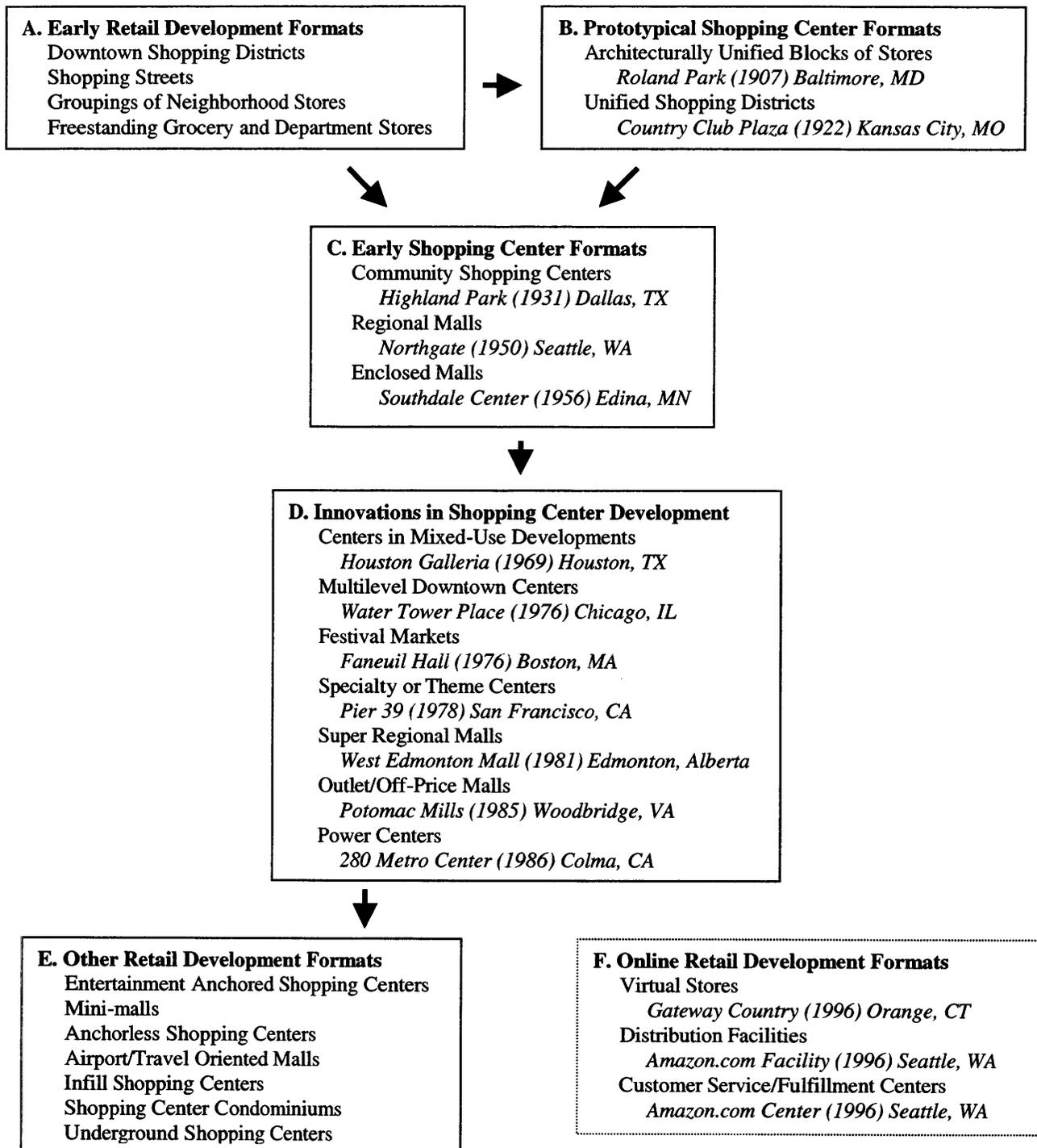
In few areas of the real estate industry has the impact of innovation been felt so pervasively as in retail development, where the shopping center seized dominance from traditional retail formats and stitched itself into the social fabric of modern American society. In the course of the twentieth century, retail development has evolved from a cottage industry of merchant-owned downtown stores into a dynamic system of interwoven products and services.⁹⁹ This chapter seeks to analyze innovation in the retail development business using the theoretical tools that were articulated in Chapter 1 and applied to three real estate industry subgroups (services, construction, and development) in Chapter 2. The analysis begins with a big-picture overview of the impact of disruptive technologies in retail development, and proceeds with a detailed discussion of how and why specific innovations changed the competitive landscape of the industry.

The history of retail development is rich with examples of technological innovations that have improved the shopping experience for consumers and provided retailers with new and exciting ways to merchandise their goods and services. The development of retail real estate has grown in scale and scope from less than 10 million square feet of shop space in 1900 to more than 5 billion square feet spread over 40 different retail formats in 2000.¹⁰⁰ Figure 5 summarizes the evolution of retail development in the twentieth century.

⁹⁹ See Alexander Bühl and Nicholas Ordway, "Shopping Center Innovations: The Past 50 Years," *Urban Land* (June 1987), 22-23.

¹⁰⁰ See "The Scope of the Shopping Center Industry in the United States," International Council of Shopping Centers Report (Spring 2000), available at www.icsc.org, under "/research".

Figure 5. The Evolution of Retail Development, 1900-2000¹⁰¹



¹⁰¹ Chart is adapted from Büll and Ordway, 24. Additional data was drawn from Robert E. O'Neill and Sandra M. Sutton, "A History of the Shopping Center Industry," Monitor, August 1990. Data on the online retail development formats collected by the authors from www.amazon.com, and www.gateway.com.

Retail Development “Technologies”

The innovations listed in Figure 5 along with the projects that featured them are widely regarded by retail developers as landmark advances in retail development technology. Technology, as it relates to retail development, can be thought of as the process of bringing together land, labor, and materials to produce a structure or set of structures that house stores.¹⁰² In broader terms, a retail development technology is a physical format that links retailers to consumers. Using this notion of technology, each of the innovations listed in Figure 5 represent distinct retail development technologies. Some of these technologies are incremental, such as the evolution of the downtown shopping district, and some of them are radical, such as the development of the enclosed mall. The first challenge in organizing these technologies for the purpose of our analysis is to identify a dominant technological paradigm to which the disruptive technology framework can then be applied.¹⁰³ A technological paradigm can be thought of as a ‘master’ or ‘meta’ technology that controls a group of subsequent technologies through a shared set of characteristics.¹⁰⁴ With regard to retail development, the first technological paradigm of the twentieth century can be called *independent* development technology.¹⁰⁵

Independent Development Technology

Getting its start in the growing downtown markets of the early 1900s, this technology consists of acquiring a piece of land and building a customized structure for a single retailer. The structure is physically ‘independent’ from surrounding structures and

¹⁰² This applied notion of ‘technology’ is based on the general notion explained in Chapter 1. See Christensen, *The Innovator’s Dilemma*, xii.

¹⁰³ The idea of organizing technologies into paradigms was first presented by Giovanni Dosi. See Dosi, 34.

¹⁰⁴ Dosi, 40.

is planned and designed to provide a unique point-of-sale for a retailer within a local market.¹⁰⁶ Independent development technology dominated retail development from the latter part of the nineteenth century through the first quarter of the twentieth century.¹⁰⁷ Because this technology emerged within an urban context in an age when consumers lacked cars and were therefore relatively immobile, independent retail formats were pedestrian oriented and centrally located.¹⁰⁸ (This technology is represented in Figure 5, Box A.) Thus, the dominant retail development paradigm in this period measured performance in terms of direct and convenient access to urban consumers.

Disruptive Retail Technologies

With regard to primarily rural retail development before 1900, the first technological paradigm of the twentieth century can be called a “disruptive” development technology. The reader will recall that a disruptive technology is defined as an innovation that introduces a new value paradigm to the market and changes the basis of competition between firms in an industry.¹⁰⁹ Disruptive products are typically simpler and cheaper and initially appeal to emerging markets, coming to dominate mainstream markets when they become performance competitive with established products.¹¹⁰ Thus, disruptive technology theory differentiates innovations primarily based on the way they affect the dimensions of performance demanded by the market. Using this theory to differentiate among the wide array of retail development technologies in Figure 5, three

¹⁰⁵ See Bül and Ordway, 22. They use the term “independent retailing.”

¹⁰⁶ See, “Shopping Center Development Handbook,” *Urban Land Institute*, second edition, 1995.

¹⁰⁷ O’Neill and Sutton, 11.

¹⁰⁸ See Tedlow, Chapter 2.

¹⁰⁹ See Christensen, *The Innovator’s Dilemma*, 22.

¹¹⁰ Foster, 47.

disruptive technological paradigms can be identified: *unified* development, *value* development, and *cyber* development.¹¹¹ These technologies were disruptive because they fundamentally changed the relationship between retailers and consumers, permanently altered the dimensions by which the performance of retail development was judged, and redefined the competitive landscape in the retail development industry.

Unified Development Technology

Starting in the 1920s, disruptive unified development technology emerged to serve the growing suburban markets that independent developers largely ignored.¹¹² Less elaborate than their independent counterparts, early unified developments were simple groupings of stores that were designed, constructed, owned, and managed by third-party firms.¹¹³ These firms developed ‘shopping centers’ which brought together wide groups of different retailers as rent-paying tenants into a set of uniformly designed and constructed buildings within a particular suburban trade area (represented in Figure 4 by each of the formats listed in box B, C, D, and E, except for “Outlet/Off-Price Malls” and “Power Centers”).¹¹⁴ These technologies catered to vehicle-equipped growing suburban populations who primarily valued access to a wide array of retailers, locations proximate to homes, sufficient parking, and entertainment.¹¹⁵ Over the next 60 years, as suburban populations exploded and urban populations remained stagnant, unified technology

¹¹¹ The distinction between independent development and unified development is articulated by the Urban Land Institute. See Büil and Ordway, 23. The “value” and “cyber” distinctions are drawn by the authors.

¹¹² Büil and Ordway, 25-27.

¹¹³ See Don Wharton, “Those Amazing Shopping Centers,” *Readers Digest* Volume 80, Number 481, May 1962, 180.

¹¹⁴ O’Neill and Sutton, 11-13.

¹¹⁵ See Wharton, 182.

became the dominant paradigm within retail development.¹¹⁶ Beginning with the shopping center format, unified technology evolved into regional malls, which were designed and built throughout the 60s, 70s, and 80s, to provide suburban communities with places to gather and interact with one another. As it has matured, unified development technology has come to define performance along increasingly social dimensions, incorporating a growing number of entertainment retailers and restaurants into the shopping center concept.¹¹⁷

Value Development Technology

The early 1980s saw the advent of the disruptive value development technology. This technology introduced a new value proposition that was largely missing from established retail development by developing suburban retail formats that emphasized efficiency and price.¹¹⁸ Originally established to provide deep discount warehouse-type retailers with access to low-income consumers, these formats sacrifice proximity to consumers, convenience, and selection to emphasize access to value retailers and their products.¹¹⁹ Value technologies are cheaper and simpler in design and construction than both independent and unified development technologies, consisting of a set of large warehouses constructed outdoors with minimal attention paid to pedestrian traffic.¹²⁰ These formats offer depth and breadth of merchandise at discount prices for selected types of hard and soft goods, such as electronics, furniture, books, hardware, toys, food,

¹¹⁶ See Paul Doocey, "Postcards From The Past," *Shopping Centers Today*, May 1992, 153.

¹¹⁷ Bul and Ordway, 28.

¹¹⁸ See "Mall Customer Shopping Patterns," *ICSC Research Quarterly* Volume 5, Number 3, Fall 1998, 3.

¹¹⁹ See Michael D. Beyard, "Power Centers: A Development and Investment Perspective," ULI position paper, Fall 1996, 1-3. Available at www.uli.org.

¹²⁰ O'Neill and Sutton, 17.

housewares, and factory seconds of fashion apparel.¹²¹ (This technology is reflected in Figure 4 as “Outlet/Off-Price Centers” and “Power Centers” in box D.)

Cyber Development Technology

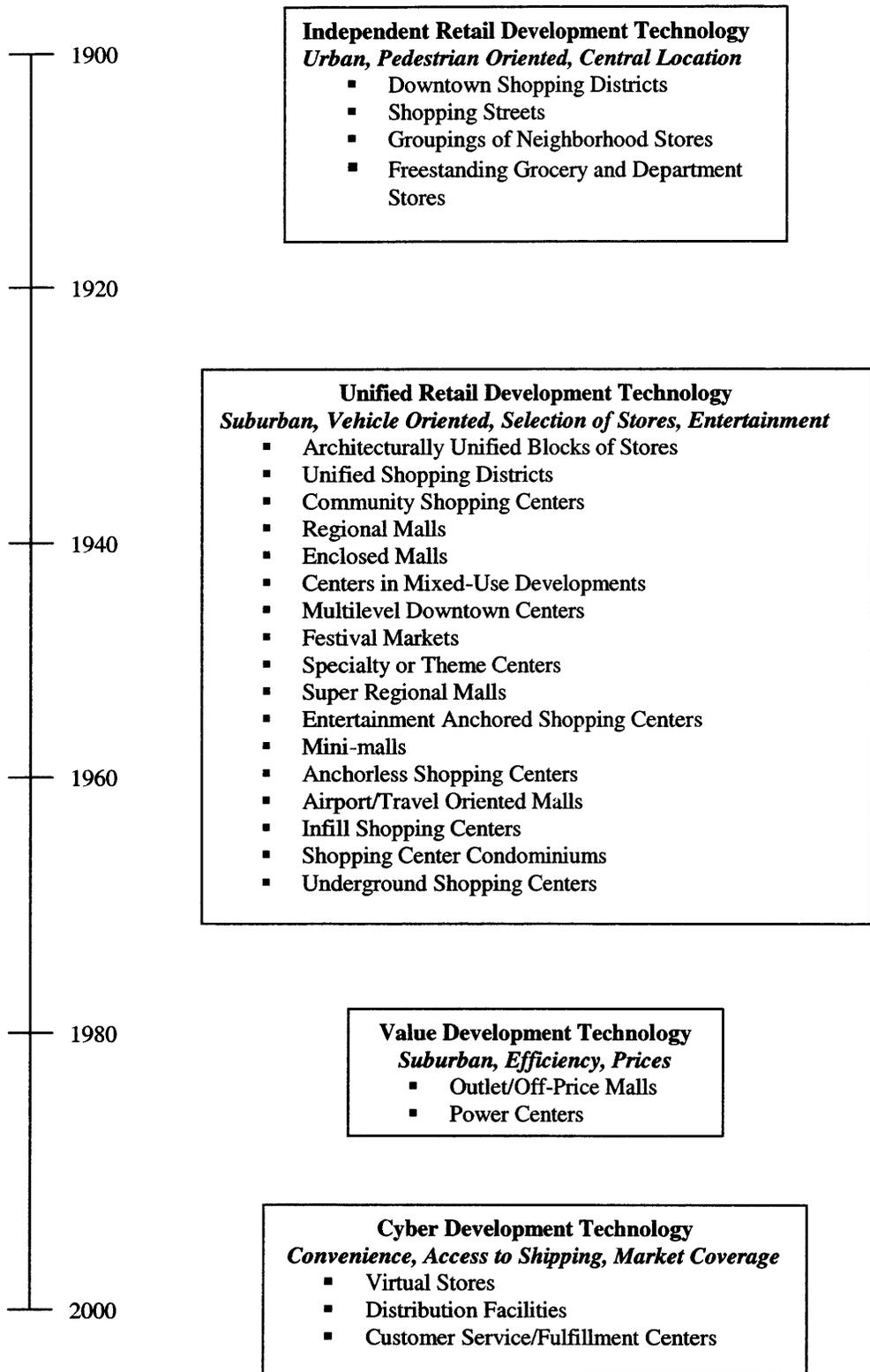
Cyber development technology began in the mid 1990s in response to the growth of online retailers. This relatively young disruptive technology enables online retailers to provide goods and services to consumers through the Internet.¹²² Cyber development represents a dramatic departure from conventional retail formats in that the role of physical space as a link between consumers and retailers is completely redefined. Harkening back to nineteenth century mail-order systems, the ‘cyber store’ is a network of computers linked to customer service centers and warehouses that caters exclusively to online consumers.¹²³ As of August 2000, cyber retail technology has produced three types of development formats: virtual stores, distribution facilities, and customer service facilities (reflected in Figure 4 as box E, “Online Retail Development Formats”). These formats offer unprecedented levels of shopping convenience to consumers while maximizing market coverage and market penetration for retailers.¹²⁴ Performance of cyber development is measured by efficient distribution of products and access to transportation. The technologies in Figure 5 are reproduced in Figure 6 below in terms of the dominant retail development technology paradigms described above.

¹²¹ Beyard.

¹²² See “e-Commerce,” *ICSC White Paper*, Spring 2000, 2.

¹²³ See, “Hotwired,” *The Industry Standard*, June 1999, 23-28.

Figure 6. Dominant Technological Paradigms in Retail Development (1900-2000)



¹²⁴ See "Successful Online Retail Strategies," online article 6/14/00 by Gomez Advisors, a leading Internet consulting group located at www.gomez.com.

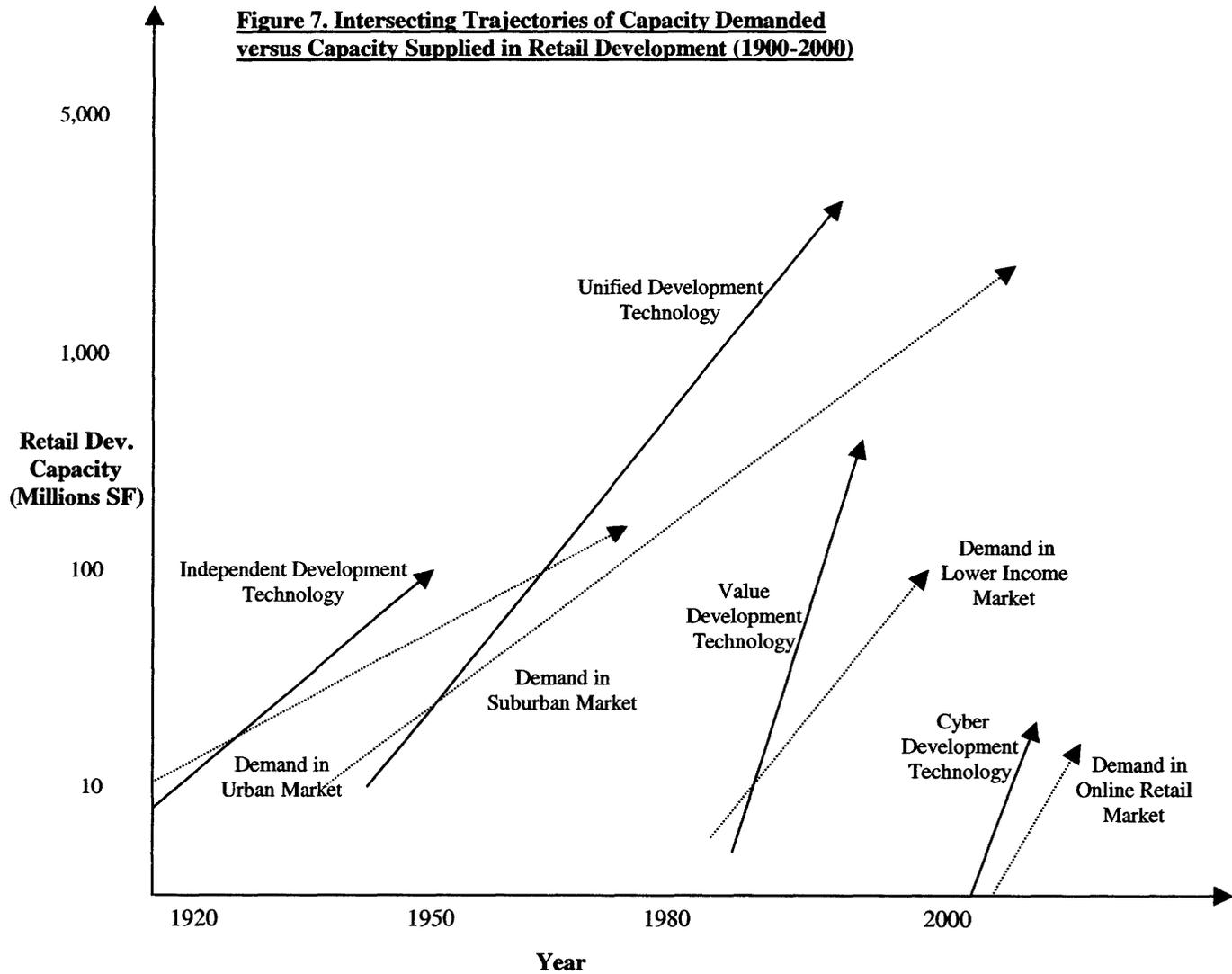
Figure 6 summarizes the evolution of retail development using the theory of disruptive technologies. Each dominant paradigm is listed with its dominant characteristics (in italics) and its component technologies along the time line on the left hand side of the figure. The next section considers the performance of each of the four technologies listed above in order to better understand how retail development evolved in the twentieth century.

Performance of Retail Technology

Ultimately, the performance of a retail technology is measured by its growth trajectory. This growth is a function of the success and profitability of the technology relative to competing technologies in the marketplace.¹²⁵ Figure 7 charts the growth trajectories of each of the four dominant technological paradigms in retail development in the twentieth century. The solid lines represent the growth in supply of the four dominant retail development technologies, while the dashed lines represent the growth in demand in the primary markets where these technologies were initiated. The slopes of each of the trajectories represent estimated growth rates of supply and demand during the time period for which each of the four technologies held a significant market position (1900-1940 for independent technology, 1940-2000 for unified technology, 1986-2000 for value technology, and 1996-2000+ for cyber technology). They extend out to represent how

¹²⁵ Christensen, 48.

much capacity within each technology would be supplied if that technology continued on its established growth pattern.¹²⁶



Measuring growth in supply of each technology is a relatively straightforward process that consists of measuring the change in the amount of retail development product (in square feet) over a period of time (years) and deriving an annually

¹²⁶ For example, the 'Independent Retail Technology' curves represent the growth trajectories that were

compounded average growth rate.¹²⁷ The slope of each solid line represents the average annual growth rate in the amount of new product built within each technological paradigm from 1900 to 2000. Measuring demand for a specific retail technology is not as straightforward. Some theorists argue that demand is based on average rents, reasoning that better development formats command higher rents from retail tenants.¹²⁸ Other scholars have argued that growth in sales per square foot is the best measure of demand for retail formats.¹²⁹ Still others have suggested that demand for a retail format can be measured by comparing actual sales growth to “sales potential growth,” which is a theoretical measure of sales productivity based on population growth and spending patterns.¹³⁰ While each of these approaches sheds considerable light on the underlying factors affecting demand for retail space, they are primarily short-run (12 to 36 months) demand models that are used to predict future patterns in demand for retail space. The absence of systematic long-run (5 to 50 years) data on per square foot sales, rents, and vacancy rates severely limits the effectiveness of these approaches in explaining historical changes in retail development demand.¹³¹ Borrowing from the classical theory of retail competition, in which stores are held to compete with each other along the dimensions of price and location, the best and most consistent long-run measure of

established during 1900-1940. For further elaboration, see Christensen, *The Innovator's Dilemma*, Ch. 2.

¹²⁷ A compounded annual average growth rate $[r]$ is calculated in the following way: $X_1 \times (1+r)^T = X_2$, where X_1 is the level of square footage at the beginning of the period, X_2 is the level of square footage at the end of the period, T is the number of years in the period.

¹²⁸ See John M. Clapp and Stephen D. Messner, *Real Estate Market Analysis: Methods and Applications* (New York: Praeger, 1988) chapter 3.

¹²⁹ See, Gaylon M. Greer and Michael D. Farrell, *Investment Analysis for Real Estate Decisions* (Chicago: Dearborn Financial Services Publishing, 1993).

¹³⁰ See Douglas M. Casey, “Overstoring: A Look at Retail Space and Sales Performance,” *ICSC Research Quarterly* Volume 3, (Number 3, Fall 1996) 13.

¹³¹ See Denise DiPasquale and William C. Wheaton, *Urban Economics and Real Estate Markets* (Englewood Cliffs, NJ: Prentice Hall, 1996) 270.

demand for retail space is population growth.¹³² The use of population growth as a proxy for retail development is not a new approach. It has long been common wisdom in the development business that “retail follows rooftops.”¹³³ Simply stated, the growth in demand for a particular retail technology is strongly correlated to the growth of its core consumer constituency.¹³⁴ Thus, the dashed line represents the compounded annual growth rates in the primary consumer constituencies for each development technology: city populations from 1900 through 1940 for independent technology, suburban populations from 1940 through 2000 for unified technology, lower-income populations from 1980 through 2000, and Internet usage among the population for cyber development technology.¹³⁵ The difference in slopes between the supply line (solid) and the demand line (dashed) represents market oversupply for each technology.¹³⁶ Figure 7 graphically portrays the effect of disruptive innovation on the retail development sub-sector and the shift from independent to unified technologies as well as the growing threat of value and cyber development technologies.

Independent development technology grew from roughly 20 million square feet of product in 1900 to roughly 300 million square feet of product in 1940, translating into an

¹³² See William B. Breuggeman and Jeffrey D. Fisher, *Real Estate Finance and Investments* Tenth Edition, (Boston: Irwin McGraw-Hill, 1997) 272-274.

¹³³ The origin of this quote is from visionary early twentieth century developer J.C. Nichols. See O’Neill and Sutton, 56.

¹³⁴ This is also true for the demand for hard disk drives. See Christensen, *The Innovator’s Dilemma*, 28.

¹³⁵ The historical data on population growth is drawn from the U.S. Department of the Census (www.census.gov) and the *United States Historical Census Data Browser*, an online data source available from the University of Virginia at www.fisher.lib.virginia.edu/census. Data on Internet usage drawn from Forrester Research, at www.forrester.com. Growth rates are calculated in the same manner as for supply of space. See note 119.

¹³⁶ See A.H. Studenmund, *Using Econometrics: A Practical Guide* Third Edition (Menlo Park, CA: Addison-Wesley, 1997) 466-493.

average compounded growth rate of roughly 7% per annum.¹³⁷ Population growth in urban centers averaged roughly 4% per annum between 1900 and 1940.¹³⁸ Unified development technology has grown from less than 10 million square feet of product in 1940 to more than 5 billion square feet of product in 2000, a compounded average annual growth rate of about 11%.¹³⁹ During this same period, suburban population growth averaged approximately 8%.¹⁴⁰ Value development technology began in the early eighties with a handful of power and outlet centers throughout the country and has grown from less than 5 million square feet in 1986 to more than 500 million square feet in 2000, an impressive annual growth rate of approximately 39%.¹⁴¹ The growth of lower-income populations during this period averaged 16% per year.¹⁴² Cyber retail development technology began in 1996 with less than 1 million square feet of space and has grown to just over 20 million square feet in 2000, with projections for up to 70 million square feet by 2003.¹⁴³ The annual compounded growth rate between 1996 and 2000 for this

¹³⁷ Author's estimate based on data on number of independent retail stores drawn from www.sears.com, under "/history". Data on average store size drawn from O'Neill and Sutton, 45-48. According to Sears, there were 150,000 chain stores in the country by 1940 and average size per store was 2,000 square feet

¹³⁸ City population data drawn from: *United States Historical Census Data Browser*. See note 128.

¹³⁹ See "1999 U.S. Retail Sales, Mall Sales, and Department Store Sales," *ICSC White Paper*, May 1999. Also see DiPasquale and Wheaton, 274-276.

¹⁴⁰ Data on suburban growth drawn from two sources: (1) Samuel R. Staley, "The Sprawling of America: In Defense of the Dynamic City," Policy Study No. 251, Reason Public Policy Institute, 1999, and (2) "Source of Suburban Population Growth: U.S. Urbanized Areas Over 1,000,000, 1950-1990", Demographics Brief, available at www.demographia.com.

¹⁴¹ Author's estimate based on data from "Mall Openings, 1987-2000: How and Why They've Changed," *ICSC Research Quarterly* Volume 5, Number 2, Summer 1998.

¹⁴² See 1990 U.S. Census Estimates at www.census.gov. "Lower-Income" defined as households with less than 50% of median annual income for 1990.

¹⁴³ Author's estimate based on data collected from www.webvan.com, www.gateway.com, www.dell.com, www.cdnw.com, www.amazon.com, www.buy.com, www.homegrocer.com, and www.egghead.com. The average size of a distribution center for each of these firms is 300,000 square feet and the average size of customer service/fulfillment centers is 150,000 square feet. There are approximately 60 distribution centers and 20 customer service/fulfillment centers worldwide. In addition, Gateway Country has approximately 500 stores worldwide with an average size of approximately 5,000 square feet per store.

technology is an astonishing 211%. During this same period, growth in the online buying population has averaged 208%.¹⁴⁴ These findings are summarized in Table 2.

Table 2. Technology Overshooting

Retail Development Technology (Life Cycle Horizon)	Estimated Growth of Supply (% per annum)	Estimated Growth of Demand (% per annum)
Independent Development (1900-1940)	7%	4%
Unified Development (1940-2000)	11%	8%
Value Development (1986-2000)	39%	16%
Cyber Development (1996-2000)	211%	208%

What figure 7 graphically illustrates and Table 2 numerically summarizes is the progression of disruptive retail development technologies. In the early part of the century, independent development was the dominant paradigm. In the early 1930s, unified technology captured market growth and displaced independent formats. In the mid eighties, value technology dominated industry growth and began to challenge unified formats. And since the mid nineties, cyber development formats have been growing at an alarming pace, challenging the viability of all other retail development technologies. Table 2 illustrates that each successive technology has grown at a faster rate than its predecessor and the marginal growth rate of each new technology has been increasing: the Unified Development growth rate is about twice the Independent Development growth rate, the Value Development growth rate is roughly four times the Unified Development growth rate, and Cyber Development has been growing at roughly five times the rate of Value Development.

¹⁴⁴ Estimate gathered by authors on 8/12/00 from Jupiter Communications, www.jup.com.

In every instance described above, the established leaders within the dominant technological paradigm failed to capture the new growth opportunities by continuing to supply more product than was demanded within the established technology. In the shift from independent to unified retail, merchant owned stores were displaced with commercial leases and retailers were effectively driven out of the development business by emergent unified shopping center developers.¹⁴⁵ Since the mid eighties, value development has been increasingly challenging traditional shopping center formats and the market leaders in the unified paradigm have retreated up market to super regional mall formats while lower-tier mall owners are losing business to value developers.¹⁴⁶ Despite the recent explosion of online retail, none of the market leaders from within unified or value technologies have developed cyber retail space, leaving this area of the business to new specialized firms.¹⁴⁷

While this graphical and numerical data illustrates what happened to retail development technologies through the twentieth century, it does not explain why this series of disruptive technologies emerged and how firms that specialized in these technologies captured market share from established leaders. In order to better understand the nature of these technologies and describe their impacts on developers, retailers, and consumers, the history of innovation in retail development is considered below from the perspective of technology S-curves and value networks.

¹⁴⁵ See Bül and Ordway, 22-24.

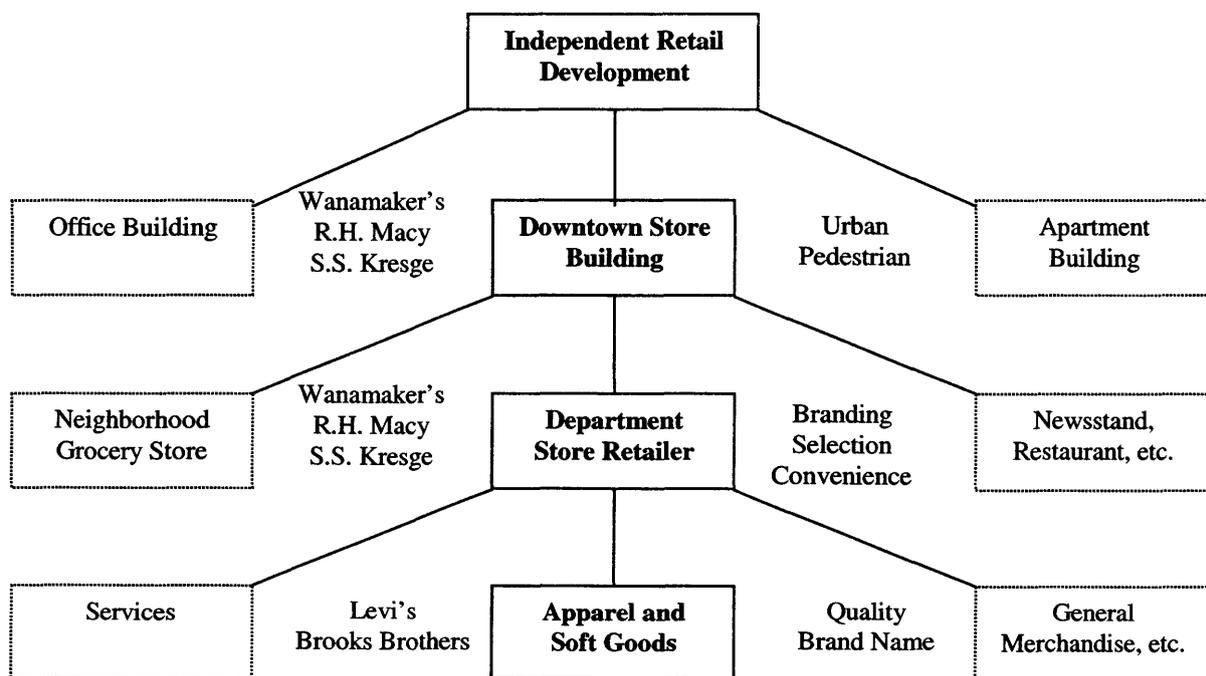
¹⁴⁶ See Beyard, 3-6.

¹⁴⁷ See, "E-Commerce is Radically Reshaping Retail Real Estate, According to Urban Land Institute Experts," *ULI Press Release*, June 8, 2000. Available at www.uli.org.

The Era of Independent Retail

From the late seventeenth century to the early nineteenth century, retail development in America was almost completely dominated by retailers themselves. Prosperous merchants built their own structures in villages and towns and less sophisticated retailers operated out of their homes or rented small offices and residences that were converted to retail use.¹⁴⁸ It was not until the middle of the nineteenth century that regional retail chains began to emerge in densely populated areas within the Northeast and portions of the Midwest.¹⁴⁹ These early retail chains bought land in central locations within burgeoning cities and constructed their own stores, creating value networks around them.¹⁵⁰ Figure 8 illustrates an example of a value network from this period.

Figure 8. Independent Retail Value Network



¹⁴⁸ See Bobbie Kalman, *Early Stores and Markets* (Crabtree Publishing: Philadelphia, 1981) 21.

¹⁴⁹ See William Allen Zulker, *John Wanamaker: King of Merchants* (Eaglecrest Press: Wayne, PA, 1993).

¹⁵⁰ O'Neill and Sutton, 11-12.

As the reader will recall from Chapter 1, value network theory maps the different levels of product architecture in order to better understand a technological paradigm.¹⁵¹ The individual components of a value network combine to form a nested commercial system that defines a firm's competitive strategy.¹⁵² Following Figure 7 from the bottom up: For independent retail developers, the network was designed to provide quality brand-name merchandise (bottom level) in a convenient branded retail format that offered a wide selection (middle level) to an urban and pedestrian consumer constituency (top level). Separate value networks exist at every level of the network in Figure 7. The dashed boxes represent the components of these nested value networks. There are two significant characteristics of this value network. First, retail development was not geographically differentiated from other types of real estate development. As a result, stores were constructed in immediate proximity to apartment buildings and professional buildings.¹⁵³ Merchants literally located themselves next to their customers to provide the highest level of convenience that was available in an age when traffic was primarily pedestrian. Second, the retailers (Wanamaker's, et al.) were also the retail developers – they adapted the skills and competencies that made them successful in the retail business into the retail development business. The dimensions of retailing performance (branding, selection, convenience) shaped the development technology. Stores were constructed as symbols of the quality and stature of the retailer.¹⁵⁴ Design and construction were geared to enhance the retailer's image and attract consumer traffic.¹⁵⁵

¹⁵¹ See Christensen, *The Innovator's Dilemma*, 32-35.

¹⁵² *Ibid.*

¹⁵³ See Kalman, 22-27.

¹⁵⁴ Tedlow, 41.

¹⁵⁵ Zulker, Chapter 4.

Independent development technology was an extremely effective means of providing goods and services to the urban populations of the early twentieth century. The growth and prosperity of cities was reflected in the growth and prosperity of retailers, evidenced by the proliferation of downtown stores. According to an estimate by Sears, there were 24,000 chain stores in 1914 and more than 150,000 by 1929, just before the Great Depression.¹⁵⁶ Over time, retailers became exceptionally adept at serving the retail development needs of their core constituencies. Recognizing that urban consumers tended to cross-shop between different department stores, they began to build their stores next to one another, clustered in high traffic areas.¹⁵⁷ Continued prosperity led companies such as Sears, R.H. Macy, S.S. Kresge, Montgomery Ward, Wanamaker, and F.W. Woolworth to become the largest retail developers and retail real estate owners in the country before 1945.¹⁵⁸

Suburbanization and Disruptive Unified Technology

In retrospect, the retailers' superb skill in serving urban consumers proved to be their downfall as developers from the mid 1940s forward. The population shift away from urban living to suburban living ushered in the disruptive innovation of unified retail development. This was a disruptive technology because it introduced a new value proposition to the market. Suburban consumers found that downtown locations were poorly suited for their needs – independent development technology resulted in stores that were too far away from suburban markets.¹⁵⁹ The essential transition from this

¹⁵⁶ See "Sears History" under "/about sears" at www.sears.com.

¹⁵⁷ Thus, the development of 'Shopping Streets' and 'Shopping Districts', see Bül and Ordway 22.

¹⁵⁸ Zulker, 155.

¹⁵⁹ O'Neill and Sutton, 12-14.

independent type of retail development to a more unified development model began with the development of Roland Park in Baltimore, Maryland in 1907 and Country Club Plaza in Kansas City, Missouri in 1922.¹⁶⁰ These prototypical projects brought together the concepts of downtown shopping districts and neighborhood stores to form ‘suburban shopping districts’ that were designed to serve the needs of the growing suburban towns and villages. Suburban shopping districts were not unlike their downtown predecessors. Although there was a greater degree of uniformity in design and construction, stores were still located on main streets in and around town centers.¹⁶¹

It was not until 1931, when Hugh Prather built Highland Park Shopping Village in Dallas, Texas, that the modern concept of the shopping center was born. This project was a watershed in retail development – it was the first shopping center to eliminate dedicated streets and turn itself inward by preventing through traffic, and it was the first shopping center where “stores were built with a unified image and managed under the control of a single owner.”¹⁶² Thus, Highland Park marked the birth of the retail development firm, which retained ownership of property and took back rents from retailers. This innovation separated retailing operations from real estate operations and enabled risk-averse mainstream retailers, who were comfortably nested in the independent technology value network. The management teams of these retailers were unable to make a sufficient case to divert resources away from the large, healthy, and profitable core urban markets to the small, unpredictable emerging suburban markets.¹⁶³ By the time that suburban markets

¹⁶⁰ Ibid., 15.

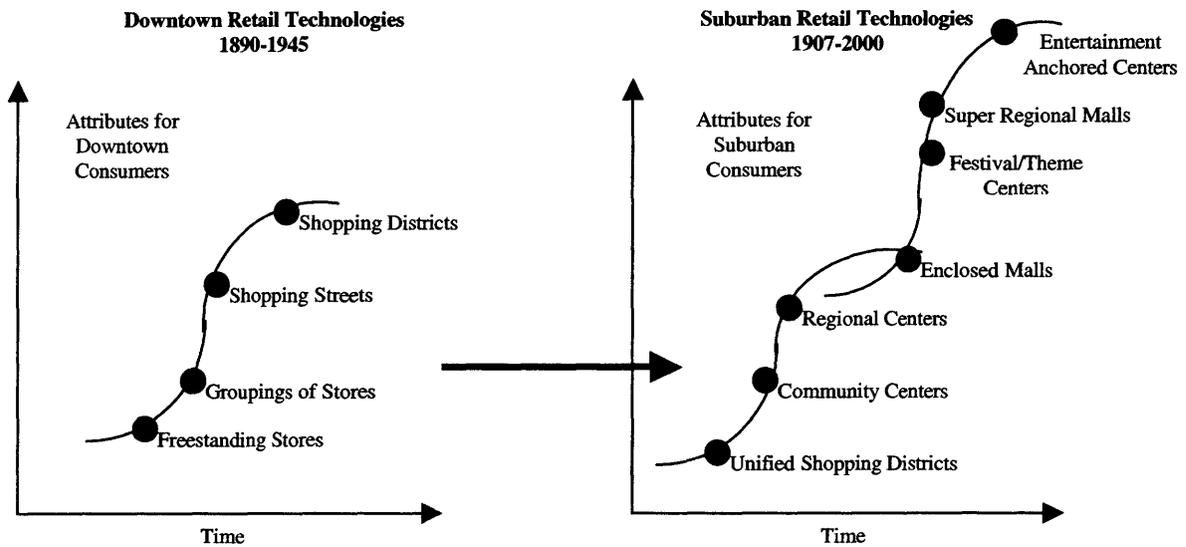
¹⁶¹ Ibid., 15.

¹⁶² Bul and Ordway quoting ULI’s *Shopping Center Development Handbook*, 22.

¹⁶³ O’Neill and Sutton, 11-13.

had grown enough to ‘become interesting’, development firms using unified technology had already built an insurmountable advantage in experience and knowledge of these markets. Figure 9 reflects this transition using the technology S-curve.

Figure 9. Independent to Unified Retail Development



S-Curve theory postulates that all technologies exhibit diminishing marginal gains in performance. When a technology is new, even slight improvements and simple innovations can produce large gains in product performance. Over time, as the technology matures, product performance begins to flatten out and is replaced by a new technology or radical innovation. Sustaining technologies are reflected as either movements along a particular curve (incremental) or shifts to a higher curve (radical). Disruptive technologies are reflected as shifts in the curve to a new set of axes. In terms of retail development, technologies are grouped as either disruptive or sustaining based on whether or not they change the metrics of product performance. A sustaining retail development technology offers consumers new ways to enjoy existing formats while a

disruptive retail technology offers consumers a new format that meets their needs in a way that existing formats cannot or do not.

The transition from independent technologies to unified technologies is represented as a shift in the S-curve from the left graph to the right graph. Shopping center developers essentially took basic elements of the independent technology and adapted them to serve the preferred attributes of suburban consumers.

The Era of Unified Development

In the 1950s and 1960s, hundreds of shopping centers were developed throughout the country.¹⁶⁴ In addition to significant design innovations such as dedicated parking lots and retail courtyards, this period saw major operational advances in leasing, promotions and advertising, maintenance of common areas, and property management.¹⁶⁵

In 1950, the concept of the “mall” was born with the development of Northgate in Seattle, Washington. Northgate was the first shopping center to have a 40-foot wide enclosed pedestrian street (called “The Mall” by developer John Graham) with large department stores at either end to act as “anchors”.¹⁶⁶ The next significant innovation came shortly thereafter, in 1956, with the development of Southdale Mall in Edina, Minnesota, the first-ever enclosed shopping center. Shoppers were able to shop during the bitter Minnesota winter thanks to technological breakthroughs in building roofing and

¹⁶⁴ Don Wharton, “Those Amazing Shopping Centers,” *Readers Digest* (Volume 80), Number 481, May 1962, 183.

¹⁶⁵ Bul and Ordway, 24.

heating and air conditioning systems.¹⁶⁷ Thus, the modern enclosed regional mall format was born and the stage was set for tremendous growth. The regional mall proved to be the dominant format within unified development technology and developers built regional malls in every major city in America over the next two decades.¹⁶⁸

By the mid-70s, there were approximately 15,000 shopping centers and 1,000 enclosed malls in the United States.¹⁶⁹ Starting in 1975, the regional mall was adapted into several new and exciting formats by several visionary and imaginative developers. The retail concept was expanded to include entertainment with formats such as the festival market and the specialty center, which were developed by Rouse Company in historic sites like Faniuel Hall in Boston, South Street Seaport in Manhattan, and Pier 39 in San Francisco.¹⁷⁰ In 1981, Triple Five Corporation developed the mammoth West Edmonton Mall, a 5.2 million square foot mall that ushered in the era of the ‘super regional mall’. West Edmonton redefined the concept of the mall with its tremendous drawing power – eight anchors, a 400,000 square foot amusement park, and a 355-room hotel.¹⁷¹ These innovations were sustaining because they improved the performance of established formats along the dimensions of performance that mainstream customers in major suburban markets had historically valued (reflected on the right hand graph in Figure 9). Suburban retail development came to be dominated by firms that learned to master the ‘shopping center technology’. As they climbed the experience curve, mall

¹⁶⁶ See Paul Doocey, “12 Who Dared to be Bolder, Brighter, Better,” *Shopping Centers Today*, May 1991, 46. Graham’s use of the term “mall” was the first ever recorded use of the word within a retail context.

¹⁶⁷ Doocey, 47.

¹⁶⁸ See Doocey, 60.

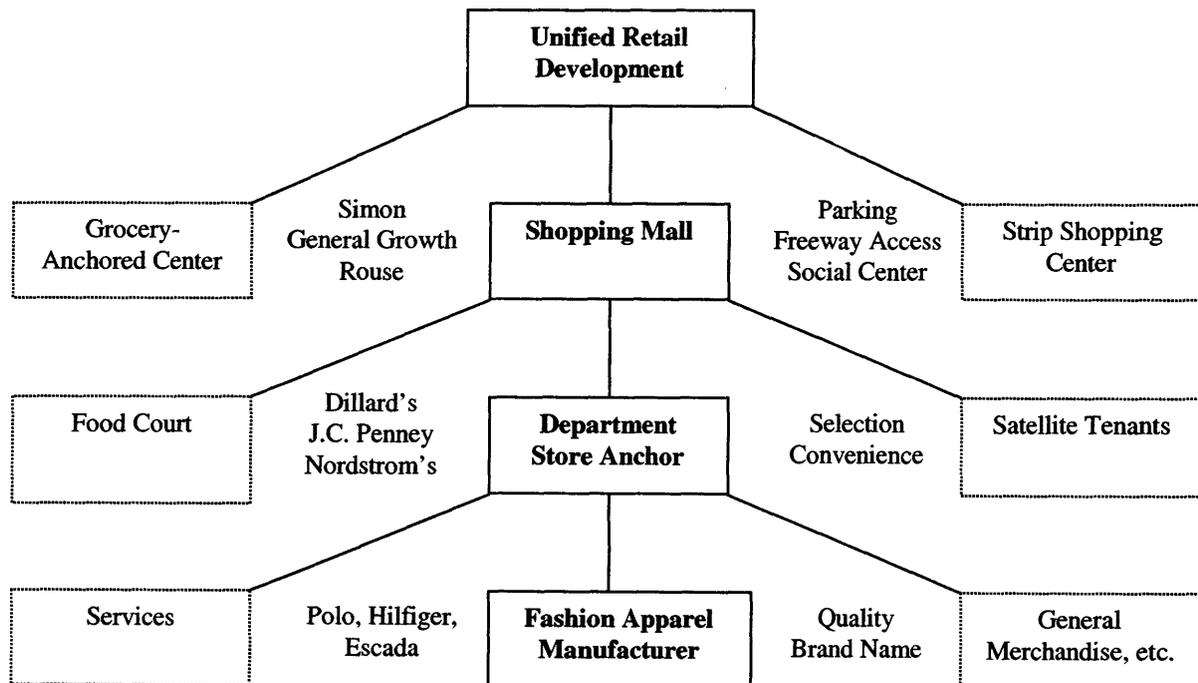
¹⁶⁹ Author’s estimate based on data drawn from ICSC website, www.icsc.org, under “/research”.

¹⁷⁰ See Doocey, 63.

¹⁷¹ *Ibid.*

developers made new discoveries about location strategies, consumer demographic metrics, tenant-mix strategies, design formats, construction methods, and entertainment retail. This is represented as the flattening-out of the upper curve on the right hand graph in Figure 8. Almost every single market leading development firm in the unified shopping center business was founded between 1950 and 1965.¹⁷² These firms rode the wave of unified technology to the top of their respective markets by building strong value networks with department store retailers and suburban consumers. Figure 10 presents an example of one such value network.

Figure 10. Unified Development Value Network



¹⁷² Melvin Simon & Associates, The Edward J. Debartolo Company, JMB Incorporated, General Growth Properties, Kimco, Hahn Development, Rouse, to name a few.

The unified technology value network is a highly specialized system geared to serve the diverse needs of suburban consumer constituencies. Different firms populate each level of the network, unlike the independent value network. In this system, the development firm identifies a location that meets the market requirements of the department store, which serves as ‘anchor’ in the eventual shopping center. The developer builds the store for the anchor and generally charges a very reasonable rent, relying on the anchor to draw consumer traffic to the mall. Based on the level of consumer traffic, the developer is then able to charge relatively high levels of rent to smaller ‘satellite’ tenants (typically selling full-price fashion apparel) that do not have the drawing power of national department stores.¹⁷³ Thus, in this value network, the developer has a major incentive to generate mall traffic. This is achieved by offering consumers the widest possible array of retailers (including food and entertainment retailers) in a pleasant and safe climate-controlled atmosphere.

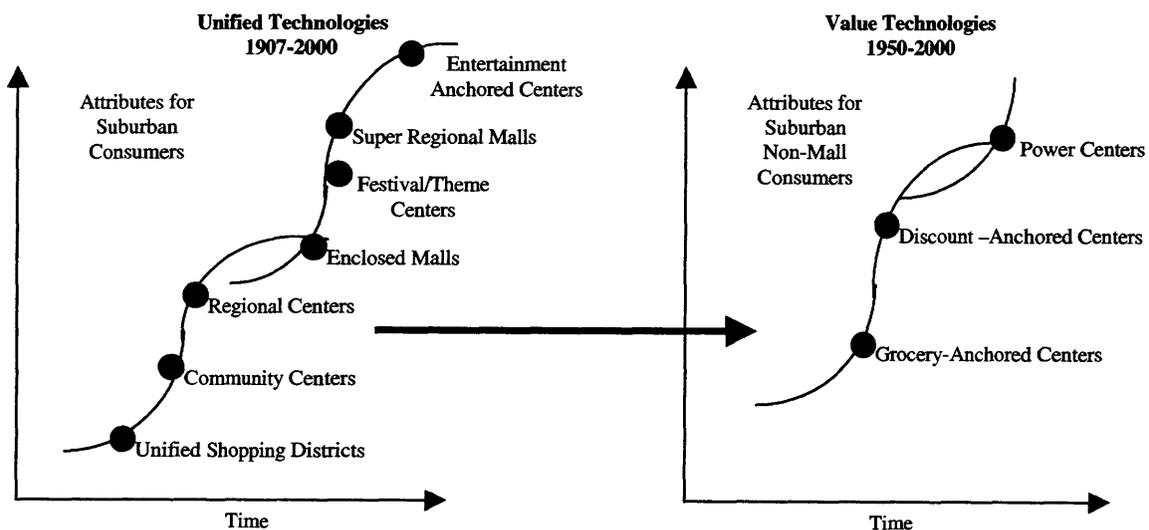
The growth of suburban populations has propelled unified developers to huge heights. They have made large strides in improving the shopping center experience. Firmly ensconced in their value networks, they continue surging up market within the unified paradigm by offering larger malls, more conventional retailers, more entertainment formats and more food retailers.¹⁷⁴ This has opened the door for disruptive value development technologies such as power centers and outlet malls, which have segmented consumer markets and specialized in value market niches.

¹⁷³ See W. Wheaton and R. Torto, “Shopping Center Economics,” Working Paper, June 1993.

Market Segmentation and Disruptive Value Technologies

With the growth of community centers and regional shopping centers from the 1930s to the 1960s, came the growth of grocery-anchored shopping centers. The supermarket concept was invented in the 1930s and most of the leading supermarket chains of today were founded before 1960.¹⁷⁵ Grocery-anchored shopping center development was a disruptive technology from the perspective of existing suburban retail formats because it brought a new value proposition to suburban consumers. Because supermarkets dealt in commodity items, shoppers were looking for a fast, simple, and convenient way to purchase their goods and take them home. Grocery-anchored centers were simple in design and cheap in construction – this technology was not about creating a mall that draws people for a pleasurable shopping experience. This is reflected in Figure 11 below as a shift from the left-hand curve to the right hand curve.

Figure 11. Unified to Value Retail Development



¹⁷⁴ See "Mall Openings, 1987-2000: How and Why They've Changed," *ICSC Research Quarterly* Volume 5, Number 2, Summer 1998.

¹⁷⁵ See Tedlow, chapter 3.

In response to the explosion of discount retailing from the early 1960s forward, the grocery-anchored format was adapted to discount-anchored centers. This was an incremental innovation since it did not involve a major change in development technology – discount-anchored shopping centers looked almost exactly the same as their predecessors. Refer to figure 11, where the discount-retail format is represented as a move along the technology curve. In the mid-1980s, this format was expanded radically into power center technology, which consisted of massive structures that resembled warehouses. The power center format enhanced the attributes by which its predecessors were judged – larger parking lot, more efficient shopping experience, better and more direct access to value retailers. This innovation is represented as an upward shift on the right hand curve in Figure 11. The power center was followed with the outlet center, which took the technology to its logical extreme, enticing shoppers to travel long distances from their homes in order to find a bargain. The market leaders in the unified technology did not build a business based on value technology primarily because (1) margins in value development are significantly lower than in other shopping center formats, and (2) the firm-level cost structure required for competition in the value arena effectively priced mall developers out of the market.¹⁷⁶

The Era of Value Retail Development

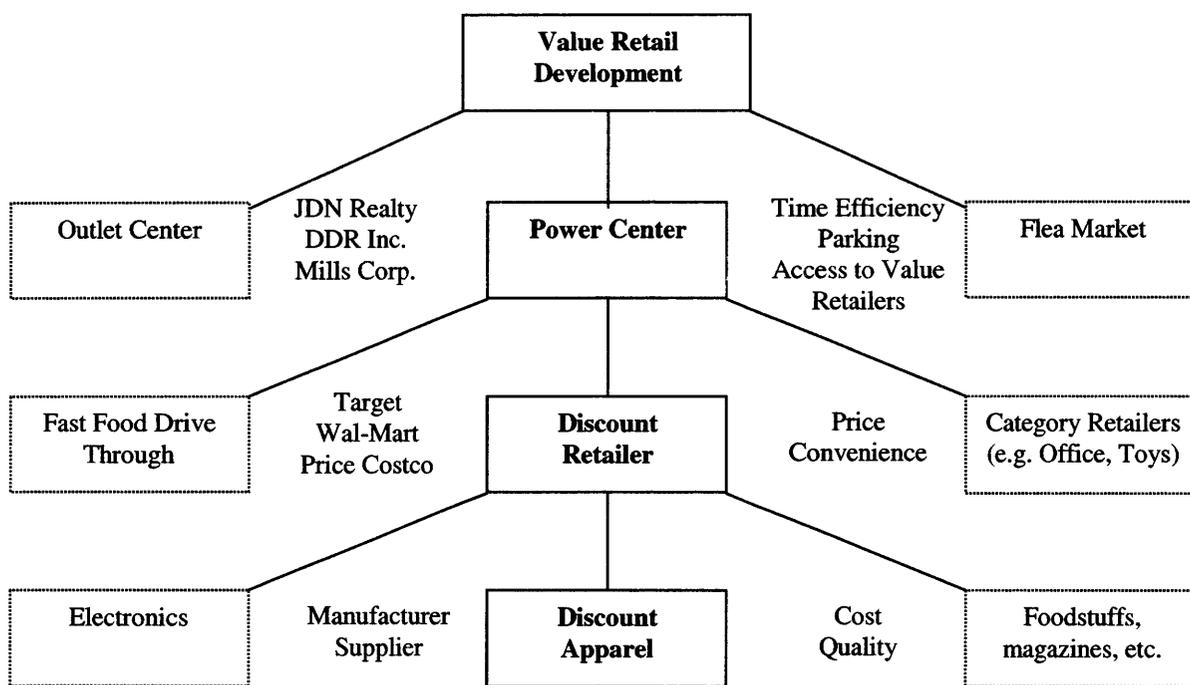
Value development technology is unique in its low construction, operational, and maintenance costs.¹⁷⁷ The emphasis in value development is providing consumers with efficient access to two types of tenants: warehouse-type general merchandise discount

¹⁷⁶ See Beyard, 1-3.

¹⁷⁷ Ibid., 4.

retailers, and category-killer specialized discount retailers.¹⁷⁸ In fact, value technology was initiated through the desire of large-format discount firms such as Target and Wal-Mart to penetrate lower-income suburban markets.¹⁷⁹ A value development is a super community shopping center in which at least 75 to 90 percent of the selling space is devoted to multiple off-price, category-focused anchors and a discount department store or warehouse club.¹⁸⁰ An example of this technology's value network is illustrated in Figure 12 below.

Figure 12. Value Development Value Network



The emphasis of this technology on price and efficiency is strongly reflected in the value network from the bottom up. The discount retailer provides relatively simple

¹⁷⁸ Ibid. 'Category-killers' are retailers such as Office Depot, Toys R Us, Michaels, and Petco, that offer a wide range of merchandise within narrowly defined retail categories such as toys, office supplies, etc.

¹⁷⁹ Beyard, 2.

¹⁸⁰ Definition paraphrased from International Council of Shopping Centers. See "Shopping Center Definitions," at www.icsc.com under "/research".

and low-cost merchandise, such as discount apparel (bottom level), to the price conscious consumer. The merchandising format and organization of a discount retail store is geared around providing access to these goods as directly as possible (middle level). Unlike conventional merchants, which rely on intricate displays, strategic lighting, and experienced salespeople, discount merchants focus exclusively on the products themselves, with very few frills and even fewer salespeople.¹⁸¹ Value technology capitalizes on societal trends toward cost-consciousness, time constraints, and informality. This ‘no-frills’ approach is translated up into the design and construction of the power center (top level). Value developments, with their emphasis on simple design and low-cost construction, resemble industrial buildings more than they do malls. Construction of these centers are being driven less by overall retail demand and more by the retailers themselves who are exploiting an imbalance in the type of retail formats and price points that consumers want. In addition, the corporate strategies of these retailers are focused on relentlessly growing their businesses at the expense of their competitors.¹⁸² This trend is reflected back in Table 2, where there is a sizeable 23% gap between growth in supply and growth in demand for value development.

Recent studies reveal that value development technology has begun marching up into the unified development market. According to research conducted by the International Council of Shopping Centers, “power centers are growing more popular with the public and are becoming formidable competitors with malls.”¹⁸³ The logic

¹⁸¹ See Donald Ziccardi and David Moin, *Masterminding the Store* (New York: John Wiley & Sons, 1997) 40-55.

¹⁸² Beyard, 7.

¹⁸³ See “Power Center Cross-Shopping,” *ICSC Research Quarterly* Volume 3, Number 3, Fall 1996, 3.

behind this trend is that (1) value developments are beginning to incorporate entertainment retail, food retail, and other formats that used to be constricted to unified technology, and (2) fewer mainstream retailers are willing to pay the relatively high occupancy costs related to mall tenancy.¹⁸⁴ According to the Department of Commerce, since 1990, the retailers in the value development technology value network, such as discount warehouses, home improvement centers, and electronics stores have registered 90% of the growth in mall-oriented retail sales.¹⁸⁵ Disruptive technology theory would predict that this trend will continue and value development will capture an increasingly larger portion of every consumer dollar spent on retail.

In addition to driving the continued success of value retail development technology, consumer demand for low-cost, efficient, and convenient access to retailers has propelled the growth of online retail and cyber retail development technology.

The Emergence of Cyber Retail Development

Starting in the mid 1990s, the World Wide Web has emerged as a powerful new medium to sell products and services. With the explosive growth and widespread popularity of the Internet among all generations of Americans, a few ingenious individuals recognized the opportunity to reach a large and growing audience of potential consumers. Early entrants to the online retail business such as Amazon.com and Gateway.com, focused on merchandising products that consumers “already know” and

¹⁸⁴ Ibid.

¹⁸⁵ See U.S. Commerce Department Data quoted in, “1999 U.S. Retail Sales, Mall Sales, Department Stores Sales Review,” *ICSC White Paper* Spring 2000.

“can define exactly what they want”, such as books and computers.¹⁸⁶ The initial financial success and fundamental growth of these companies fueled the proliferation of literally hundreds of new online retailers, offering an extremely broad range of products and services.¹⁸⁷ This growth in the online market has affected every area of the real estate industry (as discussed in Chapter 2), but no single area has received as much media attention as the retail development business.¹⁸⁸ The logic behind the focus on retail development is that (1) online retail is changing the way consumers purchase goods and services, (2) new consumption patterns do not require physical contact with retailers, and (3) this removes the necessity for retail development.¹⁸⁹

While it is true that online retail does change the way consumers interact with retailers, there has been little evidence since 1996 that consumers perceive online retail as a substitute for physical stores. Current research suggests that consumers treat online retail as a complement to conventional retail with shopping center tenants reporting that the number of Internet-researched purchases made at conventional stores exceeds online purchases by a factor of about five to one.¹⁹⁰ But the growth of cyber retail development cannot and should not be ignored. Compared with the other three technological paradigms discussed in this chapter, cyber development has grown geometrically faster in its early phase than any other retail development technology. Fueled by explosive demand for cyber development technologies, a few firms with relatively little prior

¹⁸⁶ See “Nonstore Retailing: Implications of the Internet,” *ICSC Research Quarterly* Volume 3, Number 3, Fall 1996, 9.

¹⁸⁷ See “Online Shopping” section on Ziff-Davis website, www.zdnet.com.

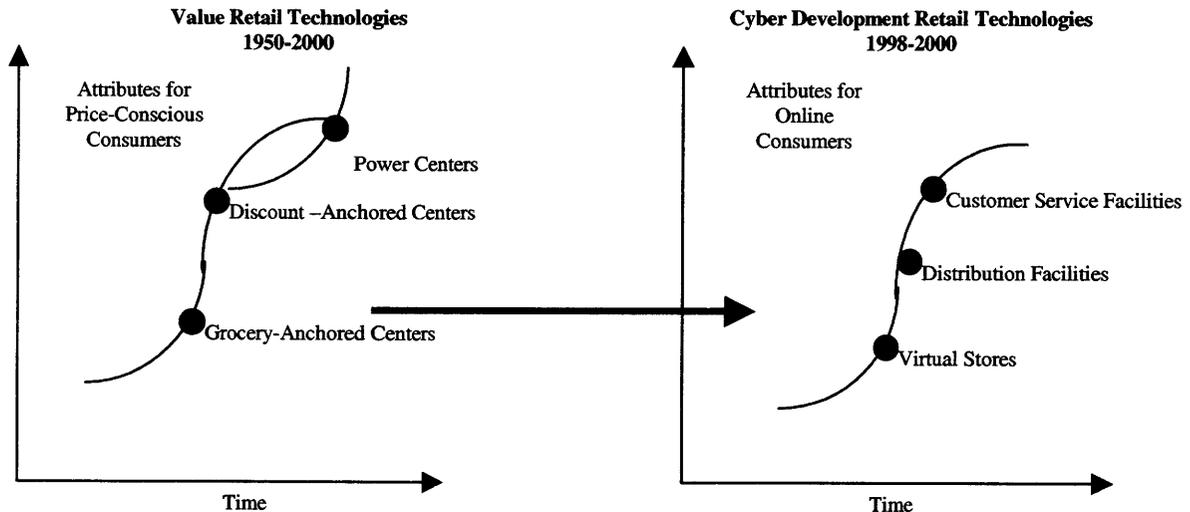
¹⁸⁸ See “Shopping Center Web Sites,” *ICSC Research Quarterly* Volume 6, Number 2, Summer 1999, 2.

¹⁸⁹ *Ibid.*, 4-7.

¹⁹⁰ See “Shopping Center Web Sites,” 5.

experience in retail development are leading the charge of cyber development. Figure 13 characterizes the origin of cyber retail development.

Figure 13. Value to Cyber Retail Development



Cyber development can be represented as a rightward shift in the value technology S-curve. This is for two reasons: (1) cyber retail development draws on many of the attributes that characterize value technologies, and (2) cyber retailers mostly traffic in the same goods (i.e. hard goods, books, electronics) as value retailers. Just as in value development, the emphasis in cyber development is to build retail environments that maximize the efficiency and convenience of the shopping experience. Virtual stores, the first instance of a cyber technology, were actually popularized within value centers across the country by Gateway 2000, a leading national computer retailer.¹⁹¹ The typical

¹⁹¹ For more information on the origins of virtual stores, see Gateway's 1996 Annual Report, available online at www.gateway.com.

“Gateway Country” store consists of a showroom filled with the most popular items in the Gateway product line. Consumers enter the store and interact with the products just as they would in a conventional store. Customer representatives assist potential shoppers and answer any questions that may arise. When the customer has decided on the specific product attributes that are most appealing, he or she is invited to a terminal where the salesperson takes the order for a customized computer with those attributes and instantaneously sends it to the central network that Gateway uses to manage its supply chain. The ‘perfect’ computer is then delivered to the customer within a week.¹⁹² From a development perspective, this type of retail is disruptive for two reasons. First, there is very little space devoted in the store to inventory – the store is essentially a showroom from which the customer chooses the attributes for their customized product. Second, the store is physically connected by cables and wires to an ultra high-speed network that connects the store to the distribution facility and the manufacturing plant. These two characteristics have the potential to change the dimensions along which customers value retail development. Namely, in the virtual store technology, the customer values the ability to browse among different products, physically interact with those products, get answers to their questions about the products, and leave the store with a customized product.¹⁹³

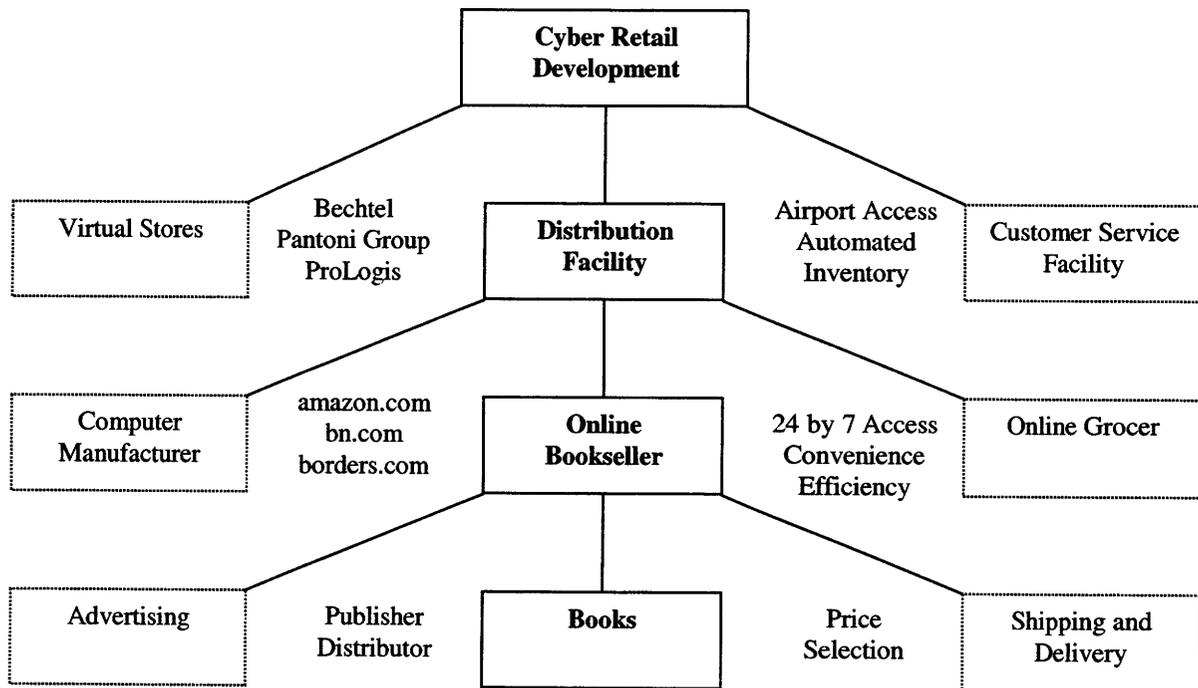
A second, more radical variant of cyber development technology is the ‘invisible store’.¹⁹⁴ This technology was first used in 1996 by Amazon.com, the leading online bookseller. From a development perspective, this technology is closer to industrial

¹⁹² Description based on author’s experience at Gateway Country Store in Glendale, CA 7/14/00.

¹⁹³ See “Gateway Country,” on the web at www.gateway.com.

development than it is to retail development. In this model, the consumer never makes physical contact with the product they purchase until it arrives by mail. Questions or comments are directed to a customer service network (available 24 hours a day, 7 days a week) that handles all consumer issues. This system essentially eliminates the need for the physical store and replaces it with distribution facilities and customer service facilities. An example of a cyber development technology value network is represented in Figure 14.

Figure 14. Cyber Development Value Network



The cyber development value network is designed to maximize convenience and efficiency for the consumer.¹⁹⁵ The vast majority of online purchases are made by consumers who can identify exactly which product attributes they desire. In other words,

¹⁹⁴ Phrase coined by Vishnu Menon, former Bain consultant and current venture capitalist.

there are no salespeople in cyberspace and as a result, most purchases are well researched (lower level). The online retailer adds value by providing a format that enables the consumer to access the store at any time and from any place, provided they have access to a digital network (middle level). The need for convenience and efficiency is translated into the upper level of the network, where developers build highly automated distribution centers (efficiency) located near airports (convenience) that enable the retailers to get their products to consumers as quickly as possible. The core competencies that are required to develop distribution centers are fundamentally different from those of other retail development technologies and as a result, highly specialized development firms dominate this area of the business. While the size of the online retail market and subsequently, the size of the cyber development market, are currently very small compared to the established technologies, the growth rates suggest that over the next five years, this gap will close very fast.¹⁹⁶

Established Market Responses

Conventional retail developers were initially slow to respond to the growth of cyber development technologies, but have begun to focus an increasing amount of resources on exploring the nature of online retail. Within the industry, the established leaders currently fall into two camps: those who choose to fight cyber technologies and those who choose to embrace them. Predictably, the opponents of cyber technologies continually argue that the online market is 'too small to worry about', and have led the vigorous campaign to tax all purchases made on the Internet, hoping to curb the growth

¹⁹⁵ "e-Commerce", *ICSC White Paper*, Spring 2000, 4.

¹⁹⁶ *Ibid.*, 5-8.

of online retail and ‘level the playing field’ for conventional retailers.¹⁹⁷ The proponents of cyber technologies are struggling to understand the future of cyber development and have invested a large amount of resources in Internet-related technologies.

In order to better understand the impact of innovation in retail development, it is helpful to consider disruptive technologies from a firm level perspective. In the next chapter, we consider the strategy of Simon Property Group, the leading firm of unified development, and a strong proponent of cyber development technologies.

¹⁹⁷ Ibid., 1.

Chapter 4. Firm-Level Strategy – Simon Property Group

If longevity, firm size, and firm profitability are indicators of success, the Simon Property Group having been in business over 40 years, owning over 180 million square feet of retail space, and with a \$17 billion market cap could be considered a successful firm.¹⁹⁸ Could a major factor in the Simon Property Group's success be their ability to manage both sustaining and disruptive innovations? This chapter discusses Simon's major technology initiatives. The goal is to build upon the analysis from the last chapter and apply some of the lessons about innovation in the real estate industry. The analysis begins with a brief overview of the firm and proceeds with an account of the firm's technology strategy.

Simon Property Group History¹⁹⁹

Melvin Simon and Associates was founded in 1960, shortly after the advent of the enclosed regional mall. The firm began by developing both community shopping centers and regional malls throughout the Midwest in the seventies and eighties. By 1990, it was one of the largest regional retail development firms in the country. In the early nineties, Simon merged with the Edward J. Debartolo Company to form the nation's largest retail development firm. Simon-Debartolo went public in 1993 and began an aggressive campaign of purchasing existing shopping centers and malls from smaller competitors. Simon-Debartolo led the shopping center industry in the national consolidation phase of the mid-90s. In 1998, the firm was renamed Simon Property Group. As of June 30,

¹⁹⁸ For more historical information on the Simon Property Group, see www.about.simon.com. Market cap rate was as of 6/30/2000.

2000, the company owned or had an interest in 253 properties comprising regional malls, community shopping centers and specialty and mixed-use properties containing 184 million square feet of gross leasable area (GLA) in 36 states and five assets in Europe. Simon Property Group, Inc., together with its affiliated management company, owns or manages approximately 190 million square feet of GLA in retail and mixed-use projects and attracts over 2 billion shopping visits annually to its properties

Simon is comfortably nested in the shopping center/mall value network that it helped to create. The firm has truly mastered mall technology and introduced several sustaining innovations that have become integral to the modern notion of the mall. Some examples of these innovations include advanced customer research, retail food courts, category clusters, kiosks, and direct mail advertising. It is not an understatement to say that Simon has helped retailers understand and interact with their consumers more effectively. Along with a few other leading firms, Simon has pushed mall technology to new heights.

Simon's Innovations

However, the Simon Property Group has, during the first half of 2000, looked outside of their existing value network to explore innovations that could further add value to the firm. Simon turned their attention to exploring potentially disruptive innovations that would service the new economy. One Simon marketing manager stated,

“The reality facing Simon is that the potential for improvements in mall technology is almost fully realized. Mall formats have converged – it is very difficult for consumers to

¹⁹⁹ Information gathered from www.shopsimon.com, Simon Property Group's website, 7/22/2000.

distinguish between malls because they are all beginning to look alike. In order to be competitive in the new economy we need to be willing to take chances on technologies that will potentially change the way the industry operates.”²⁰⁰

Although still committed to improving their existing retail models through sustaining innovation, Simon’s management team is cognizant of the fact that the time is ripe for new disruptive retail technologies.²⁰¹ Therefore, Simon adopted a two-prong value network. The first focusing on Simon’s traditional retail business and the sustaining technologies that support it, and the second focusing on potentially disruptive innovations, which are managed by Simon subsidiaries. The following is an account of Simon’s technological initiatives during 1999 and 2000.²⁰²

- www.merchantwired.com

Description: Merchantwired bills itself as the “Net Power for the Bricks and Mortar World”.²⁰³ Merchantwired.com promises to provide a complete end-to-end solution that will help retailers streamline back-office operations, while adding great opportunities at the point of sale. The result is a coast-to-coast extranet that provides high speed, low cost online access, a revolutionary new network for the retail industry, local networks within each Simon mall, a national link of Simon stores and properties, and a

²⁰⁰ Statement made by Simon Property Group marketing manager interviewed in person by Andre Navasargian, 5/23/2000.

²⁰¹ Opinions gathered from interviews, conducted in person by Andre Navasargian, with 3 Simon employees, 5/23/2000-5/25/2000.

²⁰² What follows is a brief analysis of their major strategic policies from the perspective of disruptive technologies. This information was primarily gathered from the media, Simon’s promotional literature, and the Internet. Simon representatives were contacted for further comment, but declined to divulge specific information other than that which is available publicly.

connection for all retail operations from manufacturing through distribution and human resources.

Analysis: Merchantwired.com has been a boost to Simon's brick and mortar retail model. Simon was the first to establish a portfolio-wide extranet that allows each retailer to access a multitude of enhanced services. We believe the merchantwired.com technology to be sustaining as it hasn't changed, but has enhanced the existing model by creating more efficient operational processes.

- Operation Resourcenet

Description: This technology is an electronic marketplace for retailers, vendors, businesses, and mall owners. It essentially leverages the collective buying power of its members to obtain lower prices, improved services, and higher-quality products.

Analysis: Resourcenet is another sustaining technology. The technology has not changed the retail business model, but it has presented the opportunity for more cost effective operation of business. Similar to merchantwired.com, resourcenet further strengthens Simon's brick and mortar retail model by offering value added services to its retailers.

²⁰³ For more information visit www.merchantwired.com.

- www.shopsimon.com

Description: This is Simon's primary presence on the Internet. The website offers consumers a searchable list of malls and stores, printable mall maps and driving directions, links to virtual storefronts, links to retailer websites, purchase of gift certificates, and information on mall promotions.

Analysis: Shopsimon.com is a sustaining technology. It is designed to stimulate additional traffic from mainstream consumers within the existing performance paradigm. In other words, this technology does not offer consumers a new set of reasons to come to malls.

- [MALLPerks](#)

Description: MALLPerks is a national shopper loyalty program with more than two million members. Consumers can enroll for this free service online by entering some personal information. Upon enrollment, consumers receive a card that is used to track the client's spending pattern. Shoppers earn points for every dollar they spend at any of Simon's 250 malls. These points can then be exchanged for goods and services.

Analysis: This program is a clever sustaining technology. It is designed with two objectives: (1) to get mall shoppers to spend more at Simon properties by offering incentives, based on spending, to those that shop at Simon properties, and (2) to provide detailed demographic and spending pattern information on mall shoppers. The system is designed to squeeze more performance out of existing mainstream mall technologies.

- Simon Branding

Description: Starting in 1999, Simon launched an effort to promote the firm as a unique brand. According to their promotional literature, over one half of shoppers surveyed know the Simon name and understand the Simon brand. Specific branding strategies include direct mail advertising, embedding the “Simon” name within the mall’s name, standardization of design elements, and the publication of S Magazine – a partnership with Time Inc. that is distributed to shoppers.

Analysis: This is another clever sustaining technology that does not extend the market reach beyond mainstream mall shoppers. The development of a Simon brand does not really bring the market a new value proposition. Branding technology has historically been used to market easily substituted, commodity-

type products such as soap or cheese. Branding shopping malls can be thought of as a strategy in response to the market reality that mall technology is converging and the s-curve is beginning to flatten.

- www.fastfrog.com

Description: Teens can use FastFrog.com both online and at the mall.²⁰⁴ To use FastFrog.com, a teen simply registers at the "Frog Pond" (a FastFrog kiosk in a mall) or online at FastFrog.com. Once registered, a teen can check out a "zapstick" from the in-mall kiosk and scan items they like at participating retailers to add them to their wish list. Teens can log onto the FastFrog.com website and access their wishlists and add items to their wishlists online.

Once a teen has created a wishlist, the wishlist can be emailed, printed out, or the teen's parents can visit the FastFrog.com kiosk in the mall where the Frog Pond staff will print the wishlist for them.

Analysis: This is a potentially disruptive technology as it's a departure from the traditional shopping experience. The technology will allow teen shoppers to combine both physical and

²⁰⁴ See www.fastfrog.com for more information.

virtual shopping models. The process may change the way in which products are displayed, marketed, purchased, and delivered.

- www.yoursherpa.com

Description: Not unlike FastFrog.com, YourSherpa.com uses hand-held and online technology to help time-constrained consumers shop efficiently when and where they want.²⁰⁵ The hand held technology, in the form of a "ruggedized" Palm Pilot PDA (personal digital assistant) with a barcode scanner, allows adults to shop simply and quickly by scanning items they want from favorite retailers, pay through a single channel, and have those items conveniently delivered, avoiding the hassle of checkout lines.

Consumers can use YourSherpa.com in two ways, online and in the mall. To use YourSherpa.com, a consumer can either register online at the YourSherpa.com website, or at a YourSherpa.com kiosk in a mall. When a consumer registers, a customer account is created which can be accessed either via the Internet or using a YourSherpa.com PDA.

To use YourSherpa.com in a mall, registered users of YourSherpa.com check out a PDA from the YourSherpa.com kiosk. The PDA has a built-in barcode scanner and utilizes the Palm Operating System. Registered YourSherpa.com users can

then go into participating retailers and scan the items they want to purchase immediately and the items they would like to purchase later. When the consumer is done shopping he or she returns the PDA to the YourSherpa.com kiosk and the items that have been scanned are uploaded to the consumer's personal YourSherpa.com website. The purchased items are then fulfilled for the consumer and YourSherpa.com arranges with the consumer when and where they want their purchases delivered.

To use YourSherpa.com online, a registered user simply logs into YourSherpa.com on the Internet. Once logged on a consumer can shop on the website like any traditional online shopping website. Additionally, the consumer can also review items scanned previously in the mall and purchase those items over the Internet.

Analysis: YourSherpa.com is also a potentially disruptive technology. The technology offers a new shopping option, allowing consumers to efficiently and expeditiously purchase their retail items. The technology may also alter retailer's current business models to accommodate this new wave of consumers.

²⁰⁵ See www.yoursherpa.com for more information.

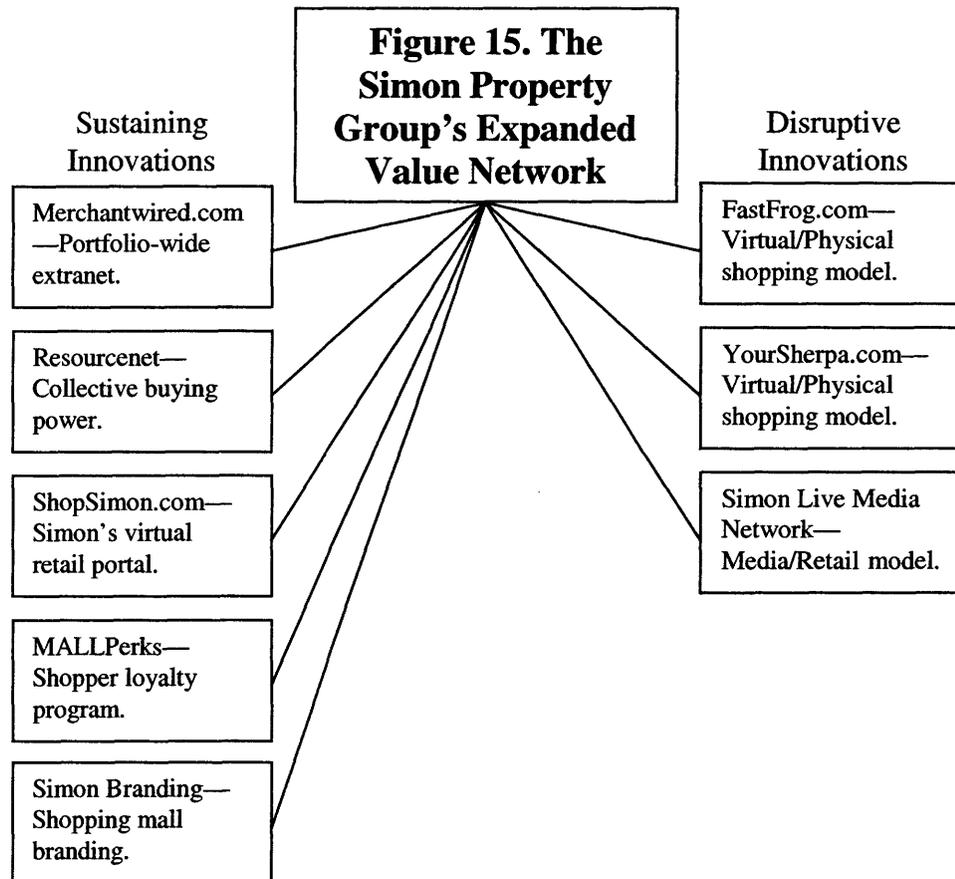
- Simon Live Media Network

Description: Simon's partnership with Turner Broadcasting System to produce a private in-mall retail entertainment network consisting of a televised network that will broadcast mall events, live entertainment and informational events targeted to consumers, interactive media stations within the mall, and a family zone that includes gaming, animated programming, and retail offerings.

Analysis: This is a disruptive technology because it involves creating a totally unique marketing medium. The mall is transformed into live media. The entertainment/retail/media hybrid model offers a new forum for both retailers and consumers to buy and sell goods. The innovation will require a new type of retail space and new method of product presentation. Further, the consumers shopping experience will change drastically as they are engulfed in an interactive, entertainment-based retail experience.

The following represents a sampling of Simon's expanded innovations (Figure. 15). Note that although the sustaining innovations outweigh the disruptive innovations in the diagram, this is only the beginning of Simon's initiatives to develop disruptive innovations. They currently have a number of new, potentially disruptive initiatives underway.²⁰⁶

²⁰⁶ For more information on the Simon Property Groups current technological initiatives, see www.about.simon.com.



In their efforts to capitalize on disruptive technologies, the Simon Property Group quickly learned that the exploration of innovations outside of your existing value network could be viewed as threatening to those operating within the network and those that the network services.²⁰⁷ Therefore, Simon took steps to create a system that would allow the firm to pursue both sustaining and disruptive technologies. The group spearheading the development of sustaining innovations would continue to operate as *The Simon Property Group*, while smaller, subsidiary groups would be formed to develop/test potentially

²⁰⁷ Opinions gathered from interviews, conducted in person by Andre Navasargian, with 3 Simon employees, 5/23-5/25.

disruptive technologies.²⁰⁸ Simon's approach is consistent with the theory that smaller groups with flexible value networks may have an easier time developing and introducing disruptive innovations into the market place.

Further underlining their commitment to the development of sustaining and disruptive innovations, Simon has joined forces with some of the country's largest property owners, Equity Office and Equity Residential, "to form a company that will search out, establish and incubate web-based and electronic-commerce businesses that will target the millions of people who walk through their properties every week."²⁰⁹ The group is Constellation and it acts as safe alternative for Simon to invest in potentially disruptive technologies. It creates an independent organization that has the flexibility to chase small emerging markets with disruptive innovations.

The Simon Property Group has stated their commitment to pursuing the development of both sustaining and disruptive developments. They have also experienced the complexities of exploring potentially disruptive innovations within an established value network. As a result, they have created a business strategy that includes a two-prong value network. The first focusing on the development of sustaining technologies, managed by The Simon Property Group proper; and the second focusing on the development/testing of or investment in potentially disruptive technologies, managed by Simon subsidiaries or third parties such as Constellation. To date, Simon has created 4

²⁰⁸ Clixnmortar.com, FastFrog.com, YourSherpa.com, and the Simon Live Media Network are all subsidiaries of the Simon Property Group and were established to develop/test potentially disruptive innovations.

subsidiaries to spearhead these potentially disruptive initiatives.²¹⁰ This new strategy coupled with Simon's allocation of human and financial capital to the initiatives has established Simon as one of the drivers of innovation within the industry.

Again, it is likely that the Simon Property Group has experienced sustained growth and profitability, in part, as a result of their effective management of innovation. First, they have pursued the development of innovations that the market may not be ready for with the understanding that the time may come when the market is ready for the innovations. Second, they have allocated the necessary resources to the development of disruptive innovations. Third, they have empowered subsidiary groups to spearhead their disruptive initiatives with the understanding that these smaller groups with flexible value networks are more likely to have success in developing disruptive innovations. Finally, they have looked to introduce their disruptive innovations in emerging markets with the understanding that these markets are more likely to embrace the new innovations than an established market. The combination of the above factors may very well provide the Simon Property Group with the edge they need to continue to grow their market share and profitability.

The final chapter will recap the frameworks and theories presented in the previous chapters and offer suggestions to effectively manage innovation in the real estate industry.

²⁰⁹ See Barbara Martinez, "Big Property Owners Team Up for E-Commerce," *The Wall Street Journal*, May 4, 2000, A3.

²¹⁰ See www.about.simon.com for more information concerning Simon subsidiaries.

Conclusion

Innovation in all shapes and forms will continue to revolutionize the real estate industry. By applying analytical frameworks (developed through the study of other industries) to the real estate industry at varying levels, we hoped to learn more about the nature of innovation and its impact on the real estate industry. In the end, what do real estate managers learn from this study and what are the steps they should take to successfully manage innovation in the real estate industry? The research suggests the following:

First, innovation impacts both high technology and low technology industries alike. The theory of disruptive technologies suggests that certain innovations that bring new value propositions to market have the ability to fundamentally reshape the competitive landscape within an industry. The technology S-curve and the value network are shown to be especially useful tools in understanding how and why some technologies change industries while others serve to strengthen the positions of established leaders. The theory has been proven in high-tech industries such as the disk drive industry and in low-tech industries such as the construction industry. Each of these industries, as indicated in the study, has experienced a shift in their S-Curves as a result of disruptive innovation.

Second, these disruptive innovations tend to be simple innovations that make life/work easier. Disruptive innovations are, for the most part, innovations that make processes more effective and efficient. For example, the idea of an online real estate

exchange, such as Zethus, is a fairly simple model. It essentially creates the opportunity for property to be bought and sold online. Despite the simplistic nature of the model, the innovation is disruptive as it simplifies a process that is traditionally complex.

Third, small groups with flexible value networks have historically had a more successful time of developing disruptive innovation. These small groups have an advantage over established firms, as they are able to focus solely on the development of the disruptive innovation. Further, disruptive innovation usually appears threatening to existing value networks. The small groups are usually still in the process of establishing their value networks and, therefore, the development of disruptive innovation doesn't usually pose a threat to their still evolving value networks.

Fourth, emerging markets tend to be more receptive to disruptive innovations. Just like established firms, established markets have existing value networks. These markets are often wary of looking at innovations that lie outside of their value networks. The solution is to focus on emerging markets when developing or testing disruptive innovations. These markets are still in the process of establishing their value networks and are much more likely to evaluate disruptive innovation.

Finally, in order to stay competitive in the new economy, real estate managers must have a value network that includes both sustaining and disruptive initiatives. It is imperative that firms continue to pursue sustaining innovation that will bolster their existing models. It is equally important for these firms to incorporate the development of

disruptive innovation into their value networks to service emerging markets and capitalize on potential opportunities created by shifts in the industry S-Curves.

A savvy real estate manager should consider the following when creating a business model to manage disruptive innovation:

1. **Pursue innovation outside of existing value networks.** Innovation that may not appear to be useful to markets today may directly address their needs tomorrow. Therefore, it is imperative that a firm look outside their existing value network when pursuing the development of disruptive innovation.
2. **Resources are necessary to successfully develop disruptive innovations.** There is a direct correlation between the success of managing innovation and resource allocation. Innovation proposals that get the funding and manpower they require may succeed; those given lower priority, whether formally or de facto, will starve for lack of resources and have little chance of success. Firms must allocate the necessary human and financial resources to their disruptive initiatives if they are to succeed.
3. **Matching the market to the technology is not an easy task.** Successful companies have a practiced ability in taking sustaining technologies to

market, routinely giving their customers more and better versions of what they say they want [e.g., SHOPPING CENTERS → REGIONAL MALLS → ENCLOSED MALLS → SUPER REGIONAL MALLS]. But this does not work when handling disruptive technologies. If a company forces a disruptive technology to fit the needs of an established market, it is almost sure to fail. The successful firm will find a new or emerging market that values the attributes of the disruptive innovations. “Disruptive technology is a marketing challenge, not a technological challenge”.²¹¹

4. A subsidiary should be created to spearhead disruptive initiatives.

Our study indicates that an independent subsidiary or third party should spearhead the development of all disruptive innovations. The group should be formed with flexible value networks allowing for the focused pursuit of the development of disruptive innovations. These groups should be empowered to develop outside of current market value networks with the hope of developing an innovation that will one day be deemed essential by the existing markets.

In addition to sound business practices, managers can surmount the complexities associated with disruptive innovation and capitalize on the benefits that accompany them by exploring innovation outside of their existing value networks, supporting the development of potentially disruptive innovations with the necessary human and capital resources, identifying emerging markets that may be receptive to the disruptive

²¹¹ Taken from Clayton Christensen’s *Innovator’s Dilemma*, page 208.

innovations, and empowering a focused and flexible entity to spearhead the development of the potentially disruptive innovation.

Despite the suggestions for managing innovation in the real estate industry, this study raises more questions than it answers. For example, where can managers turn for the information required to make large and decisive investments in the face of disruptive technology? The information simply does not exist in an assessable, inexpensive, and flexible forum.

Second, the barriers to entry in terms of successfully developing and introducing disruptive innovations are difficult to calculate. Despite their endowments in technology, brand names, management experience, relationship with tenants, and just plain cash, successful real estate companies populated by good managers have a genuinely hard time doing what does not fit into their existing value networks. Because disruptive technologies rarely make sense during the years when investing in them is most important, conventional managerial wisdom at established firms constitutes an entry barrier that entrepreneurs and investors can bank on.

In order to fully understand the complexities of disruptive innovations and the proper way to manage disruptive initiatives, firms must make the necessary investment into further research on the topic. Each market and sub-group within the real estate industry is highly complex and unique. Using the theories and analytical frameworks presented, firms must identify the potential for disruptive innovation within their specific industries. Those firms that successfully develop and manage the complexities of

disruptive innovation will potentially increase their competitive advantage, increase their market share, and subsequently add value to their bottom lines. The opportunities associated with disruptive innovation are endless.

“The Internet is a mechanism that will revolutionize the Real Estate Industry by solidifying its competitive edge, enhancing its business processes and business solutions and increasing its return on investments. The power of the digital economy is infinite.”²¹²

²¹² Comment made by Forbes Magazine in preparation for the “E-Business in the Construction Industry” conference sponsored by Forbes, Bentley Systems, Cephren, Pricewaterhousecoopers, Primavera. For more information concerning the conference or the press release, see www.cephren.com/about/press, 3/21/2000.

Works Cited

- Bergsman, Steven. "E-Ready, Set, Go!" *Urban Land* (May 2000): 20-21.
- Beyard, Michael D. "Power Centers: A Development and Investment Perspective", *ULI Position Paper*, (Fall, 1996).
- "Big Property Owners Team Up for E-Commerce." *The Wall Street Journal* (May 4, 2000).
- Bowen, H. Kent, Kim B. Clark, Charles A. Halloway and Steven C. Wheelwright. "Make Projects the School for Leaders." *Harvard Business Review* (September-October 1994): 131-140.
- Bower, Joseph L. *Managing the Resource Allocation Process*. Homewood, IL: Richard D. Irwin, (1970).
- Breuggeman, William B. and Jeffrey D. Fisher, *Real Estate Finance and Investments* Tenth Edition, (Boston: Irwin McGraw-Hill, 1997): 272-274.
- Bul, Alexander and Nicholas Ordway. "Shopping Center Innovations: The Past 50 Years." *Urban Land* (June 1987): 22-25.
- Casey, Douglas M. "Overstoring: A Look at Retail Space and Sales Performance", *ICSC Research Quarterly*, Volume 3, (Fall, 1996).
- Christensen, Clayton M. *The Innovator's Dilemma*. Boston: Harvard Business School Press, (1997).
- Christensen, Clayton M. "Exploring the Limits of the Technology S-Curve." *Production and Operations Management* 1 (1992): 334-366.
- Christensen, Clayton M. "The rigid Disk Drive Industry: A History of Commercial and Technological Turbulence." *Business History Review* 67. (1993): 531-588.
- Christensen, Clayton M. and Richard S. Rosenbloom. "Explaining the Attacker's Advantage: The Technological Paradigms, Organizational Dynamics, and the Value Network." *Research Policy* 24 (1995): 233-257.
- Christensen, Clayton M. and Richard S. Rosenbloom. "Technological Discontinuities, Organizational Capabilities, and Strategic Commitments." *Industrial and Corporate Change* 3 (1994): 655-686.

- Clapp, John M. and Stephen D. Messner, *Real Estate Market Analysis: Methods and Application* (1988):Chapter 5.
- Clark, Kim B. "The Interaction of Design Hierarchies and Market Concepts in Technological Evolution." *Research Policy* 14 (1985): 235-251.
- "Developers Stake Claims in New Economy." *The Asian Wall Street Journal* (March 10, 2000).
- DiPasquale, Denise and William C. Wheaton, *Urban Economics and Real Estate Markets* (Englewood Cliffs, NJ: Prentice Hall, 1996): 270.
- Doocey, Paul. "Postcards from the Past." *Shopping Centers Today* (May 1992): 69-84.
- Doocey, Paul. "12 Who Dared to be Bolder, Brighter, Better." *Shopping Centers Today* (May 1991): 45-68.
- Dosi, Giovanni. "Technological Paradigms and Technological Trajectories." *Research Policy* 11 (1982): 147-162.
- "E-Commerce", *ICSC White Paper*, (Spring, 2000).
- "E-Commerce (A Special Report): On the Battlefield – Home Advantage." *The Wall Street Journal* (July 17, 2000).
- "E-Commerce is Radically Reshaping Retail Real Estate, According to Urban Land Institute Experts," *ULI Press Release*, (June 8, 2000).
- Enos, J.L.. "Invention and Innovation in the Petroleum Refining Industry." *The Rate and Direction of Inventive Activity: Economic and Social Factors*. National Bureau of Economic Research Report (1962): 299-321.
- Eli Lilly and Company: Innovation in Diabetes Care*. Harvard Business School case study 696-077 (February 8, 1996).
- Evans, Philip B. and Thomas S. Wurster. "Strategy and the New Economics of Information." *Harvard Business Review* (September-October 1997): 71-82.
- Foster, Richard J. *Innovation: The Attacker's Advantage*. New York: Summit Books, (1986).
- Greer, Gaylon M. and Michael D. Farrell, *Investment Analysis for Real Estate Decisions*, (1993).

- “Harvard Study on Discount Shoppers.” *Discount Merchandiser* (September, 1963).
- Henderson, Rebecca M. and Kim B. Clark. “Architectural Innovation: The Reconfiguration of Existing Systems and the Failure of Established Firms.” *Administrative Science Quarterly* 35 (1990): 9-30.
- Henderson, Rebecca M. “Keeping Too Close to Your Customers.” *Massachusetts Institute of Technology Sloan School of Management working paper*, (1993).
- Hewlett-Packard: The Flight of the Kittyhawk*. Harvard Business School case study 697-060 (March 7, 1998).
- Hewlett-Packard’s Merced Division*. Harvard Business School case study 699-011 (February 19, 1999).
- “HomeGain Gets Funding of \$53 Million.” *The Wall Street Journal* (January 19, 2000).
- “Hotwired”, *The Industry Standard*, (June, 1999):23-28.
- HydroCision, Inc.* Harvard Business School case study 699-176 (May 28, 1999).
- Kalman, Bobby, *Early Stores and Markets* (Crabtree Publishing: Philadelphia, 1981): 21.
- “Mall Customer Shopping Patterns”, *ICSC Research Quarterly* Volume 5, Number 3, (Fall, 1998).
- “Mall Openings, 1987-2000: How and Why They’ve Changed,” *ICSC Research Quarterly* Volume 5, Number 2, (Summer 1998).
- Managing Innovation at Nypro, Inc. (A)*. Harvard Business School case study 696-061 (December 18, 1998).
- Martinez, Barbara, “Big Property Owners Team Up for E-Commerce,” *The Wall Street Journal*, (May 4, 2000): A3.
- Moin, David and Donald Ziccardi, *Masterminding the Store* (New York: John Wiley & Sons, 1997).
- “More People Turn to Web to Buy, Sell Homes.” *The Wall Street Journal* (July 8, 2000).

- Motorola, Inc.: Bandit Pager Project (Abridged)*. Harvard Business School case study 692-069 (January 23, 1997).
- “Nonstore Retailing: Implications of the Internet,” *ICSC Research Quarterly* Volume 3, Number 3, (Fall 1996): 9.
- “Office Owners to Develop Web Leasing System.” *The Wall Street Journal* (June 6, 2000).
- O’Neill, Robert E. and Sandra M. Sutton, “A History of the Shopping Center Industry.” *Monitor* (August 1990): 11-56.
- Pfeffer, Jeffrey and Gerald R. Salancik. *The External Control of Organizations: A Resource Dependence Perspective*. New York: Harper & Row, (1978).
- Pisano, Gary P. “R&D Performance, Collaborative Arrangements, and the Market-for-Know-How: A Test of the “Lemons” Hypothesis in Biotechnology.” *Harvard Business School working paper* (1997).
- “Power Center Cross-Shopping,” *ICSC Research Quarterly* Volume 3, Number 3, (Fall 1996): 3.
- Porter, Michael. *Competitive Advantage*. New York: The Free Press, (1985).
- “Retailing: In the Age of the Web, a Book Chain Flounders.” *The Wall Street Journal* (February 22, 1999).
- Rosenbloom, Richard S. and Clayton M. Christensen. “Technological Discontinuities, Organizational Capabilities, and Strategic Commitments.” *Industrial and Corporate Change* 3 (1994): 655-685.
- Rybczynski, Witold. “The New Downtowns.” *The Atlantic Monthly* (May 1993): 98-106.
- “Shopping Center Web Sites,” *ICSC Research Quarterly* Volume 6, Number 2, (Summer 1999): 2.
- Solow, Robert M. *Growth Theory: An Exposition* (2000).
- Staley, Samuel R., “The Sprawling of America: In Defense of the Dynamic City,” Policy Study No. 251, Reason Public Policy Institute, (1999).
- State Street Bank and Trust Company: New Product Development*. Harvard Business School case study 696-087 (April 12, 1996).

Studenmund, AH, *Using Econometrics: A Practical Guide* Third Edition (Menlo Park, CA: Addison-Wesley, 1997): 466-493.

“Successful Online Retail Strategies”, Gomez Advisors, (June, 2000).

Tedlow, Richard. *New and Improved: A History of Mass Marketing in America*. Boston: Harvard Business School Press, (1996).

“Technology Solutions for Retailers.” Simon Property Group promotional material (May 2000).

“*The Real Estate Landscape in 2000 – Challenge and Opportunity*.” Deutsche Banc Alex. Brown industry report (June 15, 2000).

“Trading Real Estate Like Winter Wheat.” *The New York Times*. (July 25, 2000).

Tushman, Michael L. and Philip Anderson. “Technological Discontinuities and Organizational Environments.” *Administrative Science Quarterly* 31 (1986).

Von Hippel, Eric. *The Sources of Innovation*, New York: Oxford University Press, (1988).

Wanamaker, John and William Allen Zulker, *King of Merchants* (Eaglecrest Press: Wayne, PA, 1993).

Wharton, Don. “Those Amazing Shopping Centers.” *Reader’s Digest* volume 80, number 481 (May 1962).