

E-Tail Constraints and Tradeoffs¹

Charles F. Hofacker
Florida State University

Charles F. Hofacker is Professor of Marketing in the College of Business at Florida State University. His current research interests lie at the intersection of marketing and information technology. His work has appeared in such outlets as the *Journal of Marketing Research*, *Management Science*, *Journal of Interactive Marketing*, *Journal of the Academy of Marketing Science*, *Psychometrika* and other journals. He currently serves as the Moderator of the ELMAR virtual community and edits the AMA's Academic Resource Center Web site.

He can be reached at

Charles F. Hofacker
College of Business
Florida State University
Tallahassee, FL 32306-1110 USA
+1 850.644.7864
chofack@cob.fsu.edu

This manuscript is currently in press (2008) in *Direct Marketing: An International Journal*. This version is not paginated, and should not be used for citation purposes. A paginated version is available from *Direct Marketing: An International Journal*. Notwithstanding any designation to the contrary in any printed version, copyright is held by the author.

¹The author would like to thank Kathleen Seiders who made many helpful comments on an earlier version of this article. Any remaining errors are due solely to the author.

E-Tail Constraints and Tradeoffs

Abstract

Purpose - The purpose of this paper is to reveal how mental models inherited from offline retailing have impeded both the theory and practice of online retailing, and to suggest fruitful areas of research in online retailing.

Design/methodology/approach – Our mental models of physical retail suggest physical constraints of various sorts, and yet for the most part, the constraints acting upon the e-tailer are instead logical, symbolic and cognitive.

Findings – Researchers in e-tailing could benefit from pursuing a set of interesting issues including assortment, customer-to-customer value creation, site design and structure, and the importance of network topology.

Research limitations/implications – There are many new topics in retailing that can be explored by marketers, as long as we are willing to jettison some of our cherished terminology and ways of thinking. In effect, online, the retailing mix becomes human-centric, rather than focusing on physical components.

Practical implications – The skill sets needed to set up a e-tailing presence are substantially different than those required for offline retailing.

Originality/value – The paper takes an unconventional view of the retailing literature, literature that goes back to the foundation of marketing as an academic discipline.

E-Tail Constraints and Tradeoffs

“The proper study of mankind is the science of design.”

-- Herbert A. Simon (1996) *The Sciences of the Artificial*

This paper looks at the nature of the constraints faced by online e-tailers and compares these to the constraints acting upon offline retailers. Generally, offline retailing is constrained by staff considerations and simple physics while e-tailers do not face such limitations. That being said, e-tail certainly entails constraints as well, and how these are managed is critical to e-commerce success. Online constraints tend to be more psychological and less physical and are imposed by cognitive effort, force of habit, and by learned perceptions, both on the part of clients, as well as on the part of the e-tailers themselves.

One premise of this paper is that researchers in the field have been implicitly assuming that the old physical constraints are still in force. In this paper I therefore review many of the classic themes of retailing with the aim of exposing how constraints differ offline to online, and pointing out where theory building efforts in e-tailing have been hampered by habits and metaphors that suggest the physical constraints of physical stores. Just as online retailers have been freed from having a local physical presence my goal here is to free our thinking from habits carried over from before mass e-tailing. A second related goal is to suggest what I hope will be fruitful new areas for e-tailing research.

Section 1 below contains a general introduction to the notion of constraints in retailing, and the special role that metaphor plays in creating constraints in e-tailing. In Section 2, a brief review of the e-tailing literature is presented, in an attempt to summarize the best-covered e-tailing topics from the literature and to expose the role of constraints and metaphors in that extant coverage. In Section 3, a number of areas are discussed that have not been well covered in the literature. In Section 4, some conclusions are offered.

1. Introduction

As the Internet began to diffuse through the developed world a number of years ago, numerous writers pointed out various cost advantages of online retail. It was noted that the selling firm need not provide physical parking, cashiers, shelves, aisles, or a building. In effect, the usual physical constraints acting upon the retailer no longer applied. The lack of physical establishment could generate cost savings. An early advertisement for Amazon.com showed a pile of books as high as the Statue of Liberty. The ad implied that Amazon's inventory was not limited by physical factors.

A constraint is a restriction that limits our decision in some way (Powell and Baker, 2007, p.221). For example, the cost of retail space constrains our ability to offer variety to the client. The Amazon ad suggests that management was no longer forced to compromise on customer satisfaction. Without such constraints, anything seemed possible – the sky was the limit.

While we did not need to take our buildings online, we have carried habitual ways of thinking into the online world. For example, Web sites tell their customers to “place” their purchases in a “shopping cart”. Certainly there is no longer a physical need to provide a shopping cart for the client. So why have one? I propose that there are at least three reasons

Software often functions through metaphor, and the metaphor of the shopping cart is at least partially imposed by the practitioner's need to communicate with the client. That client has a set of learned mental scripts (Houston and Smith, 1985) for how the retail experience is supposed to unfold. The shopping cart metaphor taps into the learned, culturally transmitted mental script for shopping, and in an elegant way allows the customer to transfer what has been learned offline, to the online shopping experience.

A second practical reason to maintain the shopping cart metaphor is that it allows the customer to keep track of what they intend to buy. While it is no longer necessary to haul

the items to a cashier, when the customer wants to review the items they have tagged for purchase, we might as well call that storage “place” a shopping cart. So no doubt, even if the consumer did not have a mental script for the role of the shopping cart, the e-tail manager might need to invent one to allow the customer to review her order.

A third reason is that practitioners also have mental scripts. Since most e-tail managers were once offline shoppers, how else would they conceptualize the shopping experience? In fact, wouldn't it be convenient for both the firm and the customer to be able to save the contents of the “shopping cart” indefinitely? That this is rarely done is testimony to the power of the limitations of, or the constraints imposed by, scripts and other mental models. Of course, academic theories are not immune either. Academics debate the relative merits of online “racetracks” versus other interior store layouts (Vrechopoulos et al., 2004). There is nothing inherent in hypertext that forces us to use a racetrack or any other site design for that matter.

I believe that sellers and buyers are beginning to engage in a cycle of learning from each other as we discover how the online distribution channel works best. Ten years ago, there were thousands of “online malls”. Later, e-tailers realized that the physical reasons motivating the mall format were not applicable online. Innovation in e-tailing is largely the process of ignoring a formerly relevant physical constraint in a way that invites the customer to rethink how they buy.

Because it is not built from physical components, the virtual world is soft, malleable, arbitrary or symbolic. In other words, I can make my virtual store upside down, right side up, blue or green, by simply modifying a computer program. The virtual store is created and executed with software, the building block of all e-service technologies (Hofacker et al., 2006). In fact, with few exceptions such as custom kiosks, the hardware for e-tailing service is chosen and provided by the customer. Each Amazon.com customer chooses his or her communications devices (computer, monitor, mobile phone, PDA) but what Amazon does as the selling firm is to write or choose software. It is software that creates the customer-facing part of the e-tail mix. In e-tailing, the service

performance is executed by the service *environment* defined as the ambient conditions, signs, symbols and layout (Bitner, 1990) created by the software artifact.

One goal of this paper is to highlight how constraints implied by physical retailing differ from those implied by a software artifact, and why this difference matters for both practice and theory. In pursuit of this goal, we begin by discussing a set of four classic retailing elements as they are expressed online: customer service design, service operations, atmosphere, and pricing. These four elements have been fairly extensively explored in the literature on online retailing, and so the following section of this paper, Section 2, which covers these four, provides an overview of these well-researched topics.

In the section that follows that one, Section 3, a second goal of this paper is pursued, namely that of suggesting important future research topics for those interested in e-tailing. In Section 3, five under-researched online retailing topics are covered. Coverage of the five begins with the topic of customer-to-customer value creation. The next three pertain to designing retail Web sites. Such design is presented at three logical levels: The level of the text, images and hyperlinks that appear on each page, the level of the whole page, and then the level of the overall site structure. Finally, the location of a selling outlet online is roughly analogous to the topic of network topology, and that is the final section of the five. No doubt to some readers these five sections will seem a bit unfamiliar as retailing topics. The limited coverage of these five elements in the literature is due to the fact that, according to the premise of this paper, marketing scholars have not come to grips with the differences in the constraints that operate online as compared to offline. Hopefully this article will help rectify that situation.

2. A Brief Overview of Some Well-Researched E-Tailing Topics

Customer Service Design

Evaluation of e-tail service design has been dominated by the need to measure service quality and the role that service quality plays in satisfaction and repeat patronage. Off

line, constraints on retail customer service quality are generally human-resource based, as retail employees have a big impact on the service quality dimensions (Parasuraman et al., 1985) of responsiveness, assurance, reliability and empathy.

Online retail service in comparison is broken into two rather distinct phases: the client interaction phase taking place online and the fulfillment phase taking place offline (Bauer et al., 2006, Posselt and Gerstner, 2005). In this paper we primarily focus on the first phase, although in the next subsection on service operations we will briefly the second phase.

Previous research on the first phase has strongly suggested that Web site quality is a matter of delivering both hedonic and utilitarian elements (Bauer et al., 2006, Collier and Bienstock, 2006, Yoo and Donthu, 2001). It is also taken as a given that perceived ease-of-use (Davis, 1989, Venkatesh and Agarwal, 2005) is critical when providing an e-service such as online retailing. Thus the e-tailer faces three dictates: the site must offer a compelling hedonic experience, it must be useful in providing retailing functionality (i. e. search, comparison, transaction) and it must be easy to use. The question remains: how do we design e-tail sites to simultaneously satisfy all three of these requirements?

Insert Figure 1 about Here

Figure 1 illustrates three dilemmas posed by this three-way trade off among experiential, usefulness and simplicity goals. First, to create a hedonic experience, we need to provide sensory stimulation and imagery and to generate affect. But to keep the site useful, the hedonic experience cannot distract from or interfere with the execution of the set of retail tasks. Second, for any interface, or for any tool for that matter, the power of the interface is inversely related to the ease of using it. If I keep adding more and more options and functionality to my site, eventually I will produce enough complexity so that the site becomes very hard to use (Dellaert and Stremersch, 2005). Third, the flow state (Hoffman and Novak, 1996), that represents the “Holy Grail” for creating a hedonic

experience in a hypermedia environment, requires a sufficiently high level of challenge or difficulty, yet clearly the interface simultaneously needs to be sufficiently easy to use. There is virtually nothing in the literature about the implications of these three design tradeoffs, nor is there any advice to the e-tailer.

In general, e-service designers attempt to minimize the negative consequences of such tradeoffs by imitating a common or dominant design (Yadav and Varadarajan, 2005). So for example, many selling Web sites provide a menu of thumbnail pictures. Experience accumulated over the years might suggest to a shopper that clicking on the thumbnail will call up detailed product or ordering information. New or innovative designs create “instant familiarity” by incorporating a familiar metaphor (Coyle and Thorson, 2001) in the design. Some of the metaphors in common use today in the Web e-tailing channel include the *shopping cart*, *checkout*, *departments*, motion or *navigation*, and *tabs*. These metaphors are where offline culture meets online commerce. Very little research in marketing has been performed on the use of metaphor online. How can designers pick metaphors so as to realize channel goals? When and how can we abandon a familiar metaphor so as to offer a radically new service?

Service Operations

The second phase of e-tail service is a question of outbound and reverse logistics as distinct from the dominance of inbound logistics that we see offline. For this and other reasons, e-tail operations design can severely conflict with offline operations design. For example, warehouses designed for retailing need to accommodate large pallets and fork lifts while warehouses for e-tailing are human scaled in order to facilitate pick-and-pack operations involving smaller orders (Metters and Walton, 2007).

The e-tailer has a challenge in setting fulfillment quality levels, and customer expectations of those levels. This challenge begins with the response time of the Web server, moves to the amount of time the customer must wait until the order ships, and also includes the time the shipping process takes. These operational and inventory policy questions have been explored by Rabinovich (2004) and Cao and Zhao (2004).

Atmosphere

Retail atmosphere is a function of the physical store setting, which is largely determined by cost of real estate and the various physical objects required to create different sounds, aromas, colors and lighting. Online constraints tend to be related to the screen resolution and the hardware that exists at the consumer end of the channel. The importance of hedonic factors in designing the Web site interface has already been noted above. The hedonic experience of a site can be enhanced with symbolic, nonverbal and escapist elements created by images, colors, fonts and more recently, streaming media such as videos and music. A good number of marketing scholars have already begun to investigate the many facets of online store atmospherics (Eroglu et al., 2001, Williams and Dargel, 2004).

Pricing

One clear difference between online and offline pricing is the greatly reduced menu costs for the former. In short, a menu cost is the administrative cost to the firm of changing a price. Reduced menu costs mean that retailers can employ dynamic (Xing et al., 2006) or customized (Terui and Dahana, 2006) pricing strategies. There is a danger to customized pricing, however, as Amazon discovered when customers found out that different shoppers were paying different prices for the same item (Garbarino and Lee, 2003) and reacted vociferously.

The technique of combining various products into bundles sold as a single unit has been studied by economists and marketers for at least four decades. The cost to the e-retailer of combining products is low, especially for information products, which can be copied at will. In other words, separate information products can be bundled with minimal or no additional cost to the seller. An e-tailer can reduce customers' perceived risk by selling a bundle (Sarin et al., 2003), but the classic motivation behind bundling occurs when there is a negative correlation in reservation prices between bundle elements (Stremersch and Tellis, 2002).

At the beginning of the Internet age, it was thought that price competition online would be very difficult for e-tailers, with only the lowest cost suppliers able to compete. More recently, it appears that this is not so. By definition, if it were so, we would not see very much price dispersion on the Internet where in reality there is substantial price dispersion online for search goods such as CDs and books (Lindsey-Mullikin and Grewal, 2006, Venkatesan et al., 2007). E-tailers have become stickier (Baye et al., 2003), and have utilized unpredictable short-term price changes to keep prices high (Baye et al., 2004).

2. An Overview of Some Under-Researched E-Tailing Topics

Assortment

Retail assortment is limited by the cost of holding inventory near the customer and the space needed for it, while e-tail assortment is more a matter of managing fulfillment and the customers' expectations of fulfillment service levels. Online product inventory can be stored anywhere and in fact may not even be in the e-tailer's possession. The reduced cost of online inventory management as compared to the offline situation leads to a completely different strategy formulation, known as the "long tail" strategy, which leverages taste heterogeneity and high assortment levels (Brynjolfsson et al., 2003). The essence of the long tail strategy is to sell a small amount of a large number of products rather than a large amount of a small number of products. In other words, instead of focusing on a small number of hits, online retailers are increasingly likely to sell numerous niche items. This strategy is especially prevalent for information goods and services such as books, music, blogs and film.

While the general principle seems clear, there is very little academic research on long tail retailing despite the success of such online retailers as Amazon, iTunes, Netflix and others. As has been mentioned, there is a good amount of research on the logistics of executing online strategies, but not much on consumer perceptions and response. How do consumers perceive the embarrassment of riches at a long tail e-tailer? How do they

navigate through it all? When and how can information overload be avoided? Why is it that hypermarkets failed in the US but online long tail e-tailers have thrived? How is what we already know about variety-seeking applicable in an e-tail context with literally millions of choice options? These questions bear simultaneously on consumer behavior, as well as e-tail strategy.

Customer-to-Customer Value Creation

To a much greater extent than previous media, the network structure of the Internet empowers the consumer as a producer of communications and other content. There is a long history in our field of studying word-of-mouth processes, and marketers have turned their attention to the online environment (Senecal and Nantel, 2004) where word-of-mouth can be further amplified by software that indexes, organizes, stores and retrieves it. While we don't always think of it as such, consumers are producing "content" in word of mouth processes and in that sense online word of mouth is a category of consumer generated content.

Electronic mechanisms to leverage consumer generated content are often collectively referred to as Web 2.0. Some e-tailers have figured out how to encourage and leverage such content. For example, some online sellers use customer-to-customer processes for post-purchase support (Wiertz et al., 2005). Firms have discovered that consumers will aid other consumers in help forums designed to facilitate C2C knowledge exchange. Other vendors such as Amazon use software to translate customer preferences into recommendations for other customers. Amazon also encourages customers to write reviews of books they have read. These reviews aid still other customers who are browsing Amazon's virtual shelves. While there is ample literature on the optimal design and application of recommendation agents (Aksoy et al., 2006, Ansari et al., 2000, Iyer and Pazgal, 2003, Smith et al., 2005) much less has been written about the drivers and constraints acting upon the generation of consumer-generated recommendations. Why do people pitch in and help Amazon? What prevents them from doing so? Answers to these

questions are suggested by what economists call two-sided markets, and it is to that topic that we now turn.

In effect, at any moment a visitor on Amazon might fall into one of two groups: a reader consuming user-generated reviews or a writer who is producing a review. Therefore, in addition to providing the standard retail function of selling books, Amazon also provides a platform for a two-sided markets (Eisenmann et al., 2006) where review writers and readers enter into an exchange. Two-sided markets are characterized by positive cross-externalities: participants benefit from the presence of others participating on the “other side”. The more potential readers I have, the more likely I will be to write a book review. The more potential reviewers there are, the more likely it is that I can find a review of interest to me. As one side grows in size, the benefits to the other side increase, causing that side to grow. This feeds back creating an incentive for the first side to grow some more, and so on.

Such “virtuous cycle” processes are often hindered by a lack of critical mass (Markus, 1987). Thus a unique constraint faced by e-tailers is the problem of jump-starting a facilitative exchange between customers. This leads to an interesting contrast with offline retailing. The physical constraints acting on offline retailers almost always lead to negative consumption externalities: crowding, traffic jams, and the sheer mass of people can reduce the benefit of shopping. While few shoppers want to be completely alone in a store, clearly too much crowding can be a problem. Online the situation is reversed: I benefit from an increase in the number of other customers using Amazon.com as these other shoppers provide me with reviews and other services such as collaborative filtering (Ansari et al., 2000).

The e-tailer Zazzle combines the long tail strategy mentioned above with a platform that enables consumer generated product design. Customers can design their own tee shirts, mouse pads, aprons, hats and ties and sell those to other customers. Rather than imitate off line retailing, Zazzle uses networked software to create customer value from other customers. Clearly Zazzle has not been blinded by traditional ways of organizing

retailing. It has rethought and reworked the entire process by which a customer group is valued by a firm, and has encouraged customer participation in unique ways.

There is a challenge in encouraging customer participation, but there is also a challenge represented by that very participation. A tradeoff exists between an open brand community and the loss of control that such a community implies. Careful monitoring is needed to make sure that community participation is appropriate. Marketers in general and retailers in particular are accustomed to calling the shots, but the openness of the Internet shifts the locus of control towards the consumer in the strategic branding process (Pitt et al., 2006).

Text, Image and Hyperlink Design

In the physical world, the retailer and manufacturer share control over the presentation of the product. The manufacturer controls the packaging, but the retailer executes the visual merchandising and signage that provide the context for the package. Online, there is also a sharing of control but the e-tailer controls the product *representation*, as opposed to the product *presentation*, since the product per se is not physically present in front of the customer. Instead, the e-tailer decides how to represent the presence of the product as part of the information mix for the site: images, text and hyperlinks among other elements. The e-tailer is constrained by the distribution of screen and window size, and screen resolution, in the target market, but most of all by the likely reactions of the market to design elements. Key among these reactions, given the directness of the Internet channel, is clicking behavior, whether that be preliminary clicks on promotional materials or final clicks that execute an actual sale. Authors have looked at the impact of the words chosen to induce clicks (Hofacker and Murphy, 1998) but more often the focus of academic research has been on graphical elements (Lam et al., 2007).

An e-tail transaction occurs at the end of a series of hypertext links that either convert a visitor to a purchaser or not (Moe and Fader, 2004). In this process, not all clicks are equal. Hofacker and Murphy (2005) experimentally demonstrated that some link text has

a high click through, while other links are more likely to result in a greater total number of clicks, a metric often called *site depth*. These goals are not necessarily identical. In other words, if page A links to page B, which in turn, links to C, in one experimental condition a higher percentage of visitors clicked on the first link (A to B) than in a second condition. However, most of those visitors stopped at B. In the second condition, fewer clicked on the link and made it to B, but of those, many more went all the way to page C. The implication is that the simple click through of a link (A to B) does not tell the entire story, and it might make sense to optimize a series of links (i. e. A to B to C), rather than individually.

Page Design

The main constraint in designing any particular e-tail Web page is human attention. Human cognitive costs can in fact be quantified (Bettman et al., 1998) and measured during page processing (Murphy et al., 2006). To browse a page, consumers must move their eye fixation point, read, comprehend and possibly move the mouse to scroll. It is fair to say that advertising researchers (Geissler et al., 2006) have explored the ways that consumers process individual Web pages more than retailing scholars. One recent exception is the paper by Lam et al. (2007), who explore the placement and arrangement of product thumbnail images in online retailing.

Overall Site Structure

Offline, the physical size and shape of the retail space and the laws of physics constrain store layout. In comparison, the layout of a Web site is relatively arbitrary since any page can be made to link to any other page. Despite this fact, research on e-tail site structure has been largely limited to physical metaphors. For example, Vrechopoulos, O'Keefe, Doukidis, and Siomkos (2004) compare racetrack, grid and freeform formats for Web sites. In actual current practice, the Web site structures tend to be some variant of the designs illustrated in Figure 2.

Insert Figure 2 about Here

While there is a lack of physical constraints on e-tail site design, the costs of cognitive effort and search time on the part of the visitor represent real challenges to the online marketer. Given these costs, in practice linking is constrained by a sort of micro-competition for clicks between links on the same page. Like any other choice situation, we would expect that the addition of additional choice options should have predictable impacts on consumer choice. Consider two pages i and j such that page j contains a subset of the links on page i . We would expect that the total clicks for page i should be no less than the total clicks for page j , or mathematically, $T_i \geq T_j$. However, in terms of the specific clicks on any particular link on page j , we would expect $S_i \leq S_j$ (Hofacker and Murphy, 2000). The wisdom of adding links depends on whether you want to optimize the total clicks, or a specific click. We cannot simultaneously optimize all site metrics; we need to pick and choose strategically. In fact much work is needed on how site design influences the trade off between different site metrics.

Given these kinds of visitor constraints, what goal should we apply to site design? Historically speaking, marketers focused on transactional exchange. In the most recent decades, marketers have increasingly emphasized relational exchange and customer retention. In terms of site design, those goals do not perfectly overlap. Figure 3 shows three idealized site structures with the left structure optimized for transactions (links form a funnel moving visitors toward conversion), while the middle structure is optimized to keep the visitor on the site for as long as possible, entertaining or informing the visitor and otherwise broadening and leveraging the relationship (Sawhney and Zabin, 2002). The right-most structure in Figure 3 shows an idealized site design for creating two-sided exchange among consumers as might be the case with Amazon book reviews. Thus the e-tail site designer is constrained by the incompatibility of transactional, relational and two-sided platform goals. Which pages link to which other pages depends on whether we wish to optimize transactions, our long term relationship with the client, or consumer-to-consumer exchange.

Insert Figure 3 about Here

There are other site design issues that pertain to menu structure. Many e-tail sites have a hierarchical page structure (see Figure 2) with menu pages referring the visitor to sub-pages. Often menus are multi-level with menu pages that lead to sub-menu pages that lead in turn to even lower level menus. There does not appear to be any literature at all on the impact of such variables as menu breadth, menu depth, menu sequence, menu organization on persuasion, or sales. Nor have researchers connected Web site menu design with consumer product categorization schemas.

Network Topology

“Location” is a key variable in offline retailing. It has long been known (Huff, 1964) that travel distance is a measure of cost to the consumer and an important determinant of retail patronage. If we can maintain an analogy between physical space and the geometry that exists in a hypermedia environment with links, we can explore the notion of location in cyberspace. In such an analogy, the effort of a click is equivalent to a movement across a fixed distance, and so a page that is two clicks away is twice as far as a page that is only one click away. In that case the visitor’s effort is precisely double for two clicks as compared to one. Understanding the consumer’s travel costs is clearly important to understanding the nature of online competition.

Given an ability to measure distance in terms of clicks, we note that the Internet and other information environments are characterized by “patchiness”. What this means is that visitors frequently find interesting and useful pages in clumps, or patches. A Web site can be considered a patch. The patchiness of information presents the visitor with a basic choice between staying in the current patch, or moving to another patch perhaps a considerable distance (number of clicks) away. This ecological thinking is featured in Foraging Theory (Pirolli and Card, 1999), which in addition to patchiness, emphasizes the importance to the visitor’s cost-benefit analysis of information acting at a distance,

known as “scent”. Online banner advertising and search engine advertising is thus equivalent to providing a scent at a distance. Here we might think about conveying intensive, selective or exclusive distribution to consumers so that they know what to expect when they arrive on our site.

Much is known about the structure of networked systems like the World Wide Web. For example, the number of links to a particular site (known as the in-degree distribution) and the number of links from a particular site (known as the out-degree distribution) follow a power law (Watts, 2004). An idealized power law is illustrated in Figure 4. A variety of mechanisms have been proposed to account for this pattern, but one very simple possibility is known as preferential attachment: A power law distribution is consistent with the idea that site owners preferentially link to other sites with a probability that is proportional to the number of inbound links already pointing to those sites.

Insert Figure 4 about Here

While network scientists have extensively explored the mathematics of the Web’s power law, the implication of it for consumer behavior is much less clear. Google, the Web’s most visited search engine, relies heavily on a page’s in-degree to calculate that page’s ranking when it presents the results of a keyword search. Search engines such as Google are an important factor in site visibility (Drèze and Zufryden, 2004). Clearly an e-tailer’s in-degree is an important contributing factor to success since it relates to search, but we also do not know the implications of power law distributions on e-tail market structure and market concentration. It is likely that this mathematical structure has important implications for online pioneer advantage, as well, but this has not been developed.

4. Conclusions

It appears that long standing interests of retailing scholars have been applied to online retailing. This is both a good and a bad thing. The positive side of the phenomenon is that we can borrow from the rich set of results and theories and see which of these are applicable to e-commerce. The negative side is that our experience has led to blinders in terms of what sorts of phenomena should be investigated in online retailing, and in the theoretical approaches to which we have limited ourselves.

The online world is one in which the customer is relatively empowered. Customers are active; they do not merely listen and react passively. Instead they express their opinions, and their identities, online. The energy created in these sorts of C2C exchanges represents one of the central narratives of the Internet, yet there is very little on the subject in the retailing literature. Perhaps the reason is that the consumer-to-consumer matching function that Amazon uses to connect reviewers with buyers is only possible through software-mediation; physical space does not allow it. The level of analysis for retailing phenomena is more physical while the level of analysis for e-tailing phenomena such as customer-to-customer exchange is more logical. It requires a different type of theory.

Likewise, constraints pertaining to physical stores and the physical density of consumers, or the lack thereof, make long tail retailing infeasible offline. Perhaps that is why this key online trend has slipped under the radar of retailing scholars.

There is a strict limit to the number of possible store layouts imposed by the scale of human bodies and real estate; such constraints do not apply to hypertext, which has now been in popular use for more than a decade. Despite the rich literature in physical store variables such as atmospherics and layout; or perhaps because of it; retailing academics have focused on variables that are analogous to physical variables – like Web site image – and have not looked at the logical environment created by hyperlink networks.

Each and every e-tailer, big and small, represents a potential experiment in Web design. As has been discussed, there are difficult tradeoffs facing these myriad e-tailers. Should

we emphasize transactions or relationships or community? Do we try to create a fun, or a useful, environment? Do we give the consumer powerful but complex tools, or keep everything as simple as possible? These questions play out at the level of the individual link, the page, and the site and I suggest that they would make for interesting and rewarding research topics.

5. References

- Aksoy, L., Bloom, P. N. & Cooil, B. (2006) Should recommendation agents think like people? *Journal of Service Research*, 8, 297-315.
- Ansari, A., Essegaier, S. & Kohli, R. (2000) Internet Recommendation Systems. *Journal of Marketing Research*, 37, 363-375.
- Bauer, H. H., Falk, T. & Hammerschmidt, M. (2006) eTransQual: A transaction process-based approach for capturing service quality in online shopping. *Journal of Business Research*, 59, 866-875.
- Baye, M. R., Morgan, J. & Scholten, P. (2003) The Value of Information in an Online Consumer Electronics Market. *Journal of Public Policy & Marketing*, 22, 17-25.
- Baye, M. R., Morgan, J. & Scholten, P. (2004) Temporal Price Dispersion: Evidence from an Online Consumer Electronics Market. *Journal of Business Research*, 57, 101-115.
- Bettman, J. R., Luce, M. F. & Payne, J. W. (1998) Constructive Consumer Choice Processes. *Journal of Consumer Research*, 25, 187-217.
- Bitner, M. J. (1990) Evaluating Service Encounters: The Effects of Physical Surroundings and Employee Responses. *Journal of Marketing*, 54, 69-82.
- Brynjolfsson, E., Hu, Y. J. & Smith, M. D. (2003) Consumer Surplus in the Digital Economy: Estimating the Value of Increased Product Variety at Online Booksellers. *Management Science*, 49, 1580-1596.
- Cao, Y. & Zhao, H. (2004) Evaluations of E-tailer's Delivery Fulfillment: Implications of Firm Characteristics and Buyer Heterogeneity. *Journal of Service Research*, 6, 347-360.

- Collier, J. E. & Bienstock, C. C. (2006) Measuring service quality in e-retailing. *Journal of Service Research*, 8, 260-275.
- Coyle, J. R. & Thorson, E. (2001) The Effects of Progressive Levels of Interactivity and Vividness in Web Marketing Sites. *Journal of Advertising*, 30, 65-77.
- Davis, F. D. (1989) Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology. *MIS Quarterly*, 13, 319-339.
- Dellaert, B. G. C. & Stremersch, S. (2005) Marketing Mass-Customized Products: Striking a Balance between Utility and Complexity. *Journal of Marketing Research*, 42, 219-227.
- Drèze, X. & Zufryden, F. (2004) The Measurement of Online Visibility and its Impact on Internet Traffic. *Journal of Interactive Marketing*, 18, 20-37.
- Eisenmann, T., Parker, G. & Van Alstyne, M. W. (2006) Strategies for Two-Sided Markets. *Harvard Business Review*, 84, 92-101.
- Eroglu, S. A., Machleit, K. A. & Davis, L. M. (2001) Atmospheric Qualities of Online Retailing: A Conceptual Model and Implications. *Journal of Business Research*, 54, 177-184.
- Garbarino, E. & Lee, O. F. (2003) Dynamic Pricing in Internet Retail: Effects on Consumer Trust. *Psychology & Marketing*, 20, 495-513.
- Geissler, G. L., Zinkhan, G. M. & Watson, R. T. (2006) The influence of home page complexity on consumer attention, attitudes, and purchase intent. *Journal of Advertising*, 35, 69-80.
- Hofacker, C. F., Goldsmith, R. E., Bridges, E. & Swilley, E. (2006) E-Services: A Synthesis and Research Agenda. *Journal of Value Chain Management*, 1.
- Hofacker, C. F. & Murphy, J. (1998) World Wide Web Banner Ad Copy Testing. *European Journal of Marketing*, 32, 703-712.
- Hofacker, C. F. & Murphy, J. (2000) Clickable World Wide Web Banner Ads and Content Sites. *Journal of Interactive Marketing*, 14, 49-59.
- Hofacker, C. F. & Murphy, J. (2005) Using Server Log Files and Online Experiments to Enhance Internet Marketing. IN KRISHNAMURTHY, S. (Ed.) *Contemporary Research in E-Marketing*. Hershey, PA, The Idea Group.

- Hoffman, D. L. & Novak, T. P. (1996) Marketing in Hypermedia Computer-mediated Environments: Conceptual Foundations. *Journal of Marketing*, 60, 50-68.
- Houston, M. J. & Smith, R. A. (1985) A Psychometric Assessment of Measures of Scripts in Consumer Memory. *Journal of Consumer Research*, 12, 214-224.
- Huff, D. L. (1964) Defining and estimating a trading area. *Journal of Marketing*, 28, 34-38.
- Iyer, G. & Pazgal, A. (2003) Internet Shopping Agents: Virtual Co-Location and Competition. *Marketing Science*, 22, 85-106.
- Lam, S. Y., Chau, A. W.-L. & Wong, T. J. (2007) Thumbnails as online product displays: How consumers process them. *Journal of Interactive Marketing*, 21, 36-59.
- Lindsey-Mullikin, J. & Grewal, D. (2006) Imperfect Information: The Persistence of Price Dispersion on the Web. *Journal of the Academy of Marketing Science*, 34, 236-243.
- Markus, M. L. (1987) Toward a 'Critical Mass' Theory of Interactive Media: Universal Access, Interdependence, and Diffusion. *Communications Research*, 14, 491-511.
- Metters, R. & Walton, S. (2007) Strategic supply chain choices for multi-channel Internet retailers. *Service Business*, 1, 317-331.
- Moe, W. M. & Fader, P. S. (2004) Dynamic Conversion Behavior at E-Commerce Sites. *Management Science*, 50, 326-335.
- Murphy, J., Hofacker, C. F. & Mizerski, R. M. (2006) Primacy and Recency Effects on Clicking Behavior. *Journal of Computer Mediated Communication*, 11.
- Parasuraman, A., Zeithaml, V. A. & Berry, L. L. (1985) A conceptual model of service quality and its implications for future research. *Journal of Marketing*, 49, 41-50.
- Pirolli, P. & Card, S. K. (1999) Information Foraging. *Psychological Review*, 106, 643-675.
- Pitt, L. F., Watson, R. T., Berthon, P., Wynn, D. & Zinkhan, G. M. (2006) The Penguin's Widow: Corporate Brands from an Open-Source Perspective. *Journal of the Academy of Marketing Science*, 34, 115-127.
- Posselt, T. & Gerstner, E. (2005) Pre-sale vs. post-sale e-satisfaction: Impact on repurchase intention and overall satisfaction. *Journal of Interactive Marketing*, 19, 35-45.

- Powell, S. G. & Baker, K. R. (2007) *Management Science: The Art of Modeling with Spreadsheets*, Hoboken, NJ, John Wiley and Sons.
- Rabinovich, E. (2004) Internet Retailing Intermediation: A Multilevel Analysis of Inventory Liquidity and Fulfillment Guarantees. *Journal of Business Logistics*, 25, 139-170.
- Sarin, S., Sejo, T. & Chanvarasuth, N. (2003) Strategic Use of Bundling for Reducing Consumers' Perceived Risk Associated with the Purchase of New High-Tech Products. *Journal of Marketing Theory and Practice*, 11, 71-83.
- Sawhney, M. & Zabin, J. (2002) Managing and Measuring Relational Equity in the Network Economy. *Journal of the Academy of Marketing Science*, 30, 313-332.
- Senecal, S. & Nantel, J. (2004) The influence of online product recommendations on consumers' online choices. *Journal of Retailing*, 80, 159-169.
- Simon, H. A. (1996) *The Sciences of the Artificial*, Cambridge, MA, MIT Press.
- Smith, D., Menon, S. & Sivakumar, K. (2005) Online peer and editorial recommendations, trust, and choice in virtual markets. *Journal of Interactive Marketing*, 19, 15-37.
- Stremersch, S. & Tellis, G. J. (2002) Strategic Bundling of Products and Prices: A New Synthesis for Marketing. *Journal of Marketing*, 66, 55-72.
- Terui, N. & Dahana, W. D. (2006) Price customization using price thresholds estimated from scanner panel data. *Journal of Interactive Marketing*, 20, 58-70.
- Venkatesan, R., Mehta, K. & Bapna, R. (2007) Do market characteristics impact the relationship between retailer characteristics and online prices? *Journal of Retailing*, 83, 309-324.
- Venkatesh, V. & Agarwal, R. (2005) Turning visitors into customers: A usability-centric perspective on purchase behavior in electronic channels. *Management Science*, 52, 367-382.
- Vrechopoulos, A. P., O'keefe, R. M., Doukidis, G. I. & Siomkos, G. J. (2004) Virtual Store Layout: An Experimental Comparison in the Context of Grocery Retail. *Journal of Retailing*, 80, 13-22.
- Watts, D. J. (2004) The 'New' Science of Networks. *Annual Review of Sociology*, 30, 243-270.

- Wiertz, C., De Ruyter, K., Dellaert, B. G. C. & Mathwick, C. (2005) The Drivers and Marketing Implications of Community Citizenship Behavior in Online Communities for Service Delivery. *Proceedings of the 14th Annual AMA Frontiers in Services Conference*. Tempe, AZ.
- Williams, R. & Dargel, M. (2004) From servicescape to cyberscape. *Marketing Intelligence & Planning*, 22, 310-320.
- Xing, X., Yang, Z. & Tang, F.-F. (2006) A comparison of time-varying online price dispersion between multichannel dotcom DVD retailers. *Journal of Interactive Marketing*, 20, 3-20.
- Yadav, M. S. & Varadarajan, P. R. (2005) Understanding product migration in the electronic marketplace: A conceptual framework. *Journal of Retailing*, 81, 125-140.
- Yoo, B. & Donthu, N. (2001) Developing a Scale to Measure the Perceived Quality of an Internet Shopping Site (SITEQUAL). *Quarterly Journal of Electronic Commerce*, 2, 31-46.

List of Figures

Figure 1. E-service design tradeoffs.

Figure 2. Three current site design standards.

Figure 3. Site design optimized for time on site or for funneling traffic.

Figure 4. Site design optimized for C2C matching.

Figure 5. Idealized power law density function for incoming links.

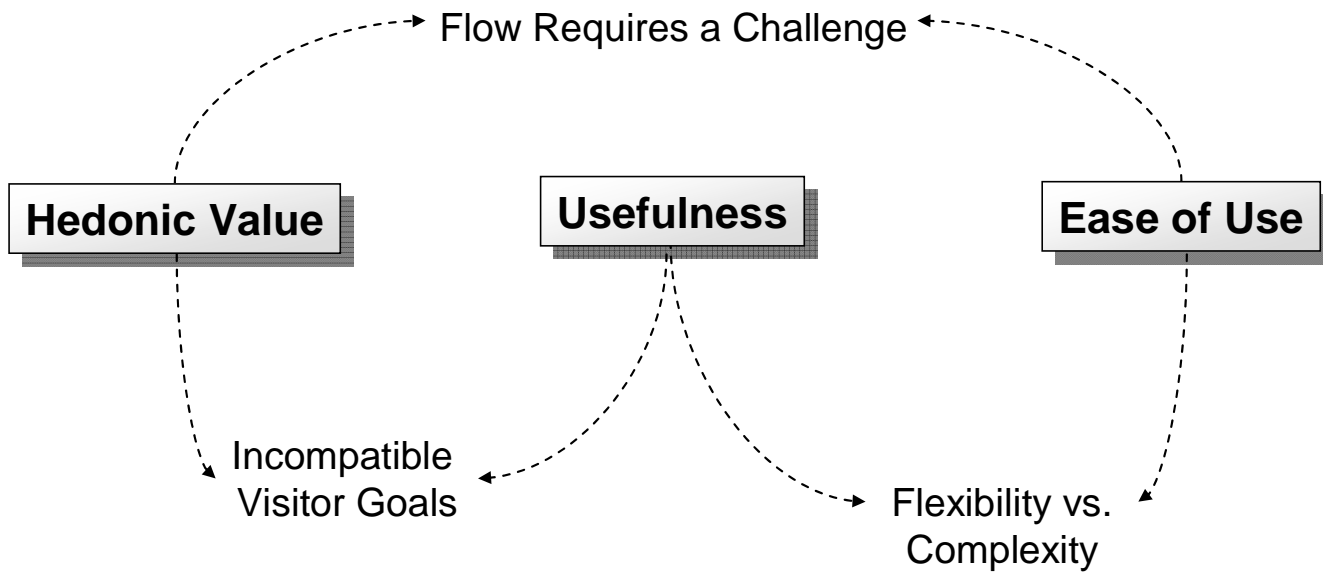
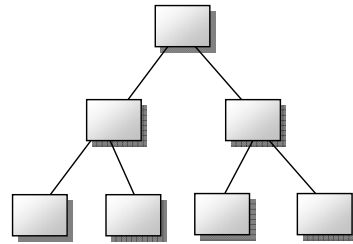


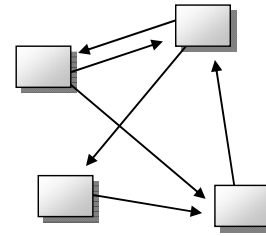
Figure 1. E-Service Design Tradeoffs



Linear/Sequential



Hierarchy/Menu



Network/Semantic

Figure 2. Three Current Site Design Standards

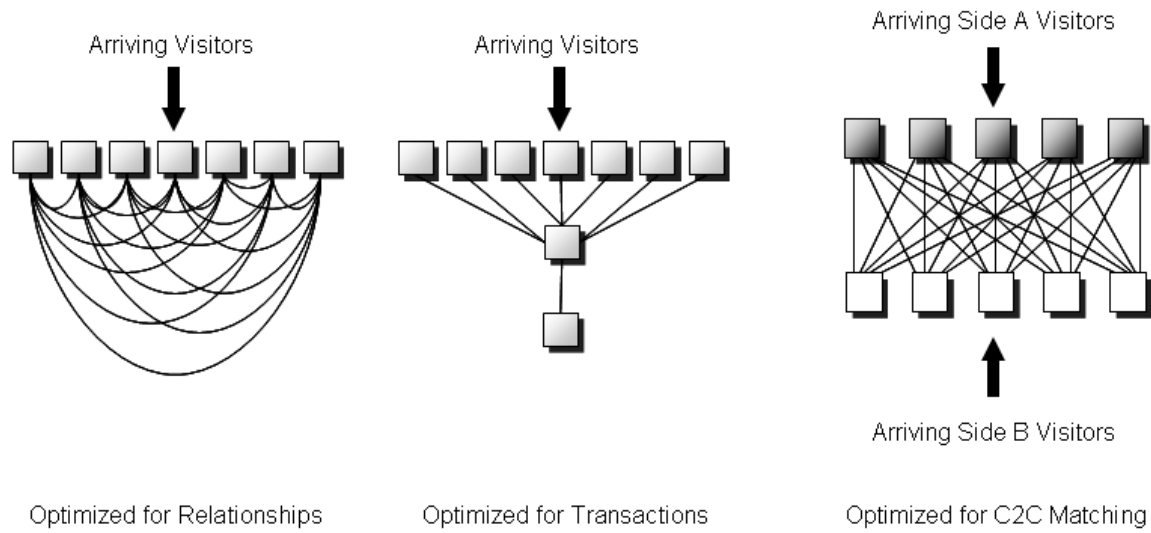


Figure 3. Site Design Optimized for Time on Site, for Funnelling Traffic, or for Creating Exchange between Two Sides of a Market

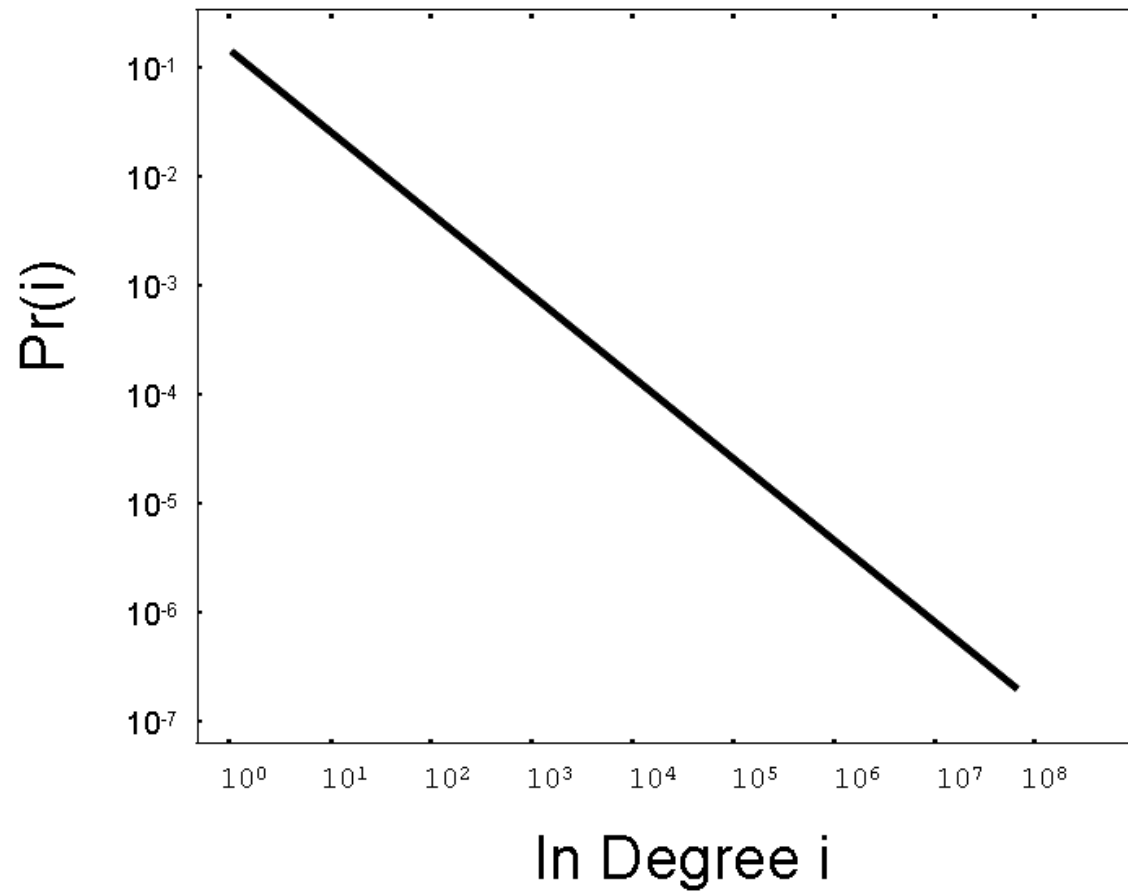


Figure 4. Idealized Power Law Density Function for Incoming Links