

# Identifying Growth Opportunities Using Information Analytics: A Case Study in Five Industries

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**Abstract**—Information analytics, wherein data and information are leveraged to improve efficiency and gain a competitive advantage, has great potential to revolutionize numerous industries. Internet-based businesses have particular potential in this arena due to the large amount of data available on consumer Internet usage. This paper explores opportunities to apply information analytics for growth in five major industries: Internet yellow pages, elderly services, advertising, Internet health sites, and Internet television. These opportunities will improve the effectiveness with which services are delivered to consumers, thereby making businesses in these industries more competitive.

## I. INTRODUCTION

The Internet is transforming all facets of American life. People are shopping, learning, playing, and communicating online. As Internet connectivity becomes more prevalent, businesses are increasingly reliant on Internet functionality to improve the quality of services to consumers. The vast amounts of data available on Internet traffic and usage can be further leveraged for a competitive advantage through information analytics. Information analytics involves the analysis of data to glean information that might allow companies to become more efficient, more profitable, and more helpful to consumers. This project identifies opportunities for growth that utilize information analytics in five different industries, each with the potential to benefit a variety of stakeholders including consumers, suppliers, advertisers, and others. Industries researched include Internet yellow pages, elderly services, advertising, Internet health sites, and Internet television.

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## II. INTERNET YELLOW PAGES

### A. Background

The Internet yellow pages (“IYP”) industry consists of several segments: Internet versions of print yellow pages (“PYP”), local search features on major search engines, directory services (e.g. craigslist.org), and other, more “outside the box” segments. The industry is growing very rapidly; the size of the industry was \$3.4B in 2005. It is expected to rise to \$13B by 2010, which corresponds to an annual growth rate of 31% [1].

A competitive analysis shows that the industry is somewhat fragmented, with no firm owning more than 24% of market share (See Fig. 1) [2]. A good measure of market fragmentation is the Herfindahl-Hirschman Index, defined as:

$$HHI = 10,000 \sum_{i=1}^n s_i^2 \quad [3:154],$$

where  $s_i$  is the market share for firm  $i$ . The IYP industry has an HHI of about 1450, which the US Department of Justice defines as “moderately concentrated” [4]. Thus, while not perfectly competitive, the market is not dominated by one or two large firms.

The Porter Five Forces analysis details other characteristics of an industry. One very important force is the threat of new entrants [5]. For the IYP industry, the threat of new entrants is high, for two reasons: low entry costs, and low switching costs. Entry costs are low because an IYP start-up would not be tremendously capital-intensive. In addition, switching costs are low, since advertisers can place advertisements on multiple sites without significant cost implications.

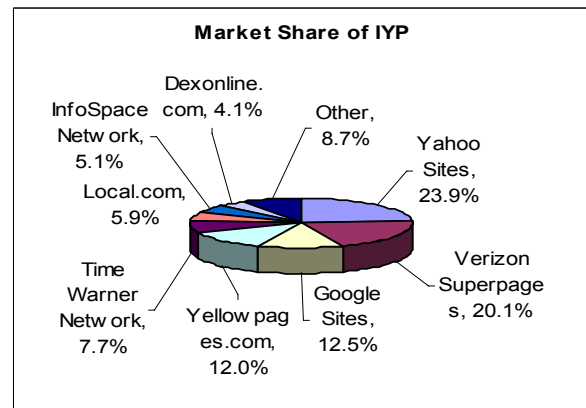


Fig. 1. Market share of IYP, showing fragments [2].

The high growth rate, moderate market fragmentation, and high threat of new entrants make IYP a good industry for entry, given a good business plan.

### B. Alternatives

From an analysis of the market segments listed above, three weaknesses are evident: interface issues, problems with feedback, and connectivity problems between businesses and consumers. Taking advantage of these three problems will enhance the IYP experience for both consumers and businesses.

One alternative would be to alter a site's interface from the typical IYP listings. Traditional PYP is more intuitive for the middle-aged and elderly population, who are more used to PYP. A more intuitive interface that reflects a PYP design may make IYP more attractive for this part of the population, which is known to use the yellow pages more often than other age groups [6]. Thus, it makes the experience better for the consumer. It also improves the advertisers' choices, because advertisements can have different sizes, designs, and text.

Another alternative involves a social networking component to an IYP site. Adding this component would improve the feedback features that consumers often do not utilize. Extensive feedback adds value to the consumer experience; it offers multiple pieces of advice, instead of one (or none), which is often the case today.

Finally, a third alternative addresses the problem regarding the connectivity between businesses and consumers. A site that shows multiple competing bids on a centralized platform achieves this connectivity. Current IYP sites have no way of connecting a business to a consumer on their site. Multiple bids allow the consumer to view many options at once; when the bidders are allowed to compete, prices will drop, which also enhances the user's experience. Businesses will benefit as well, because they will only pay per "lead", instead of paying per click or paying for space on a page. A lead is the information of a seriously interested customer; therefore, every time a business pays for a lead, it involves a serious customer. Information analytics could be used to appropriately price leads, depending on several factors including cost of project, likelihood of being contracted, and other factors.

Clearly, there are many possible improvements to the current IYP realm. A careful methodology can help to form new, successful alternatives. Information analytics, such as demographic information and the lead pricing model, can help a venture to succeed.

## III. ELDERLY SERVICES

### A. Background

Over the next three decades, the elderly population in the US will experience massive growth, climbing to nearly 87 million by 2050 [7]. Not only are the elderly increasing in number, but they are also living longer [8], staying healthier longer [7], working past the typical age of retirement [9],

and becoming more technologically proficient [10][11]. Furthermore, the elderly boom has significant implications for the economy, as the elderly represent an estimated \$1.7 trillion in annual buying power [12]. Businesses and government bodies focusing on the elderly will need to be increasingly analytical to address the needs of this rapidly changing demographic.

### B. Improved Elderly Search Functionality

Use of search engines is an integral part of the web experience for Internet users of all ages. It would be useful for elderly Internet users and for the websites attempting to attract elderly users if search engine functionality were improved for this demographic. One promising area for search improvement is in the use of data related to elderly web usage to return more helpful search results.

It is intuitive that certain websites appeal more or less to elderly users than to younger demographics. For example, a 65 year-old grandfather would most likely desire different health and medical advice than his 17 year-old grandson. Search engines would therefore be wise to identify the age of the searcher and to adjust search results accordingly. With no more data than the age of the searcher, it is possible to significantly increase the likelihood that a search result is one that is of interest to the user.

Elderly use of apparel retail websites provides an instructive example of the differences in web usage between older and younger demographics. Certainly, there are some apparel retail websites that are frequented by younger and older users alike. ComScore Networks Media Metrix data reveals that for the month of January 2007, for example, *Limited Brands* was the top apparel retail destination on the web for those aged 18 to 24, 25 to 34, 35 to 49, and 50 and older. Likewise, *Nordstrom's* was in the top four apparel retail sites for each of these demographics. On the other hand, there were several sites that experienced vastly differing traffic patterns depending on age. For example, *L.L. Bean*, the third-most visited apparel retail site amongst the 50-plus demographic with a reach of 2.3% of all Internet users in this age group, ranked a mere 42<sup>nd</sup> amongst the 18 to 24 demographic with a reach of only 0.6%. Likewise, *Land's End*, ranked eighth in the 50-plus demographic with a reach of 1.6%, ranked just 47<sup>th</sup> in the younger demographic with a reach of 0.6%. Clearly, these are sites that elderly Internet users would prefer to see in their search results for apparel.

In contrast, there were several apparel sites frequented by younger users that were rarely visited by the elderly. *American Eagle* ranked sixth for the 18-24 demographic with a 2.5% reach; it ranked 19<sup>th</sup> for the 50-plus demographic with a 0.8% reach. *Urban Outfitters* had a reach of 2.0% and was ranked 10<sup>th</sup> in the 18-24 demographic; amongst the 50-plus, it plummeted to 49<sup>th</sup> ranked, with a reach of 0.4%. These are clearly sites that would be less desirable if returned as search results to elderly Internet users.

Fig. 2 shows a comparison of the number of January 2007 total visitors across four age demographics to five different

retail sites: *American Eagle*, *Coldwater Creek*, *L.L. Bean*, *Lands End*, and *Urban Outfitters*. The results show that the popularity of each site varies tremendously by age demographic. Clearly, there are opportunities for extensive information analytics of web age demographics to improve search functionality and render the search experience more useful for elderly users.

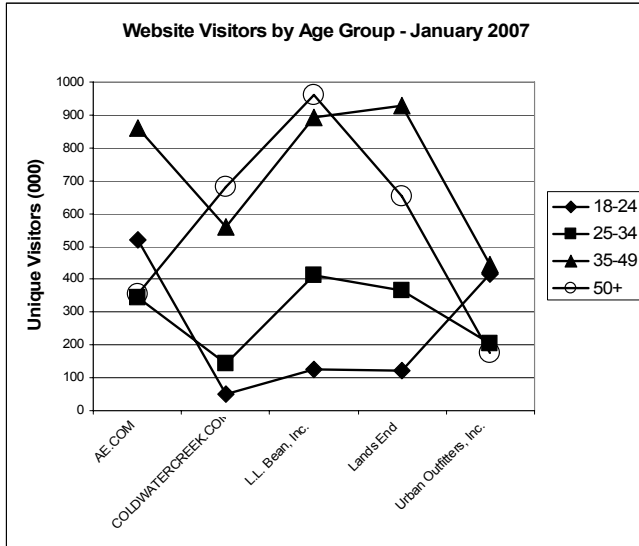


Fig. 2. Comparison of apparel retail sites by age

#### IV. ADVERTISING

##### A. Advertising Industry Background

Firms use advertising to increase the demand for their goods and services. They prefer advertising to captive audiences, and prefer to target demographics that are interested and therefore more likely to purchase their products. Information analytics can be applied to inefficient aspects of the industry to offer firms targeted ad opportunities with more captive audiences.

The first opportunity to apply information analytics to the advertising industry is due to changes the industry is experiencing as a result of new consumer electronics. The emergence of media available over the Internet and the development of consumer electronic products such as the iPod and Digital Video Recorders (DVRs) have given consumers much more control in how and when they consume media. Simultaneously, laptop computers, personal digital assistants (pda), and cell-phones have created a much more mobile society. This explosion of consumer electronics is greatly impacting the advertising industry as advertisers are having less success in reaching consumers through the traditional mediums, including newspaper, television, and radio. This is forcing advertisers to use non-traditional mediums to target advertisers [14].

The second opportunity is the result of the inefficiency in learning about advertising opportunities. Firms must either pay ad agencies to purchase ad spots on their behalf, or must contact each media owner individually and negotiate the terms of a deal with the media owner. The first option is

expensive, while the second alternative is extremely time consuming [15].

##### B. Highly Targeted Internet Advertising

The Internet is a unique medium for advertising because it allows the media owner to serve a unique advertisement to each set of eyeballs that see a page. Whereas everyone watching a television ad sees the exact same ad, each online user can be shown a different ad because each webpage loads individually. This offers an unparalleled targeting opportunity. Additionally, each user can be uniquely identified by their computer's Internet-Protocol (IP) address. By connecting the IP address with a set of data about the user, advertisers could achieve the ultimate level of targeting [16].

There are a number of different ways to obtain the information necessary for this idea to work. Because Internet users stand to gain from the targeting, it is possible some would be willing to complete a short questionnaire such that the ads they receive are relevant to their interests. While this may be unlikely, it is one possibility. Second, many websites, including search engines, store information based on IP addresses. For example, Google automatically stores queries, IP address, and other information [17]. The information could be purchased from or shared with these sites in order to improve advertising. The third option involves linking the IP address with non-Internet sources. Firms including Acxiom, Abacus, and Epsilon all collect and maintain consumer information on most US households. Currently, catalogue companies and credit card companies use their services to target consumers. By linking this data to Internet users, sites could serve highly targeted ads. Regardless of how the information is obtained, the process of displaying the ads remains the same. When the user requests a webpage to load, the page takes the users IP address, and queries a database full of information about the user. At that point, a data mining program could be used to determine which ad, from an available set, should be served to the user's browser. The user would not notice this process occurring, as it would happen as the page loads.

##### C. Transparent Ad Marketplace

The advertising marketplace idea seeks to rectify inefficiencies by creating a more transparent advertising marketplace. Media owners would list the advertising opportunities that are available through their medium. The marketplace would include ad opportunities across all mediums and each listing would include cost information, demographic information, and specific ad details, such as size and formatting specifics.

By offering an optimization algorithm, information analytics could also be incorporated into the advertising marketplace. Advertisers could input a set of constraints including the desired number of people reached, desired demographics of those reached, and which mediums the advertisers want to utilize in conjunction with a budget constraint. The algorithm would then find the best

combination of ads among those available to build an ad campaign for the advertiser.

There are two sets of data needed for this idea to work. The first is the set of advertising opportunities. Once media owners buy into the idea of the ad marketplace and see the potential benefits to them, they could provide the ad opportunities, costs, and specific details of the ad, including the specifications. The other set of data is the demographic information specific to each ad opportunity. The Audit Bureau of Circulation, Nielsen Media Research, and ComScore Networks provide demographic information for periodicals, television and Internet users, respectively. This information, which ad agencies currently use, could be purchased from these firms.

Both of these ideas represent opportunities to improve the advertising industry by using information analytics. Advertisers benefit from the first idea by acutely targeting consumers and reaching them through a non-traditional medium, which is more in-tune with today's fast-paced society. Advertisers benefit from the second idea by using their ad budgets efficiently. Furthermore, firms no longer need to waste resources by individually contacting media-owners. Consumers also stand to gain from both ideas. In both cases, consumers will receive ads for products and services that they are interested in purchasing. Additionally, the highly targeted Internet advertising reaches consumers at times that are more convenient than traditional mediums.

## V. INTERNET HEALTH SITES

### A. Background

The online health information industry is rapidly growing and experiencing many advances in the use of information analytics to make the industry more efficient. In addition, the price of health care is continuously rising causing more Americans to become responsible for their own coverage. This responsibility has made them more active in their health plan service and medical research. Current online health information sites provide services that help consumers improve their overall quality of care by making more informed health decisions [18]. As the US population ages, personalized health services will become more important, as will the tools that consumers need to make the best choices based on both cost and quality. This can be achieved through websites that offer interactive features to handle health needs without going to a doctor's office [19]. With health information websites drawing over 52 million unique visitors per month (February 2007), a site with superior technology and options could have a potentially dramatic impact on the health industry [20]. Fig. 3 depicts the many different stakeholders that benefit from health-information websites.

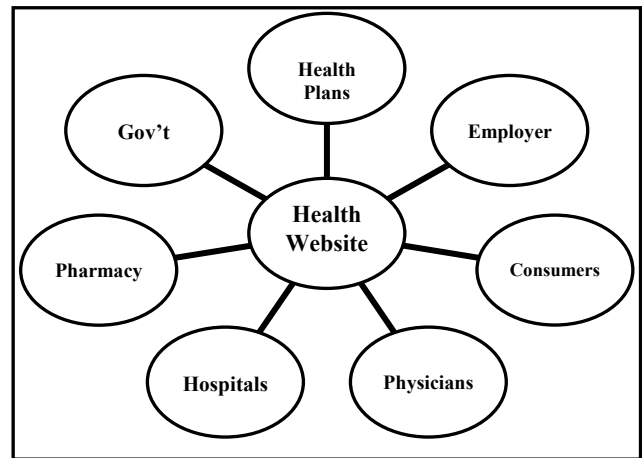


Fig. 3. Components to Health Website Integration [21]

### B. Improved Online Health Search Engine

The Internet has already transformed how Americans relax, shop, learn, buy, and ultimately live. Soon, the health care industry will follow suit by adapting to this technological way of life [21]. Search engine technology is continuing to evolve, offering better results. Difficult jargon and complicated medical journal articles make search results too difficult for most people to understand. Over 70% of people who search online for health information are dissatisfied with their results [22]. The main area for search improvement is in the use of meta-search and vertical-search technology, as well as improvements in displaying returned results in clusters.

One way to improve upon the current structure of health search engines is by using meta-search technology to make search results more relevant to the user's needs. Products like Wrapin can take common disease names and search for the medical terminology of the same disease. For example, when a user searches for 'tennis elbow', a search is conducted that also looks for 'lateral epicondylitis' which is the official medical name. This way, the consumer is not penalized in search results because they do not know the medical jargon.

A vertical health search engine could help users more efficiently find the exact information that they seek. A vertical search is a niche search engine that focuses on a specific genre or line of business. This type of site benefits both the user and the supplier; the user receives relevant and essential information while the supplier can offer advertisers a focused audience. Very few sites currently employ vertical search technology even though it would greatly benefit everyone involved.

Clustering would make search results easier to understand and navigate. Mooter.com and Clusty.com are good examples of clustered search engines. When a user searches for a generic word like 'cancer', results are grouped together by specific topics about cancer. These are generally listed from most relevant or most results to less relevant or fewer results. Another way to group results is by common labels that would be used for every search term. These could include definition, symptoms, diagnosis, treatment, prevention and prognosis. By keeping a standard template

for all search terms, the user will be better able to navigate the website and find the information he or she is looking for.

### *C. Advertising Opportunities*

A niche website directed specifically towards people searching for health information allows advertisers to target those consumers most likely to purchase their product. Advertisers and sponsors consist primarily of pharmaceutical, biotechnology, medical device, and consumer product companies whose products relate to health, wellness, diet, fitness, lifestyle, safety and illness prevention. These health and pharmaceutical companies allot a large portion of their advertising budgets towards targeting online users of medical website. They are drawn to sites that bring them the most users within their target market and where better to find consumers looking to buy health products than those searching for health information. A superior site will bring more users which will increase the advertiser interest in the website.

## VI. INTERNET TELEVISION

### *A. Background*

Today, more than 88 million US households (80%) subscribe to a television service [23]. With increases in prices, service offerings, and entry into the market by telecom companies, consumers are faced with the opportunity of choice. In the past this has not truly been the case, as cable providers are given a natural monopoly by the high cost of deploying cable wiring which is further protected by franchise laws. In addition to this change, television content has also begun to move onto the Internet. "TV and the Net are two of the biggest, most complex media systems ever built. Their ongoing collision -- actually a three-way with phone networks skidding into the nexus -- is unleashing forces that overshadow every previous era of media disruption" [24]. This changing and growing market for online video content provides an interesting opportunity for entry that is worth researching and analyzing. In fact, "Internet video has long held potential to become a disruptive media force, allowing the entry of smaller and independent players worldwide and changing television viewing patterns and habits" [25].

### *B. Opportunity for Ad Revenue on Internet Television*

Internet advertising would be either a large or main source of revenue for Internet television. In 2006, the Internet represented 7.5% of US advertising spending for a total of \$12.5 billion. Ad revenue is an appealing revenue source for Internet television for three reasons: the rapid growth of Internet advertising, the superior targeting capabilities the Internet offers, and finally because the prevalence of Digital Video Recorders (DVRs) has made television a less desirable medium for advertisers.

The Internet enjoys the fastest advertising revenue growth of any industry. From 1998 to 2004, it increased an impressive 28% especially when compared to the television industry's mere 4.8% growth [26]. This rapid growth is

expected to continue, with analysts estimating Internet ad revenues to reach \$24.4 billion by 2010 [27]. Given that growth, it is expected for "total Internet ad spending to rival local and national TV broadcast advertising by 2011. As that occurs, we expect the Internet to become an increasingly integral part of broadcasters' primary brands" [25]. Thus online video content provides a large opportunity to generate revenue today, and even greater revenue in the future. "The steady growth of online advertising is a clear indication that marketers continue to believe in the opportunities and effectiveness that this medium delivers in reaching and engaging their consumers," said Greg Stuart, the CEO of the Interactive Advertising Bureau [28].

Internet advertising should be appealing to brands because of the wealth of knowledge that a consumer's Internet behavior provides. The Internet makes tracking consumer behavior easier, making it possible for advertisers to more effectively market towards the individual [29]. "Unlike traditional media, the Internet can provide usage data to advertisers on a Census basis. Every ad impression generated, link clicked, or keyword entered is recorded on the server. And data collected can be divided and diced into meticulous details as desired by advertisers" [26]. Consumers confirm this targeting capability, with 20% of respondents to a survey stating that the Internet "provide[s] the most relevant ads with which they interact on a weekly basis" [26].

By giving advertisers superior targeting capability over television, online video portals should be able to charge advertisers higher CPMs, the cost per one thousand views of an ad. Even given the higher cost, advertisers appear interested in directing some of their ad spending to this medium. "Ad execs love Internet TV because its audience is measurable, targetable and interactive. If you spend 10 minutes learning about a new car you're interested in," Hilmi Ozguc CEO of Maven says, "that's worth gold to advertisers" [30]. Comcast has recognized the value of such advertising and has plans to deliver individual ads to set-tops. Through these plans, the chief operating officer Steve Burke hypothesized that "you can assign some pretty amazing CPMs" to those commercials [31]. Because of the information provided, marketers find Internet advertising to be "a compelling opportunity to leverage the Internet as a powerful medium that drives both branding and sales results" [28].

"As if viewer erosion from cable hasn't been enough for television networks to worry about, ad-skipping DVRs...further undermine the value of 30-second spots bought by advertisers" [25]. Thus, the rise in popularity of DVRs also makes the Internet a more attractive advertising medium compared to television. Today, the 7% of US households who own DVRs are unlikely to watch commercials [32]. In a recent survey, "62% of respondents indicate that one of a personal video recorder's top benefits is its ability to 'fast-forward through or skip commercials'" [26]. Not surprisingly, "content producers and distributors are less than thrilled by the loss in revenue from all those

skipped commercials.” Viewers’ ad avoidance may be a result of the insufficient targeting of the television ads that they are shown. “In the digital age, relevancy has become the top quality of an effective ad because consumers are just one click away from turning off the irrelevant ones.” A poll by Parks Associates indicated that TV viewers would be willing to provide personal information in order to “receive more targeted advertising in exchange for their ability to bypass TV advertising that isn’t as relevant.

## VII. CONCLUSION

Through the use of information analytics, the five industries discussed all have great potential for improved efficiency and better quality of service. The Internet yellow pages industry would benefit greatly from modified site interfaces that better the consumer experience, the addition of social networking components, and a thorough analysis of connectivity issues between businesses and consumers. Likewise, the elderly services industry could provide greatly enhanced search engine results through a more thorough analysis of current trends in elderly Internet usage. In the advertising industry, improvements are possible through the increased use of non-traditional advertising mediums, improved targeting of Internet advertising, and greater transparency in the marketplace. For online health sites, optimization of health search engines and efforts to increase advertiser interest would both be beneficial. Finally, the Internet television industry could benefit from superior advertisement targeting.

Information analytics is by no means limited to these five industries. While the opportunities discussed in this case study are certainly worthy of further investigation and consideration, this project more broadly demonstrates that systems engineering-style analysis can be used for ingenuity in any large, complex, dynamic industry. The success or failure of future businesses will depend in part on their ability to incorporate analytics into their business processes. Ultimately not only will this render these businesses more profitable, but it will also cause consumers to benefit from more efficient and effective service.

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