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The commodification of search

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ABSTRACT

THE COMMODIFICATION OF SEARCH

by Hsiao-Yin Chen

This thesis addresses the topic of the commodification of search by examining the historical role of the Internet search engine. Given the fact that the search engine is crucial in the dissemination and the construction of knowledge for its users, it is important to understand the variables that led to both its creation and continued use. This study presents the early history of the search engine from 1990 to 1998, and charts its ongoing transformation, via commercialization, from its status as an information gatekeeper to that of an advertising tool. Rather than focusing on the search engine's commercial value, the researcher utilizes Marx's commodification theory in conjunction with modern studies of the political economy of communications. This is a critical analysis that reconsiders the value of the proliferation of commercialized search engines in relation to the concentrated, online power structure that has resulted from such proliferation.

By mapping the early history of the Internet search engine, this study reveals that there are at least three search commodities produced in the course of search engine commercialization: search engine technology, search services, and search engine users. Intensive marketing activities are shown to significantly consolidate power that gives privilege to commercial websites. At the end of this study, viable alternatives to major search engines are suggested that may restore the authentic relation between a user's query and the Web's reply.

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Introduction

In the early days before the Internet gained popularity as an information source, people had to look up the telephone business directory for an auto insurance company. Today, through simply typing keywords into a search engine's search field, people can instantly obtain a list of hundreds of auto insurance companies. Search engines enable Internet users to instantly access global information with a simple click of the mouse. Modern Internet search engines are, in some ways, similar to early mass media, which was deemed the most important gatekeeper in the 1980s, when consumers had no alternative channels to obtain timely information outside of their homes. This attribute makes search engines major players in the ever-changing construction of knowledge and in the acquisition of new information, which have had a direct impact on the society and the culture as a whole.

Search is in fact the most heavily used Internet application after e-mail (Roberston, 2005). Advertisers have figured out how to reach consumers via the partnership with search service providers. Search engine commercialization became conspicuous in the late 1990s after search providers began to combine their technologies with advertising businesses. Today, Internet consumers take it for granted that search engines sell advertising, however, this was not always the case. In the pre-Internet and early Internet years, search technology was not always commercialized, and even when it was, advertising sales was not the typical business model. Search engine technologies were originally developed to organize the vast amount of information online and to solve

computing problems. Now, the common goal of search engine providers is to attract as many users as possible to increase advertising sales.

In this study, the transformation of search engines from an academic role to the current, predominant business model will be discussed utilizing commodification theory. Commod*ific*ation, however, is often confounded with the term commod*itiz*ation. People tend to be more familiar with commoditization, which refers to a process that transforms a unique, branded product into an undifferentiated one. In the business world, this process is understood as the transformation of a monopolistic market into a more competitive market where major players do not occupy a significant market share. Consumers often benefit from commoditization because it usually leads to lower prices and more product choices. Commodification, on the other hand, is derived from Marxist theory. Commodification is a process through which objects, ideas, and even people that by nature are not commercial are transformed into merchandise to be sold and bought. In other words, this is a transformation of non-commercial relationships into relationships of buying and selling. A commodity's market value is considered to surpass its social value. One example of commodification is the commercialization of information, in which the production of informational products such as books, databases, and even computer programs is primarily determined by sales models. Instead of serving human needs, the commercial intention to invent and produce these products has become more obvious.

The definition of commodification and that of commoditization is therefore fundamentally different. From Marxist standpoint, commodification is a contradictory process that is demeaning and dehumanizing, but at the same time liberating and

progressive. This phenomenon was born within the free market system with little government oversight. Simply put, "commodification is more of a crime of the market against humanity, while commoditization is more of a market problem for the manufacturers of branded goods" (Rushkoff, 2005, para. 5).

This study focuses on the critical aspect of commodification. Commodification is often criticized in that it is thought to eventually lead to social, economic, and political inequity, for in a free marketplace privilege is usually given to those who have greater economic and political power. This study utilizes the fast-growing search engine industry as a model to illustrate and examine how commodification extended under the logic of capitalism.

One important characteristic of contemporary capitalism is the continuous accumulation of capital, which usually results in the concentrated control of wealth and power by a handful of people. In a capitalist society, it is therefore common that the rich get richer and the poor get poorer. Both Ben Bagdikian (2004) and Robert McChesney (2000) have noted that the concept of a fair market is based on competition, but the key to success in a capitalism-oriented market is to eliminate competition. Bagdikian (2004) demonstrated the trend by indicating that the traditional media in the United States, including TV, radio, film, magazine, and newspaper, is now controlled by only few big companies, whereas they were once run by 50 separate corporations 20 years earlier.

The concentration of wealth has also occurred in the search industry. In fact, there were once dozens of search engines available to Internet consumers. Today, the search businesses are dominated by only a few commercial players. As capitalism and

consumerism spread throughout the Internet, the corporate world has also begun to enhance its business utilizing this new media.

The *commodification of search* is defined as a process that derives exchange value from search engine technology, turning search-related affairs, people, systems, matter, and culture into commercial activities or products. Before understanding this phrase, one has to acknowledge that the main business strategy of commercial search engines is to transform information databases, search services, and even users into valuable, saleable assets. In addition to licensing the technology, commercial search engine providers also indirectly take advantage of the search technology by selling traceable and search-based advertising services to online marketers. In this situation, even though search engine users avail of the service for free, they have actually become a valuable asset to commercial search engines in that users attract advertising clients.

Following the deep-rooted nature of capitalist logic, search engine companies eventually created profitable exchange value out of the technology. From academic projects, to the licensing of technology, to the selling of search results, search technology's market value escalated rapidly and has now outflanked the technology's initial usefulness. This ongoing commercialization has led to some negative consequences. For example, the commercial manipulation of search engines' ranking systems has resulted in considerable site-optimization activities, which then arguably diminish the relevancy and integrity of search results.

This study recognizes the ongoing process of the commodification of search engine technology in that the social value of the technology has been transformed into an

essential value of commerce to be traded for advertising dollars. This study traces the early history of search engines through the framework of commodification theory to explain how these information-retrieving tools were being commodified as well as to show how the same forces of power affect both the online construction of knowledge and its offline world counterpart, while simultaneously proving that a classic model of the political-economic communication theory is still applicable to these new media giants: commercial search engines.

Definition of Terms

To clarify the boundaries of the study and the research targets, the following terms need to be defined:

Search Engine – According to the *PC Magazine* website, it is the software that searches for data based on some criteria. Every search engine website utilizes a search engine that is either created by the site's developers or purchased from a third party. Search engines can differ dramatically in the way they find and index the material, and therefore different search engines return different results even with the same query. In fact, a search engine is technically the software and algorithm used to perform a search, but the term has become synonymous with the website itself. For example, Google is a major search site, but rather than being called the "Google search site," it is commonly known as the "Google search engine" (PC Magazine, 2007).

Search Advertising – This is one of the online advertising formats. According to the Interactive Advertising Bureau (Interactive Advertising Bureau [IAB], 2007), advertisers

pay commercial websites, e.g., search engine sites, to list the advertiser's site domain name or to link it to a specific search word or phrase.

Paid Listing – Also known as paid search or sponsored listing, this is one major format of search advertising. In paid listing, text links appear on the top or side of search results in response to searches for specific keywords. The more a marketer pays, the more conspicuous his or her link will appear on the webpage. Marketers only pay when a user clicks on the text link. This pricing model is called cost-per-click. See Figure 1.

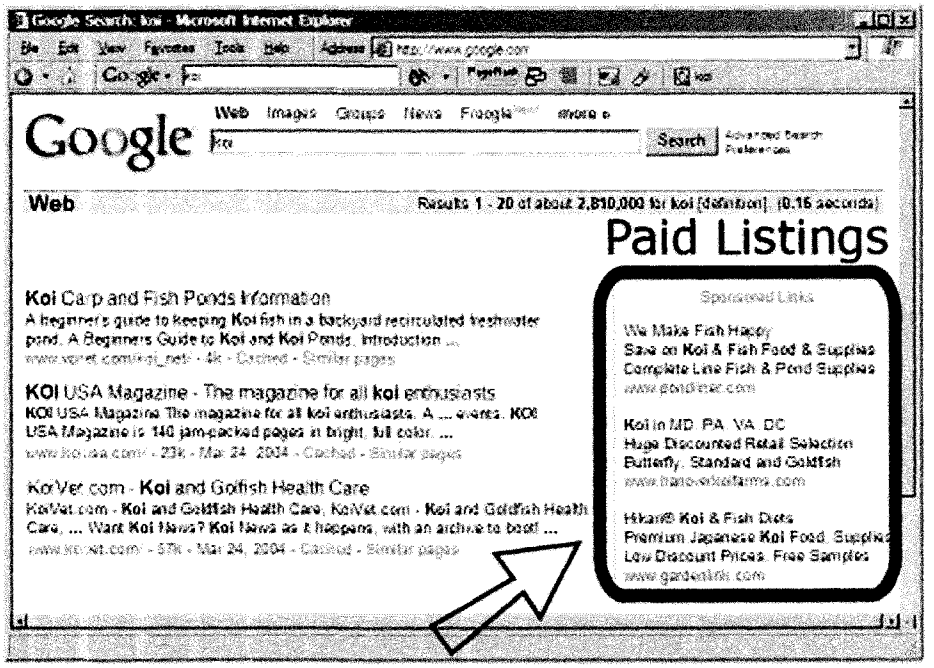

Figure 1. An example of paid listings – Google AdWords.
Source. Insider SEO (2007).

Paid Inclusion – It guarantees that a marketer's website is indexed by a search engine. The listing is determined by a search engine's algorithms. An example of adopting paid inclusion is Yahoo! Directory.

Organic Search Result – Organic search result means that search results are returned based on content and keyword relevancy. It differs from paid search, which ranks listings based on who paid the most money to appear on the top. Sometimes organic search is called *pure search* or *natural search* as it is supposed to be untainted by commercial payments or bids.

Site Optimization – Also known as search engine optimization or SEO marketing, this is a service provided by third-party companies or agents on behalf of a client, in this case the advertiser, to modify the client's site and to make it easier for search engines to automatically index the site. The strategy makes it more likely that the advertiser's site will rank higher in response to certain search terms, hopefully generating a better placement in organic search results.

Purpose of Study

The purpose of this study is to demonstrate how, through the process of commodification, search technology evolved into commercial search engines, and to indicate the social meaning of such transformation as well as the critical role of Internet search engines as the new media gatekeepers. This study is presented to examine the development: How did search engine technology become commodified?

As a matter of fact, the process of the commodification of search resulted from the question: How can commercial search engines make money from a service that is offered for free? To answer the inquiry, one has to understand that the core asset of search engine companies, the search engine technology, has been traded both directly, through licensing, and indirectly, through advertising. Instead of charging users fees, search

engine sites act, to some extent, similarly to the function of public libraries in that they grant public access to information. However, search engines today are not so public even though they perform better as the technology improves. In the beginning of search engine commercialization, search engine technologies were the commodity, in the form of licensing, to be traded for profit. But licensing cannot always generate sufficient revenues for commercial engines that are created to make money. As the Internet was invaded by more and more commercial activities, selling advertising soon became the best way to amass profits for commercial search engines.

The importance of this study can be discussed in terms of both academic and socially applicable aspects. In the aspect of academic contribution, knowing that most recent search engine and business studies tend to focus on search engine's marketing and e-commerce value, it is no less important to understand the rise of commercial search engines from a social-science perspective. Previous communication studies in the United States have not placed much emphasis on both search engine commercialization and the aspects of commodification in comparison to studies in the United Kingdom, where the online advertising industry is growing faster than in the United States (IAB UK, 2007). As a result, there is definitely a need for social science researchers in the United States to pay more attention to this issue.

The recognition of search engines' increasing social importance is emphasized because they should be regarded as gatekeepers of online information. In the societal aspect, search engine commercialization has been recognized to have ongoing impacts on both the advertising economy and citizenship as a whole (Battelle, 2005; Couvering,

2004, 2007; Fabos, 2006; Hinman, 2005; Introna & Nissenbaum, 2000; Vaughan & Thelwall, 2004; Walker, 2005). Not only does such commercialization change the way in which advertisers spend their marketing budgets, but it also affects the way in which people acquire information as well as their daily decision-making process. Even though the criticism of search engine commercialization has consisted of heated debates among educational and social activists, most people are simply not conscious of the change. This study also aims to raise the awareness of the commodification of search engine technology and to place such development within an historical perspective, hoping search engine users and consumers to pay more attention to this salient feature of social transformation.

This study presents a discussion of Internet search engines' revolutionary development and analyzes the changing function of search engine technology over time. In short, the main purposes of this study include:

1. Present the argument for the commodification of search engines.
2. Demonstrate the relevance between the commodification of search engines and society as a whole.
3. Explain how search engines became commodified.
4. Rethink the merits and value of commercial search engines.

Background

In the early days, there were clearly two types of Internet search engines: directory-based and index-based. Directory sites, such as Yahoo!, presented arrays of resource links in systematically and manually arranged categories, often in a complex hierarchy.

They usually charged Web publishers for submitting their websites for review. Although Yahoo!, for example, is currently known as an Internet portal, its directory service still exists and charges $299 a year for site submissions (Yahoo!, 2008). On the other hand, indexed sites such as Google fully indexed the entire text of webpages so as to make them keyword searchable. Indexed sites use computer programs called robots to automatically move from page to page throughout the Internet, reading content, and adding it to their databases.

Today, big search engine providers such as Google, Yahoo!, and MSN offer both directory-based and index-based search services, but it is obvious that an index-based search engine, which requires a more complex search technology, is the primary choice for searchers as it allows them to simply type one or a few keywords and retrieves thousands of relevant results in less than a second. Therefore, major search engines usually do not set their directory search as the default search service as the index-based search engines are usually preferred.

Current search industry. According to the Pew Internet and American Life Project, almost half of all Internet users use search engines on a typical day, which is pulling closer to the 60% of Internet users who use email (Fallows, 2008). In addition, the majority of search engine use takes place in two advertising-driven search engines (comScore, 2008).

Table 1

Top Five Search Providers in July 2008. Ranked by Total U.S. Searches

Rank	Search Site	Share of Searches
1	Google	61.9%
2	Yahoo!	20.5%
3	MSN	8.9%
4	Ask.com	4.5%
5	AOL	4.2%

Commercial search engines today rely on selling advertising as their main source of revenue. The possession of a powerful search technology has actually appeared to determine whether they can generate satisfactory advertising dollars by attracting users to visit their sites. Google is renowned for its innovative search technology that instantly returns relevant results, and it is widely considered one of the most efficient search engines on the Internet. Yahoo!, in fact, did not realize the value of owning a search technology as a key to a successful search business until Google became popular. After the popularity of the advertising program, Google AdWords, Yahoo! began to recognize how critical it was to have its own search technology as a unique selling point to attract users. In 2003, Yahoo! acquired both Inktomi's algorithmic search technology and the search company Overture, which had been famous for selling advertising links that accompany search results (Yahoo! Media Relations, 2003, July 14, 2003, March 19). Microsoft, too, despite its late entry into the search engine war, has been attempting to gain a part of the lucrative search market. In 2005, the software giant developed MSN

Search, now called Live Search, as its proprietary search technology to compete with Google and Yahoo! (Sullivan, 2005). Search technology per se has in fact become a money-making tool with the operation of the advertising business model.

In addition, many search sites actually share the same results as many less-known Internet search engines are subsidiaries of big ones. It is unlikely to see that each search site has its own search algorithm. For example, searchers can observe that WebCrawler and Excite have identical search results, as the former site was sold to the latter at the end of 1996. But, WebCrawler is currently owned by InfoSpace, which also owns and operates Dogpile and MetaCrawler search engines. On the other hand, Excite was acquired by Ask Jeeves in 2004 (Sharma, 2005). In 2005, Ask Jeeves cooperated with InfoSpace and the latter began to power Excite (Monica, 2005). Therefore, WebCrawler and Excite again have identical search results. In short, even though there are numbers of search sites for users to choose from, the diversity of search results could be low.

Search advertising. In general, there are two main types of advertising formats displayed and delivered within the search engine context. One is similar to traditional advertising like display and classified ads. The other is an entirely new type called search advertising.

The argument of the commodification of search requires a preliminary understanding of recent online advertising's fast growth. From 2003 to 2007, online advertising spending increased from $7.3 billion to $21.2 billion in the United States and it is estimated that the figure will exceed $60 billion by 2010 (Elkin, 2007; IAB, 2008). Search advertising currently is the largest revenue format of online advertising, which

accounted for 41% of the 2007 full year revenue and increased 30% from 2006's $6.8 billion to 2007's $8.8 billion (IAB, 2008). Google and Yahoo! together controlled more than 90% of the total U.S. search advertising spending, while Google alone controlled more than 70% (eMarketer, 2007).

Regardless of advertising formats, an advertisement by definition is a paid form of communication, utilizing various media, by which a promotional message is conveyed. Its goal is to call public attention to a product, service, or company. Therefore, an ideal advertisement is considered to be persuasive, informative, and should be designed to influence purchasing behavior so as to increase sales. However, in the search industry, commercial search engines have changed the advertising game by stressing neither persuasiveness nor attractiveness, but rather simply the accessibility of an advertisement.

In search advertising, commercial search engine providers deliver relevant ads in response to a consumer's query. The new format of advertising is so popular because of its cost-efficiency. As consumers become more segmented because of their individual search queries, the ability of commercial search engines to cater to these individual queries makes this type of advertising so efficient in attracting targeted consumers for advertisers. Table 2 shows major search engines' continuous growth of advertising sales from 2005 to 2008 and their heavy dependence on this revenue source.

Table 2

Major U.S. Search Engines' Advertising Revenues 2005-2008

	2005	2006	2007	2007 % from Advertising	2008 2nd Quarter % from Advertising
Google	$6.07	$10.49	$16.41	99%	97%
Yahoo!	$4.59	$5.63	$6.1	88%	89%
MSN	$1.39	$1.53	$1.84	72%	N/A

Note. Percentages rounded; dollars in billions.
Source. Google, Yahoo!, and *Advertising Age* websites.

In fact, the phenomenon of search engine commercialization has raised concern among social and educational researchers. As Fabos (2006) noted, search engine companies "have morphed into advertising conglomerates and now serve advertisers, not users" (p. 188). Commercial search engines have built up a subtle yet substantial relationship between their users and advertisers. Such an intensive relationship depends upon a search engine's increasing reliance on advertising businesses. Accordingly, investors and corporations observed a search engine's indispensability for consumers, and consequent profitability for the search engine, when information on the Internet was promptly increasing. With this growing commercialization, the criticism of Internet search engines' new business model is sharper. Dr. Jakob Nielsen (2006), a pre-engineer at Sun Microsystems, in an online article entitled *Search Engines as Leeches on the Web*, stated that "search engines are sucking out too much of the Web's value, acting as leeches on companies that create the very source materials the search engines index" (para. 1). Nielsen explained that the profitability of search advertising has triggered

many search engine companies to offer a broad variety of attractive non-search services in order to direct more traffic to their search pages. Among these free offerings are services such as online maps, email, photo hosting, natural language translation, and even a search of the user's local computer hard drive.

It has to be noted that the inherent value of commodification differs from that of commercialization. Commodification does not exclusively involve the creation of a monetary relationship between a seller and a buyer as commercialization does. Rather, it concerns any object that undergoes a significant shift from its original use value to a new commercial value, thereby primarily focusing on the commodified object's social effects rather than its economic impact.

Theoretical Framework

The commodification theory is a relevant division of the critical political economy of communications, and is here considered an appropriate theoretical framework for a macro-level study. Marxist theory is the mother of political economy studies, which gives clear interpretations of materialism, imperialism, capitalism and so forth, including both social and economic aspects. In general, political economy studies are concerned with "ownership, support mechanisms (e.g., advertising), and government policies [which] influence media behavior and content" (McChesney, 1998, p. 3).

Karl Marx (1818-1883) is known not only as a socialist, but also a philosopher, an historian, and a political economist. Marx's economic analysis of capitalism is based on his version of the labor theory of value, which includes the analysis of capitalist profit as the extraction of surplus value from the exploited proletariat. His work, *Contribution to*

a Critique of Political Economy, published in 1859, later became the groundwork of modern studies of political economy.

Among contemporary political economists, Dallas Smythe, Vincent Mosco, Eileen Meehan, and Dan Schiller are important scholars who have contributed significant, guiding works to the theory of commodification and most of them have fairly solid academic experiences. First, Smythe (1907-1992) was a political activist who avidly researched mass media and telecommunications. One of his main ideas included in this study is the notion of the audience commodity. Vincent Mosco (1996) introduced the notions of commodification, spacialization and structuration in his comprehensive work, *The Political Economy of Communication: Rethinking and Renewal*, with regard to the development of mass media in the political-economy environment. Moreover, as one of few female political-economic scholars in the United States, Eileen Meehan first introduced the notion that ratings are commercial media's main commodity (Mosco, 1996). Last but not least, Dan Schiller (1988) considered that information also became a commodity in today's information society, whose work is considered to be relatively up to date and aligned with the pace of social changes. He is also the author of a widely-cited book, *Digital Capitalism: Networking the Global Market System*, in which he considered that power and class still exist on the Internet. The four scholars' works have been repeatedly cited by many recent political-economic studies (Bettig, 1997; Couvering, 2004; Simpson, 2004).

Literature Review

The approach of this study is interdisciplinary in nature. The order of the concepts reviewed begins with the gate-keeping theory in that a search engine's social role is compared to mass media's role as an information gatekeeper. The discussion includes the definition of a gatekeeper, its main features, and its social responsibilities. Following this, the studies of commodification as well as the relationship of this theory to today's information society will be discussed. Important authors in the section include Marx, Mosco, Smythe, Meehan, and Schiller. The discussion then turns to the increasing criticism of commercial search engines in recent years, highlighting the ongoing commodification of search engine technology.

Gate-keeping Theory and Social Responsibility Theory

The concept of the gatekeeper was first coined by the social psychologist Kurt Lewin in 1947 (Barzilai-Nahon, 2005). The theory includes at least three conceptual distinctions (Williams & Carpini, 2000). First, the news media are directly responsible for fulfilling the media's civic functions and they should be separated from the entertainment media. Second, within the news media, news reporting should strive to be accurate, objective, and balanced. According to McQuail (2005), objectivity or neutrality is a particular form of media practice, particular to the tasks of information collection, processing and dissemination. Third, and perhaps most significantly, the public is distinguished from media elites and policy experts, with the former viewed as generally passive, easily manipulated consumers of information, and the latter as information gatekeepers who represent the public's interest in the construction of political and social

reality (Williams & Carpini, 2000). In other words, the notion of the news media's professionalism is connected to the idea that the news media serve a public interest that transcends the interests of particular parties or owners of social groups.

As a result, the social responsibility theory concedes the inevitability of both a centralized, privately owned media and a passive, powerless public, and that much of the civic responsibility of the public is transferred to the information elites. Consequently, the truth about the social and political world is no longer constructed out of enlightened public conversation, but instead emerges from a more managed and limited exchange among experts in the news media. Citizens are redefined as unsophisticated consumers of information, and the public is redefined as an audience (Williams & Carpini, 2000).

In the new-media era, a more relevant formulation of the gate-keeping theory was suggested by Barzilai-Nahon (2005), which she named the network gate-keeping theory. Based on the authoritative or functional dimension, network gatekeepers may include governments, regulators, search providers, network service providers, organizations, and individuals. According to the theory, online information flow enables a frequent and varied exchange between individuals and gatekeepers. In other words, the traditional model of the sender-receiver relation became irrelevant in the new media. Thus, the gated, an individual that is subject to gatekeepers, can circumvent gate-keeping more easily than in traditional media. But it should also be noted that because network gatekeepers often have more mechanisms and resources of information control than the gated, circumvention is not always possible (Barzilai-Nahon, 2005).

Commodification Theory

In the context of a consumer society, public spaces and private properties are inundated by advertising media, through which consumers perform their consumption and advertisers engineer instrumental, market-based activities (Gotham, 2002). Gotham explained the idea by demonstrating the transformation of the city of New Orleans' local customs, festivals, and rituals from originally cultural scenes to tourist attractions. The urban tourism in New Orleans has been commodified into a barely visible commodity. Gotham concluded that once a commodity's market relations dominate social life, commodification has taken place.

The dual value of a commodity. To explain commodification, the values of a commodity should be understood first. Tracing back to the 19th century, a commodity is defined by Marx (1859) as any good or service produced by human labor and offered as a product for general sale on the market. Based on Marx's theory, every commodity has a twofold aspect, which includes use value and exchange value.

A commodity's use value, by its intrinsic characteristics, can satisfy some human need or want, physically or ideally. Use value as an aspect of the commodity coincides with the physical, palpable existence of the commodity. Bread, for example, has a distinct use value differing from the use value of a car, a pair of shoes, a piece of paper, etc. As a result, use value is thought to serve social needs. Exchange value, on the other hand, means that a commodity can be traded for other commodities. For example, a pair of shoes and ten pieces of bread may have the same exchange value. When a commodity

is said to have exchange value, the commodity's use value is no longer a prominent feature and can easily be exchanged in the appropriate proportion (Marx, 1859).

In addition, the production of a commodity is closely tied to the value of labor. According to Marx's labor theory of value, labor power is also considered a commodity. Labor power is defined as the combination of those mental and physical capabilities existing in a human being, which one exercises whenever he or she produces a use-value of any description (Marxist.org, 2008). To create a commodity, an individual exchanges his or her labor power for payment, in order to earn a living. For example, the work of a teacher is a commodity whether the teaching is paid by the student, the student's parents or by the government. On the other hand, a mother's education of her child is not a commodity since it is not done for payment but simply out of human nature, love. Because labor power can be sold to someone else to use for their own purposes and the wage-worker can thereby earn a living, such power is considered a commodity.

However, one might argue, since commodities are exchanged at their face value, how is it possible to make a profit from an equal value exchange? Marx (1859) showed that commerce on its own cannot generate new value, it can only distribute value around. Both parties exchange a commodity of equal value to get what they want, but neither party gains any profits or surplus value. In fact, profit originates in the purchase of labor power, the consumption of labor power, and the sale of the product of labor at a profit. Capitalists, then, own both the means of production and workers' labor power. After paying wages, capitalists then become the owners of surplus value, over and above the value of workers' labor power.

Today, nearly everything, including objects, ideas, and even people, can be transformed into saleable merchandise. Commodification is defined as "the process of transforming use values into exchange values" (Mosco, 1996, p. 141). For example, when a woman exchanges her labor for payment, instead of serving her family out of love, the labor is considered to be commodified. This process is essentially socialization, but because of the dominant position of capital, socialization, at the moment, means commodification. As a result, the potential power of commodification is to create surplus value, which is generated when the total output is sold for more than originally invested.

Commodification and advertising. To underscore the role of advertising in the course of commodification, Jhally (1987) stated that "advertising is the main weapon that manufacturers use in their attempt to 'produce' an adequate consuming market for their products" and it "works to create false needs in people (false because they are the needs of manufacturers rather than consumers)" (p. 3). He concluded that advertising not only reflects the extraction of surplus value or profit, but is itself a part of it, in addition to realizing it. In advanced capitalism, it should be noted that not only does material production fall into the sphere of exchange value, so do 'things' such as love, technology, knowledge, and consciousness.

According to Mosco (1996), there are at least three different forms of media commodification closely connected with advertising. These are content commodification, audience commodification, and ratings commodification. First, content commodification involves transforming messages into marketable products. It has become routine since the privatization and commercialization of media outlets. In the case of newspapers, a

story written by a newspaper journalist goes through a transformation from use value in terms of practicality for readers into an exchange value, which empowers a journalist to sell his or her writing skill for a wage. Along with advertising, a newspaper article therefore forms a packaged product. If the story produced by a journalist is successful, it then creates surplus value for the newspaper business. In this situation, mass media play both a direct role in commodity production and an indirect role, through advertising media, in the process of content commodification. Mass media are therefore viewed as economic entities. The ideologies and meanings inherent in media content are considered to reflect the opinions of and favor those who possess economic power.

Second, instead of viewing media content as a commodity, there is a different approach with regard to the production of media products. This approach suggests that media products are, in fact, the audience. The idea of audience commodity was first introduced by Dallas Smythe (2001). Based on Smythe, the mass media are constituted by a process in which media companies produce audiences and deliver them to advertisers. In his argument, mass media provide the audience with a "free lunch": a television show, stories in a newspaper, music on the radio, which are all combined with advertising. By watching, reading, or listening to an advertisement, the audience is delivered to advertisers and thereby commodified (Smythe, 2001).

However, in order to determine the prices at which audiences are bought and sold, independent ratings become another commodity. The third form of media commodification is based on a notion that commercial media's commodity is not the audience per se but rather the ratings, which are believed to represent the audience and

thus are seen as an essential commodity in media production. Eileen Meehan is the scholar who first introduced this notion (Mosco, 1996). She concentrated on the fact that mass media sell ratings to advertisers. These rating reports on "audience size, composition, and pattern of media usage constitute the primary commodity in the media system" (Mosco, 1996, p. 150). At the same time, the audience is the laborer who produces these rating numbers. Watching is working, but not all audiences are equally in demand and hence not all of their works are equally valued in the market.

Meehan's analysis is interesting, but some of her arguments are questionable. The first is the role of labor in producing the value of commodity ratings. Meehan seemed to imply that an audience's watching labor is the necessary condition of ratings commodity. If that is the case, an audience's labor should be the substantial value that sets the broad parameters of bounding ratings production. For Meehan, instead, ratings are the commodity exchanged for advertising money. Even if ratings commodity was not dependent upon audience labor but was rather, as Meehan said, institutionally constrained by a larger trans-industrial relationship, the value of ratings commodity still has to be understood in terms of the labor of workers in ratings firms and other audience research agencies (Chen, 2004).

Commodification of information and technology. Mosco (1996) argued that the process of commodification has been extended to public areas and social places as well as to practices once organized by a social logic based on universality, equality, social participation, and citizenship, this logic now reduced to a market logic that equates citizenship with market power. This is what Mosco defined as extensive

commodification. Such extension is evidenced by the ongoing process of the broad-based privatization and commercialization of public information, broadcasting, telecommunication systems, high education, and technologies, and by the introduction of the economic logic of cost-based pricing models perpetuated by those who hold market power.

Such extensive commodification was cited as the focal concern when information became indispensable and ubiquitous. Dan Schiller (1988) offered the view that information has actually become a commodity which in turn became the primary site of today's market system. In defining an information commodity, Mowshowitz (1992) argued that its function is to enable the user, a goal-seeking system, to make decisions or to control processes. For instance, before a trader makes an investment decision, he or she may purchase information that can be used to assist in making the decision. Common examples of information commodities are books, databases, computer programs, and advisory services.

Schiller (1988) also noted that information services, though, are not involved in adding use value to a product itself, rather they produce a surplus value for the owners of accounting firms, advertising agencies, research and development laboratories, public relation companies, and corporate marketing departments. These "peripheral phenomena" have become profoundly ancillary activities in the economy. As a result, the goods produced by information services are argued to benefit persons or entities other than the immediate users, providing the existence of ancillary value (Bates, 1988). For

example, price advertising contains only market information on the price and availability of products, which mainly benefits advertisers in their work to attract consumers.

However, when the marketplace has the ability to determine the price of information and its access, it will ultimately mean that the marginalized, the uneducated, and those who are simply uncomfortable with electronic mediums will find it difficult to acquire information (Sharman, 2001). To achieve the goal of making information equally and freely accessible to every citizen, libraries play a crucial role in asserting rights of access in today's information-driven society. Sharman (2001) wrote that "the public offering of database searches and other online services undercuts attempts by the market to create scarcity and concentrate ownership, as well as countering efforts by technological industries to commodify information access and restrict its flow to those who can afford to pay for the latest connectivity, CD-ROMs and software" (p. 4). However, even public libraries are not immune to the commodification trend. Sharman concluded that libraries are increasingly in danger of becoming leasers of information access in that some libraries have expanded into the corporate world by offering fee-based information services.

Mosco (1996) argued that one of the factors that facilitate the commodification process is technologies. In Mosco's (1988) earlier article, he stated that the ability of new technology to measure and monitor consumers' electronic communication and information activities results in a pay-per society. When companies have advertisers in mind, the creation of consumer databases is a profitable method of packaging and

repackaging information into a marketable commodity. The practice of selling information has become a core value of many businesses.

In fact, the members of government, private industries, and academic institutions are increasingly focusing on the critical role of technology and information in creating both wealth and competitive advantage. Many new technologies developed at universities, such as medical implements and computer programs, have undergone commercialization to benefit society and, at the same time, to benefit both universities and entrepreneurs. From 1991 to 1996, in the early days of the Internet, the number of university licensing agreements grew by 70% (Association of University Technology Managers [AUTM], 1997). On the one hand, universities earn royalties and gain reputation by licensing inventions to businesses, thereby gaining additional funds for further research. In 2006, U.S. universities received more than $45 billion in research and development expenditures at U.S. academic centers (AUTM, 2007). On the other hand, entrepreneurs also benefit from academic inventions by the introduction of new products into the market, which then helps to generate more revenue and to contribute to local economic development (Shane, 2002).

This university-industry cooperation bridges the gap between academia and industry. As one can see in Figure 2 below, the cultural differences between university and industry are like the opposite poles of the earth. For instance, in contrast to industry, universities almost never maintain trade secrets, which are antithetical to the knowledge-expanding culture of an educational institution.

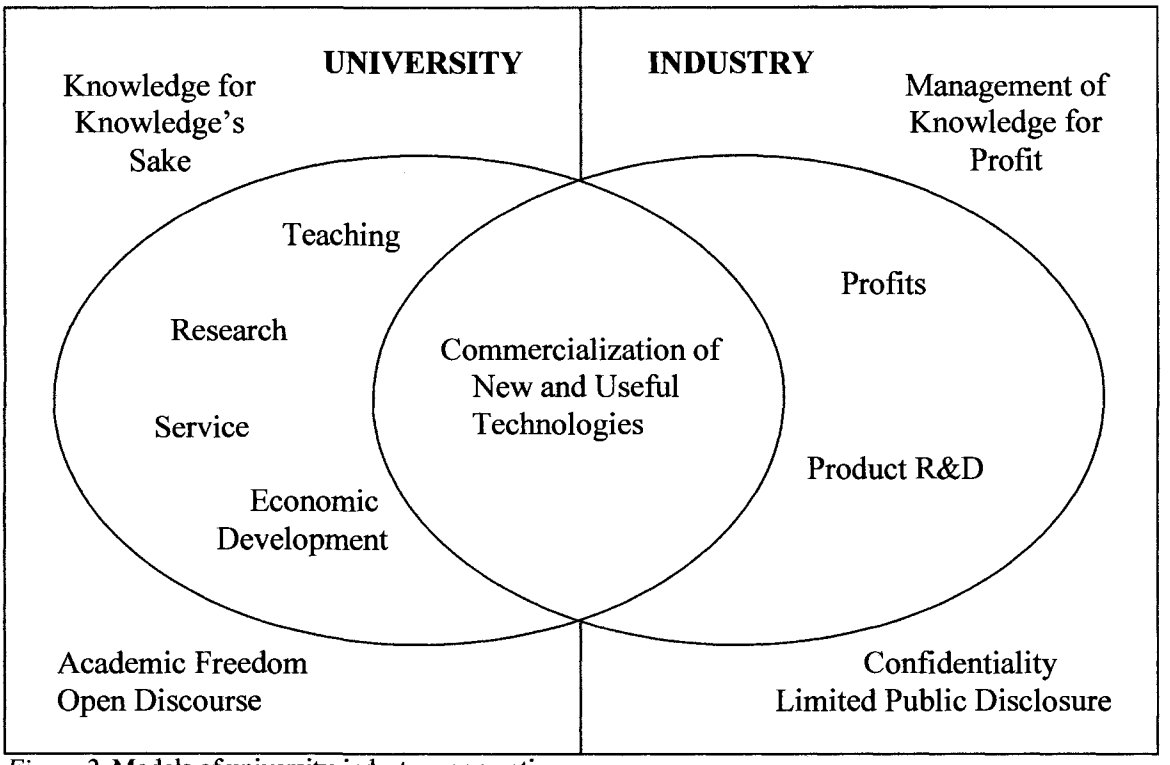

Figure 2. Models of university-industry cooperation.
Source. Severson (2004).

From Marx's point of view, the commercialization of scientific and cultural activities orients such activities toward serving commercial concerns rather than human interests. The nature of commodification is contradictory, for it is arguably both demeaning and dehumanizing, while simultaneously being a liberating and progressive process. On the upside, the success of commercializing new technologies encourages academic research, promotes economic growth, and ultimately benefits the public; while on the down side, the usually untainted university culture is becoming more or less commercially oriented. For example, Eric Campbell, an assistant professor at Harvard Medical School, and other researchers found that 21% of geneticists who withheld information from other researchers did so in order to protect the commercial value of

results. This may result in too many discoveries based on commercial potential rather than basic human interests (Hopkins, 2004).

Following the concept of university-industry cooperation geared toward commercializing university technologies, Jolly (1997) suggested a standard road map for building the commercial value of new technologies. The process of technology commercialization includes five phases: Imaging, Incubating, Demonstrating, Promoting, and Sustaining.

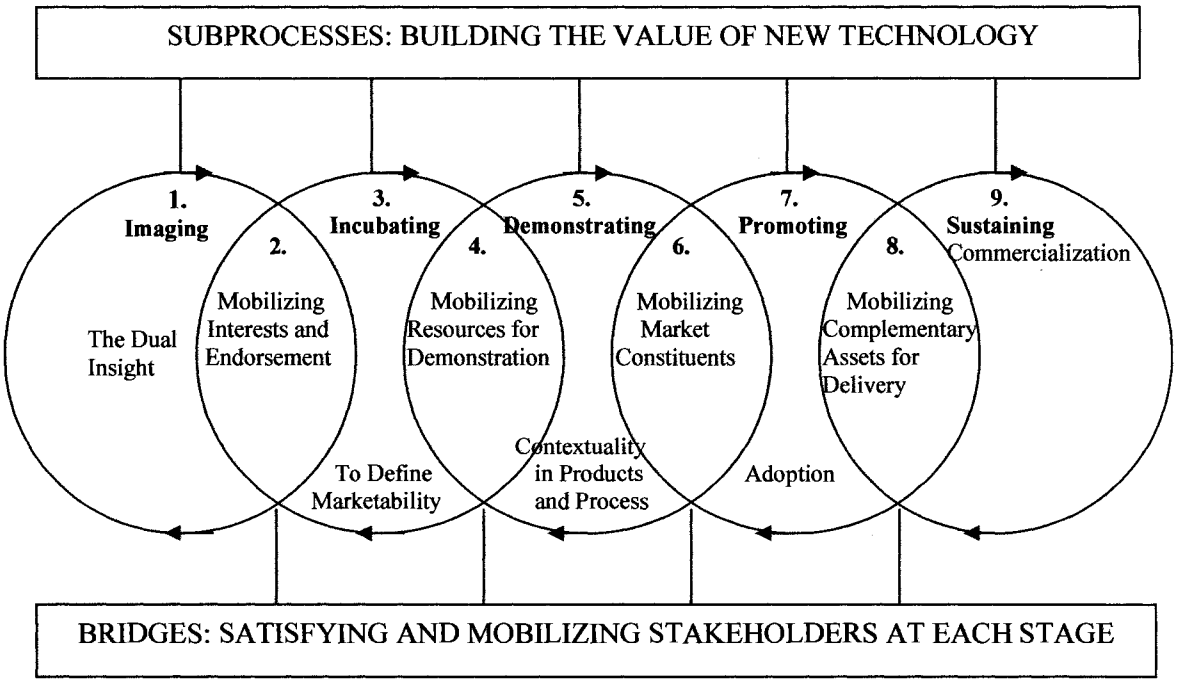

Figure 3. Model for the commercialization of new technology.
Source. Jolly (1997).

Moving from one sub-process to the next requires demonstrating the commercial value of the technology at each stage, which in turn requires the support of key stakeholders. Stakeholders will inevitably change from sub-process to sub-process. In the earlier stages, inventors, development partners, and potential users of the technology

are of primary importance in building the value of technologies; while in the later stages, the importance of potential customers, suppliers of complementary technologies, and business partners is more significant (Jolly, 1997). To be responsible for moving technology through the five sub-processes, many universities have established Technology Transfer Offices (TTOs) and relevant policies, which encourage as well as pave the way for licensing technologies (Shane, 2002).

Under a licensing agreement in the course of technology transfer, someone agrees to pay for the use of the intellectual property that the university owns under strictly defined terms and conditions that are specific to each license. But the academic institution still maintains the ownership rights to the intellectual property under the condition of employment (BWF & HHMI, 2006). With the collaboration of the inventor, a TTO evaluates an invention for potential use and marketability, handles the forms, filings, negotiations, as well as follows up the transfer process.

According to the Association of University Technology Managers website (AUTM, 2008), TTOs follow the provisions of the *Bayh-Dole Act*. Enacted on December 12, 1980, the Act created a uniform patent policy for the many federal agencies that fund research, enabling small businesses and non-profit organizations, including universities, to retain title to inventions made under federally funded research programs. Major provisions of the Act include:

1. Non-profits, including universities, and small businesses may elect to retain title to innovations developed under federally funded research programs.

2. Universities are encouraged to collaborate with commercial concerns to promote the utilization of inventions arising from federal funding.
3. Universities are expected to file patents on inventions they elect to own.
4. Universities are expected to give licensing preference to small businesses.
5. The government retains a non-exclusive license to practice the patent throughout the world.
6. The government retains march-in rights.
7. The *Bayh-Dole Act* was especially instrumental in encouraging universities to participate in technology transfer activities.

After successfully commercializing academic inventions, both universities and students will earn a percentage of any resulting licensing income, including royalties. The income sharing formulas for a successful commercialized invention differ for distributing intellectual-property-related royalty and equity income. A common distribution is 40% as taxable income to the inventors (split if there are multiple inventors), 40% to the inventors' departments for education and research during the development, and 20% to the university for management of the invention and support of the technology transfer efforts. However, some universities give the inventors as much as 50% of net licensing income, and others give the inventors as little as 20% (BWF & HHMI, 2006).

The Internet is a place where many new technologies are being employed. Based on the notion that commodification is taking place everywhere, the Internet is no exception. Breslow (1997) described the Internet as a "commodified communications

apparatus," where the commercial and political forces tend to define it in pretty much the same way as the television was construed. To further demonstrate commodification on the Internet, which is manipulated especially by commercial forces, Robison (2004) considered that corporations have recreated the Internet, the free-share-based medium, in the minds of consumers by encouraging users to invest their time and money into it. The Internet was transformed from a vehicle that was originally designed to provide the free sharing of information between scholars and scientists into a medium with commercial potential, albeit such commercial use of the new medium was initially forbidden by federal law (Robison, 2004).

Bettig (1997) then concluded that the expansion of intellectual property rights, the growing commercialization of information and cultural output, and the increase of online advertising, all govern the development and deployment of communication technologies on the Internet, the so-called information superhighway. He argued that both the concentrated control of the new medium and the infiltration of advertising, following the logic of capital, are consistently undermining the liberal potential that may be inherent in this new technology.

Similar to the idea that the world of online media has similar commercial purposes and ownership concentration to that of offline media (McChesney, 1999), Couvering (2004) added that "there is at least one set of large industrial players akin to the television networks or the Hollywood studios, and those are the search engines" (p. 3).

Search engine controversies. According to the Pew Internet and American Life Project (Fallows, 2005), the frequency of using search engines is increasing and will soon

match email as a primary Internet activity on any given day. Despite search engines' critical role in the distribution and eventual construction of knowledge, Hinman (2005) suggested that "their procedures are opaque, and they are almost completely devoid of independent oversight" (p. 19). With the increasing influence of search power, search engines have become a new subject, warranting recent political-economic studies to dissect its power structure (Couvering, 2004; Fabos, 2006; Hinman, 2005; Introna & Nissenbaum, 2000; Walker, 2005).

One practice that is often being criticized involves the inclusion of sponsored results along with organic search results. According to Hargittai (2004), sponsored link designations are sometimes ambiguous. This notion is substantiated by the Pew Internet and American Life Project (Fallows, 2005), which revealed that 62% of search engine users were unaware of the difference between paid and unpaid results. However, a focus group study of search engine users by Hotchkiss (2004) revealed drastically different results. In this study, 80% of users skipped sponsored listings and went directly to organic results, while only 16.6% of users said that they check out sponsored listings regardless of what they find in the organic results. Both the Pew Internet and American Life Project and Hotchkiss indicated discrepancies in the judgment of sponsored listings between major search engines, with Google users having the best understanding of which results are organic and which are sponsored.

Another central contention in political-economic studies is the argument that capitalism often gives greater privilege to those who possess greater economic power, thereby causing inequity. Walker (2005) wrote that one flawed assumption about the

Web is that all its nodes are equally accessible. In fact, several studies have charged that commercial search engines systematically exclude certain sites in favor of others or give prominence to some at the expense of others (Fabos, 2006; Introna & Nissenbaum, 2000; Walker, 2005). A study conducted by Introna and Nissenbaum (2000) showed that many of the leading search engines have an evident tendency towards giving prominence to popular, wealthy, and powerful sites. These researchers postulated that if this inequality of access continues, the phenomenon would inevitably worsen as the Internet expands. Their conclusion, however, is not supported by any empirical or anecdotal evidence; rather, it is based on an assumption that the existence of a certain type of search methodology is intrinsically affected by the influence of dominant interests.

In an empirical study, researchers investigated the link characteristics of highly controversial political topics such as the death penalty, gun control, and abortion on Google and Yahoo! (Hindman, Tsioutsiouliklis, & Johnson, 2003). The study showed that political information on the Internet remains concentrated. After crawling almost three million pages, it was confirmed that a only few sites accrued most of the traffic flow, suggesting that a normal user would be pulled toward those sites, rather than traveling to smaller and less popular ones. This study also found that website linking often mirrors well-established traditional organizations with only occasional newcomers. Even though a topic may be presented from many viewpoints and published cheaply on more popular or less popular sites, the latter are not necessarily easily accessible via major search engines. As a result, the somewhat surprising fact is that even if the Web's

technical architecture means in principle that any webpage is retrievable, not all pages are equally visible.

Other than the fact that search engines favor certain types of political information, studies also found that the new media gatekeepers are influenced by economic forces. Hargittai's (2004) investigation into the framing of content on search engines and portals concluded that these interfaces are heavily influenced by commercial motives. He argued that the commercial nature of positioning on major portals negatively influences the overall quality of information available to users. However, again because of methodological uncertainties resulting from the complexity and ambiguity of the Internet, the conclusion of a positive association between economically powerful organizations and their ability to influence search engine rankings has no anecdotal or empirical evidence.

The above arguments regarding both political and economic inequality on the Web are also relevant in understanding the practice of Google's PageRank system (Fabos, 2006; Walker, 2005). The PageRank system was designed according to the notion that the more links a webpage acquires, the more important a page is and, therefore, the page should be ranked higher. "Google drastically changed the search engine game by not simply counting keywords but using links as the primary method of determining the value and thereby the deserved visibility of a website" (Walker, 2005, p. 525). Under the PageRank mechanism, an initially prominent webpage will become even more prominent within the system, which is accelerated by the practice of search engine optimization (SEO). Fabos (2006) stated that Google's PageRank system "undermines the company's

own line about search engine result integrity" (p. 194). He concluded that the algorithm has been calculated to assure the democracy of the marketplace but not the democracy of ideas. Even though there is no direct evidence that a search engine's algorithm endangers the free flow of information on the Web, the coverage bias of commercial search engines has been proven to exist (Introna & Nissenbaum, 2000).

In December 2007, the PageRank update caused a widespread outbreak of concerned webmasters worrying about their future position on Google. Given the fact that many commercial websites, especially popular blogs, have been relying on selling text links on their sites to make money and for advertisers to drive more traffic to their sites, Google penalized those sites that intensively sell paid text links by actively lowering their PageRank position as a warning for deterring them from polluting the integrity of search results (Holoubek, 2007). Such prevalent SEO activities, to put it simply, indicate not only the important position search engines hold in the online ecosystem but also the significant fallout of the commercialization of the Web.

Concerning the business model of commercial search engines, Fabos (2006) noted that search engines once generated revenue through syndication and licensing, not advertising. For example, Inktomi, a search software provider, licensed its search technology to Yahoo!; and Teoma, an Internet search engine that is no longer in existence, syndicated to Ask Jeeves (Fabos, 2006). Syndication is a form of cooperation between companies. In the search engine context, syndication takes place when the search results of a search provider are reused by other sites that also offer search services but do not own a search technology. In other words, those sites that cannot generate their own

search results have to buy results from others. Syndication is slightly different from licensing, another major revenue source in the early search engines' business model. Through technology licensing, a licensed company is allowed to make, use, or sell a technology invented by the correspondent company, usually the licenser. In other words, a license simply allows people or entities to make, use, or sell inventions that they do not own without being prosecuted.

However, neither the syndication strategy nor the licensing strategy generated sufficient revenues for commercial search engines. Thanks to the increasingly commercialized Web, the key factors of a search engine's survival are its marketing and branding strategies, and these in accordance with the goal to increase the quantity of both users and advertisers.

The researcher in this study observed that the above information technologies not only facilitate the process of information commodification, but they themselves also become additional targets of this very process. This study is guided by the understanding that commodification is inseparable from a search engine's new business ethic. The usefulness of a search engine's technology has in fact been overshadowed by its ability to attract a substantial amount of advertising dollars.

By mapping the history of search engines from the early 1990s, when the technology was invented, to the late 1990s, when the selling of advertising space became the main source of revenue, one can notice that the social value of search engine technology has been transformed. Moreover, in line with this transformation, the present analysis helps readers to rethink the real value of the new media companies, search engines. Rather

than taking such socioeconomic change for granted, it is best to continue discussing which specific factors have altered both the nature of the consumer and his or her right of access to diverse information.

Method

Political-economic studies usually rely on qualitative research strategies and involve interdisciplinary knowledge. In this study, the analytical tools of the commodification theory are used to examine the dominance of modern search engines' new business model, to explore the social implications resulting from the transformation of the value of search technology, and to rethink the merit of the role of Internet search engines.

Historical Analysis

Observing and analyzing changes over time is essential to understanding why the contemporary landscape is the way it is. In fact, prior to the examination of the commodification of search, it is essential to read numerous books and articles dealing with the commercialization of the Internet as background to search engine commercialization. This study is presented via a historical analysis of early search engine industry, which will expose the development of the commodification of search and give a context of how the value of search engine technology was reshaped. In addition, such analysis will cite, at the end of this study, the commodities being exchanged and traded in the context of search engine commercialization.

The historical examination of the commodification of search engine technology is structured from 1990 to 1998, beginning with the discussion of the primitive function of early search engines and ending at the time when commercialization was notably confirmed. The first search engine identified was Archie, which was invented in 1990, before the growth of the World Wide Web (Search Engine History, 2007); and search

engine commercialization is considered to begin with the start-up company GoTo, and its adoption of paid placement among organic search results in 1998 (Fabos, 2006).

Sources

Meehan, Mosco, and Wasko (1993) wrote that sources such as trade publications, popular press, and government documents, though providing indirect evidence that can be closely aligned with particular industries or political agendas, can additionally provide anecdotes and diverse points of view.

In a historical analysis, caution is a necessity in that as time goes by, memories are distorted. Therefore, a researcher often relies on documents from various sources to objectively investigate the cause-effect relation between research objects. The advantage of a document analysis research method is that, on the one hand, it provides concrete evidence and a window into the past, allowing qualitative researchers to examine events, places, people, and systems thoroughly; on the other hand, most documents are created by authors who are contemporaneous with the events, which surpasses a method that utilizes interviewing, as interviewees may sometimes provide less reliable information because of memory distortion. In addition, document analysis is also an important method of data collection that is relatively affordable and provides information that is not accessible by other methods (Bryman, 1989).

In this study, most sources came from publicly accessible documents, including articles of magazines, newspapers, trade publications, and website archives. Thanks to the Internet, most of the desired documents can be conveniently accessed online through both library databases and popular websites that offer technology-related news. In

sorting out articles by the term *search engine* between 1990 and 1998, the following distribution of documents was found.

a. *ABI/INFORM Global* – This database covers business and economics-related articles from local and regional business publications. A total of 1,505 documents were found and 103 full-text documents containing the term *advertising* are reviewed below. The documents found include 8 magazine articles, 21 newspaper stories, and 76 documents from trade publications with the earliest article published on October 9, 1995 and the last one published on December 7, 1998.

b. *LexisNexis Academic* – This is a provider of legal, governmental, business and high-tech information sources. A total of 988 results were found when searching within the categories of *Major U.S. Publications*, *World Publications*, and *Web Publications* from April 13, 1990 to November 23, 1998. In narrowing the results by adding the search keyword *advertising*, 231 articles were sorted out, consisting of 121 articles from newspapers, 57 from magazines and journals, 56 from industry trade presses, 45 from newswire and press releases, 2 from aggregate news sources, 2 from web-based publications, and 1 from the category of newsletters. These are reviewed below.

c. CNET News.com – This site provides an online news archive search that allows searchers to review previous full-text news articles. A total of 804 results were found between November 17, 1995 and the end of 1998. Among the 804 results, 255 articles containing both terms, *search engine* and *advertising*, are reviewed. The site does not archive articles about search engines issued before November 17, 1995.

d. Others: websites and books – Search engine websites that list their company histories and professional websites, offering reliable search engine histories such as Search Engine Watch, are referenced. Books published in the early 1990s as educational tools for early Internet search engines, including those published later in the 2000s to show the rapid development of search engine technology, are also reviewed.

Search engine research is largely absent from the popular publications of the early 1990s because search engines were not commonly used. Even though articles retrieved from both *ABI/INFORM Global* and *LexisNexis Academic* cover those published between 1990 and 1994, they are mostly irrelevant. Early search engine stories, in fact, did not appear until a few years later, after the technology became popular and historians and scholars found it noteworthy. Therefore, to demonstrate the changing focus of search engines' business model so as to analyze the development of search engine commercialization, resources such as books and websites serve to compliment online databases.

As for the articles found on the two databases and CNET News, they are reviewed mainly to show, from 1995 to 1998, Internet search engines' dilemma of being a search engine for sending people away from their sites or being an Internet portal that holds the attention of users by displaying advertisements. There was a total of 589 articles, including 103 from *ABI/INFORM Global*, 231 from *LexisNexis Academic*, and 255 from CNET News. The stories published by CNET News are examined first among these articles because CNET News's single-source feature is considered to give this researcher

more consistency and a better understanding of the targeted development than can the multiple publications covered in an online database.

Reviewing these articles will not only help to present the development of the ultimate business model of search engines that rely on selling sponsored searches, but it will also help to develop a timeline of the commodification of search that stretches from 1990 to 1998. These two aspects are equally important in answering the following research question: How did search engine technology become commodified?

Results

In the early 1990s, the rapid growth of websites, from 130 in 1993 to over 600,000 in 1996, led to the rapid proliferation of online documents (Viney, 2007). Internet search engines were created to make information retrieval more efficient within the quickly evolving Web. Before search tools were ubiquitous, the use of search engines required a certain familiarity with computer languages. Only computer-savvy academics knew how to retrieve files by using search engines. In fact, during this primitive stage of search engines, there was no way to find something unless a searcher already knew the name and location of a file. One had to manually move through redundant and unorganized documents with very limited search capabilities. It would take hours or perhaps an entire day to retrieve the desired information. Between 1990 and 1994, Internet search engines were seen more as academic tools for sharing and retrieving online documents.

Creating Use Value, 1990-1994

Search engine technology was originally developed by students, faculties, and system staff members in university laboratories. The birth of the Internet search engine dates back to the early 1990s when Archie, the first Internet search program, was born. Archie was an archive search tool written in 1990 by Peter Deutsch, Alan Emtage, and Bill Wheelan at McGill University in Montreal, Canada in an attempt to look for public domain software out of the university's need to save money (Gilster, 1994). The search program indexed archives on File Transfer Protocol (FTP), a system that allows computers to exchange files on the Internet, enabling people to retrieve specific files by gathering and indexing all files that match a user's query. However, Archie had very

primitive search capability. The program did not index the content of text files. In other words, it only worked when a user knew the file name that he or she was looking for.

Subsequently, the capability of indexing the content of text files was developed at the University of Minnesota in 1991 and named Gopher. In addition to Archie, Gopher was another popular search and retrieval tool in the early 1990s, which provided a common interface for a number of information resources and gave users access to databases, library catalogs, and campus-wide information networks. In 1994, there were already more than 1000 Gopher systems running on the Internet. Instead of requiring one to type in domain names or addresses, the system let users use keywords or phrases in conjunction with the indexing tools Veronica and Jughead. Veronica and Jughead were developed at the University of Nevada in 1992 and at the University of Utah in 1993, respectively. When a user performed a search using Veronica, which listed all Gopher sites, he or she searched menu items accessible in the Gopher system rather than the Internet. Jughead was a variant of Veronica that allowed users to search a subset of Gopher hosts, rather than the entire Veronica index. Both search tools made the querying process more efficient in the Gopher menu system (Gilster, 1994).

What these early search engines lacked, however, was the ability to fully index documents. In other words, they could not link documents with diverse titles yet similar content. In 1989, MIT graduate Brewster Kahle starting developing the Wide Area Information Server (WAIS) while working at Thinking Machines, a supercomputer manufacturer (Gilster, 1994; Internet Archive, 2008). WAIS was a program for finding online documents, playing a similar role to Gopher as both were tools for organizing and

disseminating online documents. WAIS was the first search program to fully index all the text in Gopher and it soon supplemented Veronica, which indexed only the menu titles (Webopedia, 2003). In 1993, after the appearance and during the rapid growth of the World Wide Web, then beginning to be called simply the Web, Gopher gradually lost its popularity, while the Mosaic browser emerged as a contender. Shortly thereafter, WAIS was rendered obsolete and sold to America Online (AOL) in 1995 (Internet Archive, 2008; Schwartz, 1998). Even though the search system enjoyed only a brief presence on the stage of search engine history, it could still be described as the first genuine forerunner to modern search engines.

Architext, a precursor to the modern search engine Excite, was created in March 1993 by six Stanford undergraduate students before graduation, as they unanimously agreed that it would be more fun to establish a company instead of going out to find a real job (McIntyre, 2007). According to one of the software founders, Ryan McIntyre (2007), in 1993 the Web still lacked adequate tools for searching and discovering unstructured text, so the Stanford students decided to design Architext and soon formed the company Architext Software that same year. Excite was built in 1995 in an effort to create a business version after the six founders received considerable funding from venture capitalists who realized the company's potential (McIntyre, 2007).

On April 30, 1993, after CERN (the European Organization for Nuclear Research) announced that the Web was available to everyone on a royalty-free basis, Gopher protocol, which began charging certain users for licensing fees, started to lose its

popularity. An email released by the Minnesota Gopher Team on March 11, 1993, with the subject heading, "University of Minnesota Gopher software licensing policy," stated:

> In a time where we are having budgets slashed, it is impossible to justify continued (increasing) resources being allocated to Gopher development unless some good things result for the University of Minnesota. This is a fact of life. (Yen, 1993, para. 2)
>
> First, in the case of gopher servers run by higher education or non-profit organizations offering information freely accessible to the Internet, there is no change. No fees. They just continue to use Gopher like they have always done...Nothing's changed. (Yen, 1993, para. 6)
>
> In the case where gopher servers are being used internally by commercial entities we think a license fee is right. (Yen, 1993, para. 7)

The licensing policy was outlined as a three-tier program to offer different Gopher server licenses to institutions of higher education, small businesses, and larger corporations. In general, Gopher licensing took the form of an annual fee based on the size of the firm using the software. It remained free to nonprofits, educational institutions, and individuals. However, licensing caused controversy as the Gopher software was first released under a special "acceptable use policy" prohibiting use of the federally sponsored NSFnet (National Science Foundation Network) backbone services for commercial purposes (Frana, 2004).

On February 28, 1993, in response to Gopher team's licensing intention, Vielmetti stated that since some of the source code was actually not copyrighted or under a free software license, it was vague and unclear how the team would charge users. Vielmetti questioned, "Can I even use the code that I contributed to the project without having to buy it back?" (Frana, 2004, p. 30).

In fact, after the Web's privatization, the commercialization of competing information systems was not unusual. Before Gopher proposed its licensing policy, Archie had left its university base and became a commercial product marketed by Bunyip Information Systems. Netscape Communications had taken over the Mosaic browser and turned it into a $2.6 billion initial public offering, while WAIS had always been a proprietary technology because its development was supported by Thinking Machines, a commercial enterprise (Frana, 2004).

However, the capabilities of the above search programs were still very limited and none of them allowed an extensive Web search. The world's first Internet search engine was World Wide Web Wanderer (WWW Wanderer), which was developed in June 1993 by Matthew Gray at MIT in an attempt to systematically discover and to collect new sites while the Web was still small (Witten, Gori, & Numerico, 2007). As the Web began to grow at a nearly exponential rate, however, the focus soon turned to measuring the growth itself. Gray used the crawled results to build an index and added a search front-end. In this way, an essential feature of modern search engines was invented.

At the end of 1993, three other Internet search engines also surfaced: JumpStation, the World Wide Web Worm (WWW Worm), and the Repository-Based Software Engineering (RBSE) Spider (Mauldin, 1997). Each of these had its individual way of indexing and retrieving webpages. It must be noted that both JumpStation and WWW Worm did not rank sites according to the relevance to a user's query. Instead, they produced a list of matching documents in database order. By contrast, the RBSE Spider

and WebCrawler, the latter appearing in early 1994, were the first Internet search engines to implement ranked-relevance retrieval (Mauldin, 1997).

None of the above search tools, invented between 1990 and 1993, performed adequate link analysis or cached full webpage content. Consequently, if users did not know the exact file name of what they were looking for, it would be extremely hard to find the desired information.

Modern Internet search engines. Before 1994, a user could only search through URLs or descriptions. The WebCrawler search engine, developed by the Ph.D. student Brian Pinkerton at the University of Washington, was the first of its kind to index full webpage content, thereby leading the trend of full-text indexing (Witten et al., 2007). Released in April 1994, WebCrawler quickly became an Internet favorite (Notess, 1995, July).

In 1994, three soon-to-be well-known Internet search providers were launched: Yahoo!, Lycos, and Open Text. Yahoo!, which stands for Yet Another Hierarchical Officious Oracle, was developed by David Filo and Jerry Yang in April 1994 (Tanaka, 1995). The search tool was originally known as a catalog of Internet resources listing interesting sites with information about computers, art, movies, sports, cartoons, and so on. As a result, Yahoo! was not really classified as a search engine. Instead, it was generally considered a searchable directory. But eventually the site automated some aspects of the gathering and classification process, blurring the distinction between a search engine and a directory. The search company is currently known as the most trafficked Internet portal. In 2003, Yahoo! successively acquired both Inktomi and

Overture. These acquisitions displayed an ambitious effort, on the part of Yahoo!, to combine both the acquired search technology and the search advertising expertise to compete with the fast growing search giant Google.

Lycos was created at Carnegie Mellon University in July 1994 with a catalog of 54,000 documents, providing relevance ranking of search results to users (Mauldin, 1997). In the paper, *Lycos: Design choices in an Internet search service*, written by Dr. Michael Mauldin, the creator of Lycos, the increasing need of Internet search services and the value of the search engine are addressed:

> Between the summer of 1993 and the end of 1994, an explosion of Internet search services changed the way people use the Internet. Before then, users could only browse pages, clicking on likely looking hypertext links: a process that David Eichmann likened to starting in one city and driving around until you found a road that leads to your destination. Since 1994, most people start their Internet surfing at either a search service or a directory service, and these have become the roadmaps to the Internet.
>
> Changed, too, is the way we view information retrieval. In 1993, IR was a field for researchers, librarians, and information specialists. Today, IR is a consumer commodity, with millions of users every day. The key to that transformation was that services like Lycos were made freely available to the public, with simple interfaces and large databases that let their users rapidly find Web pages relevant to their areas of interest. (Mauldin, 1997, Impact section)

Another Internet search engine named Open Text also made its appearance in 1994, evolving from the Oxford English Dictionary research project, which began in 1991 at the University of Waterloo, Canada. The dictionary was digitized and searchable (Open Text, 2008). In the following four years, more Internet search engines made their debuts. See Table 3 below.

Table 3

Timeline of Major Search Engines' Debut from 1990-1998

Year	Web Search Engine	Developer	Renamed
1993	Aliweb	Martijn Koster	
	WWW Wanderer	MIT	
	WWW Worm	University of Colorado	
	JumpStation	N/A	
	RBSE Spider	N/A	
1994	WebCrawler	University of Washington	
	Lycos	Carnegie Mellon University	
	Open Text	University of Waterloo	
	InfoSeek	Steve Krisch	Go Network
	Yahoo! Directory	Stanford University	Yahoo!
1995	Magellan	N/A	
	Excite	Architext Software	
	AltaVista	DEC	
1996	Dogpile	InfoSpace Inc.	
	Inktomi	UC Berkeley	
	Ask Jeeves	Garrett Gruener and David Warthen	Ask
	HotBot	Wired Ventures	
	Snap	CNET	
1997	Northern Light	Northern Light Group	
	GoTo	GoTo.com, Inc.	Overture
	Google	Stanford University	
1998	MSN Search	Microsoft	Live Search

Today, commercial search engines tend to take the selling of sponsor listings for granted and most users do not see any problems with it. However, this was not the case for early search engines, which either relied on the sales of server software or depended upon technology licensing; these were the situations for WAIS and Gopher, respectively.

The absence of advertising on early search engines was likely because of the inchoate e-commerce environment and relatively low Internet usage. But it must be noted that even if the adoption of selling advertising space became customary in the mid-1990s, most ads were not associated with search results. The inclusion of advertisements along with search results was, to some extent, unacceptable because the neutrality of results became compromised and hence users were suspicious. But today, the close alliance of advertisers and search engines has become both typical and blameless.

Building up Exchange Value, 1995-1998

The success of Internet search engines has always depended on finding the right business model. The Internet underwent commercialization in 1995, which was the same year that many early Web resource-finding helpers were being commercialized (Notess, 1995, December). Many Internet search engines' addresses were switched from .edu to .com. WebCrawler, Yahoo!, and Lycos, three university-based engines, all went commercial in 1995. Other search services, e.g., InfoSeek Guide, were at the same time developed as strictly commercial services.

At the same time, users' reliance on Internet search engines was gradually increasing. As finding a website became more and more difficult because of the Web's unstoppable growth, surfers had to utilize an engine or a directory to find desired sites. This ultimately made advertisers realize that the Internet gateway was a place full of potential consumers. Following the path of traditional advertising, the sale of banner ads with eye-catching graphics soon became commercial search engines' favorite business model.

Thanks to advertising income, search companies grew larger. Open Text, Lycos, Excite, Yahoo!, and InfoSeek successively went public in 1996. Most of them used similar tactics by offering contents and free online services to cultivate long-term returning users and therefore advertisers. In 1997, these search companies began competing for the position of the default Internet starting point in hopes of attracting as many visitors as possible, with Yahoo! soon winning the title.

A major problem inherent to successful Internet search engines that relied on university equipment was that, as soon as they became well-known, they were flooded with users and their original servers were unable to handle the increased load. This happened with the first Archie server at McGill University, the first Veronica server, and then with modern search engines: WebCrawler, Yahoo!, and Lycos (Notess, 1995, December). In the early days, it was not uncommon for a search engine user to get a failed search response resulting from a high system load. The failure often led users to look for an alternative. As a result, these popular search engines had to become commercialized in order to generate stable profits to upgrade their systems. The first step was to move the projects outside of the academic laboratories.

From .edu to .com. Yahoo! was the first major search tool to become a dot-com company. The directory company was founded on March 5, 1995, after its search service became so popular that the system's incredible traffic load adversely affected other computer systems at the Stanford campus. Two developers, Filo and Yang therefore started looking for sponsors and proposed to go commercial. In early 1995, Marc Andreessen, co-founder of Netscape Communications, invited Yang and Filo to move

Yahoo! to the larger computer system housed at Netscape (Whiteley & Wiloch, 1999). The portal giant's address then changed from http://akebono.stanford.edu/ to the business URL *http://www.yahoo.com/* (Notess, 1995, December).

Similarly, WebCrawler had its URL changed from http://webcrawler.cs.washington.edu to http://webcrawler.com in June 1995, right after the first full-text search engine for the Internet was acquired by AOL to solve the problem of system overload (McGraw, 1995; Notess, 1995, December). In fact, after the search engine's campus address changed, a number of companies invested in its server equipment to ease the load, but there was no solution to the bandwidth issue. At one point, the service was entirely unusable during daytime hours. Finally, AOL, after buying WAIS and in its quest to expand its Internet service, quickly resolved the issue by purchasing the company and running it on its own network as a public service (Notess, 1995, December).

The commercialization of Lycos took a different path. In the article, *Searching the World-Wide Web: Lycos, WebCrawler and more*, published in July 1995, the author recounts the story of how the project became popular:

> When Netscape Navigator was first widely released in late 1994, the people at Netscape Communications Corporation wisely set up a page that listed various Internet search tools. In one quick and dirty comparison, they ranked them based on the results from a simple search on surf. Lycos retrieved the most documents and therefore was the first of the listed Internet search tools. Due to its prominence on the Netscape Internet Search page, Lycos's load has increased so greatly that it can be difficult to get any response at all. (Notess, 1995, July, para. 5)

On June 19, 1995, within days of AOL's purchase of WebCrawler, CMG@Ventures, a strategic investment and development company, purchased the

exclusive rights to Lycos Spider Technology from Carnegie Mellon University and formed a new company, Lycos, Inc. (Rodriguez, 1995; "Venture Acquires Lycos," 1995). The company then changed its address to http://www.lycos.com/ from its previous academic URL, http://lycos.cs.cmu.edu (Notess, 1995, December, 1995, July).

Whereas these three search engines' services remained free even though they had moved into the commercial realm, advertising sales were gradually becoming a common means of supporting free Internet services. For example, in addition to licensing, Lycos began to offer advertising space on its site to maintain the traffic flow of nearly 3.5 billion hits per week (Notess, 1995, December; "Venture Acquires Lycos," 1995).

The commercial origin. Limiting the number of users by charging a service fee was another attempt to solve the overload problem. InfoSeek, which was founded in 1994, was the first pay-for-use Internet information service provider. The company hoped to profit by providing the retrieval service at a cost of 10 cents per query after a free three-month trial (Metcalfe, 1994). In February 1995, InfoSeek Search was officially launched and the subscription fee was $9.95 per month for users to search the entire Web of commercial databases. At that time, it was the only retrieval service to expand the scope of searches to include commercial databases (Booker, 1995). However, InfoSeek peaked in popularity during September 1995, after teaming up with Netscape to become the default search engine for the Netscape browser, thus providing a free Web search service ("InfoSeek's free WWW search service," 1995).

Excite was another search engine created for profit. As mentioned earlier, Excite was originally called Architext. In 1994, several venture capitalists funded the Architext

project. The six project developers were therefore urged to figure out a business model. They then decided to launch a commercial search engine. Excite.com was launched in October 1995 and quickly sold million-dollar advertising sponsorships (McIntyre, 2007). In November 1996, directly after its purchase of the Magellan search engine, Excite bought WebCrawler from AOL and thus became the exclusive search engine and directory service for AOL (Angwin, 1996; CNET News, 1996, November 25). After these acquisitions and continuously increasing advertising income, Excite became the second profitable search engine after Yahoo! (CNET News, 1997, January 31).

After the debut of several commercial search engines, and at the end of 1995, Digital Equipment Corporation (DEC) launched AltaVista as a showcase for its high-speed servers with the capability of running database software at much faster rates than its competing systems (Beatty, 1996). It was the first commercial-strength, Web-based search engine available to the public. However, the search service was not designed to make a profit at the very beginning:

> According to the company officials, the idea is to show off the power of technology, not to make money. (CNET News, 1995, para. 2)

AltaVista soon grew so popular that it was arguably the Google of its day. With this in mind, DEC decided to turn the company's Internet search technology into a commercial software product that could be sold to both PC uses and corporate intranet servers. At this time, unlike Excite, Yahoo!, and Lycos, the search site did not sell advertising, but it would eventually do so at the end of 1996 (CNET News, 1996, May 7; McDonald, 1996).

The Wall Street allure.

> A well capitalized company through an IPO will be better off to buy up other companies and to offer more competitive rates to advertisers. The timing is ripe. ("Search engines uncover IPO gold," 1996, para. 4)

This quote is by Michael Balmuth, the principal of Broadview Associate—now Jefferies Broadview, a company that specializes in the mergers and acquisitions of information technology, communications, and media industries—when he was interviewed by *Interactive Daily* in March 1996, in regard to a number of commercial search engines announcing their initial public offerings (IPOs), including Lycos, Yahoo!, Excite, and InfoSeek ("Search engines uncover IPO gold," 1996).

The Internet search engines' IPO frenzy occurred in 1996. In fact, Open Text, a Canadian search engine company, was the first to announce its IPO, which took place in January 1996 (Open Text, 1996). On April 2, 1996, Lycos became the first U.S. search company to hit Wall Street, while two big competitors, Excite and Yahoo!, successively launched their IPOs during the same month (Aguilar, 1996; CNET News, 1996, April 2). Two months later, InfoSeek became the fifth search engine company to enter the stock market (Shelton, 1996).

As Internet search engines became more commercially oriented, their developers started shifting the focus to marketing. The continuous launch of new features and free online services in 1997 was the first evidence of branding. This was a direct way to differentiate one company from another. At the time, advertising income occupied a large portion of the total revenues of a commercial search engine. InfoSeek, for example, one year after its IPO, only had less than 5% of revenues coming from its software

products (CNET News, 1997, April 18). Needless to say, the eventual marketing goal pursued by the dot-com superstars was to allure as many advertisers as they could.

The Internet portal war.

> In 1996, the distinction between search engines, online services, and free centralized sites was fairly clear. In 1997, the lines began to blur and have grown increasingly fuzzy. (Kornblum, 1998, para. 6)

> In the late 1990s the goal was not to send people away from your portal, as search did. It was to keep them there. (Battelle, 2005, p. 84)

Internet portals served as entryways to the Web. Beginning in 1997, the most important policy of search-engines-turned-portals was to attract as many eyeballs as possible in order to boost advertising revenue. In 1996 and 1997, several new search engines, including Inktomi and HotBot, were still springing up (CNET News, 1996, May 20). To prevent themselves becoming ordinary search tools, popular search sites such as AltaVista, InfoSeek, Excite, Yahoo!, and Lycos, revamped their sites and added new features such as chat, free email, road maps, classifieds, and telephone business directories. In this way, users would then consider these sites as good, all-inclusive default pages from which to navigate the Internet. Portals organized sites by TV-like channels such as sports, arts and entertainment, business and investing, computer and Internet, and so on. This idea made surfing the Internet much easier and resulted in companies like Microsoft and Netscape following suit:

> They all seemed to figure out the same secret recipe for success on the Net and then raced to their virtual kitchens to cook it up. It goes something like this: Create channels featuring the different aspects of the Net such as news and shopping; add hot content; and throw in a few spicy goods, such as free email or instant messaging clients. Then entice surfers to your page, tempt them to stay there with delicious content, and then lure them back again and again. (Kornblum, 1998, para. 8)

> That's the best way to catch Web denizens' eyeballs, and attracting hordes is what any site must do to sell a lot of advertising banners. (Lake, 1998, para. 2)

In early 1997, less than a year after going public, Yahoo! announced that it became the first search company to turn a profit. A few months later, Lycos became the second profit reaper. Both Yahoo!'s and Lycos's profitability soon inspired other companies, which consequently increased banner advertising and its commensurate income (Grady, 1997).

The portal frenzy highlighted the contradiction inherent in the commercialization of the search engine: The main aim of a search engine is to send users to other sites and therefore away from the initial site, yet advertisers were generating profits largely by attracting users to view and click banner ads, thereby detaining these users and disallowing them from quickly passing elsewhere. However, financial analysts suggested that the profits from this business model were not sustainable in the long run as online advertising at that time occupied only a small portion of all advertising spending and banner ads were easily ignored by most Internet users. The need to develop a more profitable business model was at stake. The first step was to seek partnership with popular e-commerce sites such as Amazon.com, which would grant the search engine company a certain percentage of online transactions, thus creating an additional source of revenue (Galante, 1998). But the reliance on advertising sales never ceased.

In the meantime, these new search engine portals were distracted from furthering search technology. Search was considered good enough and there was no urgency to improve it. The surprising successes of GoTo and the dark horse Google were, in fact,

aided by this major lapse in quality search results. Both GoTo's improvement of its search technology and its association with e-commerce helped to draw a new picture of the search market and the online advertising industry.

Commercializing search results. While Yahoo!, InfoSeek, Excite, and Lycos were deriving their revenues from selling banner space, in June 1996, the Canadian search engine, Open Text, initiated a preferred listing service, which gave paying Web publishers a guaranteed top placement in search results (CNET News, 1996, June 21). In general, most search sites that provided advertising services at the time tried to avoid displaying obnoxious and obtrusive ads, which now commonly exist in other media and even in many Internet banner ads. With the launch of the preferred listing service in 1996, search engine ads became obtrusive and remain so to this day.

The idea of selling preferred placement among Open Text's search results was suggested by Lilly Buchwitz when she served as the company's marketing director. In 1996, the Web was already full of banner ads, a fact which Ms. Buchwitz used to her company's advantage, thus creating the idea of selling preferred placements among the results of Open Text searches (CNET News, 1996, June 21; Kapica, 1996). The service was considered extremely efficient in that the majority of users would unavoidably be drawn to the top search results, the location of which was paid for. The marketing director explained this idea in an interview with CNET News in June 1996:

> This service was in response to market demand. I have so many people calling me saying, 'Can we pay you to be in the top-ten results?' Eighty-five percent of our users will only look at the first ten results of a search. (CNET News, 1996, June 21, para. 7)

The preferred placement service, however, soon drew criticism and heated debate. For most search engine users relevancy is foremost. The best search engine is always considered to return the most relevant results regardless of the search term or query. Concerning search results that utilized the preferred placement service, opponents and other search engine companies argued that a good search engine was not supposed to list results based on advertising dollars, for this would endanger the integrity of search results by juxtaposing advertising with editorials. It would also hurt those companies that do not have sufficient advertising budgets:

> If the goal of a search engine is to be the best possible search engine, then including less relevant sites at the top of the page defeats its purpose, argued Suzanne Lainson, a web marketer. (Kapica, 1996, para. 10)
>
> Open Text Index represents itself to reveal Web sites in a relevant order. With the yellow pages, listings are delivered alphabetically. There's no illusion there, said Bob Davis, CEO of Lycos. To me, this damages the integrity of the search service. This is like librarians putting books on the end [of a bookshelf] if you pay her some extra money. We would not do it with Lycos. (CNET News, 1996, June 21, para. 9)
>
> If money can buy position on the web, wrote A. Rothman of Ontario, it has the potential of hurting those companies that cannot generate sufficient cash flow to incorporate a meaningful advertising promotion to get the exposure necessary on the web. (Kapica, 1996, para. 11)

In opposition to these criticisms, there were people on the side of Open Text. Supporters suggested that search engines did not have the obligation to maintain the editorial objectivity that journalists strive for:

> Everybody expects *The New York Times* to adhere to journalistic integrity, but I don't think it should be anyone's expectation of a search engine on the Internet, said Rosalind Resnick, president of Net software and marketing company NetCreations. (CNET News, 1996, June 21, para. 5)
>
> I could see placing the 'paid hits' in a separate category at the top of the listings and indicating that that's what they are, argued Rich Meislin of *The New York*

> *Times*. I can see boldfacing them and having them appear in order, *à la* the phone book. (Kapica, 1996, para. 9)

Open Text insisted that the service was akin to a phone company's directory as both provide comprehensive listings that contain larger, more prominent ads for the advertisers who pay for them. Ms. Buchwitz responded to the critics of her company's search result method, saying:

> The biggest criticism I got was that I was blurring the line between advertising and editorial.
> But we don't -- the ads are clearly marked. (Kapica, 1996, para. 13)

At a time when most search engines ranked sites based on keyword density or mathematical algorithms, Open Text's controversial preferred listing service was doomed because of the distrust it caused in consumers (Clark, 1998). Concerning the deception involved in juxtaposing advertising and editorial content, Margie Wylie, former editor at the industry newsletter *Digital Media*, stated: "That division between editorial and advertising is more important on the Web than ever. If you lose your credibility, you lose your stock in trade because you're selling information" (CNET News, 1996, June 21, last para.).

Two years later, and in keeping with the widely held notion of the Internet's unpredictability, a new search site, adopting an idea similar to Open Text's pay-for-placement business model, turned out to be a success. Even though there remained some controversy over search result bias, its negative portrayal in the mass media was relatively minor. Instead, the site became so popular that other Internet search engines, including the latecomer Google, began imitating its business model. The site that indirectly created the Google legend was GoTo.com, which was founded in late 1997.

The New Business Model

At the end of 1997, the selling of a preferred listing service turned out to be the aggressive modus operandi of GoTo's founder, Bill Gross (Battelle, 2005). He contended that the market should have the final say. The position of an advertiser's ad should be decided by how much an advertiser pays; the greater the amount paid translates to a higher placement on the webpage:

> The GoTo model recognizes the dramatic shift that has taken place on the Internet since its inception. No longer an egalitarian playground for the tech-savvy community, it has become the focus of corporations and commerce and invaded by the masses. (Business Wire Writers, 1998, para. 9)

Unlike Open Text, GoTo emerged when e-commerce was growing with foreseeable potential. According to the U.S. Census Bureau (2003), the percentage of Internet use at home for people 18 years old and older grew from 16% in 1993 to 35% in 1997, eventually reaching 82% in 2003. In 1993, the Internet was still too young for online shopping. But toward the end of October 1997, shopping occupied 15% of total home Internet use (U.S. Census Bureau, 2003). Founded in late 1997, the commercial search engine GoTo, later renamed Overture and sold to Yahoo! in 2003, was the first search engine to successfully rely on selling sponsored search (Battelle, 2005).

Originally, GoTo's mission was to generate good traffic, the traffic of consumers who have the intention of using a business's goods or services (Battelle, 2005). Despite the fact that there were already many search players in the market, searchers still received a considerable number of irrelevant results and spam, even from the most popular search engines and directories. The undifferentiated traffic drawn by poor search results could negatively impact a search engine's advertising business. To prevent spam from creeping

through Internet search engines, which would result in a large quantity of undesired traffic, GoTo's Bill Gross initiated a pricing plan associated with listings and began combining the algorithmic searches with a database of advertisers (Battelle, 2005). This move was based on the assumption that search results get better when the listings are paid for because advertisers who can afford to pay for such spots and ads are often better qualified, and hence, more relevant to a consumer's query.

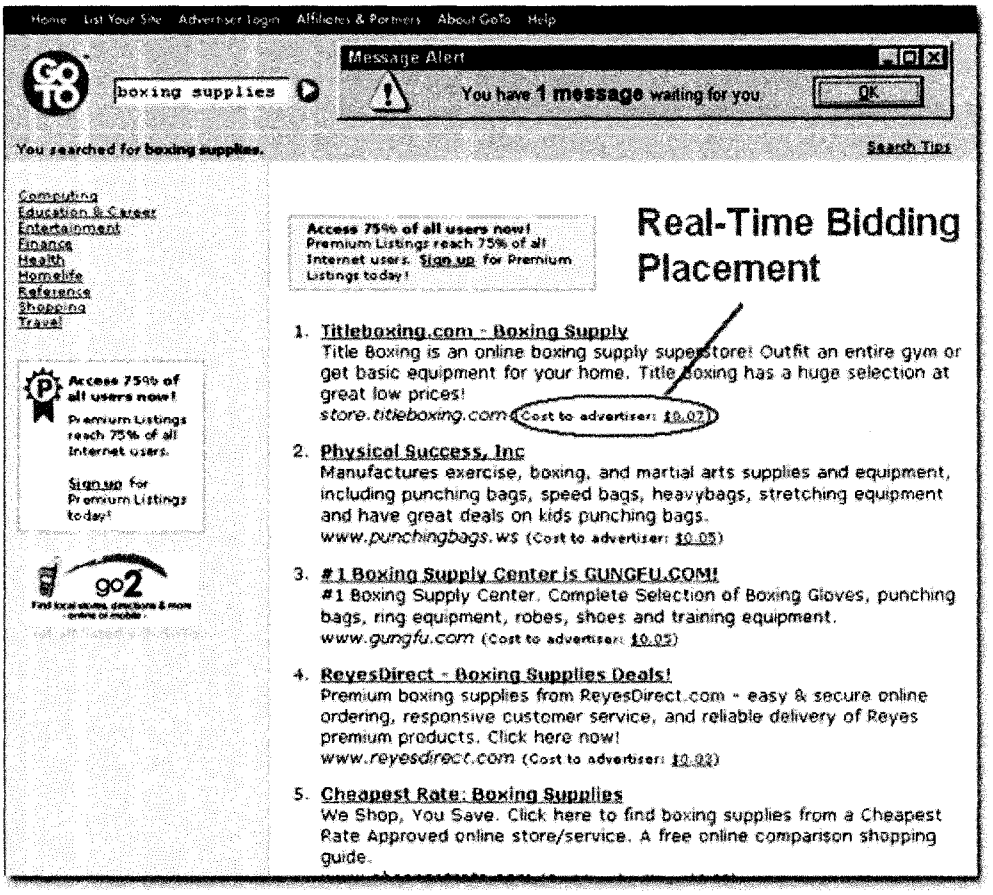

Figure 4. GoTo posted the per-keyword pricing for each click-through so that websites could bid for higher placement within a list of search results of any given topic. At the same time, consumers clearly understood that placement on the list reflects a website's desire to reach them.
Original Picture Source: Plaza Digital (n.d.). Edited by the researcher.

This concept could prove controversial because many Internet users seek information that does not necessarily come from the largest companies. In fact, this service viewed Internet users as consumers and visualized the Internet as one gigantic shopping mall. But what if a surfer is not looking for a business or a product? *The Wall Street Journal* set up a small experiment and searched for the pop artist Sarah McLachlan on both GoTo and Yahoo!, and found that the results produced by GoTo were mostly irrelevant compared to the lists returned by Yahoo!. One obvious reason for GoTo's

failure in this case was that it could not find any bidders for the search term, and therefore could not return relevant material ("A closer look: Going, going..." 1998).

However, GoTo's success could be attributed to its initiation of the pay-per-click pricing model. In this service, both consumers and other advertisers could see how much each advertiser was paying. GoTo's advertising business was grounded by this performance-based pricing model and the company received payment only when a consumer visited the advertiser's site rather than simply glancing at the listed link, which defeated the usually untraceable ad spending in traditional media. This process shows that the interplay between consumers and advertisers could determine the value of a given click-through. With users clicking on sponsored links that effectively steered traffic to the pages of paying customers, advertisers were literally lining up to do business with GoTo. In July 1998, the search engine signed up more than 1,000 paid advertisers (Business Wire Writers, 1998). The number of GoTo's advertisers had reached more than 15,000 by September 1999 (Lucas, 1999).

The rise of Google. In September 1998, while GoTo enjoyed its advertising glory, Google Inc. was quietly incorporated (Battelle, 2005). This dark horse distanced itself from other competitors by not competing to be the default portal, but rather by developing its powerful search capability with a simple and clear interface on its website.

The giant's origin could be traced back to the work of Larry Page and Sergey Brin, two Stanford University Ph.D. students, who published a paper in 1998, entitled, *The Anatomy of a Large-Scale Hypertextual Web Search Engine* (Battelle, 2005). The motivation for the project was a simple yet ambitious interest: retrieving relevant

information from a massive set of data on the Web (Google, 2007). The uniqueness of Google's search technology is that it not only analyzes the words on a webpage, but also looks at what other sites are linking to that page. This proprietary algorithmic system is widely known as PageRank.

PageRank was inspired by academic citation analysis, in which the more frequently a work is mentioned by other papers, the more academic importance it possesses. Guided by this idea, Page and Brin found that a raw count of links to a page would actually be a useful reference to that page's rank. Soon this innovative search technology brought more and more traffic to google.stanford.edu, and the two Ph.D. students realized that they could not afford to support the service anymore unless they ran Google as a business (Battelle, 2005).

At the inception of Google's business, the company did not have a clear business model to generate sufficient and stable cash flow to satisfy venture capitalists. During the late 1990s's Internet boom, the two founders were urged to deliver a viable and profitable business model. Despite the start-up's adamant position of rejecting the sale of advertising along with search results, the company was gradually pulled into the advertising debates. In their academic paper introducing Google, Page and Brin (1998) clearly wrote:

> Currently, the predominant business model for commercial search engines is advertising. The goals of the advertising business model do not always correspond to providing quality search to users. For example, in our prototype search engine one of the top results for cellular phone is "The Effect of Cellular Phone Use Upon Driver Attention", a study which explains in great detail the distractions and risk associated with conversing on a cell phone while driving. The search result came up first because of its high importance as judged by the PageRank algorithm, an approximation of citation importance on the Web. It is clear that a search engine

> which was taking money for showing cellular phone ads would have difficulty justifying the page that our system returned to its paying advertisers. For this type of reason and historical experience with other media, we expect that advertising funded search engines will be inherently biased towards the advertisers and away from the needs of the consumers. (Page & Brin, 1998, p. 18)

However, near the end of 1999, the founders compromised by selling text-only ads on Google. Because of its clearly superior search technology, Google drew plenty of traffic to its site, and the advertising business proved a success. In 2000, Google formally launched AdWords, a keyword-targeted advertising program that enables advertisers to purchase keywords, keyword phrases or categories to target potential customers (Google, 2007). Today, this business model is the money maker of most commercial search engines.

Discussion and Suggestions

Even though many early Internet search engines moved from universities into the commercial realm, their free availability remained unchanged. To support the freely available service, search companies usually make money from selling advertising and, to a lesser extent, from licensing. Generally speaking, driven by the power of capital, Internet search engines were continuously moving toward the interests of capitalists.

In this section, the research question of how search engine technology became commodified will be answered. As noted in the above introduction, commodification means the transformation of relationships, previously untainted by commerce, into commercial relationships of buying and selling. The continuous commercialization of search has been involved in building and creating exchange value, a value more quantitative than qualitative. This exchange value has overshadowed use value, from which arise the discussion and the identification of search commodities. A commodity has been defined as something produced in exchange for something else. The use value of finding relevant information on the borderless Web was made real by university-born search engines, but they quickly turned into companies that relied on licensing technologies for their business models. As these companies grew, the search for a more profitable model became more urgent than the improvement of software and service products. The use value of search engine technology gradually transformed into a value of commerce, the extent of which occurred between 1995 and 1998, and profit became the watchword of the day.

The Commodification of Search

The commodification of search engine technology begins with the creation of exchange value and with the production of search commodities. To explain the commodification of search, the commercialization of search technology must first be discussed. Commercialization turned the technology into a tradable product and named a price for its use. Furthermore, with ongoing commercialization and the appearance of the advertising business model, there was a continuous creation of exchange value out of the new technology. However, the extended creation of exchange value did not improve or develop any use value of the new technology, in much the same way that the addition of email account and content services to search engine portals did not improve the latter's result relevancy. Rather, the services were added simply to draw more users for advertising dollars, and these search-engine-turned portals worked in ignorance of the core value of being a search provider, that is, providing a powerful and useful search technology.

The continuous creation of exchange value necessarily leads to the production of search commodities, which is performed under the indispensible coexistence of search technology and the advertising business model.

Search engine technology as a commodity. In fact, the commercialization of university technologies is explicitly encouraged under federal technology transfer policies (AUTM, 2008). An analysis of federal technology transfer policies is another complex yet welcomed study of political economy but one that is beyond the scope of the present study. Here, readers simply need to understand that these policies were

established to stimulate and support the creation of inventions, which are in turn patented for lease or sale. Federal technology transfer policies play an important role in ensuring that research ultimately benefits the public.

The licensing search technology demonstrates the conversion of students' labor power, in the forms of intelligence and creativity, into a tradable commodity. This conversion is a major part of the debate over political economy and intellectual property rights. On the one hand, the technology is a product produced by students and professors who dedicate their time and labor power, as intelligence, while being supported by university resources, the means of production. The inventors exchange their labor power for academic fulfillment and later share a percentage of the royalties when the technology is successfully commercialized. On the other hand, universities who own the means of production, the resources to support the invention, can be viewed as employers who own the intellectual property of the technology. Moreover, by earning the licensing royalties annually, these academic institutions also become the owners of the surplus value, which is over and above the value paid to support the invention. Simply put, the first step of the commercialization of search engine technology is the transformation of useful technology into a saleable commodity.

Furthermore, based on Marxism, which views accumulating capital as the primary goal of a capitalist society, capitalists are first in line before the public to benefit from the commercialization of academic research. The development of search engines' advertising business model was initiated by the momentum of capital, in the hopes of getting the highest returns in the shortest time. The overwhelming presence of

advertisements on search engines' webpages is unnecessary and definitely not beneficial to a searcher's query. Although search advertisements are sometimes useful to online consumers who already have the intention to shop, this is not the case for most Internet searchers. As the social value of search technology has been gradually replaced by its market value, search companies have had to focus on building up exchange value in order to produce more commodities that attract both consumers and advertisers.

Service as a commodity. Since the late 1990s, the major business model of Internet search engines has relied on offering services instead of selling their proprietary technologies directly for profits. Service is no doubt the most important commodity for modern commercial search engines.

Commercial search providers have been offering, from 1995 to the present, two very different products, search services and advertising services, which aim to serve users and advertisers, respectively. But which service is the real commodity of commercial search engines? In fact, Internet search engines are always expected to serve users, not advertisers. Although there are researchers who have argued that commercial search engines are doing the exact opposite, the first search engines were not created out of commercial interests. As a result, the search service is considered the primary commodity of search providers.

However, under the principle that individuals deserve the right to access public information, this commodity does not generate the expected surplus value for capitalists, for it is inappropriate to charge users for searching. At a certain level, commercial search engines' current business model is similar to that of traditional media. Based on Mosco's

(1996) theory of media content commodification, which involves transforming messages and information into marketable products, Open Text and GoTo, as the forerunners of commercial search engines, turned search terms into commodities for purchase by advertisers. Both audiences of search engines and traditional media consider information a free resource, so the content production fee is necessarily paid by advertisers. Through the advertising mechanism, the surplus value of a free search service is created out of the interaction between users and advertisers. The commodification of search could not take place if advertising was not involved.

Therefore, service commodification is the act of exchanging a free service for user traffic. During the Internet portal war, commercial search engines added new features and non-search services ultimately to gain more users, the traffic of which generated greater advertising dollars. Selling banner ads was then the major income source. The value of search technology actually depreciated as big commercial search providers, such as Yahoo!, Lycos, InfoSeek, and Excite, were all focusing on providing content and free services that had nothing to do with search, in an attempt to retain users long enough to view their banner ads. The fact that search technology was the core value of search businesses was briefly eclipsed during the portal frenzy.

In 1998, after the portal war began to cool down, the awareness of the importance of a powerful search technology reemerged. Since GoTo's bidding-placement model gained popularity, conducting a Web search has involved numerous processes of exchange. A normal search process starts with a user typing in one or multiple keywords of interest in the search field of a commercial search engine. The search engine's

algorithm system then quickly scans relevant webpages from its database that contain the queried keywords, and in less than one second returns relevant results that match the user's query. Setting aside the issue of how the engine ranks results, the returning of relevant results is not the finale of a commercial engine search. On a commercial search provider such as Google, on which, according to Nielson Online (2007), an estimated 4 billion search queries were conducted in September 2007 alone, the queries entered by users become meaningful and valuable only if they match the keywords that advertisers paid for to display their ads.

Strikingly, search after 1998 differs from search of 1994, when the role of advertising was trivial. The commodification of search, therefore, regardless of the ad formats, is a process of commodity exchange that takes place between users, commercial search engines, and advertisers. Not only have search technologies and information services become commodities, search engine users have also been transformed.

Users as a commodity. With more users clicking on a paying advertiser's ad, more advertising dollars are stockpiled for the new media giants. In this process, search engine users are entirely commodified. Based on the theory of audience commodity, commercial search engine users are materialized and quantified as data, e.g., a click-through, then traded between search engine companies and advertisers via the use of free services.

Marx argued that surplus value is extracted from the exchange of labor (Marxist.org, 2008). Users' labor plays an important role in generating search engines' advertising dollars. Search engine companies own the means of production, search

technology, as private property. Internet surfers have no choice, i.e., the availability of non-commercial search sites, but to sell their labor power to commercial search providers by conducting a search for desired information. Users contribute labor power by producing click-through as a product to be sold to advertisers, and the wage that search companies pay users is the satisfaction of using their free services. By using the free search service and add-on services such as an email account and map search, users create exchange value for commercial search engines, which is reflected in the statistics of increasing traffic flow and the expanding market share. The data displaying popularity in terms of number of users and number of queries have actually become yet another commodity capable of attracting advertisers. Because commercial search companies own the proprietary search technologies as the means of production, the profits generated from user performance also belong to the engines. In short, as represented in Figure 5, the relationship between commercial search engines, users, and advertisers is triangular.

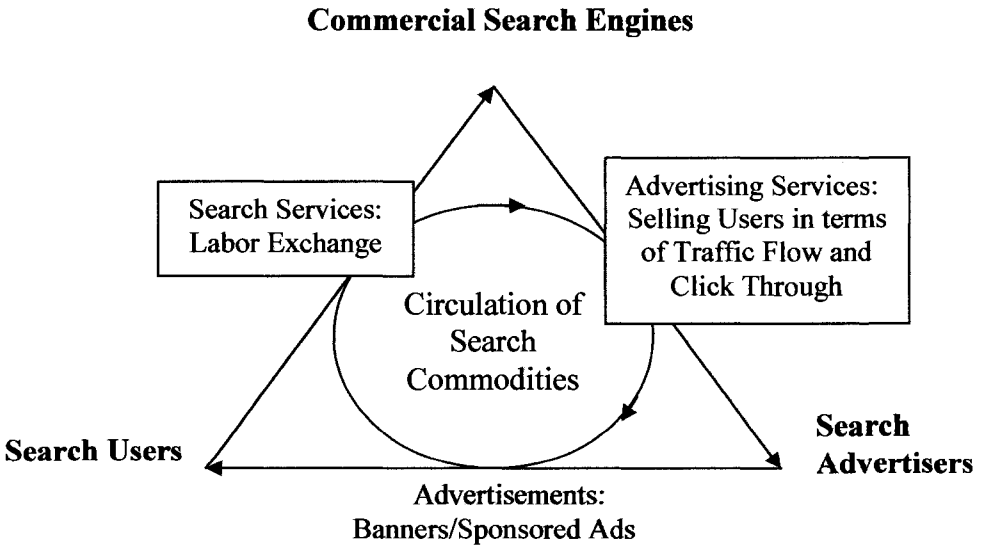

Figure 5. The triangular relationship of the commodification of search.

The class built by search engine technology. Even though Internet gatekeepers do not produce content, their potential to represent political-economic ideologies is considered real. Content commodification theory maintains that the ideologies and meanings reflected in Internet content ultimately favor parties of great wealth and power. Given the fact that search engine technology was originally created with the intent to make every webpage retrievable, under the mechanism of search engines' new business model, however, the importance of retrievability has been overshadowed by visibility. To stand out in the crowd, advertisers pay search providers for better exposure. This monetary relation facilitates the exchange of search commodities and the accumulation of capital. Under the new business model that relies on selling sponsored ads, the positions of commercial sites often obtain higher visibility than those of non-commercial sites.

One clear example of this business model is the SEO strategy conducted by online marketing firms as a service to generate better placement for the clients of commercial search engines. In fact, the function of SEO is very similar to that of a public relations firm in the context of traditional media. When traffic has become the currency of exchange in the online community, the publishers of a commercial website will always look to increase their traffic flow. With site optimization, the client can now purchase, via site optimization, a long-term placement in organic search results, which is believed to be more stable and more valuable in the eyes of users, as some marketing research has shown that people have been increasingly ignoring online advertising altogether (Drèze & Hussherr, 2003). Even though SEO marketing is more risky and often more expensive than keyword advertising, if done well it will result in a much greater flow of traffic,

which in turn is exchanged for more advertising and e-commerce money, necessarily leading to a concentration of capital. Companies with larger marketing budgets usually both optimize and advertise, whereas small companies usually cannot afford to optimize. As a result, the online community guarded by commercial search engines is arguably not exempt from economic power structures.

Suggestions

The development of Internet search engines is clearly the best example when considering the commercialization of new technologies. In the early 1990s, a number of Internet search tools were created to serve mostly computer-savvy Web users so that they could not only conveniently share and retrieve information, but also solve computing problems. Given the usefulness of the technology, early academic search projects carried out between 1993 and 1994 turned into companies in the mid-1990s to sustain their services. To keep the information service free to users, selling advertising and looking for sponsorship soon became the best and fastest solutions to support the large expense of engine servers. Similar to traditional media's business model, attracting the attention of users and detaining them in their sites became the common goals of commercial search engines. Despite the failure of selling sponsored results in 1996, when Open Text initiated such service, search technology was continually improving and in 1998, the year e-commerce emerged, the new business model became very popular.

Before GoTo search technology was not good enough. The return of irrelevant results, even on the most popular engines and portals, was still a headache to users. In refining search engine technology, GoTo combined the power of the technology with the

consumers' reliance on search, thereby leading to a huge success that unwittingly paved the way for Google. Today, search is the most heavily used Web function after e-mail, with only three major players remaining: Google, Yahoo!, and MSN.

The commodification of search is best approached using a historical analysis because the increasingly commercialized Web indicates an inherent social development under capitalist logic. Along with the development of search engines' new business model, overall exchange value greatly increased in direct proportion to the number of commodities produced. In the earlier discussion of the free services offered by commercial search engines, services were considered commodities to exchange for users. In this situation, users are quantified into numerical data, inevitably becoming another commodity exchanged for advertising dollars. Meanwhile, users offer their labor power by helping to produce click-through, which the search engine companies sell to advertisers. These analyses indicate the presence of commodification in the search engine context, which goes hand in hand with the privatization of search technology as the means of producing search commodities.

Because search engine companies play an absolutely pivotal role in information collection and dissemination, their standing as new media giants is indisputable. As a result, the commodification of search can be viewed as the extension of media commodification, in which the role of advertising is indispensible. Even though these new media giants do not produce content per se, but rather search results, via advertising and SEO marketing resulting from commercial search engines' closed algorithms, the long-term negative effects on the integrity of search results are still in existence.

Free from commercial bias. There has yet to emerge the viable alternative of a non-profit or non-commercial search engine. But in order to avoid commercially biased search results, users must have an alternative to commercial search engines. Indeed, they must demand an alternative, as the current search engines will not even disclose why a given page ranks as it does.

In fact, several open source search engines have recently been developed or are now in the developmental stages. These new engines aim to provide users the best search results possible and without bias results. The major asset of an open source search engine, as opposed to commercial search engines, is its disclosing of the ranking formula. In other words, an open source search engine hides neither its ranking formula nor its source code from the public. Anyone can use the software for free and contribute to improving it. With this transparency, using an Internet search engine that is designed with open source technology is considered a workable way to pursue bias-free search results, or at least its possible bias is made public. Unfortunately, most open source search engines still lack full functionality and complete indices because the software is often developed by volunteer programmers and is not designed to make profits. Consequently, the development and improvement of the software is a very slow process.

Among the current open search engines in action, Wikia Search received the most attention in media. The search company was founded in 2004 by Jimmy Wales, the founder of Wikipedia, a non-profit online encyclopedia (Doran, 2006). As emphasized on its website, the principles of the open search engine pivot on transparency, community, quality, and privacy, which are often the most disputed issues in the operations of leading

search players. The Wikia search engine is based on a collaborative, user-dependant search technology, by which users can work together to improve search results, just as Wikipedia users have done (see Figure 6). This could have the potential, if the search engine acquires more users, to transform the current power structure of the Internet, which is presently structured by computer-based algorithms that lack human judgment and therefore produce flawed results.

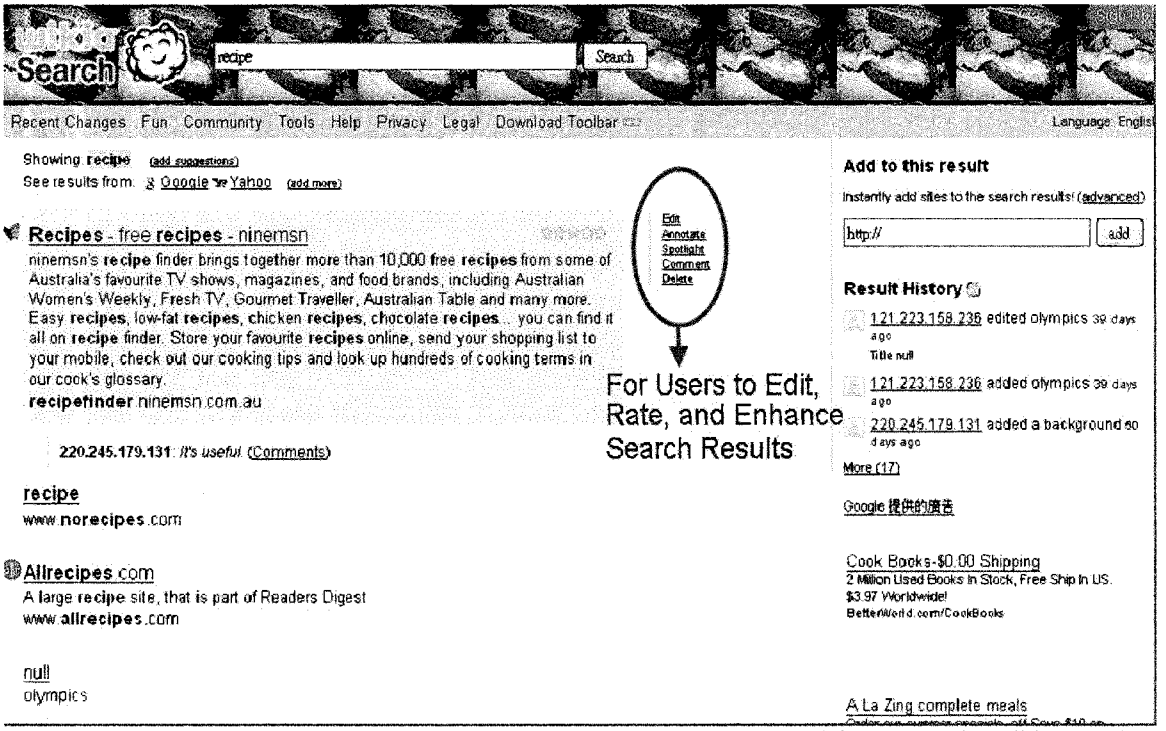

Figure 6. Users are allowed to edit, annotate, spotlight, comment, and even delete results in Wikia Search.

Moreover, search results returned on Wikia Search are all listed on one page. In other words, it is easier for users to seek what they want if they do not have to pass through the redundant clicks of commercial pages. Such convenience, however, is partly because of the limited number of websites included in the Wikia Search index, which makes its search results less complete than those of its competitors. Nevertheless, to compensate for this database shortage, the open source search engine currently includes

links to the results of major search engines such as Google and Yahoo! (Wikia Search, 2008).

Falling in line with most Internet search engines, Wikia Search's revenue also comes from advertising. However, under public scrutiny, it is less probable that an online marketer will perform site optimization or purchase placements in the organic search results on Wikia Search.

Future projection of the commodification of search. It has been argued in this study that the power of search engines does not lie in the production of content, for they produce none. Instead, their manipulation of the visibility of results is extremely influential. Concerning future studies, a further comparison of content bias between search engines and traditional media may show more clearly whether commercial search engines are heading down the same road as traditional media did, having heeded the words of those who hold the greatest wealth and power. Even though this would require a more complex and empirical research method, the study would perhaps uncover the political and economic forces at work in a privatized information service.

This study analyzed the commercial development of Internet search engines from a critical standpoint, as they are currently viewed as the gatekeepers of the online community. By employing Marx's commodification theory and the theoretical arguments of Mosco's (1996) media commodification, the researcher explored the commodification of search taking place in the new media gateway. It was discovered that a continuous creation of exchange value, out of the interaction between search engine users, search providers, and online advertisers, took place from 1990 to 1998, and that the

phenomenon was especially noteworthy after the Internet portal war of 1997, the latter attributed to both the growth of e-commerce and people's increasing reliance on the search tool. Also, the tendency of Internet search engines to be determined by commercial forces became increasingly obvious during this period. Because of the inherent capitalist nature of modern society, advertising is by far the most efficient way to provide a freely accessible information service. The fact of the matter is that the development and maintenance of such a service is extremely expensive. Finally, by comparing a commercial search engine, with a proprietary search technology, to an open source search engine, with an open technology, one observes that even if both sell advertising, their methods of ranking results can be drastically different. In the present information society, the creation of an information retrieving system that is fair, transparent, and diverse has become more critically important than the issue of search relevance.

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