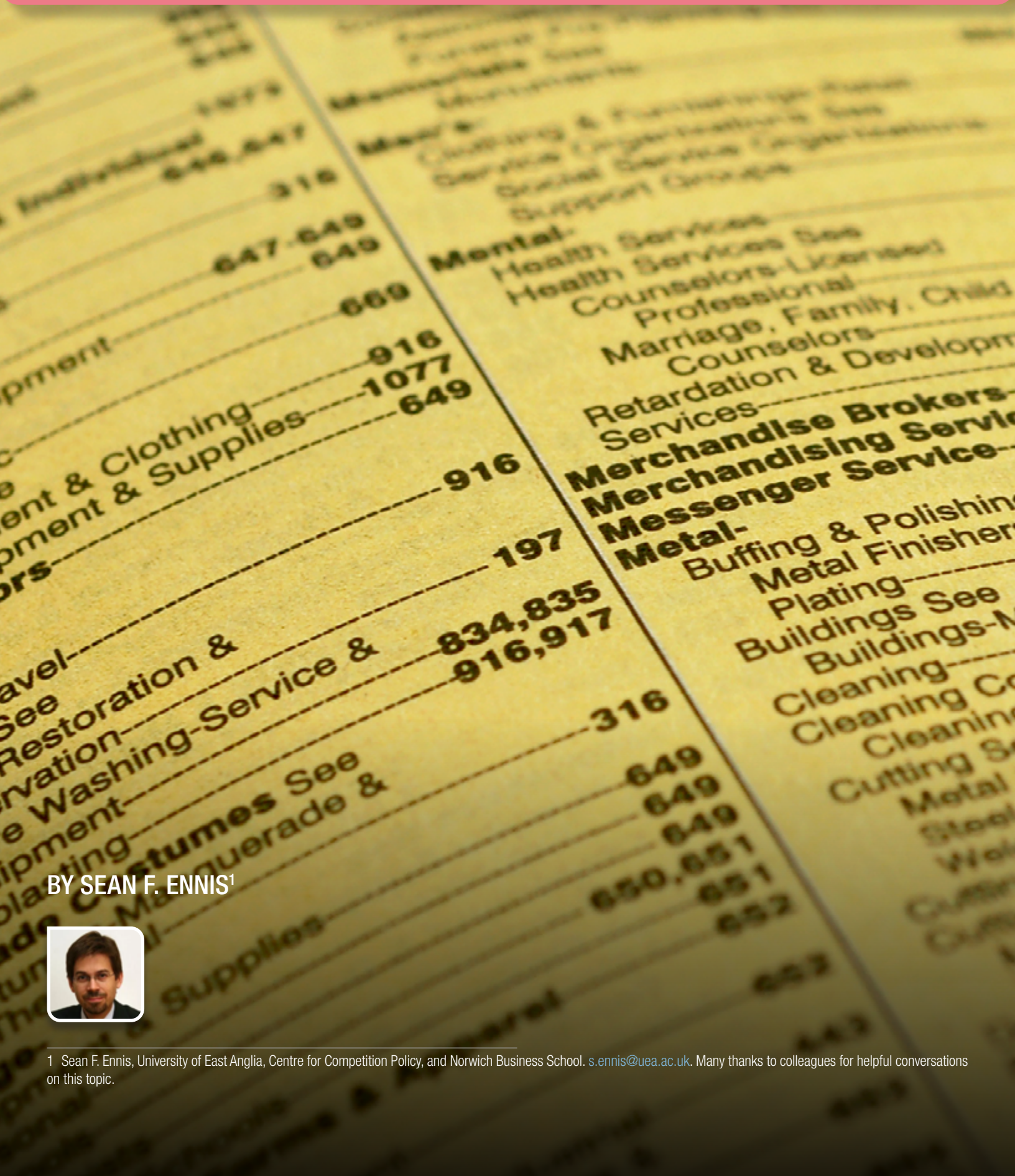


# A COMMERCIAL ADVERTISING REVOLUTION: FROM YELLOW PAGES TO SEARCH ENGINES



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## A COMMERCIAL ADVERTISING REVOLUTION: FROM YELLOW PAGES TO SEARCH ENGINES

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Over the last three decades, the search process for commercial information has changed fundamentally. The move from yellow pages to search engines has been accompanied by fundamental changes in the advertising model. These changes are argued to arise from three main differences between media technologies: content “depth,” display space, and cost structure. The printed yellow pages are unconstrained in paper space, as new pages are easily added, so pricing was based on the size of the ad. Search engines have a different problem, to allocate *scarce* space on a screen to its best use. A scarcity premium is paid by each successful advertiser, as determined by auction. But the number of advertisers from whom surplus can be extracted from a single search is low. Although auctions by click price expand opportunities for advertisers who could not cover the price of printed ads, the aggregate effect of the move to search engines must account for screen scarcity, content detail and the ability to extract higher value from higher value ads.

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## I. INTRODUCTION

Over the last three decades, search engines have largely replaced yellow pages as sources of information on commercial sellers. This gradual change for users heralded a dramatic change in business model despite the consistency of media technologies being two-sided platforms. Counter-intuitively, this change reduced the information available in the advertising medium as yellow pages permitted large and detailed advertisements that are not generally possible in the constrained space of screens. The evolution involved substantial learning and business exploration, as new alternatives to provide results of commercial search were accompanied by an alteration in the method and source of advertising revenue from these media. In order to understand the current approaches of online search advertising, it is worth focusing on how differences between the new and traditional media impact the associated advertising model. I take seriously the idea that many of the changes from the introduction of online search inevitably led to the need for a new model of advertising revenue. This does not mean, however, that the selected new model, which has largely been created by search companies, is optimal from the perspective of consumer users or business users, even though there may be consumer and business benefits from the new technology.

This note introduces a categorization of the qualitative differences between the old and new commercial search media. I suggest a typology for three different models: yellow pages, internet directories, and search engines. This typology then flows into hypotheses about impacts of the changes on advertising technologies on the pricing model for advertising. The internet directory product merits attention in this context because it achieved success in the U.S. prior to free-text search's takeover, which was the curated directory at the origin of Yahoo!, in which Yahoo! made judgements over how to categorize options and placed them into a hierarchy of subject orders, much like the subject index of libraries.

The approach used in the paper is one of abstraction from narrow product details towards core product features. As part of this abstraction, numerous real and important features of the sale of advertising are ignored, including the vertical chain of sales of advertising, the diverse types of internet advertising<sup>2</sup> and the role of non-search based advertising.<sup>3</sup> Dominance or monopoly is not an explicit focus here, though it may be important both in the original yellow page market (despite the fact that many markets had competing yellow page services)<sup>4</sup> and in the subsequent commercial search markets. Thus, I focus on users who are explicitly searching for a supplier and who use media specifically capable of performing such searches.<sup>5</sup>

## II. STAGES OF EVOLUTION

The replacement of yellow pages by internet search has both created a new customer search process and changed the way that companies advertise themselves to users.

For clarity, I begin by describing what is meant by the phrase “yellow pages” in this note. Yellow pages are paper-based guides to corporate presence, including contact information (phone) and physical address of companies.<sup>6</sup> They show information on all businesses that subscribe to a business telephone line.<sup>7</sup> This “basic” business information is provided free of charge to customers. The main focus here, though, is on the supplemental information, or commercial advertising, that yellow pages made available to companies. This supplemental information included boxed display advertising designed for the advertiser and which does require payment by the advertiser.<sup>8</sup>

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2 These include information, brand, and price advertising in addition to core commercial advertising for finding sellers and learning how to contact or visit them.

3 Much advertising comes when users are not explicitly seeking the advertised information, such as fashion advertising whether it is delivered in a magazine or on an internet application.

4 Yellow Pages were produced both by primary companies, such as telephone companies and, in the U.S., by competitors that also delivered free yellow pages to homes. (For a valuable analysis of this competition, see Rysman, M. (2004). Competition between Networks: A Study of the Market for Yellow Pages. *The Review of Economic Studies*, 71(2), 483–512. <http://www.jstor.org/stable/3700635>.)

5 The media may also be capable of other types of searches.

6 We are not here focusing on yellow pages as separate internet products, though these do exist. Not only have they been generally less successful than search engines, they may around 2001 have accounted for as much as 5% of advertising revenues for internet search engines, suggesting that they were not necessarily the first port of call for commercial searches over the internet.

7 Businesses did have an option not to appear in the yellow pages.

8 The sizes of ad boxes ranged from small numbers of extra words in an ad to one full page, and thus included a great range of advertising size options.

The development of alternative sources of information provided over the internet has changed the provision of yellow pages. These have generally ceased printing and distribution, such as Yell in the UK which announced in 2017 its plans to cease paper production. While some yellow page related websites do exist, such as yellowpages.com (U.S.) and pagesjaunes.fr (France), these sites are now believed to be relatively modest sources of commercial information compared to during the period before free-text search.

The first major internet innovation in commercial search was the introduction of a curated directory of information. This was most emblematically developed and made available by Yahoo!.<sup>9</sup> Their site presented information, and allowed finding of products and companies, based on a model in which Yahoo determined a fixed hierarchy of data under high-level categories such as arts, news, education, regional, etc.<sup>10</sup> This form of ordering of information allowed relatively quick search for a user, by typing their search terms into the text box on the page which would show multiple pages of the directory as options. The cost of producing this hierarchical organization was high due to the rapid growth in the number of products on web pages, which required regular adjustments in the content and organization of the hierarchy. Furthermore, the pre-established directory structure did not respond easily to the evolution of user interests and could not easily learn from their choices. This cost and complexity of curated internet directories made the structure relatively expensive to implement even if the variable costs of any individual search were moderate. The key features of this difference from the yellow pages were:

- the geography covered with yellow pages being exclusively local;
- the number of information categories, which was much greater; and
- depth of information provided in each category as information could be much more narrow, granular, and detailed than in a single printed book.

Figure 1. Yahoo! Home Page in 1996



Source: Yahoo! IPO Prospectus, 1996

<sup>9</sup> Other versions of electronic directories existed earlier, such as the French Minitel version of the Pages Jaunes (yellow pages).

<sup>10</sup> In many respects, this curated structure could be considered inspired by the Library of Congress Classification or Dewey Decimal Classification.

The second major innovation in commercial search is free-text search. Free-text search is the type of search popularized by Google that allowed free text entry in a search to return an ordered list of web content. The internet search provider presents pages relevant to the user search terms, according to a page-ordering algorithm. The algorithm initially delivered suggestions based on assessments of relevance to the search based on link strength. Later versions of page ranking also rapidly learned average consumer interests from user selections from the search engine response in order to revise the page order of natural results. Yahoo! included Google as its source of free-text search in 2000. Google equaled Yahoo! as a source of search revenue by 2003 - 2004.<sup>11</sup>

The key differences between free-text search and yellow pages include the much greater “coverage” that applied geography, breadth of topics, and detail on each topic. The key differences between curated directory and free text search include the fast-evolving response structure to commercial questions of interest which learned from prior users’ areas of interest and allowed for fast responses to new interests<sup>12</sup> and to the provision of new information on websites that were catalogued by search engines.<sup>13</sup>

The differences in features of the different models for information provision resulted in a user movement from yellow pages to curated directories and then to the free text search model built around a page-ranking algorithm. Ultimately, the most successful model has been the free-search model, eclipsing both the paper and internet directory approaches.

### III. TYPOLOGIES OF FEATURES AND ADVERTISING MODELS

The change in the structure of information provision has been followed by changes in the structure of advertising delivery. I limit the focus here to searches by consumers that are intended to find a commercial seller. These types of searches have been performed with traditional yellow pages, internet directories, and search engines.

The move from Yellow Pages towards internet directories changed the type of advertising, featuring display ads, which would contain a rectangular ad, and ad boxes (often placed to the right of search results, to distinguish them from more natural hierarchical directory results). Although these advertisements are not shown in Figure 1, they were present more generally at the top and side of the screen’s main content.

It is worth emphasizing that the utility of the internet search mechanisms is much broader than that of Yellow Pages, due to the possibility of information provision in addition to product information. Thus, in addition to this commercial search objective, both internet directories and search engines provide advertising in response to non-commercial searches. A non-commercial search is one that begins without an explicit purpose to find a supplier. Some non-commercial searches do not have advertising, while some do. Providers such as Google note that a high percentage of searches yield no advertising, and thus no direct advertising revenue. Delivering good results on non-commercial searches enhances user loyalty which then pays off for the search engine providers when users are either performing non-commercial searches, but with an advertiser present, or when performing commercial searches.

The key characteristics of the typology of different commercial search mechanisms are presented in Table 1. These features will then be correlated with the advertising solutions adopted by each mechanism.

**Table 1.** Typology of Commercial Search Features by Technology

		<b>Yellow pages</b>	<b>Internet directory</b>	<b>Free word search</b>
Detail	Content depth	High-level	Medium	Narrowest
Space	Display space	Unlimited	Limited	Limited
Focus	Geography	Narrow	Narrow-Wide	Narrow-Wide
Dynamics	Adjustment speed	Slow	Medium	Fast
Cost	Variable costs	High (er)	Low	Low
	Fixed Costs	Modest	High	Low

*Source: Author*

11 It is worthy of note that Yahoo! turned down opportunities to purchase Google for \$1 million in 1998 and for \$5 billion in 2002 both of these offers occurring at times when Yahoo had a higher market value than Google.

12 New interests might arise from news, sports events, and many other sources of changing focus in search over time.

13 The updates of web pages and the creation of new pages and websites require regular collection of information from the internet.

One core observation in this typology is that a narrower focus is associated with success over the prior model. This is in part because a narrower focus could co-exist with a broader focus, and thus serve narrow and broad commercial searches with the same interface.

A key feature for the products in this typology is that commercial advertising on the internet is generally more constrained for space than commercial advertising in the yellow pages. Other outcomes of note include that much more customized and lower total cost of advertising is available for a small company with a targeted customer approach. Such targeting was not possible on yellow pages, which thus made yellow pages expensive for advertising to narrow groups.<sup>14</sup> Companies often sought to distinguish themselves from others by the size of their advertising. This meant that in crowded product spaces with many sellers, such as auto dealers, many large ads would be bought.

Another key feature is the dynamics of content adjustment of the search content. In part due to faster and more detailed updates, the user demand moved towards free word search.

The variable costs of the search model are built around the costs of gathering, sorting, and presenting information, which have a low marginal cost per search, compared to yellow page variable costs, which were built largely around the cost of printing and contracting. The different cost and production model for search has been followed by the internet's introduction of payment by click for a limited number of "preferred" options presented in one search, and with low visual distinctiveness from "natural" search results. This auction approach for positioning helps prioritize those that can receive attention within a much more limited visual space than is found in yellow pages. Although yellow pages can expand their presentation space to meet increased demand, internet directories and searches cannot do this. The individual user focus of search engines nevertheless increases the capacity for small and medium-sized enterprises to raise their profile to specific categories of consumers through advertising even if the enterprises have a narrow customer base.

Advertisers do not always benefit from the ability to focus on narrow customer groups. One reason is that the auction for right to have clicks also raises the cost of advertising for certain activities, compared to a space on a printed page cost model, because of the increased scarcity of possibilities for high-demand space. Movement to small screens, as computer usage is substituted for by smartphones, increases the space scarcity and could increase the scarcity premium that advertisers must pay. Another reason is that advertisers that had poor return on investment in yellow pages (such as those that advertised with a low marginal profit gain from the ad lower than the cost of their ad), can, ironically, even be worse off after yellow pages are eliminated. The reason is that enterprises may have better discovery rates by customers prior to the introduction of the internet; the increasing use of the internet by larger segments of potential customers then steers even more customers to other sellers if no internet advertising is undertaken by the company in question.

Table 2 shows the typology of commercial search advertising models. The hypothesis of this paper is that the models for monetization of the advertising platform follow from the typology of technology characteristics described in Table 1.

**Table 2.** Typology of Commercial Search Advertising Models

	<b>Yellow pages</b>	<b>Internet directory</b>	<b>Free word search</b>
Content depth	Basic information content	Medium level of information content	Very narrow searches permitted, allowing greater advertiser participation especially by SMEs
Display space	Unlimited. Advertisers choose the size of ad	Limited, if many advertisers for a specific customer type, not all companies wishing to advertise can be simultaneously presented	Limited, if many advertisers for a specific customer type, not all companies wishing to advertise can be simultaneously presented
Geography	Local advertising by metropolitan area or narrower geography	Ads can be tailored to geography or individual features	Ads can be tailored to geography or individual features
Pricing	Price list, ad size-based. Pricing must cover printing costs for the size of ad and include yellow page markup for reaching the customer	Charge Per Display, Charge Per Click, Auction (evolving over time)	Auction based on bid price per click, or commission on observed sale
Viewer customization	Low	Medium	High
Advertising episodes	Low	Medium	High
Surplus extraction	Modest	Greater	High (margins up to 90% from low marginal costs and auctions + scarcity)

*Source: Author*

<sup>14</sup> The cost of advertising was nonetheless much lower for smaller ads than larger ones.

Certain advertisers have undoubtedly benefitted from the introduction of more narrowly tailored advertising, even if auctions may generally require sharing higher levels of surplus to the advertising medium than under a fixed price scheme available to paper-based advertising models. Small businesses and businesses with narrow niches can benefit from this change.<sup>15</sup> Small and medium-sized enterprises can successfully advertise over such a medium, while they may have found advertising in yellow pages prohibitively expensive. Businesses can also reach customers more easily while starting up, compared to a commercial advertising model with slower information spread.<sup>16</sup>

Nevertheless, some businesses may be worse off under internet search than under the prior model, notably to the extent that a higher portion of their surplus goes towards advertising. The advertising cost of some businesses is extremely high. For example, Booking.com has been reported to pay as much as 50 percent of its revenue to search engines.<sup>17</sup>

Even absent the greater ability to engage in surplus extraction from auctions compared to fixed prices for advertising, a key variable, for determining whether advertisers may be better off with internet advertising, is how frequently the advertiser's businesses is found in the absence of internet advertising and how frequently it is found under the changed model (both when they advertise on the internet and when they do not advertise on the internet). That is, the internet may have higher usage for commercial purposes than prior media. This might be reflected, for example, in high numbers of commercialized search opportunities from search engines, meaning more searches lead to advertising. This increase in turn may (or may not) result in lower prices per click. The higher consumer dependence on the internet than yellow pages may reduce the frequency with which businesses would make a sale who do not use any advertising at all.

The balance of impacts from change in commercial advertising technologies is complex. While the focus here is on commercial advertising, the distinction between this and other forms of advertising may have become fuzzier with the introduction of internet search advertising;<sup>18</sup> thus, while yellow pages may have a greater immediate ability to provide detailed content to users, because of larger ad sizes that permit provision of more information to customers, the market outcome has moved away from greater information provision to less, taking account of screen space constraints. The use of screens shrinks the immediate availability of information and replaces that with likely much greater commercial information provided over a separate advertiser-operated website, to which users go by a click from the short-form advertisement. However, the success of the different advertising technologies ultimately reflects an evolution in the underlying consumer preferences. These preferences may include a desire for immediate access to highly detailed information, a preference which is arguably best served by internet search, second best served by curated internet directories, and least well served by static yellow pages. The evidence for this ordering lies in how usage patterns of the three media changed over time, as each of the first two lost usage to the subsequent medium.

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15 Previously, limited ability to target advertising narrowly restricted opportunities for narrowly focused advertisers.

16 The time needed for advertising to appear in yellow pages could be as much as 18 months after the decision to undertake advertising, due to the annual production schedule of yellow pages and their lead times for contracting and production.

17 This example is not intended to suggest that most advertisers spend 50 percent of their revenues on search advertising.

18 For example, the distinction between commercial advertising and brand advertising may be less clear.



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