Electron Markets (2010) 20:251–262
DOI 10.1007/s12525-010-0041-z

GENERAL RESEARCH

Has the web transformed experience goods into search goods?

Makoto Nakayama · Norma Sutcliffe · Yun Wan

Received: 21 February 2010 / Accepted: 22 October 2010 / Published online: 9 November 2010

Abstract Klein (Journal of Business Research 41(3): 195–203, 1998) posited that the Web can transform experience goods into search goods (ES shifts). We examine her proposition in three ways. First, we critically assess the background of her proposition in light of the Web evolution in the past decade. Second, we conduct a comparison of past studies that measured the extent of search, experience, and credence (SEC) characteristics of goods. Third, we report the results of an exploratory survey on a set of commonly purchased products to benchmark possible ES shifts against the past studies. Their results indicate that SEC classification changes do not seem significant.

Keywords Consumer purchase behavior · Product attribute · Product quality · Search-experience-credence (SEC) classification · Web impact

Jel M19

Introduction

Web shopping offers a variety of products to anyone anytime anywhere. In addition, the popularity of search engines has made comparison-shopping information such as prices and product reviews commonplace to consumers. One challenge, nonetheless, is that consumers cannot physically inspect products online for their quality in many cases. The question remains whether the abundance of searchable product information overcomes such a challenge.

Klein (1998) posited that the Web can transform experience goods (those that consumers must use before their quality is known) into search goods (those that consumers know their quality before purchase and use) in three ways. First, the Web can lower search costs of certain product attributes. Second, the Web can alter how consumers evaluate different product attributes. Third, the Web can make it possible for us to experience products such as software virtually without directly inspecting product attributes.

Since consumers know that the Web provides tremendous opportunities to search for shopping information before they purchase any products or services, it would not be surprising if the Web has transformed products into search goods. If so, the market, in general, is then more transparent than before. But, has the Web really transformed experience goods into search goods?

While the Web offers us product information readily, more information does not necessarily translate into a more effective, easier search on products. More information necessitates that consumers process information more efficiently. In addition, consumers are dependent on how helpful the information is on a product's attributes. On the supplier side of information, we have vendors, retailers, and other consumers. We also have various third-party search engines and shopbots. What consumers see on the Web nowadays is not necessarily randomly generated or viewed. Consumers often see information that providers consider "best" for consumers. Finally, consumers have more purchase options through a variety of outlets online and offline. In sum, effective search depends on the quantity of information, the quality of product attribute information, and the comparison of alternatives (Alba et al. 1997).

Responsible editor: Hans-Dieter Zimmermann

M. Nakayama (✉) · N. Sutcliffe
College of Computing and Digital Media, DePaul University,
243 South Wabash Avenue,
Chicago, IL 60604, USA
e-mail: mnakayama@cdm.depaul.edu

Y. Wan
University of Houston, Victoria School of Arts and Sciences,
3007 North Ben Wilson,
Victoria, TX 77901, USA

The purpose of this paper is to evaluate past studies to see if we indeed have some evidence of the shift from experience goods to search goods. We first consider possible counter forces against such shifts. We then examine empirical data on SEC ratings from past studies to look for any evidence of the shift between search and experience goods. Finally, to benchmark the current status of the shift, we measure consumer perceptions on six common products using exploratory surveys.

The structure of the paper is as follows. After a brief review of the original intent of the SEC classifications, we critically evaluate Klein's propositions. We then conduct a comparison of the past studies that report the extent of SEC characteristics of products. To benchmark, we take an in-depth view on the SEC classification changes of selected products using the data obtained from recent survey questionnaires. The paper concludes with implications and future research agendas.

Assessment of Klein's arguments

In this section, we review the definitions and background of search, experience and credence (SEC) goods. We also summarize Klein's argument that the Web alters SEC perceptions. Then we consider possible counter forces against such changes in SEC perceptions.

Definitions of SEC goods Nelson (Nelson 1970) focused on how consumers search information about price and quality of different products. Key parts of his insights are as follows. Search goods are those products that consumers can search, inspect, and compare options (search behaviors) prior to purchasing. Consumers can thus know the quality of products before they buy. Examples include glassware and cameras. In contrast, consumers cannot know the quality of products such as cars and air conditioning systems until they purchase and use them for a while. These goods are called experience goods. Nelson's view hinges on two key assumptions. First, consumers search until the marginal return of search equals the marginal cost of search (Stigler 1961), and second, they know where to turn for relevant information. Later the third kind of goods was introduced as the credence goods that "cannot be evaluated in normal use" even after consumers purchased products (Darby and Karni 1973). Such products include vitamins and supplemental healthcare services.

Although the theoretical foundation of the SEC classifications appears clear enough, the distinction depends on subjective judgments on how we empirically measure benefits and costs of search. In addition, a specific product does not necessarily fit within the SEC boundaries. "Product classification is admittedly ambiguous (e.g., jewelry and silverware). In fact, the search vs. experience classification more represents the two extremes of product classification, with most items falling somewhere in-between" (Laband 1991).

Klein's analysis of web impact on SEC goods In her 1998 paper, Klein notes the Web can lower the search costs. First, the Web may accentuate search attributes:

> "For search goods, the incremental value of the new media will be the provision of information in a more accessible, less costly, and more customizable format. We would expect this to reduce the costs of search directly (e.g., time, travel) and to increase the expected benefits through the improved processability of new information."

Second, the Web may lower the search costs of experience attributes:

> "On the other hand, for goods dominated by experience (or credence) attributes, which are traditionally not known with certainty prior to purchase, the new interactive media may provide the greatest value through what I label 'virtual experience.'"

Therefore, she posits that the transformation of previously-considered experience goods into search goods "is possible." She cites computer software and wine as such examples. Consumers can download sample software, if available, and inspect it directly on their PCs. The same can obviously be said more about the search attributes for many digital products. Concerning wine, she highlights (a) consumer priority changes on product attributes and (b) "virtual experience" of taste perceptions via the expert comments on the tastes, the comments that are shared with consumers. Consumers then can share their own experience as well (e.g., http://corkdork.typepad.com/).

Her arguments pose a few interesting questions. First, has the Web transformed more experience goods into search goods? Second, has the Web shifted attribute priorities that consumers weigh when making a product purchase? Third, how do digital attributes of goods affect SEC transformations since those digital attributes often enable "virtual experience"? Below, we discuss four counter arguments to Klein's experience-to-search (ES) shifts due to the Web.

Possible web impact on how consumers weigh product attributes The Web can impact how consumers consider product attributes. A study shows that online recommendation agents can "systematically influence decision makers' multiattribute preferences" (Haubl and Murray 2003). That is, consumers are subtly manipulated on what they "like" about products (e.g., price, brand social status, package

design, unique features) and ultimately on what they decide to buy. Web or non-Web commercial advertising claims, too, can change consumer perceptions, since these claims frequently employ tactics that manipulate consumer perceptions of product attributes (Ford et al. 1988). Major search engines like Google and yahoo.com incorporate advertisers' links as part of search results. Vendors and retailers accentuate the positives of their products and de-emphasize the negatives through the Web and traditional media. This influences consumer preferences when searching and evaluating "true" product attributes that are important for them. Whether Klein's speculation materializes seems to depend on whether and how some "neutral" search engines provide impartial assessment and summary of product comparisons.

Possible web impact through "virtual experience." Whether consumers can fully inspect an experience good on the Web through virtual experience arrangements depends on the degree to which they can access quality virtual experience. For example, do the 360-degree views of an automobile on a web page give consumers the same experience that they get from a look at the car in a showroom? If a product is in digital form, the distribution of whole or partial product samples is easier through the Web. For instance, a complete (as opposed to a demo) version of a software product is downloaded onto a user's PC and then evaluated for a certain period. This enables consumers to inspect it as much as they desire. However, how much "virtual experience" is available for other products? Most goods consumers purchase are not in digital form. Also, how real is such an experience when it is offered online? Does a firm want to provide comprehensive virtual experience arrangements of its good that reveals some weaknesses? Or, does it just want to show positive highlights of the good? If so, virtual "limited" experience then distorts a consumer evaluation of competing product attributes. What about the costs of such comprehensive virtual experience arrangements? Concerning the goods that depend heavily on our sensory perceptions, we have not seen convincing evidence yet that others' words can approximate our sensory perceptions towards goods like wine, food and entertainment to change our view that these goods have become search goods.

Possible web impact on digital goods Some products are stored and distributed in a digital format. These are generally known as *digital goods*. There are various types of digital goods available, including software, music, movies, photos, books, lectures, counseling, interactive communication sessions, and all information-based products like insurance. No doubt the Web can make samples of these digital goods available online more easily than before the Web. Thus, the ES shift can occur to the extent which goods have such digital attributes. Goods with less information-intensity like cars may not see the ES shift strongly; information-intensive goods like insurance policies may experience more of the ES shift. However, whether that factor facilitates the ES shift depends on the similar issues mentioned above: the availability of inspection samples, the quality of those samples, the search costs to consumers (including economic, time/opportunity and emotional costs), and the effects of commercial advertising claims.

Information explosion vs. information filtering Key assumptions of the search-experience distinction are that consumers (a) know their purchase options and (b) rationally assess the obtainable information. The landscape of online retailing is constantly changing. Do consumers really know where to get the best quality information? One option consumers now have is to look up what other consumers recommend and to likewise make a recommendation to others. Many online retailers also offer purchase options customers want to see based on what their shopping cart contains. It is well-known that Amazon.com has successfully used such tools, or collaborative filtering, since the late 90 s (Baker 2009). "Amazon.com uses recommendations as a targeted marketing tool in many email campaigns and on most of its Web sites' pages, including the high traffic Amazon.com homepage" (Linden et al. 2003). Nowadays online retailers and search engines are actively guessing what consumers want and present relevant information accordingly (Baker 2009). In that case, consumers are not really "searching" but are being exposed to selective information that favors retailers.

Thus, the transformation of traditional experience goods into search goods in an online environment may well be possible as posited by Klein. In contrast, the manipulation of online product information and their virtual experience may conceal or obscure the product attributes that are critical to consumers in an accurate quality evaluation.

Therefore, we begin with an examination of two main issues. First, do we have some indication that the Web has transformed experience goods into search goods? The next section reviews past studies that reported SEC ratings to determine any SE shifts. Second, what are the factors for such a transformation or lack of transformation? Following the next section, we report the results of a consumer survey to find the current SEC ratings for select products.

Empirical data on the SEC ratings of goods from previous studies

Historical comparisons of SEC attributes are challenging because there are "no universally accepted measures of 'goods classifications'" (Ekelund et al. 1995). In fact, many

different product classification schemes have been devised and used. "The marketing literature is replete with such categories and goods' arrangements" (Ekelund et al. 1995).

Table 1 summarizes four studies that used surveys to independently rate SEC attributes. We converted the SEC ratings in the originally used scale into the 1-3-5 scale (1: search, 3: experience: 5: credence) so that we can compare the ratings among four studies. While rating comparisons are possible, we must caution that these four studies used different survey samples, methods and product categories. We therefore interpret the standardized SEC ratings just for general patterns over time.

If we use the 10 search goods Nelson (1970) listed as a starting point for bench marking, these products are jewelry, typewriters, radio, television, tire, battery, aircraft, boats, motorcycles, heating and plumbing, bicycles, automobiles, music instruments, and appliances. The most recent study [D in Table 1] (Weathers and Makienko 2006) shows automobiles as a clear search good and appliances as a hybrid, slightly on the search side. So we have at least two products whose SEC classification apparently shifted from experience to search as Klein predicted. It is also interesting to note that automobiles are fairly close to search even in Iacobucci's study in 1992 which was before the Web became popular. Therefore, this shift might be due to the general improvement of product quality in cars; the media often remind us about the ups and downs of consumer perceptions of the quality of various automobile brands (Stertz 1990). However, jewelry, electronics (radio, television), and musical instruments remain solid experience goods. Interestingly, furniture in 2006 became an experience good whereas Nelson listed it as a search good.

Study B (Thakor and Kumar 2000) and Study C (Krishnan and Hartline 2001) in Table 1 focused exclusively on services. Services are traditionally regarded as goods with predominantly experience attributes (Iacobucci 1992). Most services are intangible and delivered each time. This makes hands-on inspection very difficult before purchase. Study B reports ratings that are mostly comparable to what Study A reports from a decade before. However, the ratings from Study C in 2001 are mostly between search and experience ranges. One possible reason is that the Study C divided the SEC rating scale into two parts: a range from pure search to pure experience, and a range from pure experience to pure credence. For a given product, the respondents must select its rating between search and experience while at the same time they are forced to rate it between experience and credence. With this rating method, goods between experience and credence are automatically rated more towards the search good side. Then, the ratings from Study C are not comparable to those from Studies A and B. In contrast, Studies A and B use the same rating scale. Based on these two studies, a clear shift from experience to search goods is not really seen from the beginning and end of the 1990s.

One interesting aspect of Study B is that it compared the ratings between the U.S. and Canada. The ratings do not vary wildly between two countries, yet the ratings are not identical either. Also the 95% confidence intervals of the U.S. ratings remind us that the SEC ratings can differ substantially from person to person as well as from one region to another.

Table 1 Selected studies reported the SEC ratings

	Subjects	Method	Remark
A (Iacobucci 1992)	98 MBA students	Ask raters to check one of three choices for each of 48 goods and services: whether the item (1) "could be evaluated prior to purchase;" (2) "could be evaluated only after some trial;" or (3) "would be difficult to evaluate even after trial"	Services (1) have more credence and experience qualities than search qualities; (2) are slightly more complex than most goods; (3) are only relatively more intangible than goods; and (4) are less standard (more heterogeneous) as purchases.
B (Thakor and Kumar 2000)	advanced undergrads 133 in US 167 in Canada	Ask raters to pick one of three options for each of 42 services: "Can be evaluated before purchase", "Can only be evaluated after using/experiencing for some time", and "Is difficult to evaluate even after use/experience"	The services with higher experience or credence attributes are more complex, critical and highly-skilled professional services. Word-of-mouth plays an important role.
C (Krishnan and Hartline 2001)	65 undergrads	Ask raters their ability to judge the performance of 25 services before purchase using 9-point scale ranging from "Not at all to "Very well." Credence attributes are measured using a separate question with the same 9-point scale.	Brand equity is more important for tangible goods than for services. No brand equity differences exist between search-dominant and experience or credence-dominant services.
D (Weathers and Makienko 2006)	108 students	Ask raters to classify 35 goods into one of (1) predominantly experience goods, (2) predominantly search goods, or (3) they do not know	e-tailer reliance on experience goods was negatively related to success. The relationship between success and product categories sold was moderated by shopper efficiency features (shopping cart and search functions).

Finally, strong credence attributes appear to be rare. In Studies A and B, only social work, psychotherapy and flu vaccination have the mid-SEC ratings between experience and credence sides. One study reported that consumers "were more consistent in classifying claims as experience and less consistent in classifying claims as credence" (Ford et al. 1988). This may indicate that consumers generally have difficulty in admitting that some goods and services have "unknown" qualities.

In sum, we do not see clear patterns of ES shifts in past studies among the products these studies survey. Given there are so many products, we want to take an in-depth look at the SEC ratings for some common products and at the factors influencing the SEC ratings. As discussed with Study B above, service components are a key factor in the ES shift. Among the 48 products Iacobucci (1992) studied, the more service components a product has, the closer its SEC rating is to the experience-goods level rating. Klein's ES shifts rely upon so-called *digital components* of products, or the part/whole of products that can be in the electronic form. Also many common products can be purchased online. Online purchases involve some *service components*, such as shipping, handling and returns. It is, therefore, in our interest to assess how much those *digital and service components* of products may impact their SEC ratings. Another point of interest is to see some evidence of consumers actually searching rationally prior to purchase. For example, do consumers differentiate their search activities based on SEC ratings and other factors such as product complexity and economic risks (price levels)? The next section sets up the stage to examine these issues using an exploratory survey.

Exploratory SEC rating probe

The main goal of this probe is to obtain the *most recent* SEC ratings on select products with different levels of digital and service components to compare and contrast. Specifically, we want to know whether traditionally regarded experience goods have become search goods. The secondary goal is to identify possible factors (including Web use) that influence the SEC ratings of the select products.

Using six commonly purchased SEC goods, we aim to probe any ES shifts using three null hypotheses regarding the Web impact on their SEC ratings on three grounds. First, there are counter-forces to the ES shifts. Second, we have not seen past studies indicating clear patterns of ES shifts. Third, the long-term assessment of ES shifts is difficult because products and their quality attributes change over time in response to market needs. For these reasons, we set forth null hypotheses that test (a) any shift from experience to search goods and (b) any evidence of the Web changing a product's SEC rating in any way considering control variables.

Determining the products for testing SEC classification shifts is often quite contentious. First and foremost, the SEC trichotomy has subjective ambiguity, and there is no universally-agreed product classification. Second, firms constantly change or adjust their products to meet market needs; the proportions of SEC attributes can change accordingly. Third, we have no established historical benchmarking data or method. Therefore, we cannot categorically support or deny the Klein position that the Web is responsible for an ES shift.

This exploratory study selects common products that most of us purchase frequently or occasionally. They are relatively neutral to age, gender, ethnicity and income levels (Table 2). These products have some *digital and service components*. The *digital component* is the attribute that enables the shift from an experience good to a search good. The *service component* strengthens experience attributes. The study examines how the balance of these two components affects Klein's predictions at the incremental level or at each purchase decision.

PCs are deemed a search good now because PCs are more standardized and their product quality is much improved. As far as how consumers search, "the attributes of computer … are largely revealed by specifications" (Hoskins et al. 2004). The prices of PCs are steadily declining. It indicates that PCs are in the commodity market that is mainly comprised of search goods. A best-selling book is also a search good in the sense that price is the most important attribute, with the physical aspects of the book largely standardized. The service aspect is shipping and handling with return policies. Popular retailer sites like Amazon.com provide ratings of customer service. There is growing recognition that the importance of service quality in online shopping is different from in the brick-and-mortar environment (Chiu et al. 2009). Cell phones and cars are considered search goods if we only consider only their prices, specifications and product quality ratings. In contrast, they have a non-trivial service and maintenance component associated with product purchases. So they are also classified as experience goods. We selected auto insurance over other types of insurance, such as life insurance, because auto insurance is a mandate for car drivers in the U.S. The effectiveness of vitamins is generally not discernible.

Therefore, we define our null hypotheses as follows. H1 directly examines any ES shift among the common SEC goods. H2 examines whether the Web changes SEC ratings in any way. Since the basis in Klein's arguments relies on the ability of the Web to lower search costs, it is imperative that we test the relation between Web access and SEC ratings. Given that the impact of Web use can come from *current Web use* and *cumulative Web use*, we divide H2 into two ways—current Web access and long-term use of the Web.

Table 2 Key features of selected goods

Good	Dominant SEC attributes	Digital component	Service component
PC	Search (Girard et al. 2002; Girard et al. 2003; Hoskins et al. 2004)	A poster child of digital products. It is still hardware equipment, however.	PCs occasionally require service, but it can be done on many occasions via phone or the Internet.
Best-selling book	Search (Ekelund et al. 1995; Girard et al. 2002; Chiu et al. 2005)	eBooks devices like Kindle are becoming popular. Amazon.com and Google Books made common selective previews.	When purchasing books online, consumers have to assess the retailer services such as shipping, handling and returns.
Cell phone	Experience (Girard et al. 2002)	Most cell phone specifications are standardized and can be evaluated online.	Almost all cell phones come with a service contract.
Automobile	Search/Experience (Nelson 1970; Iacobucci 1992)	Online reviews of cars are readily available. One in five consumers buys a car online (Capgemini 2008).	Reliability of service and maintenance is important part of purchase.
Auto insurance	Experience (von Ungern-Sternberg 2004; Chiu et al. 2005)	Major auto insurance providers offer an online purchase option. Insurance clauses can be viewed and compared online.	Once clients have an incident, they enter into the service process and learn the "true" quality of service.
Vitamins	Credence (Wikipedia; Girard et al. 2002)	Health benefits and user testimonials of vitamins are readily available online.	When purchasing online, consumers have to assess retailer services such as shipping & handling.

H1 Among the selected six products, experience goods (cell phone and car) have not shifted into search goods in the current study from the previous studies.

H2a Whether consumers have current access to the Web for a product does not affect how they determine its SEC rating.

H2b The level of cumulative Web use for shopping does not affect how consumers determine a product's SEC rating.

In addition to these three null hypotheses, we also examine to what extent consumers rationally search for the selected products. This is important for assessing the Web impact because SEC rating shifts can take place in response to non-Web factors. Concerning consumer decision-making, Bettman et al. (1991) recapitulate as follows. One perspective assumes that consumers are "exquisitely" rational. An alternative, more realistic view is that consumer decisions are limited by their bounded rationality. After all, studies show that almost 90% of consumers occasionally purchase impulsively and that 30–50% of all purchases are regarded by the buyers themselves as impulse purchases (Hausman 2000). Furthermore, consumers "rarely visit more than one or two outlets when they are buying expensive consumer durables" (Alba et al. 1997). Yet, another perspective is that "consumers are adapt and change the strategies they use depending upon the demands made by the specific decision they face" (Bettman et al. 1991). In other words, how consumers determine a product's SEC classification is up to certain goods and consumer profiles. For this reason, we investigate consumer web search activities, consumer profiles (e.g., gender, age), and the SEC ratings they give on the six products.

Empirical data from exploratory survey

This section first describes the method used to collect the data and the profile of the exploratory survey participants. We then discuss the variable constructs. The SEC rating results are examined in detail. To explore what factors are behind the SEC ratings, regression analyses and their results are presented. Finally, we look at the rationality of consumers search for information on a product.

Method To test our hypotheses, we used online survey questionnaires to collect data from 557 respondents in 2008. We assessed the data quantitatively with regressions and made qualitative interpretations of the data. Prior to the survey, we conducted a pilot study at a Midwestern university and a Southwestern university. We sought undergraduate and graduate students to test the prototype version of the questionnaires. In total, 48 participated. Based on their feedback and the survey results, we developed a full-scale, comprehensive version of the questionnaires.

Profiles of survey participants Previous studies note that using students as human subjects poses certain limitations on the external validity of research outcomes (Gordon et al. 1986; Greenberg 1987). To overcome such limitations, we recruited volunteers through the Web with an offer of a modest *Amazon.com* gift card. We first identified several popular online forums and classified ads sites like *craigslist* and *dealsea.com*. Then we prepared a short advertisement and posted it to the online forums of these sites. For *craigslist*, since it is region-based, we posted the same ad in the top 6 most populous US cities and under three

categories in each city: book, electronics, and auto. For general online shopping forums like dealsea.com, we posted in the "hot deal" section of the forum. Through the hyperlink in the ad, a person was able to access our online survey with a click. Altogether, we had more than 550 participants with valid submissions (e.g., no double entries, incomplete data entries). The survey had 292 (52.4%) males and 265 females (47.6%). The age of the survey participants is 18–19 (8.1%), 20–29 (35.4%), 30–39 (33.1%), 40–49 (13.8%), 50–59 (6.7%) and 60 or older (2.9%). On web search experience and use, the participants rated themselves high. This is not really surprising given the ease and popularity of major search engines like Google. As of June 2009, nearly half of the U.S. population use Google search according to Nielsen (Nielsen 2009).

Dependent variable The dependent variable for this study is the SEC rating. We chose the same basic construct that Iacobucci (1992) as well as Thakor and Kumar (2000) used so we can compare our results with those from their studies. That is, the SEC ratings are based on the three points on the rating continuum: (1) "could be evaluated prior to purchase;" (2) "could be evaluated only after some trial;" or (3) "would be difficult to evaluate even after trial."[1] However, based on the pilot study results, we adopted the 7-point Likert scale to refine the scale; the survey participants were allowed to choose beyond and between those three choices on the scale continuum.

Independent variables A key influential factor for SEC ratings is the impact of the Web. In other words, we want to assess how much a consumer uses the Web changes SEC ratings. The Web use can be divided by *current use* and *cumulative use*.

Our first independent variable is current Web use or Web access. The survey participants were asked to rate goods by one of the following conditions: no Web access ("No Web"), Web use only without any other media use ("Web Only"), or any media use including the Web ("No Restriction"). We call this factor "treatment." We accordingly created three different versions of the survey, in which the respondents assumed they had no Web access, Web access only, or no restriction on any media. The three versions had 197, 169 and 191 participants, respectively.

For cumulative Web use, we choose three factors that accompany online shopping: Web search engine use, online shopping frequency for any products, and online shopping frequency for a particular product. Web search engine use is assessed by the question, "How do you rate your web shopping experience?" with a 7-point Likert scale ("novice" to "expert"). General Web shopping experience is measured by the question, "How do you rate yourself as a Web search user?" with a 7-point Likert scale ("no experience at all" to "expert Web shopper"). The extent of Web search for a particular product was evaluated by "How much time would you spend to collect information from the Web before you decide to purchase this product?" with 7-point Likert scale (2: "a quick look at a few websites," 4: "careful search on 4 to 6 websites," 6: "extensive search through many websites"). This scale was based on the results from the pilot study (Fig. 1).

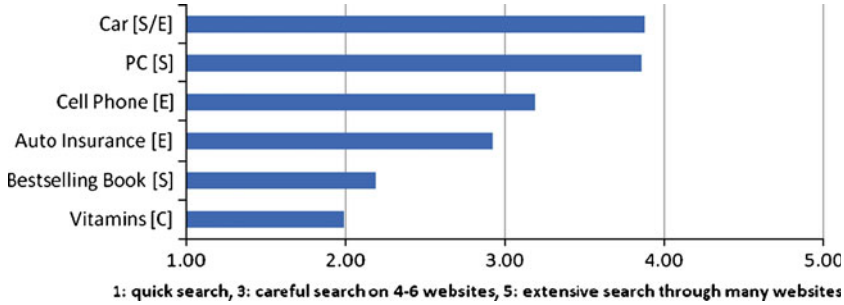
The outcomes reveal some interesting aspects of consumer search behaviors that we cannot see just from the averages of these web search extents. First, most respondents do not really search vitamins extensively. This may be due to the credence characteristics of vitamins; consumers cannot know much more about vitamin quality with extensive search. A similar data distribution is seen in best-selling books. Consumers do not to search beyond book prices perhaps because the quality of best-selling books is "proven" by best-seller rankings. In contrast, many consumers made product Web search on car, PC and cell phone. Cars are obviously an expensive shopping item; consumers have higher economic stakes with such purchases.

Control variables There are potentially many control variables given the diversity of consumers and the idiosyncrasy of individual consumer behaviors. A longer survey questionnaire, on the other hand, is likely to lower the number of respondents. For this practical reason, we limit the use of control variables to two most basic demographic variables: age and gender (Bhatnagar and Ghose 2004; Iacobucci 1992; Senecal et al. 2005).

The SEC ratings of the six products The SEC ratings of the six products by the three treatment groups are shown in Table 4 and Fig. 2. PC and best-selling book are rated as the hybrid between search and experience. The rest of the goods are rated as experience dominant. The ratings are mostly in line with what the previous studies reported. The ratings of PC and best-selling book are comparable to those of Iacobucci (1992). Cell phone had a similar rating to electronics from the Weathers et al. (2006) study. Auto insurance has a lower rating than those insurance products

[1] Whether the SEC rating should be on a single continuum or a multi-dimensional construct can be debated. As we see in the previous studies, the constructs used so far are either a single continuum or a two-dimensional (search attribute and experience/credence attribute). We choose, however, a single continuum for two reasons. First, we want to benchmark our results against the two studies using a broader range of products. Second, using a multi-dimensional construct can increase uncertainly in (a) whether to use a formative vs. latent construct and (b) reliability and convergence issues of measurement items.

Fig. 1 Extent of web search



reported by the two studies in 1992 and 2000. Vitamins ratings are higher than health/beauty supplies in Weathers and Makienko (2006) but lower than the flu shot in Iacobucci's (1992) and Thakor and Kumar's (2000). Thus, H1 is supported. In other words, the ES shift is not seen in the common SEC goods we chose (Table 3, Fig. 2).

For the six products, the ratings in Fig. 3 appear mostly the same for the three treatment groups, except for PC and car. The *t*-test, however, shows that only the PC ratings between "Web Only" and "No Web" are somewhat different (p=078). Rating differences between the three treatments for other products are not statistically different. Thus, H2a is mostly supported, except for PCs.

The distributions of SEC ratings do not appear normal (Appendix A). The skewness is significant except for vitamins at ($p \leq .01$). Kurtosis is significant ($p \leq .01$) for auto insurance and vitamins. The general patterns seen are as follows:

- There are two dominant groups of consumers who regard a product as either mostly search dominant or mostly experience dominant.
- The majority balance between these groups seems to tip the scale between mostly search dominant or mostly experience dominant.
- The ratings are spread widely. While the majority regards a product as a search good, some consider it even as a pure credence good.

Therefore, what we see is that multiple consumer types perceive the SEC ratings differently for different goods. Simply observing the average SEC ratings for each good will hide the rating changes among consumers with certain profiles.

Table 3 SEC rating summary of this study

SEC ratings of this study [web only, no web, no restriction]	SEC ratings of related goods in other studies
PC [1.76, 1.97, 1.91]	CD player [1.9] (Iacobucci 1992)
	electronics [2.33] (Weathers and Makienko 2006)
Best-selling book [2.08, 2.03, 2.08]	novel [2.08] (Iacobucci 1992)
	book [1.33] (Weathers and Makienko 2006)
Cell phone [2.16, 2.19, 2.23]	electronics [2.33] (Weathers and Makienko 2006)
Car [2.47, 2.24, 2.35]	car [2.1] (Iacobucci 1992)
	car and boat supplies [1.34] (Weathers and Makienko 2006)
Auto insurance [2.26, 2.19, 2.34]	life insurance [3.5] (Iacobucci 1992)
	life insurance [3.76] (Thakor and Kumar 2000)
	property insurance [3.53] (Thakor and Kumar 2000)
Vitamins [2.62, 2.73, 2.62]	health/beauty supplies [1.93] (Weathers and Makienko 2006)
	flu shot [3.9] (Iacobucci 1992)
	flu shot [4.11] (Thakor and Kumar 2000)

SEC rating uses the 1 (search)-3 (experience)-5 (credence) scale

Factors behind the SEC ratings For the next step, we use regressions to see what kinds of consumer profiles influence the SEC ratings. Regressions are considered exploratory, given the non-normal distribution of the SEC ratings and some independent/control variables. The distribution of certain variables (e.g., web shopping experience, web search experience) resembles an inverse (y=1/x) or reversed inverse (y=1/(K – x)) curve. In that case, we use variable transformation to minimize the impact of non-normality. Also not the same set of independent and control variables affected each good. For this reason, we use stepwise regressions. The summary of results is shown in Table 4.

For H2b, web search for the product is significant only for PC and vitamins. H2b is then supported for best-selling book, cell phone, car and auto insurance. H2a is also supported even when taking the control variables into accounts. For all products, the treatment variable was not significant.

Notable significant factors for SEC ratings are web shopping experience and age. Except for vitamins, consumers with more online shopping experience have higher certainty about their perception of quality. Consumers probably learn from dealing with different products, retailers and purchase options. They also learn how to find better options by using the Web. Learning is not necessarily significant with one purchase, but it

Table 4 Summary of stepwise regressions

Good	Independent Variable	R-square	F	P
PC	web search for PC (β = −.104, p=.017) web shopping experience (β = −.096, p=.028) age (β = −.084, p=.048)	.033	6.281	.000
Best-selling book	web shopping experience (β = −.095, p=.024) age (β = −.135, p=.001)	.026	7.321	.001
Cell phone	web shopping experience (β = −.115, p=.007)	.013	7.322	.007
Car	web shopping experience (β = −.127, p=.003) age (β = −.122, p=.004)	.033	9.352	.000
Auto insurance	web shopping experience (β = −.084, p=.048)age (β = −.141, p=.001)	.029	8.048	.000
Vitamins	web search for vitamins (β = −.119, p=.005)	.014	7.879	.005

Dependent variable: SEC rating of a good

Independent variables: treatment (web access), web search for the product

Control variables: age, gender, web search engine expertise, general web shopping experience, purchase frequency of the product, online purchase frequency of the product

becomes significant over time as the body of consumer knowledge grows. Age then comes in handy for products like PCs, books, cars and auto insurance.

How consumers search for the selected goods Finally, is there any indication that consumers are searching rationally when purchasing goods? Fig. 1 seems to suggest that consumers (a) search extensively for expensive (e.g., car) or goods that are important in their daily life (e.g., PC, cell phone). There are several clusters of consumers who have different perceptions on the availability of information on product quality. For example, 53% of car shoppers search the Web extensively whereas 20% search in a cursory manner and 20% check on just 4–6 websites carefully. Cell phone shoppers, too, consist of three groups: those who search the Web extensively (39.2%), those who take a look at just a few websites (28.4%), and those who are somewhere between the two groups (32.4%). Thus, we may have several consumer groups for each product. The Web and other factors might impact differently those consumer groups in how they rate the SEC classifications.

In summary, pervasive ES shifts are not seen with the six products. The SEC ratings for these products fall between the ratings of pure search and pure experience goods, mostly towards the experience-good side. Whether consumers use the Web for a particular purchase is not a factor for SEC ratings. Also using Web search engines for a particular purchase does not have a significant impact on SEC ratings (except for PCs and vitamins). What does affects consumer SEC ratings are general online shopping experience and the age of consumers. The next section considers what these results mean.

Implications

Countless numbers of products and services exist. Also new or modified products appear as some old ones disappear from the market. We cannot categorically support that the ES shift is occurring due to the Web. The ES shift, if detected, may be because (a) the product quality has improved over time, (b) the product innovation and the marketing strategies used with the product have changed consumer perception of the product from

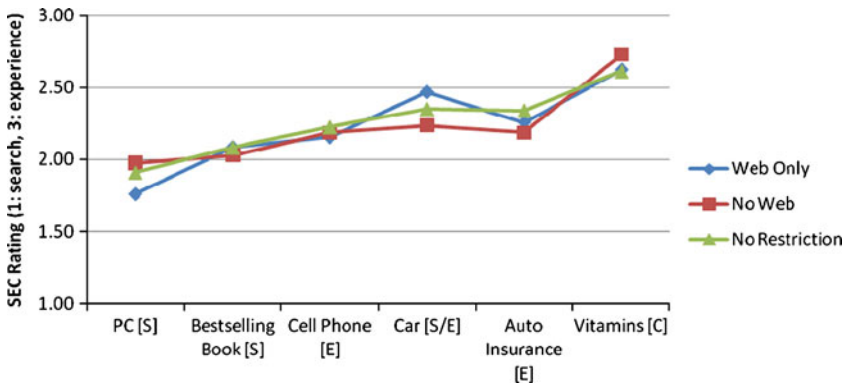


Fig. 2 SEC ratings by good and treatment

an experience good to a search good. Even if the Web has significant power to turn experience goods into search goods, numerous advertising claims can make "objective" search more challenging.

The historical evidence does not clearly indicate the ES shift. There is no significant change in the SEC ratings of service goods between 1990 and 2000. A recent study (Weathers and Makienko 2006) regards some previously scored experience goods as search goods while the reverse can be the case for some others. As with the six products we examined, the SEC ratings are mostly in line with the previously reported ratings. However, consumer perceptions are mixed whether search or experience attributes are more dominant. The histograms of the SEC ratings show that there can be more than a couple of consumer types when it comes to how certain consumers feel about product quality before purchase. To make the situation even more complicated, consumers now have more information, more purchase channels, and faster moving markets.

The results show that the current Web use or short-term Web impact on SEC ratings is rather small or negligible. In contrast, the sum total of a consumer's online shopping experience does influence his or her SEC ratings. As more consumers have online shopping experience, the more certain they feel about product quality (ES shifts). However, the magnitude of the ES shifts is rather small. This may be due to the limitations of linear regressions with the variables whose distributions are not normal. In contrast, the small R^2s do indicate that the global impact of age and current or cumulative Web use is rather small on SEC ratings.

The SEC ratings hinge on whether and when consumers can know product quality. This relates to the reliability of product quality. For example, cars from a new manufacturer may be considered experience goods whereas cars from a well-established manufacturer may be regarded as search goods. The Web effects on SEC ratings can differ from product to product. SEC ratings are influenced by the marketing strategies used with the product. SEC ratings can also depend on geographic areas (Thakor and Kumar 2000). Thus, the assessment of the SEC ratings is subject to the aggregation effects that make significant SEC rating changes at the global level hard to detect. The nature of the SEC trichotomy is rooted in economic analyses at the market level. However, what if the market has now become a quilt of micro-markets?

Limitations and future research agendas

There are several limitations of our study. This exploratory survey looks at six common products in-depth. The results do not necessarily apply for all types of products. The survey questionnaires asked the respondents to make hypothetical purchases, not actual purchases. Nevertheless, we do focus on the global perception of common SEC goods. The generic SEC ratings do not depend on actual purchases of a particular brand at a particular retailer.

Possible factors that may change a SEC rating are the general improvement of product quality and product innovations. Case studies on selected products over the decades can examine major product innovations, product quality improvements, how many of the goods are now in electronic formats (digital component), and how the service and maintenance of these products have been delivered and improved (service component). Further, what are the major market segments for these goods? Then how have these market segments changed over time? Do consumers who exclusively buy some products online rate the SEC classification differently than those who exclusively buy these goods at retail stores?

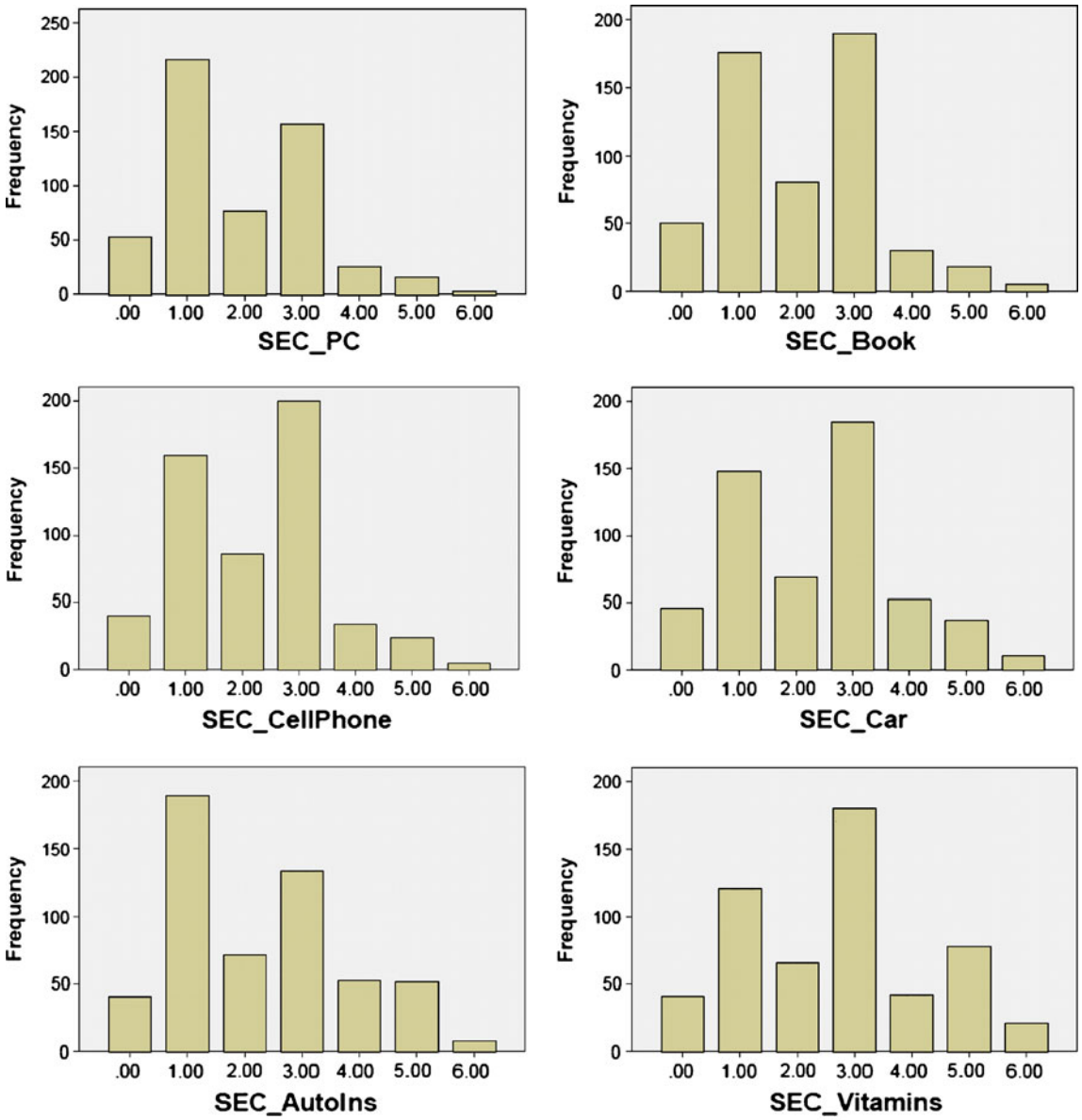
Another issue we can examine is whether virtual experience can sufficiently replace one's sensory experience (smells and tastes) so that experience goods become search goods. Some case studies may reveal unseen trends in this aspect. Finally, what about the consumers' media habits on the SEC ratings? For instance, what kinds of social network media do they get product information from? Nowadays, many consumers use social networking sites like Facebook and Twitter.

Conclusion

Has the Web transformed experience goods into search goods (ES shifts) as Klein (1998) predicted? We examined her proposition in three ways. First, we critically assessed the background of her propositions. We found that possible counter-forces may obscure any ES shifts. Among these counter-forces are commercial advertising claims, shifts in product quality, collaborative filtering at online retailers and more online shopping in which consumers cannot directly inspect products in the same way they do at retail stores. Second, a comparison of past studies did not clearly show such shifts. While some experience goods such as automobiles have more search attributes than before, we also saw the reverse with products like eyewear and furniture. Jewelry, electronics and musical instruments remain experience goods. Most services also remain experience goods.

Finally, we benchmarked the extent of ES shifts of six commonly purchased products, using the same constructs used by the studies we reviewed. The results do not show significant ES shifts. The SEC classifications of these six products do not change significantly, either. Our analyses indicate that consumers search differently on the six products depending on their priority for price and daily convenience. Therefore, we note that consumers' Web access does not seem to result in the significant shifts between SEC classifications because the counter-forces against such shifts are also working on the Web.

Appendix A. SEC rating histograms



The rating scale is: 1 (search), 3 (experience) and 5 (credence).

References

Alba, J., Lynch, J., Weitz, B., Janiszewski, C., Lutz, R., Sawyer, A., et al. (1997). Interactive Home Shopping: Consumer, Retailer, and Manufacturer Incentives to Participate in Electronic Marketplaces. *The Journal of Marketing, 61*(3), 38–53.

Baker, S. (2009, July 27). The Web Knows What You Want. *BusinessWeek,* 48–49.

Bettman, J. R., Johnson, E. J., & Payne, J. W. (1991). Consumer Decision Making. In T. S. Robertson & H. H. Kassarjian (Eds.), *Handbook of Consumer Behavior* (pp. 50–84). Englewood Cliffs: Prentice Hall.

Bhatnagar, A., & Ghose, S. (2004). Online information search termination patterns across product categories and consumer demographics. *Journal of Retailing, 80*(3), 221.

Chiu, C.-M., Chang, C.-C., Cheng, H.-L., & Fang, Y.-H. (2009). Determinants of Customer Repurchase Intention in Online Shopping. *Online Information Review, 33*(4), 761–784.

Darby, M. R., & Karni, E. (1973). Free Competition and the Optimal Amount of Fraud. *Journal of Law and Economics, 16*(1), 67–88.

Ekelund, R. B., Jr., Mixon, F. G., Jr., & Ressler, R. W. (1995). Advertising and information: An empirical study of search, experience and credence goods. *Journal of Economic Studies, 22*(2), 33–43.

Ford, G. T., Smith, D. B., & Swasy, J. L. (1988). An Empirical Test of the Search, Experience and Credence Attributes Framework. *Advances in Consumer Research, 15*(1), 239–243.

Gordon, M. E., Slade, L. A., & Schmitt, N. (1986). The "Science of the Sophomore" Revisited: from Conjecture to Empiricism. *Academy of Management Review, 11*(1), 191–207.

Greenberg, J. (1987). The College Sophomore as Guinea Pig: Setting the Record Straight. *Academy of Management Review, 12*(1), 157–159.

Haubl, G., & Murray, K. B. (2003). Preference Construction and Persistence in Digital Marketplaces: The Role of Electronic Recommendation Agents. *Journal of Consumer Psychology, 13* (1&2), 75–91.

Hausman, A. (2000). A multi-method investigation of consumer motivations in impulse buying behavior. *The Journal of Consumer Marketing, 17*(5), 403–426.

Hoskins, C., McFadyen, S. M., & Finn, A. (2004). *Media Economics Applying Economics to New and Traditional Media*. Thousand Oaks: Sage Publications.

Iacobucci, D. (1992). An empirical examination of some basic tenets in services: goods-services continua. *Advances in Services Marketing and Management, 1*, 23–52.

Klein, L. R. (1998). Evaluating the potential of interactive media through a new lens: Search versus experience goods. *Journal of Business Research, 41*(3), 195–203.

Krishnan, B. C., & Hartline, M. D. (2001). Brand equity: Is it more important in services? *The Journal of Services Marketing, 15*(5), 328–342.

Laband, D. N. (1991). An Objective Measure of Search Versus Experience Goods. *Economic Inquiry, 29*(3), 497–509.

Linden, G., Smith, B., & York, J. (2003). Amazon.com Recommendations: Item-to-Item Collaborative Filtering. *IEEE Internet Computing, 7*(1), 76–80.

Nelson, P. (1970). Information and consumer behavior. *Journal of Political Economy, 78*(2), 311–329.

Nielsen. (2009). Retrieved August 29, 2009, from http://en-us.nielsen.com/rankings/insights/rankings/internet

Senecal, S., Kalczynski, P. J., & Nantel, J. (2005). Consumers' decision-making process and their online shopping behavior: a clickstream analysis. *Journal of Business Research, 58*(11), 1599–1608.

Stertz, B. A. (1990). Big Three Boost Car Quality but Still Lag, *Wall Street Journal,* p. B1. Retrieved from http://proquest.umi.com/pqdweb?did=4205013&Fmt=7&clientId=31663&RQT=309&VName=PQD

Stigler, G. J. (1961). The Economics of Information. *Journal of Political Economy, 69*, 213–225.

Thakor, M. V., & Kumar, A. (2000). What is a professional service? A conceptual review and bi-national investigation. *Journal of Services Marketing, 14*(1), 63–82.

Weathers, D., & Makienko, I. (2006). Assessing the Relationships between E-Tail Success and Product and Web Site Factors. *Journal of Interactive Marketing, 20*(2), 41–54.