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Models of Internet Market Share

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Abstract

This study investigates the critical factors that support establishing high market share for Internet-based businesses. First it surveys the marketing literature for those factors that have traditionally been recognized to contribute to market share. Advertising, product prices, quality, selection, customization, and brand popularity share are found to be important factors. Next, the study identifies some principle quantitative models for modeling market share. Then it identifies some factors that have been identified in literature that would be expected to contribute to market share of Internet-based businesses. These include Internet advertising, shopping agents, customer loyalty and trust, among others. Finally, the study proposes a simple linear and a logistic model as the best potential choices for modeling Internet-based market share.

Keywords: Market share, Internet

Introduction

The Internet has enabled new ways of doing business. There is much argument over how radically the Internet transforms business competition (see Porter, 2001), ranging from perceiving the Internet as *the* enabler of the new information age, to viewing it as simply a new marketing channel. In either case, there has been much interest over how to successfully conduct business over the Internet. In measuring “success”, the most valuable perspective is to examine business performance using the Internet. There are many standard measures of firm performance, the most popular being net profits, sales, return on investment, return on assets, and market share. While most of these measures are absolute in the sense that they are mathematically independent on the performance of other firms, market share is the percentage of the total industry sales that a particular company contributes to, in competition with its rivals. Thus it is a performance measure that captures a firm’s relative performance vis-à-vis its competitors. Moreover, market share can be seen as an indicator of how well a company reaches a wider customer base. In this light, market share is a measure of how well a company is performing whose strategy is to garner profits by reaching as many customers in the demand market as possible.

This dual focus of market share as a performance metric makes it particularly relevant for measuring the performance of businesses using the Internet for competition. In the early days of Internet competition, there was a lot of hype that if only a company could rapidly establish a large market share as the first entrant with a new product or service, they could garner the profits that would automatically follow. The Great Dot-Com Crash of 2000 has by and large disproved this illusion. However, the problem was not that market share was a poor target for performance: early Internet market leaders such as Amazon and eBay have proven very successful in their respective fields. But companies like these have demonstrated the need to establish high market share on the solid basis of proven principles that can support the growth of profits.

This study is the theoretical part of a research project that investigates the critical factors that support establishing high market share for Internet-based businesses. It is organized in four major sections: First I survey the marketing literature for those factors that have traditionally been recognized to contribute to market share. Next I collect some principle quantitative models that are used in the marketing literature to model market share. Then I identify some factors that have been identified in literature that would be expected to contribute to market share of Internet-based businesses. Finally, I comment on the models presented earlier, and develop from them a model that I believe to be most appropriate for Internet business. I conclude the paper with some summary comments and brief outline of further steps for this research.

Traditional factors determining market share

Advertising expenditures

One of the two most common variables in the literature for determining market share is advertising expenditures (Bowman and Gatignon, 1996; Kim, 1997; Nakao, 1983) (the other is price). Advertising is naturally a major determinant of market share, because it represents a business' efforts to inform consumers about the product that they want to sell. It has almost universally been found that advertising expenditures are positively related with market share (see Szymanski, et al., 1993 for a review).

Product Price

Product price is the second widely used predictor of market share in the literature (Boulding and Staelin, 1990; Szymanski, et al., 1993; Tellis, 1988). Unlike marketing expenditures, which generally have a positive effect, the effects of price on market share are not so straightforward. Szymanski, Bharadwaj and Varadarajan (1993) offer various explanations for the inconsistent relationships found in the market share literature. Because of the ambiguous effects of prices, the particular product being used for data must be carefully noted, and market power effects could be tested for (Boulding and Staelin, 1990; Hall, 1987; Rhoades, 1985).

Product Quality

In general, higher product quality should be expected to be associated with higher market share. Consumers tend to buy more of a high-quality product, when other variables are kept constant. Several studies verify this prediction (Jacobson and Aaker, 1985; Kim, 1997; Miller, et al., 1989; Szymanski, et al., 1993). However, Szymanski, Bharadwaj and Varadarajan (1993) caution that this generalization should not be considered universal, for higher quality could also be associated with higher prices and lower sales.

Product line diversification

There are many advantages of having a broad product line that accrue to market share. While the multiple products could be regarded as a single complex product when comparing the multiproduct business to its competitors, Szymanski, Bharadwaj and Varadarajan (1993) point out that by providing products that fill narrow niches in the demand, a multiproduct business flushes out many potential niche entrants, thus guarding its market share. They also note that multiple products from one company can satisfy customers who enjoy shopping for variety, and also cater to customers whose needs change over time.

Brand popularity

The popularity of a brand is intuitively a direct factor that affects market share. In fact, one of the definitions of the market share of a brand is how popular the brand is in the market. While this concept is easy to grasp abstractly, it is not so easy to operationalize popularity for quantitative studies. In the literature, brand popularity has variously been operationalized as relative product image or company reputation from the PIMS database (Jacobson and Aaker, 1985), and as the

cumulative company sales in a given long-term time period divided by the total cumulative market sales (Kim, 1997).

Product customization

One marketing strategy often employed to increase market share is for the manufacturer to tailor products to individual consumers' specifications. From this perspective, product customization has a similar effect to that of product line diversification. While this strategy makes the product more attractive to a wider variety of customers, and hence could increase market share, it often incurs high costs to implement, again like product line breadth. These costs are passed on as higher prices, which could reduce sales, thus counterbalancing or even negating the potential increases in market share. Empirical studies of the effect of product customization has been inconclusive (Szymanski, et al., 1993), so it is unclear which effect dominates in general; it is likely that the effect of product customization depends on the specific company's situation.

Traditional models that explain market share

Incorporating many of the factors that I have described, as well as several others, various studies have used different models to explain the interaction between and relative contribution of the factors in determining market share. Ghosh, Neslin and Shoemaker (1984) described three generic models that have been popular in the literature, and compared the predictive accuracies of variations of these three. The simplest form is a simple linear equation, where each factor is added together, with a constant term and an error term:

$$\text{market share} = \beta_0 + \beta_1 \times \text{factor 1} + \beta_2 \times \text{factor 2} + \dots + \beta_n \times \text{factor n} + \text{error term}$$

A similar form is a simple multiplicative equation, where the factors are multiplied with each other:

$$\text{market share} = \beta_0 \times (\text{factor 1})^{\beta_1} \times (\text{factor 2})^{\beta_2} \times \dots \times (\text{factor n})^{\beta_n} \times (\text{error term})$$

This multiplicative form is easily converted to a log-linear equation:

$$\log(\text{market share}) =$$

$$\beta_0 + \beta_1 \times \log(\text{factor 1}) + \beta_2 \times \log(\text{factor 2}) + \dots + \beta_n \times \log(\text{factor n}) + \text{error term}$$

The theoretical difference between simple linear and simple multiplicative functional forms depends on whether the researcher believes that the factors have a linear effect on market share, or if the effect is log-linear, respectively. Because of their relative simplicity, these have been the most popular forms used in the literature for modeling market share (Ghosh, et al., 1984; Jacobson and Aaker, 1985; Miller, et al., 1989). However, these models have been criticized for being conceptually unsound, since they can yield market share predictions that do not sum up to 100%, and that might even be negative (Ghosh, et al., 1984). One reason for this problem is that these simpler models do not take into account the effect of the factors being studied on competitors' market share. A company's market share depends both on how it is performing and upon how competitors are doing, and how they interact with each other in the competitive market. To incorporate this broader perspective of market share, several studies employ an attraction model (also called gravity model) based on the multiplicative form above:

$$\text{market share for product a} = \frac{\beta_0 \times \left[\prod_1^k (\text{factor k affecting product a})^{\beta_k} \right] \times (\text{error term})}{\sum \left\{ \beta_0 \times \left[\prod_1^k (\text{factor k affecting product i})^{\beta_k} \right] \times (\text{error term}) \right\}}$$

This attraction form of the market share model has the advantages of being restricted to the range 0 to 100% for each product or company's individual market share, and also of having the total market share equal 100%. Thus it is also quite popular in the literature (Bowman and Gatignon,

1996; Ghosh, et al., 1984; Kim, 1997). However, in spite of the theoretical superiority of the attraction model and its variations, Ghosh, Neslin and Shoemaker (1984) found that they do not yield more accurate explanations of market share than do the simpler linear and multiplicative models. Without any significant advantage in prediction accuracy, there is little reason to use these more complex models, especially when conciseness is desired in a model.

Factors determining market share for Internet-based businesses

The factors that determine market share for Internet-based businesses would include all the factors described above for traditional businesses. However, there are some characteristics of Internet business that would affect market share in somewhat different or more complex ways than in traditional competition, and there are some factors that feature uniquely in Internet business. In this section, I will discuss these notable factors in Internet business.

Internet advertising expenditures

Advertising for electronic commerce is significantly different from advertising for a traditional business. Although the Internet can be regarded as a sales channel, it is also a powerful medium for communicating product information. The role of Internet-based advertising for Internet businesses is complex, primarily because of the complexity of defining an “Internet business”. On one hand, an electronic commerce company contacts and interacts with customers on the Internet. On the other hand, such companies, or departments, are almost always extensions of more traditional businesses that interact with customers via traditional distribution and marketing channels. Even “pure-play electronic commerce” companies (Turban, et al., 2000) like Amazon and eBay use physical infrastructure and traditional marketing media such as television and billboards.

Product customization and entry order

While the effects of product customization in and of itself using the Internet are probably not significantly different from their effects in traditional business, the Internet provides more opportunities for tailoring products to the needs of individual customers (Dewan, et al., 2000). The Internet enables complex gathering and processing of large amounts of information, and allows companies to dynamically assign prices that match the customizations they make. Moreover, flexible manufacturing systems and other recent innovations in operations and manufacturing have enabled the cost-effective creation of customized products (Dewan, et al., 2000). Dewan, Jing and Seidmann (2000) found that businesses who provide custom products can gain above average profits, and gain market share over those who do not. However, market pressures inevitably drive competitors to also provide customized profits, causing profits to fall below rates for non-custom products. In such situations, the early-moving customizers would benefit the most by their gains in market share.

Internet shopping agents

One of the features of the Web that is significantly transforming computer behavior is shopping agents. These tools basically provide an interface where the consumer can specify precisely what product he or she wants, and then compare the prices at various stores. Of course, making the final choice isn’t as simple as choosing the lowest price that these shopping agents present: consumers still have to compare other factors such as customer service (for more information or in case something should go wrong with the order), shipping options and prices, security of the vendor’s e-commerce system, trust of the vendor, and other factors (Brynjolfsson and Smith, Unpublished). But still, price is probably the single most decisive factor, and shopping agents at least give a consumer a number of low-price options to begin comparing based on their personal criteria.

Customer loyalty and trust

The role of trust in electronic commerce has been a recent topic of interest (see, for example, Gefen, 2000; Klang, 2001; Warrington, et al., 2000), when considering the virtual medium of cyberspace, where buyers contact sellers electronically with little tangible evidence that anyone is actually on the other end of the electron stream. While trust is also a factor in traditional business relationships, with the incidence of fraud on both ends, and the largely exaggerated danger of hackers and viruses, doing business on the Internet provides at least additional perceived risks, which must be overcome for mutually beneficial business relationships to be established.

Analytical model for Internet-based market share

As I discussed earlier, although there have been various quantitative models used to measure market share in the literature, they do not yield significantly different predictions (Ghosh, et al., 1984). Thus, since it is preferable to use the simplest form that is accurate, I will model the interaction between market share and its determinant factors using the simple linear model described above.

$$S = \beta_0 + \sum_0^i \beta_i X_i + \varepsilon$$

However, I am nevertheless concerned about the failure of market share to be range constrained (that is, bounded from 0 to 100%) and sum constrained (add up to 100%). The attraction model presented above tried to resolve this problem by using a form that is more representative of the theoretical interaction between the variables. But the resulting form does not yield results that are significantly more accurate. Thus I will take another approach to try to attempt range and sum constraints on the market share predictions. In this study, in addition to the simple linear model, I will also use a logistic model, and will compare its predictive accuracy with the first one. The logistic model I will use here is based on the assumption that the range of results of adding the market share factors linearly can yield any real number, $Y \in (-\infty, +\infty)$. The actual market share, s , is a proportion of the total market demand, and thus is range and sum bounded; that is, $s \in [0,1]$ and $\sum s_i = 100\%$. One functional form that has these properties, which I will use in this study, is

$$Y = \ln \frac{s}{1-s} = \beta_0 + \sum_0^i \beta_i X_i + \varepsilon$$

Another advantage of having two alternate functional forms available is that whichever form is more appropriate for the data can be used. If the market share data is given as dollar amounts, the simple linear form can be used. This is often the case when the researcher might have sales data for a specific number of companies or products, but no accurate estimate of the total market sales. If, however, total market information is available and the market share can be expressed as a percentage, the logistic form is more appropriate.

Conclusion

This work-in-progress lays out the theoretical basis of a research project to investigate the critical factors that support establishing high market share for Internet-based businesses. I have surveyed the marketing literature for factors traditionally recognized as contributing to market share, and have presented some quantitative models for predicting the market share of individual firms. Next I have identified some factors that are expected to contribute to market share of Internet-based businesses, and I have presented a simple linear and a logistic model for modeling Internet-based market share.

The next stage of this research would involve collecting data from Internet-based businesses in a particular industry. Data would be gathered for each factor described in this paper (or as many as feasible) to see how well the models presented successfully predict the individual firms' market shares. Thus, the relative importance of the various factors can be established, and recommendations can be made for managers and researchers of Internet-based businesses. This study is an important first step towards better understanding the factors affecting market share, an important measure of the performance of Internet-based businesses. This understanding will help managers to carefully select their market-mix and strategic variables for effective competition in the fierce arena of the Internet.

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