

## Competition and Adoption of Search Engine Software

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### *Abstract*

*In recent years, international software companies encountered fierce competition from indigenous software providers in China. In the Internet search engine market, Baidu is a latecomer compared to Google. However, by catering to local users' preferences, Baidu is able to dominate the market now. In this paper, we developed a conceptual model to analyze why users want to adopt and stay in Baidu/Google. In contrast with the user adoption literature, we investigated users' intention to use and continuance intention separately. By discriminating users who stay at Google/Baidu with those who are new to the websites, we may get a better understanding of the market competition.*

*The results of the paper shed light on answering questions as to "What are the key reasons why Baidu wins the battle with Google?" "How Baidu leverage local users' behavior and get more market share than Google?" "Is there any vital strategy which leads the success of Baidu?" The paper may also help practitioners who are planning to enter China market by providing practical lessons.*

### **1. Introduction**

Recent years have witnessed fierce competition between international software/platform and indigenous software/platform in China. Famous cases include Google vs. Baidu in the search engine market, eBay vs. Taobao in the C2C e-commerce market, and MSN vs. QQ in the Instant Messaging market.

In all of these cases, indigenous software providers are latecomers in the market. They provide software or platforms with similar functions as their international competitors. By adapting the software/platform to local users' preference and behavior, they are able to dominate the market.

For instance, Baidu, the indigenous search engine in China, was founded in 2000. Inspired by Google and Yahoo!, Baidu is devoted to providing keyword-based Internet search services in Mandarin Chinese.

Baidu claims that cultural barriers faced by Google put Baidu in an advantageous position. In its IPO literature, Baidu contrasts 38 different Mandarin words meaning "I", versus only one English word "I". Such comparison emphasizes that Baidu is the company that understands Chinese culture more, and thus, could provide the best Internet search engine service.

Google realized the great potential of the Chinese market, and built a strong Chinese search engine R&D team, leading to the launch of www.google.cn in China in Jan 2006.

According to the survey by IntelliConsulting (2007), an IT consulting company, Chinese users point out that Google's search results are better than Baidu's in terms of relevance, with less commercial advertising, and providing higher overall satisfaction.

Interestingly, the same survey also indicates that Baidu has gained substantial market share over Google from 2005 to 2006, rising from 51.5% to 64.5%, while Google's market share has slipped from 32.9% to 20.6%.

This is not an isolated case. After passing the imitation stage, indigenous software providers, such as Baidu, Taobao, and QQ, appear to be able to beat their international competitors and dominate the market.

Why users prefer Baidu to Google when Google provides almost the same, if not better search engine service than Baidu? What are the factors driving users' different adoption behavior? What are the key reasons why Baidu wins the battle over Google in China in the search engine market?

To answer these questions, we propose a conceptual framework to explore users' adoption behavior. The results of our model should help practitioners in the China market understand what steps they can take to adapt their products to local users' preference and demands.

The rest of the paper is organized as follows. Section 2 reviews technology adoption literature and proposes the conceptual model. Section 3 describes our methodology. Section 4 discusses the study's contributions and implications.

## **2. Hypotheses**

There have been considerable research efforts to explore how and why individuals adopt new information technologies. Theory of Reasoned Action (Ajzen and Fishbein, 1973) posited that individual behavior is driven by behavioral intentions, while individual's attitude toward the behavior and subjective norms surrounding the performance of the behavior are predictors of intention (Ajzen and Fishbein 1973). Tailoring this idea into IS context, Davis (1989) proposed the widely accepted Technology Acceptance Model (TAM), which articulates that perceived usefulness and perceived ease of use determine an individual's intention to use an information technology. Venkatesh et al. (2003) extended TAM and suggested Unified Theory of Acceptance and Use of Technology (UTAUT) model, where four constructs play a major role as direct determinants of user acceptance and usage behavior: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003).

However, in the case of Baidu vs. Google, we believe that we should focus not only on users' adoption intention, but also on the continuance intention. Marketing literature proves that acquiring new customers may cost as much as five times more than retaining existing ones, which specifies the difference between users' adoption intention and continuance intention. Bhattacharjee (2001) claimed that if continuance is an extension of acceptance behavior as implied by prior IS literature, then it is hard to explain why some users discontinue IS use after accepting it initially.

Since the main research question is why Baidu has a larger market share than Google, we might want to extend the reasons to why users want to stay in one system other than the initial adoption intention. Therefore, we will discriminate the adoption intention and the continuance intention.

### **2.1. Perceived Usefulness**

TAM (Davis 1989) specified that perceived usefulness of an information technology system can predict individual's intention to use it. Perceived usefulness is defined as "the degree to which a person believes that using a particular system could enhance his or her job performance".

Users have long argued that which product could provide better search result, Google or Baidu? Some believe that Baidu is good at understanding obscure Chinese keywords, while others state that Google is more objective, since the rankings of its search results are based on relevance as opposed to interference from advertising objectives.

Since this is still an open question, we believe that users will have their own judgment in terms of the perceived usefulness of Google and Baidu, which will in turn affect their adoption intention and continuance intention. This leads to:

H1a: Users' perceived usefulness of Google/Baidu is positively associated with their intention to use the system.

H1b: Users' perceived usefulness of Google/Baidu is positively associated with their continuance intention to the system.

## **2.2. User Participation**

One distinctive strategy of Baidu in recent years is to build a virtual community rather than just provide search engine services. Baidu established "Baidu post bar", where users could build a theme bar for any thing they are interested in. When other users search the keywords related to the theme, Baidu will indicate users to enter the theme bar and discuss the same topic with others. Usually, each theme bar has a few loyal users, who hang out there and make virtual friendship with each other. Other related functions include "Baidu knows", where users can post questions, and other online users can provide their answers. With such changes, users could participant in the search process.

Hunton and Beeler (1997) argued that higher level of participation is predicted to increase users' intention to use the system. After devoting time and energy in a certain system, users will have emotional bonds with the system, and are more likely to use it compared with other substitutes. Baidu's virtual community provides many ways for users to participate in the system. Collectively, these outcomes suggest:

H2a: Higher level of users' participation with Baidu/Google will lead to their intention to use the system.

H2b: Higher level of users' participation with Baidu/Google will lead to their continuance intention to the system.

## **2.3. Perceived Enjoyment**

Motivational theory (Deci 1975) suggested that users' acceptance is determined by extrinsic and intrinsic motivations. Heijde(2004) argued that users' perceived usefulness focuses on the outside benefit, and thus emphasizes extrinsic motivation. In contrast, users' perceived enjoyment concentrating on fun derived from using the system reflects the intrinsic motivation.

Baidu's virtual community provides users a place to make friends and help each other. Loyal users stay in this community not only because they could get extrinsic benefits, such as getting answers to some questions, but also because they feel fun and enjoyment when they stay in this community sharing knowledge with each other. These intrinsic motivations result in their intention to use and continuance intention, which leads to:

H3a: Users' perceived enjoyment with Baidu/Google is positively associated with their intention to use the system.

H3b: Users' perceived enjoyment with Baidu/Google is positively associated with their continuance intention to the system.

## 2.4. Image

Moore and Benbasat (1991) defined image as the degree to which use of an innovation is perceived to enhance one's image or status in one's social system. Other researchers made a parallel argument and articulated that image is correlated with users' adoption intention (Venkatesh et al. 2003).

Google and Baidu have distinctive user bases due to their different backgrounds. Although we are comparing Chinese search engine service of Google and Baidu, Google embeds Chinese and English search results together. Consequently, higher educated users, who use English frequently, are more likely to use Google. Moreover, Google has a bright company image. It disables links to porn and other sensitive content, while providing other practical tools for free, such as Google Earth.

From the beginning of entering into the China market, Google dominated the market with highly educated users, such as white-collar workers in international companies. Users may be concerned with the impression to others when they decide to use Google or Baidu. This suggests:

H4a: Image will influence users' intention to use Baidu/Google.

H4b: Image will influence users' continuance intention to Baidu/Google.

## 2.5. Habits

Habits are a strong predictor of behavior although they are seldom tested in prior literature (Thompson et al. 1991). Habits are situation-behavioral sequences that occur without self-instruction (Triandis 1971).

Thompson et al. (1991) proposed a conceptual model and specified that habits play a role in the utilization of a PC. Their arguments also apply to online surfing.

Users might repeatedly visit Baidu or Google websites not necessarily because it provides the most efficient or effective search engine service, but simply because they are used to visiting these websites.

For the initial adoption intention, habits have not been established yet, and therefore have a minor effect. Hence, we only investigate how habits affect continuance intention.

Regarding the right measurements, Triandis (1980) indicated that habits could be measured by the frequency of certain behavior. In Google versus Baidu's case, habits could also be measured by homepage setting. Baidu and Google facilitate users to set them as homepage by just one click. Once users set Google or Baidu as their homepage, to a large extent, visiting the websites is driven by habits. These findings lead to the hypothesis 5:

H5: Habits is positively related to users' continuance intention to Baidu/Google.

## 2.6. Conceptual Model

After analyzing the factors which affect users' intention to use and continuance intention to Baidu/Google, we depict the process in Figure 1.

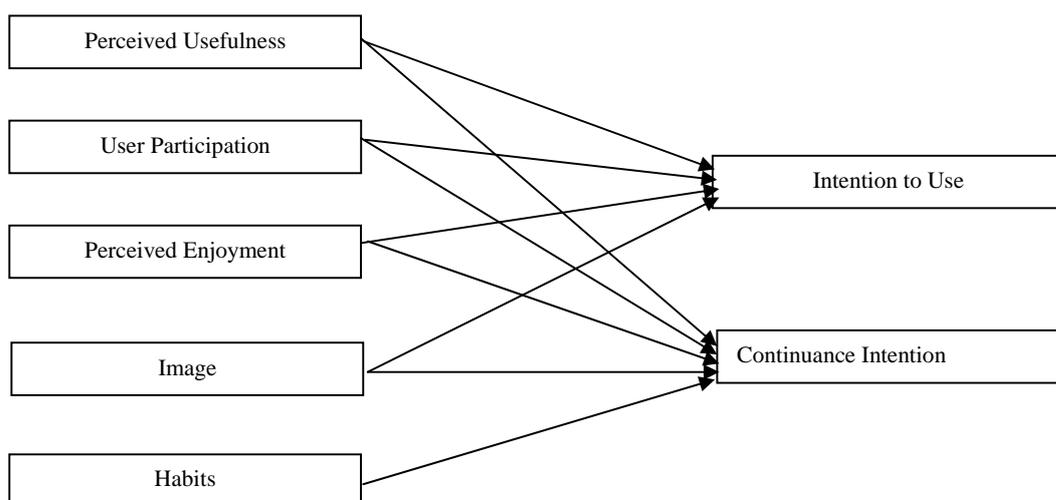


Figure 1. The conceptual model

### 3. Methodology

#### 3.1 Instrument Design

We summarize the constructs and their measurements as well as the source of the references in Table 1.

Table 1. Constructs and measurements

Construct	Definition	Items
Perceived Usefulness (Davis 1989; Venkatesh et al. 2003)	The degree to which a person believes that using a particular system could enhance his or her job performance	Accomplish tasks more quickly Improve job performance Increase productivity Enhance effectiveness Make job easier Useful in one's job
User Participation	Users' participation in certain system	Overall responsibility

(Hunton and Beeler 1997)		User-systems relationship hands-on activity
Perceived Enjoyment (Heijden 2004)	The extent to which fun can be derived from using the system	Enjoyment/disgusting Exciting/ dull Pleasant/ unpleasant Interesting/boring
Image (Moore and Benbasat 1991)	The degree to which use of an innovation is perceived to enhance one's image or status in one's social system.	People in my organization who use the system have more prestige than those who do not People in my organization who use the system have a high profile Having the system is a status symbol in my organization
Habits (Triandis 1980; Thompson 1991)	Situation-behavior sequences that occur without self-instruction	Frequency of occurrence of behavior Homepage setting
Continuance Intention (Bhattacharjee 2001)	Users' intention to continue using certain system	Intent to continue using Intentions are to continue using certain system than use any alternative system Discontinue the use of certain system (reverse coded)
Intention to use (Davis 1989; Venkatesh et al. 2003)	Users' intention to use certain system	Intent to use the system on the next <n> months Predict one would use the system in the next <n> months Plan to use the system in the next <n> months

### 3.2. Experimental Design

We use survey methodology to investigate why users adopt and stay with one search engine rather than the other.

Based on the conceptual model and instrument design, we will send questionnaires to undergraduate students and post-graduates students in one university in China.

The survey is still in progress. After we collect the data, we will use a partial least squares (PLS) approach (Chen et al. 2003) to examine the model. Since the constructs have both nominal and ordinal measurements, PLS could be a good tool to assess the relationships between constructs without distribution assumptions.

#### 4. Contribution

In China IT market, international software providers encounter fierce competition from local software providers. In a few vital cases, indigenous software providers successfully tailored their products to local users' preference and demands, and are able to dominate the market. Managers who are planning to enter the China market are keen to learn these experiences.

This paper develops a conceptual model to analyze key reasons why users prefer Baidu to Google, although more users deem Google's search engine service to be superior to Baidu.

The conceptual model draws upon literature of virtual community and proposes that Baidu's tactics to build a virtual community may help establish bonds with its users. With the development of Web 2.0 technology, Baidu promotes users' participation in the virtual community and strengthens the hedonic features of the community. Further conclusions need to be confirmed by our survey results.

Different from TAM and other adoption intention models, we believe that users' intention to use should be separated from users' continuance intention to certain systems. In terms of market share, how to maintain users is critical. Hence, we propose the construct of continuance intention and analyze the driving factors.

This paper sheds lights for practitioners who are planning to enter the China market by providing practical lessons. Also, it helps researchers understand more about users' motivation to adopt and continue using of a IT system.

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