Drivers of User Loyalty Intention and Commitment to a Search Engine: An Exploratory Study

Abstract

Based on consumer value and technology usage research, we propose a conceptual model linking search engine performance to search engine value, user satisfaction with the search engine and search engine reputation for innovation, and ultimately to user loyalty intention and commitment. The results of a study based on data collected from search engine users provide support for a majority of proposed relationships. Functional performance of the search engine affected search engine value. Value was found to be a full mediator of the relationship between functional performance and user satisfaction and between functional performance and reputation for innovation. Aesthetic performance did not affect search engine value but did have a significant effect on reputation for innovation. User satisfaction and search engine reputation for innovation, included as backward looking and forward looking antecedents respectively, influenced user loyalty intention and commitment as anticipated. Implications of the results are discussed and future research avenues are offered.

Keywords: Search engines, Internet, value, innovation, satisfaction, loyalty intention, commitment.

Introduction

Web search engines have revolutionized the process by which individuals search for information. A significant majority of consumers engage in web searches during one or more stages of product or service purchase decisions (Vuylstke et al. 2010). In turn, search engine optimization has emerged as an important method for acquiring and retaining consumers for companies of all sizes (Dou et al. 2010; Rangaswamy, Giles, and Seres 2009; Ratchford 2015). Nabout and Skiera (2012) report that search engine marketing accounted for 47% of global online advertising spending. Google Search, Google Inc.'s search engine stands out as the dominant search engine, accounting for almost 13 billion searches in a given month (Comscore 2013) and a commanding global share of about 75% of all searches throughout 2017 (SmartInsights, 2018).

In light of the pervasive influence of search engines on consumers and on marketing practice, there is a surprising dearth of research examining the determinants of consumer loyalty and commitment to search engines. We argue that in a highly competitive online context, understanding those factors that drive user loyalty and commitment are crucially important for firms. Many online markets, especially those with no monetary costs such as search engines, have generally low search costs and consumers are likely to have better product knowledge and a higher degree of brand familiarity (Wu and Padgett, 2004). Search engines engage in fierce competition in their efforts to attract new users and to keep current users in order to increase traffic to their respective sites (Garnier; 2009; Shi et al., 2014). Garnier (2009) notes that search engines as utility tools are more prone to repeated or frequently performed behavior. Frequently performed behavior is said to become habitual over time (Foxall, 1992; Kim and Malhotra, 2005) and is characterized by minimal awareness, in that individuals do not attend closely to what they are doing when they act habitually, and thus automatically repeat prior behavior. The literatures on habit and familiarity suggest that people tend to perform behaviors automatically because of (non-associative) learning (Kim, Malhotra, and Narasimhan 2005; Limayem, Hirt and Cheung 2007). A typical non-associative learning involves response patterns induced by stimulus repetition whereas in classical conditioning several stimuli are used in association (Wathieu 2004). Although using a search engine has become a regular online activity, we conceptualize user loyalty intention towards a search engine as being distinct from the habitual behavior. Since consumer behavior is goal directed, we argue that using a specific search engine for surfing behavior is a rational choice that leads to a specific consumer experience (Baumgartner, Pieters and Bagozzi 2008; Garnier 2009). This experience produces significant outcomes in the form of

a comparative gain or loss (Lafley and Martin 2017) e.g., higher/lower quality search results, which in turn affects future behaviors such as user loyalty and commitment.

The above arguments find support empirical support in the search engine literature. Studies examining search engine switching behavior demonstrate that a user's decision to select one search engine over another is influenced by reputation, search effectiveness and interface usability. For example, Mukhopadhyay, Rajan and Telang (2004), Juan and Chang (2005) and Savenkov, Lagun and Liu (2013) concluded that search engine users do not use the same engine for all queries and may switch based on the perceived poor quality of results generated from the original search engine, desire for verification or additional coverage, and user preferences. White and Dumais (2009) using data from two complimentary methods (survey data and large-scale log analyses) found that half of all users in the log sample and two-thirds of survey respondents engage in search engine switching behavior. Similarly, Dan and Davison (2013) showed that users mostly choose to defect from one search engine to another due to dissatisfaction with the results, while Kitchens, Harle, and Li (2014) found that Google produces higher quality results in response to individual's queries as compared to a non-Google search engines.

Consumer loyalty, indicated by the intention to persist with a provider, and consumer commitment, indicated by an unwillingness to switch providers in the face of external pressures are essential for firms seeking long run profitability (Crosby and Taylor 1983; Dick and Basu 1994; Pritchard, Havitz, and Howard 1999). While a handful of studies have addressed important strategic aspects of search engines such as variations in web search behaviors across countries (Vuylsteke et al. 2010), business impact of search engines (Rangaswamy, Giles, and Seres 2009), and brand positioning through search engines (Dou et al. 2010), the literature is largely silent on processes underlying consumer loyalty and commitment toward search engines. Three studies

provide some limited insights into these processes. Wu and Padgett (2004) examined consumer evaluations of search engines against a set of search engine attributes such as accuracy, ease of use, layout, and speed, overall satisfaction and user preference. Veloutsou and McAlonan (2012) examined several antecedents of online loyalty and disloyalty including perceived innovativeness of the search engine, the quality and speed of results, and user satisfaction. Finally, Garnier (2009) studied the link between commitment and loyalty intention and the moderating role of both functional characteristics (whether the search engine is practical, effective and functional) and hedonic characteristics (whether the search engine is fun, thrilling and exciting) on this linkage.

Our in-depth review of these three studies highlights a number of important research gaps. First, none of the above mentioned studies examine the potential role of search engine value in understanding loyalty and commitment towards a search engine. Delivering customer value to customers has become increasingly important in gaining a competitive edge by strengthening relationships with customers (Leroi-Werelds et al., 2014). Previous work in the marketing literature suggests that customer value is a key concept to explain satisfaction, loyalty and commitment yet this variable has been ignored in existing studies of search engine behavior (Lam et al. 2004). Perceived value has emerged as a key outcome of technology judgments and as a determinant of consumer technology acceptance and usage (Kim and Kankanhalli 2009; Turel, Serenko, and Bontis 2007). Second, with the exception of Veloutsou and McAlonan (2012), there is scant literature on the role of reputation for innovation in predicting user loyalty and commitment. Miklosik and Dano (2016) note that it is crucial for search engines to continually introduce innovations to keep their positioning intact in the marketplace. In technology markets, emerging research suggests that a reputation for innovation can influence consumer behavior

(Barone and Jewell 2013; Gurhan-Canli and Batra 2004; Henard and Dacin 2010) over and above the influences of transactional experiences. In online markets that are fast moving, a provider's past performance measured through traditional backward-looking measures such as consumer satisfaction may not be robustly predictive of future behavior (Zeithaml et al. 2006). In such markets, we argue that forward-looking measures accounting for the consumer's judgment of the future, are more likely to cohere with behavioral intentions. Therefore, the user's perception of the search engine's reputation for innovation, may play an important role in leveraging user loyalty and commitment. Finally, in studies of search engine behavior, we note that outcome variables have largely focused on loyalty that utilize items that capture the user's intention to continue to use a search provider and the inclination to recommend the search engine to others (Garnier, 2009; Veloutsou and McAlonan, 2012). There is scant literature on user commitment which is a distinct construct from behavioral loyalty. Following Gustaffson, Johnson and Roos (2005) we suggest that commitment provides a forward looking measure of consumer relationships, and provides additional insight beyond measures of behavioral loyalty.

Against this backdrop, and noted research gaps, we expand current research on search engine behavior by introducing in a conceptual model search engine value, user satisfaction, search engine reputation for innovation and both user loyalty intention and commitment as endogenous variables. We incorporate the complex interrelationships of all these constructs and test them in a search engine setting. Understanding how various factors relate to search engine value, user satisfaction, reputation for innovation, and user behavior can help managers derive initiatives involving those factors that directly affect these endogenous variables.

Conceptual Model

Our conceptual model is shown in Figure 1 and draws on research in the areas of consumer shopping technologies (Hoque and Lohse 1999; Montoya-Weiss, Voss, and Grewal 2003), the technology acceptance model (TAM) (Devaraj, Fan, and Kohli 2002; Hong et al. 2013; Venkatesh and Davis 2000), trust and online brand experience (Morgan-Thomas and Veloutsou 2013), search engine loyalty (Dan and Davison 2016; Garnier 2009), consumer/user satisfaction (Bhattacherjee 2001; Cenfetelli, Benbasat, and Al-Natour 2008), and consumer value (Babin, Darden, and Griffin 1994; Childers et al. 2001).

Figure 1 illustrates user[i] judgments of search engine performance along specific dimensions and specifies the influence of performance judgments on consumer value. Specifically, guided by the consumer value and technology assessment literatures (Childers et al. 2001; Davis 1989; Homburg, Schwemmle, and Kuehnl 2015; Venkatesh, Thong, and Zu 2012), we propose that perceived functional performance and perceived aesthetic performance as experience-based antecedents of search engine value. Search engine value in turn is proposed to determine user satisfaction with the search engine and the user's perception of the search engine's reputation for innovation. Finally, user satisfaction and reputation for innovation are proposed to determine behavior in the form of loyalty intention and user commitment. Satisfaction is conceptualized as an attitude and provides a retrospective assessment based on prior experiences with the search engine, while the provider's reputation for innovation is included as a forward-looking measure of the search engine's expected performance (Zeithaml et al. 2006). User loyalty is conceptualized as an intentional construct and surrogate of actual user behavior.

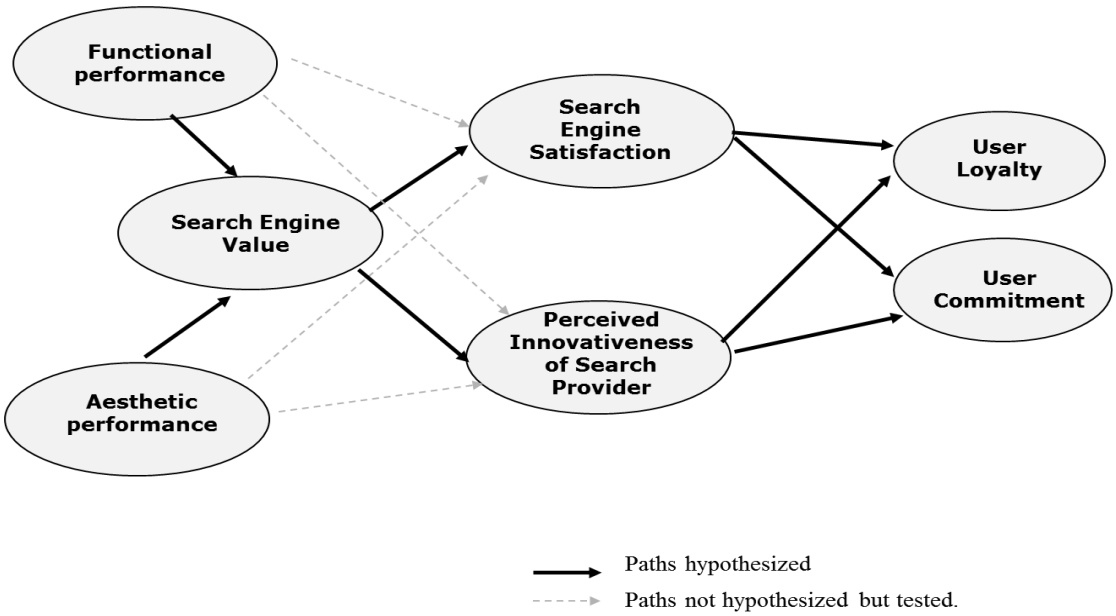

Fig. 1. Conceptual Model of User Loyalty Intention and Commitment to Search Engines

Drivers of Search Engine Value

Obtaining value or utility is a central objective underlying consumer-firm marketplace transactions (Holbrook 1994; Leroi-Werelds et al. 2014). Adapting Zeithaml's (1988) conceptualization, we define search engine value as the user's perception of the overall benefits received relative to the costs incurred in the course of a search engine usage experience. Users of consumer technologies evaluate performance along the two broad dimensions of functionality and aesthetic performance (Childers et al. 2001, Montoya-Weiss et al. 2003; Venkatesh et al. 2012). Functional performance is related to utilitarian and rational outcomes while aesthetic performance is related to pleasure and experiential outcomes (Turel et al. 2007; Van der Heijden 2004). Although prior research supports multiple ways of categorizing performance drivers, the functional and aesthetic performance distinction has found consistent support in the general context of consumer products (Babin et al. 1994; Homburg Schwemmle, and Kuehnl, 2015), and

specifically in the case of technology usage (Childers et al. 2001; Davis 1989; Turel et al. 2007; Venkatesh, Thong, and Xu 2012).

Functional Performance

According to Kollman and Suckow (2008) functional performance of the brand matters but only as one of the key bases for success. In particular, emotional connections between the user and the technology facilitate the rational evaluation of the functional and technical performance of the brand (Christodoulides et al. 2006). In product design research, Bloch (2011) and Homburg, Schwemmle, and Kuehnl (2015) define functionality as consumer's perceptions of a product's ability to fulfill its purpose. Adapting these conceptualizations, we define functional performance of a search engine as the user's judgment of the extent to which the search engine delivers useful and relevant results in response to search queries.

The functional performance dimension is broadly aligned with the usefulness dimension of the widely applied technology acceptance model (TAM), and as such, is focused on the outcomes of a search experience (Davis 1989; Venkatesh and Davis 2000). Usefulness has consistently emerged as a significant predictor of user satisfaction and behavioral intentions (Devaraj, Fan, and Kohli 2002; Gefen and Straub 2000; Cenfetelli, Benbasat and Al-Natour 2008). In consumer search contexts, functional aspects of a search experience include interrelated aspects such as the relevance of search results, their usefulness, and quality (Wu and Padgett 2004).

Functional performance is expected to directly influence judgments of consumer value for fundamental economic reasons. Economic exchange theory posits that deriving utility is an ultimate goal of consumer exchanges (Bolton and Drew 1991; Srivastava, Shervani, and Fahey 1999). Functional performance of search engine is goal-oriented, rational and utilitarian in nature

(Dhar and Wertenbroch 2000). Search queries generating relevant and useful results create information utility directly by providing required information or knowledge underlying the user's search query and indirectly by facilitating the larger goals underlying the search effort. As perceptions of the functional utility of a search engine increase, so should the user's overall perception of value. In other words, functional performance represents consumers who are attracted to practical features such as performance, convenience, rapidity and relevance of the service provider (Garnier 2009; Hong, Lin and Hsieh 2016). Cenfetelli et al. (2008) found that user assessments of website usefulness, an outcome of website functional performance, positively influenced satisfaction and intended future use of the website. Therefore:

H1: Perceived functional performance of the search engine will be positively associated with search engine value.

Aesthetic Performance

This study considers perceived aesthetic performance of the search engine as the second major driver of search engine value. Grounded in the work of Bloch (2011) and Homburg, Schwemmle, and Kuehnl (2015), aesthetic performance is defined as the user's evaluation of the attractiveness of the design aspects of the search engine landing page, i.e. the initial web page encountered by users (Rangaswamy et al. 2009). In addition to the functional performance of a search engine, consumers performing searches benefit from aesthetic qualities of the design aspects of the search page, display of results and other related elements. Positive feelings of pleasure and enjoyment accompany such pleasing aesthetic experiences add to the overall value of the search experience (Hong, Lin and Hsieh 2016; Venkatesh, Thong and Xu 2012).

The influence of aesthetic factors of technology on consumer value judgments has been documented across a range of consumer technology contexts (Chang and Chen 2008; Van der

Heijden 2004; Venkatesh, Thong and Xu 2012). In online usage contexts, the quality of the web interface has been consistently found to influence user satisfaction and loyalty (Chang and Chen 2008; Montoya-Weiss et al. 2003). Venkatesh et al. (2012) found that hedonic performance of mobile internet systems, while subject to moderating effects of age, experience and gender, strongly influenced behavioral intentions. Montoya-Weiss et al. (2003) found that graphic aspects of an online channel, measured in terms of its look and feel and overall attractiveness, directly influenced service quality and indirectly, overall satisfaction and site usage.

The TAM model has been augmented through the addition of a third factor in the form of enjoyment in order to accommodate aesthetic aspects of technology, in addition to usefulness and ease of use (Davis 1989; Van der Heijden 2004; Venkatesh, Thong and Xu 2012). Childers et al. (2001) found that in addition to utilitarian drivers, enjoyment exerted a significant influence on consumer attitudes toward interactive shopping experiences. Therefore:

H2: Perceived aesthetic performance of the search engine will be positively associated with search engine value.

Search Engine Value, User Satisfaction and Search Engine Reputation for Innovation

We next explicate the processes by which value affects user satisfaction, a retrospective evaluation of search engine experiences, and the search engine's reputation for innovation, a forward looking judgment (Barone and Jewell 2013; Zeithaml et al. 2006).

User Satisfaction

User (consumer) satisfaction refers to the user's evaluation of a technology following an experience with the technology (Anderson 1973; Bhattacherjee 2001). Satisfaction results from a process of confirmation/disconfirmation following the user's comparison of the performance

experienced versus the expectations of performance prior to the experience. Search engine value represents an overall appraisal of the search experience and is expected to influence user satisfaction (Cenfetelli, Benbasat, and Al-Natour 2008). There is extensive precedence in the literature for positioning value as a determinant of satisfaction and related outcomes (Bolton and Drew 1991; Leroi-Werelds et al. 2014; Yang and Peterson 2004). Equity theory posits that consumers judge transactions on the basis of their output/input ratio, i.e. value, relative to the output/input ratio of the provider (Oliver and Swan 1989). To the extent that consumers perceive value received as being commensurate with, or ideally, higher than that received by the provider, they are likely to perceive transactions as equitable and will therefore judge experiences with the provider as satisfying. Along similar lines, Sirdeshmukh et al. (2002) argue that value, as the superordinate goal in service exchanges exerts a regulatory influence on consumers thereby helping align long-term loyalty with those providers who deliver superior market value. Therefore:

H3: Search engine value will be positively associated with user satisfaction with the search engine.

Search Engine Reputation for Innovation

Barone and Jewell (2013) define brand innovativeness as the extent to which a brand has earned a reputation with consumers for introducing valued new offerings to the market. Accordingly, we define reputation for innovation as the consumer's overall evaluation of the search engine provider's creativity and novelty. Consumers judge reputation for innovation on the basis of the provider's current product portfolio as well as the expected stream of future products (Henard and

Dacin 2010). Firms also signal innovativeness through product roadmaps and R&D news releases (Ahlqvist, Valovirta, and Loikkanen 2012).

Despite phenomenal growth of the Internet, and as noted earlier, the study of reputation for innovation in the context of search engine behavior has received little attention. Achieving a reputation for innovation is important because consumers value innovative brands for offering improved functionality over existing options (Thompson, Hamilton, and Rust 2005). In the case of search engines, direct and unbiased signals of the provider's innovativeness likely result from the consumer's regular and pervasive search experience. Thus, we assume that users' cues of a search engine as being innovative will vary based on their prior experience. Considering such cues is important as this may provide a measuring mechanism for user's perceived innovativeness of search engines. Successful service engine providers shape their reputation for innovation through the use of co-creation platforms that help better leverage firm's value proposition (Uhrich 2014). In particular, we argue that consumers make relatively unambiguous judgments about the innovativeness of the provider as a result of their firsthand experience with the search engine (Rubera and Kirca 2012). As Barone and Jewell (2013) suggest, providers offering consistent improvements in customer value, ostensibly in the face of significant cost and risks, are conferred with a reputation as an innovator. Perceptions of a brand as innovative are formed in response to efforts that focus on customer value (Keller 1993; Rogers 2003). In light of these arguments, we hypothesize the following:

H4: Search engine value will be positively associated with the search engine provider's reputation for innovation.

Relating User Satisfaction to User Loyalty Intention and Commitment

Search engine user satisfaction is a fulfillment of user's information need (Dan and Davison 2016). This means users have certain expectations of the performance of the search engine and their satisfaction is directly linked to how well the engine performance meets these expectations. It is therefore important to characterize and predict user loyalty and commitment based on a prior experience with the search engines.

We define user loyalty as the intention to continue to utilize a search provider for future search needs and the inclination to recommend the search engine to others. The most common indicator of loyalty is the willingness to persist with a given provider for future usage occasions, despite alternative options being ostensibly available (Gustaffsson, Johnson and Roos 2005; Yang and Peterson 2004) and the willingness to recommend the service to others (Yang and Peterson; 2004; Zeithaml, Berry and Parasuraman, 1996). The relationship between satisfaction and loyalty has been demonstrated consistently in the services (Oliver and Swan 1989; Zeithaml, Berry and Parasuraman 1996) and technology (including search engine behavior) literatures (Bhattacharjee 2001; Bolton and Drew 1991; Cenfetelli, Benbasat and Al-Natour 2008; Shi, et al. 2014). Satisfied users tend to have a higher usage level, more likely to have repeat use intention and to recommend the service to others. Oliver (1999), proposed four ascending brand loyalty stages, namely the cognitive loyalty, affective loyalty, conative loyalty and action loyalty. Cognitive loyalty suggests that customers are loyal to a brand based on what they know about the brand; therefore it is of a shallow nature. Affective loyalty refers to a liking or positive attitude toward the brand. Similar to cognitive, this form of loyalty remains subject to switching. The next phase of loyalty, conative loyalty, is what is known as behavioral intention. It implies a brand-specific commitment to repurchase that may result in unrealized action. The final stage, action loyalty, is

when the customers convert intentions into actions. This is the most ideal type of loyalty but difficult to observe and measure. As such, in this study we employ the conative or behavioral intention loyalty, a measure used by most researchers (e.g. Yang and Peterson; 2004; Zeithaml, Berry and Parasuraman, 1996).

Arguments grounded in social exchange theory suggest that consumers will reciprocate the provision of satisfactory experiences by a provider through actions that in turn create value for the provider (Gassenheimer, Houston, and Davis 1998). Accordingly, a search engine user is more likely to reciprocally confer benefits of ongoing loyalty intention to a provider delivering commensurate satisfaction. Therefore:

H 5a: User satisfaction with the search engine will be positively associated with user loyalty intention.

In addition to its effects on loyalty intention, we assess the impact of user satisfaction on commitment to using the provider. Following precedence in the literature (Crosby and Tayor 1983; Kiesler and Sakumura 1966) we define user commitment as the user's intention to persist with their search provider in the face of motivations to switch. Conceptualized as such, commitment captures a behavioral component of loyalty that may not fully be captured in intention to be loyal and thereby provides an alternative measure of the outcomes of consumer satisfaction (Dick and Basu 1994; Pritchard, Havitz and Howard 1999).

In mature markets, where consumer loyalty toward existing providers may likely manifest ceiling effects, measurement of commitment is more likely to depict modulations resulting from the provider's provision of satisfaction. Therefore:

H 5b: User satisfaction with the search engine will be positively associated with user commitment.

Relating Reputation for Innovation to User Loyalty Intention and Commitment

Marketing scholars (Gustaffsson, Johnson and Roos 2005; Zeithaml et al. 2006) have encouraged the use of "forward-looking" assessments in prediction of consumer loyalty particularly in dynamic markets. In fast moving industries such as consumer technology services, a provider's past performance measured through traditional backward-looking measures such as consumer satisfaction may not be robustly predictive of their behavioral intent. Instead, in these markets, forward-looking measures accounting for the consumer's judgment of the future, are more likely to cohere with behavioral intentions.

We propose the search engine's reputation for innovation as a forward-looking measure which is expected to signal the innovation and value that will likely be delivered as a result of ongoing iterations of the search engine. The user's anticipation of future value, the delivery of which is dependent on provider innovation, is therefore intimately tied to user judgments of reputation for innovation. Recent research has provided support for the positive influence of reputation for innovation on consumer loyalty (Henard and Dacin 2010; Kunz, Schmitt, and Meyer 2011).

H 6a: Search engine reputation for innovation will be positively associated with user loyalty intention.

Extending our earlier arguments, we propose that the search engine's reputation for innovation will have a positive influence on user commitment to the provider. As a result of the hope and expectations associated with services from a provider with a strong reputation for innovation, users are expected to depict strong commitment to such providers. Moreover, an investment in innovation will likely be viewed as an implicit bond pledged to its own integrity

(Nelson 1974), thereby dampening perceptions of future risk. Users are more likely to commit to, and thereby subject themselves to potential performance risk in the future with a provider who is perceived as innovative.

H 6b: Search engine reputation for innovation will be positively associated with user commitment.

Research Design and Method

Sample and Data Collection

To test the model and hypotheses shown in Figure 1, we conducted a survey of search engine users enrolled in courses at an AACSB accredited business school at a major global university in the United Arab Emirates. The student sample with high level of fluency in English was deemed ideal for the research context, given its global composition matching the global reach of search engines, as well as its native familiarity and experience with search engines (Veloutsou and McAlonan 2012). Surveys were administered in selected classes and received course credit for participation.

In order to maintain the appropriate temporal sequence across independent and dependent variables and to reduce the potential for common method bias (Podsakoff et al. 2003), the survey was conducted in two steps with a gap of two days. The independent variables including search engine performance, search engine value, satisfaction and provider reputation for innovation were assessed in an initially administered survey. Following a two day gap, measures of user loyalty intention and commitment were assessed in a brief follow up. The surveys were completed by a total of 244 respondents of which 235 surveys were deemed as usable after omitting incomplete surveys. Although age and gender information were not collected, the courses in which the

surveys were administered were made up of sophomores and juniors in the age range of 19-21, depicting a 58%-42% (female-male) gender split according to university enrollment records.

Respondents were asked to identify the search engine that they had used most in the past 6 months and to respond to the survey with that search engine as the target of their responses. One hundred and sixty nine respondents (71.9% of subjects) identified Google as the search engine. The remaining 28.1% of respondents identified Explorer, Yahoo, Bing and Firefox as the search engine they had used most in the past 6 months.

Measurement

Given the sparse research examining search engine loyalty intention, existing measures were contextually adapted. Nineteen items were initially identified from the literature, to measure model constructs. Four items were dropped following a content-screening process involving six faculty in marketing and management information systems. Measures included in the final survey, along with key prior research from which they were adapted, are provided in the Appendix. Most of the constructs were measured using multiple indicators. Based on the suggestion to control for usage levels of technology in technology research (Kim and Malhotra 2005), the number of hours spent using the search engine was measured as a control variable in order to facilitate a more rigorous test of hypothesized theoretical relationships.

The measures were further examined for potential common method variance using Harman's one-factor test (McFarlin and Sweeney 1992). Emergence of multiple factors suggested that common method bias may not be a problem (McFarlin and Sweeney 1992; Podsakoff et al. 2003). The Appendix presents the scale items and the internal consistency reliabilities (coefficient alpha) of the measures. Scale reliabilities range from .64 to .86, with the majority exceeding the

.70 benchmark suggested by Nunnally (1978). Values of .60 to .70 are deemed the lower limit of acceptability (Hair et al., 2010).

Method of Analysis

To assess validation and test linkages in the theoretical model, Partial Least Squares (PLS) PLS-Graph (Chin 2003) was used. PLS is considered to be appropriate compared to covariance based approaches in certain contexts which are unique to our study. PLS is more applicable in research areas where theoretical bases of the model are not as well established as demanded by covariance based approaches (Hair, Ringle, and Sarstedt 2011; Barclay, Higgins, and Thompson 1995).

Results

Table 1 shows the measurement model results for constructs with multiple indicators, indicating adequate convergent validity. Most of the loadings (item reliability) exceeded the stringent threshold of 0.707 (Barclay, Higgins, and Thompson 1995). One item measuring functional performance was between 0.60 and 0.70 but satisfied the requirement of being greater than 0.60 (Chin 1998). This item were retained because it was conceptually relevant to the measurement of the construct, and did not have a higher loading on any other construct in the measurement model.

Based on the internal consistency formula of Werts et al. (1974), PLS provides an alternative measure to Cronbach's Alpha as a measure of internal consistency. Cronbach Alpha has been criticized for its lower bound value which underestimates the true reliability (Peterson & Kim, 2013). Table 1 also shows that the composite reliabilities scores were satisfactory and ranged from 0.76 to 0.88 and were above the 0.70 acceptable threshold (Gefen, Straub, and Boundreau 2000). Finally, we examined the AVE scores to assess convergent validity. This level was achieved for all model constructs (see Table 1).

To assess discriminant validity, we compare the square root of the average variance extracted[1] (AVE) for each construct with the correlation between the construct and other constructs in the model. As shown in Table 2, all constructs in the estimated model fulfilled this condition of discriminant validity. Since none of the off-diagonal elements exceeded the respective diagonal element, discriminant validity was achieved.

Table 1
Measurement Model Results

Construct Items	Loading	*t*-value[a]	Average Variance Extracted (AVE)	Internal Consistency[b]
Functional Performance			0.52	0.76
FP1. Show precisely what is being searched	0.72	9.24		
FP2. Provide exactly the information sought	0.75	8.04		
FP3. Searches on this search engine are organized with the user in mind	0.68	7.82		
Search Engine Value			0.70	0.82
V1. Are well worth the time spent	0.72	18.99		
V2. Searches on this search engine can be done with minimal clicks	0.75	20.99		
Aesthetic Performance			0.92	0.80
AP1. Has an attractive layout	0.91	34.46		
AP2. Is visually appealing	0.90	29.54		
AP3. Has a fun look about it	0.88	22.50		
Search Engine Reputation for Innovation			0.62	0.83
RI1. Is creative	0.88	10.22		
RI2. Is worth admiring	0.77	7.90		
RI3. Is innovative	0.81	9.00		
User Loyalty Intention			0.70	0.88
UL1. Use this search engine for my very next Search	0.74	7.41		
UL2. Use this search engine for most of your search needs in the next 6 months	0.90	31.98		
UL3. Recommend this search engine to friends who may ask for a suggestion	0.88	22.64		

Note:
[a] Bootstrapping results (n=1000), all significant $p < 0.001$
[b] Based on the internal consistency formula of Werts et al. (1974), PLS uses an alternative measure to Cronbach's Alpha as a measure of internal consistency.

Table 2

[1] The average variance extracted is the AvCommun in the PLS output.

Descriptive Statistics and Correlation among Construct Scores (square root of AVE in the diagonal)[a]

	Mean	S.D.	FP	VAL	AP	US	RI	UL	UC
FP	4.12	0.57	**0.72**						
VAL	4.39	0.58	0.41	**0.75**					
AP	3.94	0.89	0.03	0.08	**0.96**				
US	8.72	1.20	0.20	0.36	0.09	**N/A**			
RI	4.45	0.60	0.15	0.21	0.33	0.22	**0.79**		
UL	6.53	0.89	0.04	0.18	0.15	0.33	0.29	**0.84**	
UC	5.47	2.85	0.08	0.06	0.04	0.26	0.25	0.18	**N/A**

[a] FP = Functional Performance; VAL = Search Engine Value; AP = Aesthetic Performance; US = User Satisfaction; RI = Search Engine Reputation for Innovation; UL = User Loyalty Intention; UC = User Commitment.
N/A = not applicable since single item measures.

Recently, Henseler, Ringle and Sarstedt (2015) have suggested that the Fornell and Larcker criterion and cross-loadings are not sufficiently sensitive to discriminant validity problems. To address this issue, we used the heterotrait-monotrait ratio of correlations (HTMT), a new criterion for discriminant validity (Henseler, Ringle and Sarstedt 2015; Voorhees et al. 2016). Specifically, we computed the HTMT criteria for each pair of constructs on the basis of the item correlations. The computation yielded values between 0.03 and 0.81. Using conservative criterion of 0.85 (Kline 2011), our findings indicated discriminant validity.

The structural model was evaluated on the basis of the R^2 values for the dependent constructs, the size, *t*-statistics and significance level of the structural path coefficients (based on 5000 bootstrapping runs), the f^2 effect size and the Stone-Geisser *Q*-square test for predictive relevance (Hair et al. 2013). The structural model explained 17% of the variance in search engine value, 13.4 % in overall search engine satisfaction, 14.7% in search engine reputation for innovation, 15.5% in user loyalty intention and 11% in user commitment.

Regarding the overall quality of the research model, Tenenhaus et al. (2005) have developed an overall GoF measure for PLS based on taking the square root of the product of the

variance extracted with all constructs with multiple indicators and the average R^2 value of the endogenous constructs. However, Henseler and Sarstedt (2013) have recently challenged the usefulness of the GoF both conceptually and empirically. Following the recommendations of Hair et al. (2013) and Henseler and Sarstedt (2013), we do not apply this measure in the current study.

The Stone-Geisser test of predictive relevance was performed to assess model fit in PLS analysis (Geisser 1975; Stone 1974). Producing omission distances of 10 and 25 produced similar results, indicating that the estimates were stable. The communality *Q*-square was greater than 0 for all constructs suggesting that the proposed research model had good predictive ability.

We next discuss results pertaining to our hypotheses (see Table 3). The number of hours spent using the search engine, included as a control variable, had no significant relationship with any of the model constructs. Functional performance demonstrated a significant positive relationship with search engine value (β = .40, t = 6.36) but aesthetic performance had no significant relationship with search engine value (β = .07, t = 0.80). We therefore find support for Hypothesis 1 but not for Hypothesis 2. Hypotheses 3 and 4 were supported. Specifically, search engine value had a significant positive relationship with both search engine user overall satisfaction (β = .32, t = 4.04) and search engine reputation for innovation (β = .15, t = 1.99). The size of the beta was twice as strong for the search engine value-user satisfaction relationship relative to the search engine value-reputation for innovation relationship. We provide our insights into this finding later in our discussion.

Hypotheses 5a and 5b were also supported. The relationship between search engine user satisfaction and loyalty intention was positive and significant (β = .28, t = 3.48). The relationship between search engine user satisfaction and commitment was also significant (β = .22, t = 3.04).

Finally, hypotheses 6a and 6b were supported. The relationship between search engine reputation for innovation and user loyalty intention was positive and significant (β = .23, t = 2.89). The relationship between search engine reputation for innovation and user commitment was also significant (β = .21, t = 2.88).

Table 3
PLS results of estimated path coefficients in the research model[a]

Hypothesised Relationships	Standardized Coefficient	t-value[b]	Test Result
H1: FP→ VAL	.40	6.36	**Supported**
H2: AP→ VAL	.07	0.80	Not Supported
H3: VAL→ US	.32	4.04	**Supported**
H4: VAL→ RI	.15	1.99	**Supported**
H5a: OS→ UL	.28	3.48	**Supported**
H5b: OS→ UC	.22	3.04	**Supported**
H6A: RI→ UL	.23	2.89	**Supported**
H6a: RI→ UC	.21	2.88	**Supported**
Additional paths			
FP→ US	.07	.70	Not Supported
FP→ RI	.08	.81	Not Supported
AP→ US	.06	.69	Not Supported
AP→ RI	.31	3.45	**Supported**

Main Effects Model Evaluation Statistics:
R^2 for: Search Engine Value .17, User Satisfaction = .13, Search Engine Reputation for Innovation = .15, User Loyalty Intention = .16 and User Commitment = .11
Redundancy Q-square values all above zero

[a] FP = Functional Performance; VAL = Search Engine Value; AP = Aesthetic Performance; US = User Satisfaction; RI = Provider's Reputation for Innovation; UL = User Loyalty Intention; UC = User Commitment.
[b] t-values corresponding to one-tail tests at: t >1.65, p < .05.

Next, we explored the incremental contribution in R^2 provided by search engine reputation for innovation by comparing a model which excluded the construct based on the f^2 effect size. Guidelines for assessing f^2 are that values of 0.02, 0.15 and 0.35 respectively, represent small, medium and large effect sizes (Cohen 1988; Henseler and Chin 2010). The inclusion of search engine reputation for innovation increased the R^2 for user loyalty intention from 0.10 to 0.16 and for user commitment from 0.07 to 0.11. The calculated f^2 effect size for reputation of innovation on user loyalty intention was 0.06 and 0.05 for user commitment. These effect sizes are considered small. However, a small f^2 effect size does not necessarily imply an unimportant effect (Limayem, Hirt, and Chin 2001; Wilson 2010). 'If there is a likelihood of occurrence for the extreme moderating conditions and the resulting beta changes are meaningful, then it is important to take these situations into account' (Limayem, Hirt, and Chin 2001, p. 281).

Finally, in an effort to fully examine the impact of the two performance constructs in our model, we examined direct paths from functional and aesthetic performance to search engine user overall satisfaction and reputation for innovation (see Table 3). Although not formally presented as hypotheses in the current study, such direct effects have been argued and established in previous research (Barone and Jewell, 2013; Tractinsky, 2004, Zviran, Glezer, and Avni 2006). Findings showed that the direct links between both functional performance (β = .07, t = 0.70) and aesthetic performance (β = .06, t = 0.69), and search engine overall satisfaction were not significant. The indirect effect of functional performance on user satisfaction was significant (β = .13, t = 3.69) suggesting that search engine value is a full mediator of the functional performance-search engine overall satisfaction relationship. Over 61% of the total effect of functional performance on search engine overall satisfaction was explained by the indirect effect (Iacobucci and Duhachek 2003).

The direct relationship between functional performance and search engine reputation for innovation was not significant (β = .08, t = 0.81). However, the indirect effect of functional performance on search engine reputation for innovation was significant (β = .06, t = 1.93) suggesting that search engine value is a full mediator of the functional performance-search engine reputation for innovation relationship. Just under 40% of the total effect of functional performance on search engine reputation for innovation was explained by the indirect effect.

The direct relationship between aesthetic performance and search engine reputation for innovation was significant (β = .31, t = 3.45). We expand on the implications of this notable finding in the following section.

Discussion and Implications

The present study contributes to existing literature in three important ways. First, the research demonstrates the importance of search engine value in understanding user judgments acknowledges of search engine performance and user satisfaction with the search engine. Drawing upon literature examining consumer technology acceptance and usage in marketing and information systems, we examine the influence of search engine functional and aesthetic performance on search engine value, and the effect of value on user satisfaction with a search engine. User judgments of functional and aesthetic performance of the search engine exhibit differential effects on user satisfaction with the search engine and the search engine's reputation for innovation. Second, we demonstrate the importance of search engine reputation for innovation as a predictor of user loyalty intention and user commitment. Finally, we incorporate user commitment into a measure of search engine behavior arguing that user commitment provides additional insight beyond measures of behavioral loyalty. We expand on these

contributions as follows:

Search Engine Performance Judgments

Our results provide strong support for the proposed dimensions along which search engine experience is judged. We find that functional performance exerts a strong influence on user satisfaction, and that this effect is fully mediated by search engine value. The results support the intuition that the satisfaction of users is primarily determined by the functional performance of the search engine including aspects such as the relevance and usefulness of search results. These results are consistent with past research in online consumer judgments (Montoya-Weiss et al. 2003) attesting to the central role of information utility in consumer search. They are also consistent with the findings reported by Veloutsou and McAlonan, (2012) and Wu and Padgett (2004). Aesthetic performance did not exert an influence on search engine value, contrary to our expectation, or directly on user satisfaction. Our findings are broadly consistent with those of Wu and Padgett (2004) who found that the functional attributes of search engines are more strongly correlated with user satisfaction than aesthetic attributes.

Functional performance did not have a direct influence on the search engine's reputation for innovation, but did exert an indirect effect through customer value. Strong functional performance enhances search engine reputation for innovation through customer value. While aesthetic performance judgments failed to affect search engine value, they depicted a strong direct effect on the search engine's reputation for innovation. This finding highlights the importance of web page design or graphic aspects of the user experience in enhancing reputation for innovation. The finding bears out the intuition that design factors, which are ostensibly more difficult to create and deliver, can differentiate technology providers and benefit their reputation (Tractinsky

2004). Our research provides perhaps the first direct demonstration of the added value of the aesthetic aspects of the search engine's landing page, as a result of our inclusion of the provider's reputation for innovation as an outcome.

Mediation of Search Engine Value

Our findings demonstrate the central role of search engine value in search engine judgments, and thereby encourage further attention to the nature and determinants of value for search engine users. Value exerted a positive influence on user satisfaction as well as reputation for innovation suggesting that immediate consumer judgments of their experience with a technology, as well as higher and residual judgments of the provider's innovativeness, are impacted. While the value-user satisfaction relationship has been well established in other contexts, the value-reputation for innovation relationship has not been the subject of much prior research. It suggests that providing value delivers a dual "bang for the buck" that has heretofore not been fully accounted for.

The technology acceptance model (TAM) which has been used as a guiding framework in technology assessment, adoption and loyalty research has typically not included value as a mediator (Cenfetelli, Benbasat and Al-Natour 2008; Devaraj, Fan and Kohli 2002). Our research suggests that in coherence with findings in the marketing literature, consumer technology assessment continues to be influenced by value judgments, and that provision of value is key to enhancing user loyalty intention and commitment.

User Satisfaction and Provider Reputation for Innovation

In our research, user satisfaction with the search engine is determined by value, which in turn, exerts significant influence on user loyalty intention and user commitment attesting to its

pervasive influence. We note that user commitment was measured, not just as another manifestation of behavioral loyalty, but instead as a measure of the user's willingness to resist switching in the face of higher costs. Gustaffson, Johnson and Roos (2005) suggest that commitment provides a forward looking measure of consumer relationships, and thereby provides additional insight beyond measures of loyalty. Arguably, commitment is a stronger manifestation of a user's attachment to a provider, and therefore likely to be systematically lower than their loyalty scores. Consistent with this logic, we find that the mean score for overall commitment (M = 5.47) is significantly lower than loyalty (M = 6.53, $p<.001$).

We included the provider's perceived reputation for innovation as a forward looking measure, and expected that reputation for innovation would complement user satisfaction, as a determinant of loyalty intention and commitment. Consistent with our argument, reputation for innovation exerted significant effects on both outcomes, over and above overall satisfaction as determined by the change in R^2. The finding that reputation for innovation is a significant predictor of loyalty intention runs contrary to that reported by Veloutsou and McAlonan, (2012) who found no relationship. Overall, our findings suggest, in consonance with emerging research, that a perception of being innovative confers an innovation premium on consumer user loyalty intention and user commitment. In doing so, we add to the sparse literature that has identified previously unanticipated benefits of a reputation for innovation.

Managerial Implications

From a managerial point of view, our findings have several important implications. These implications largely pertain to Google given that 72% of respondents in our study were Google users. Interaction with a search engines depends on a click. Given the importance of functional

attributes of a search engine in predicting both search engine satisfaction and reputation for innovation through search engine value, search engine companies such as Google should continue their investment in algorithms that help them gauge the development and performance of functional features of search engines. Developers need to ensure that search results returned to the user are provided in a range of rich formats and these formats need to show precisely what is being searched and provide exactly the information sought. In addition, understanding the meaning of search is crucial to returning search results. Therefore, more research on natural language understanding is needed. Search engine companies should be less concerned about the aesthetic performance of search engines as a predictor of search engine value and user satisfaction. Aesthetic performance judgments do not enhance search engine value and user satisfaction. However, search engine companies such as Google should invest resources in web page design and the graphic aspects of the user experience as these aesthetic characteristics directly impact user perceptions of the search's engine's reputation for innovation. Reputation for innovation fosters both user loyalty intentions and user commitment.

Limitations and Directions for Future Research

Our research is subject to several limitations. First, the global matching composition of sample provides some assurance of validity but the responses are limited to a narrow geographical area. Second, we draw causal inferences from research which is in effect, cross-sectional. As a result, we are unable to rule out biases due to common method, although the potential for common method bias was reduced by administering the survey in two stages and that the Harman one-factor test confirms that such a bias was not operational. Future research should employ longitudinal research designs to underpin the complexity and dynamic nature of these

interrelationships. Third, an overwhelming majority (71.9%) of subjects in our study identified Google as their focal search engine. As a result, the results may be biased in some nonspecific manner and may be representative of experiences with Google rather than with search engines and providers in general. Future research should examine differences between Google search engine users and other search engine users. Fourth, we did not ask users to identify the device being used (e.g., mobile versus desktop) to undertake the search. Future research should examine potential variations in the antecedents of user satisfaction and both user loyalty intention and commitment across smartphones, other mobile devices and desktop devices (Sullivan 2015). Fifth, the current study did not examine switching barriers and various habitual variables (Fornell, 1992). Future research should address this shortcoming. We also acknowledge that our research focused on external search engine rather than a website's or Intranet's built-in search engine. It would be worthwhile for future research to examine the drivers of user commitment and user loyalty of internal search engines.

Our research directed users to respond to search engine experiences in the context of an informational search. Jansen et al. (2008) delineate searches into informational search or seeking information, navigational search where the aim is to find a particular website and transactional search aimed at finding a site for the purpose of commerce. The authors identify variations in information sought by users based on the types of searches performed. Future research should therefore examine how the impact of functional and aesthetic performance on user satisfaction and loyalty intention may be moderated by users' search intent.

We also encourage future investigations of other potential forward looking measures, particularly in fast moving and technology markets. One strong candidate is consumer trust. Trust provides the consumer with confident expectations about the future competence of the

provider's competence and benevolence (Sirdeshmukh et al. 2002). By serving as a means of imputing future behavior of the provider, and encouraging the willingness to rely on the provider, trust could serve as a relational forward-looking measure. Future research should also consider analyzing search engine behavior through employing data mining and data visualization techniques (Shi, et al. 2014). With an effective, explicit, visualization tracking system, search engine providers and their managers can better gauge user loyalty and commitment, over time.

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Appendix: Summary of Measures

Construct	Items	Source
Functional Performance (α = .64) (5-point scale)	Searches on this search engine show precisely what is being searched (FP1) Searches on this search engine provide exactly the information sought (FP2) Searches on this search engine are organized with the user in mind (FP3)	Cenfetelli, Benbasat and Al-Natour (2008) Chang and Chen (2008) Devaraj, Fan and Kohli (2002)
Search Engine Value (α = .65) (5-point scale)	Searches on this search engine are well worth the time spent (V1) Searches on this search engine can be done with minimal clicks (V2)	Devaraj, Fan and Kohli (2002) Davis (1989) Montoya-Weiss et al. (2003).
Aesthetic Performance (α = .86) (5-point scale)	This search engine's Home Page has an attractive layout (AP1) This search engine's Home Page is visually appealing (AP2) This search engine's Home Page has a fun look about it (AP3)	Chang and Chen (2008) Montoya-Weiss et al. (2003) Venkatesh, Thong and Xu (2012)
User Satisfaction (10-point scale)	I would rate my overall search experience on this search engine as highly satisfactory (Sat1)	Bhattacherjee (2001) Devaraj, Fan and Kohli (2002) Spreng, MacKenzie, and Olshavsky (1996)
Search Engine Provider's Perceived Innovativeness (α = .71) (5-point scale)	The search engine company is creative (RI1) The search engine company is innovative (R2)	Kunz et al. (2011)
User Loyalty Intention (α = .80) (7-point scale)	Use this search engine for your very next significant search (CL1) Use this search engine for most of your search needs in the next six months (CL2) Recommend this search engine to friends who may ask you for a suggestion (CL3)	Bhattacherjee (2001) Chang and Chen (2008) Devaraj, Fan and Kohli (2002) Yang and Peterson (2004)
User Commitment (10-point scale)	I will very likely to use the search engine even if the search engine company charges a subscription fee of AED 90/month (UC1)	Pritchard et al.(1999)

[i] We use the term “user” in most of this manuscript, consistent with usage in the search engine literature. When contextually appropriate or to avoid tedium, we instead use the term “consumer.”