



Users' Search Satisfaction in Search Engine Optimization

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Abstract. This paper identifies the best practices and guidelines for designing an effective and meaningful e-commerce website so that the given site appears at the top in a search engine's search results. A research model for users' search satisfaction is evolved from the literature. The model is empirically tested and validated by obtaining survey-inputs from 101 students from a Canadian University. The factors affecting users' search satisfaction are user characteristics, search characteristics, search engine characteristics, and clicking behavior of advertisements. The data analysis validates the impact of website features, search engine contents and search problems on user's search satisfaction. User's search behavior includes the frequency of different search data input, navigational search and the usage of different devices positively influences user's search satisfaction. Besides, the advertisements clicking negatively influences user's satisfaction. The implications for the theory and practice are given.

Keywords: Search behavior · User's search satisfaction · Search engine optimization · User characteristics

1 Introduction

The purpose of this study is to identify the guidelines and best practices for designing an effective and meaningful e-commerce website so that the given site appears at the top in a search engine's search results. Specifically, this research aims to empirically test a research model to identify the relationships among user characteristics, search characteristics, and user search satisfaction. The study findings help web site designers and marketers to improve the performance of websites in order to enhance the user experience. There are lack of studies in the literature on the user perspective. This study aims to fill this gap by identifying the factors influencing end user search satisfaction.

2 Literature Review

The Fig. 1 shows the proposed research model which is based on user satisfaction metrics which was developed by Kohli and Kumar (2011). Kohli and Kumar (2011) identified several factors that influence user satisfaction, such as response time, URL

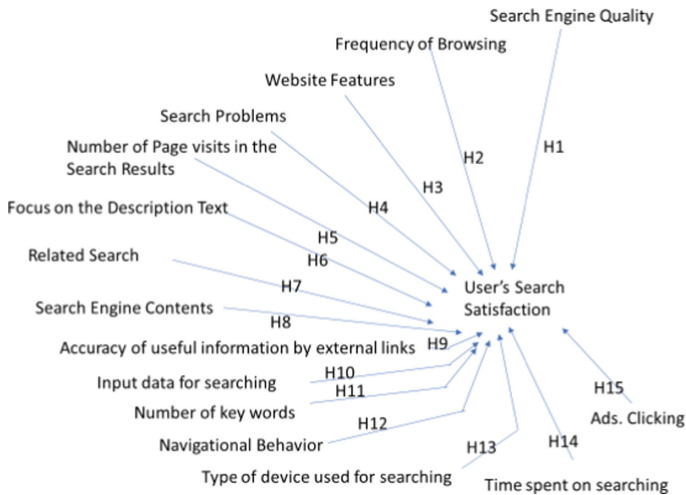


Fig. 1. Research model for user's search satisfaction

correctness, results display, overall impression, and website stability. The various components of the model are reviewed in this section.

2.1 Search Engine Optimization

Search engine optimization (SEO) was defined by Russell (2007) as a process in which search engines find and access the relevant websites. Its purpose is to improve the quality and ranking of a given website and create an effective user experience (Arora and Bhalla 2014). To understand the search engine optimization well, Russell (2007) developed a structure to show how search engine optimization works. The SEO cycle consists of the following phases (Russell 2007): Research/choose key words, Build Website: place keywords, Submit search to engine, Report on search page rankings, Optimize pages, Analyze traffic, conversions, and Maintain Website: reoptimize. In this cycle, SEO specialists do research based on the keywords used by users, location and frequency on a page, and it is the first step to incorporate keywords in the website contents (Gershonowicz 2016). Finding the keywords from the contents is also the simplest way because the users will input their search terms into search engines to describe what they are looking for and specialists can easily locate the keywords which appeal to the users (Crowley 2014). Then the search engine will conduct the research and display the search results via four steps, which include crawling, indexing, searching and ranking (Bai 2013). Based on the results, specialists can optimize the websites by analyzing the problems.

2.2 Search Engine Quality

The search engine quality is measured by the number of websites collected by the search engine, accuracy of search results, display of search results in a sorted order, rich

functions such as protect your personal information, relevance of search results, easy to remember URL of search engine, Less ads. in the search page, and the short loading time of search results.

2.2.1 User Characteristics

Education

During the search process, two types of knowledge can be applied to discuss the relationship between users' education and search satisfaction, which are familiarity with the topic or subject and familiarity with the search system. Familiarity with the search system is a kind of advanced knowledge which helps the users to search comfortably. Different search systems have different search facilities for users to choose, if they are familiar with some tools, they can improve their results. Yamin, Ramayah and Wan Ishak (2015) proposed two kinds of dimensions of the user search behavior, one is breadth search query and another is depth search query. Breadth search query can be identified as direct keywords, which focuses on the wide search; depth search query focuses on the complex search such as Boolean search.

Browsing Features

In the search process, users perform different actions to derive their expected results, which can be characterized as many different aspects such as TimeOnPage and TimeOnDomain. TimeOnPage means the time that users spend on a specific webpage while TimeOnDomain shows the visiting time on the domain. Simple aspects of the user web page interactions can be captured and quantified. These features are used to characterize interactions with pages beyond results pages.

User Experience

User experience comprised of the search activities performed by the users, the quality of search results received, and development of knowledge and impression on the search results (Song and Salvendy 2003). Besides, the experience depends on the user friendliness of the search engine, and the support provided by the search engine for query formation. Users gain rich experience when the interactions with the search engine are noteworthy. The experience also depends on the search strategies used for retrieving relevant information. The search strategies include using simple searching key words, phrases, questions, and using browser tools. The intent and purpose of searching is decided by these search inputs and achieved by obtaining a vast amount of relevant information and website links out of searching.

2.2.2 Search Characteristics

Search Purpose

The users use the search engine for the following purposes: navigational (to navigate the web), informational (to retrieve required information), and transactional (to complete a transaction) (Broder 2002). The intent to search the web is expressed by a search query which is used by the search engine to provide relevant and accurate search results (Lewandowski 2008).

Related Search

When the users don't get the required or relevant information from the initial search process, they go for some additional searches by conducting related search (Ohshima 2009). In these instances, instead of simply satisfying with the initial search results, users try with different search key words or phrases; or some times they conduct the related searches by using a different search engine. Thereby, the users try to get relevant and valuable information on the given topic and tend to avoid the irrelevant links or websites in search results.

Related search shows several links about additional information on search results, they are listed at the bottom of each result page and can be reviewed as the search history of other users.

2.2.3 Search Engine Characteristics

On-page Factors

On-page optimization includes all factors that are directly used on a website to achieve ranking on the search engine result pages. Zhang and Dimitroff (2005) identified the elements including page title, meta-content, headings, body text, navigation, and images. Meta description is a kind of short description which appears below the page links. It shows how people and organizations summarize their own web pages (Craven 2000). Keyword analysis and design could be recognized as the most important part in optimizing the webpage, which represents the users' expectation. Yalçın and Köse (2010) gave a basic principle for keywords selection which is that the chosen keywords must be performed by searching to make sure that the website can be found out in top five list, that is, only the valuable keywords should be considered because they can bring the actual positive outcomes.

In designing the web pages, the short and long names, definitions and descriptions of products or services are to be used to form key words for searching. Therefore, the key words could be descriptive instead of single word. Another issue is about keyword density. Martin (2011) defined that density was the percentage of keywords that can be found in the indexed text on a single webpage, many more keywords would lead to confusion and ignorance from web users, and the appropriate number of density is between three percent and five percent.

Content

Website usability (Alghalith 2015) is measured as evaluating items such as page views, time on site, and click paths to determine how user-friendly or user-relevant a web site is. To put it simply, usability enables the users to search the internet in a short time and with high satisfaction (Eisenberg et al. 2008). To improve the users' experience, trust and information credibility were identified by Barnard and Wesson (2003). They regarded the information privacy on the internet as the most important factor, which contains privacy policy, company overview page, feedback, and contact information. One of the main purposes of SEO is to improve user experience during the search thus to increase the popularity of the webpage. The website contents should have maximum number of relevant key words that searchers may likely to use in searching for the site (Bai 2013).

Off-page Factors

Social media

Users can find extra useful information through browsing the social media, and they can also get valuable feedback from others when they want to buy some products online. Social media can also provide promotion information about different products. For the website owners, social media plays an important role in increasing the traffic and value of the site via creating interesting and viral content to attract the attention of potential customers (Zhang and Cabage 2017).

2.2.4 Advertisement Clicking

Users predominantly use searching method to find the required information from the web. This type of mechanism can save much time and cost to some extent because traditional physical trade can be moved to online transaction (Ghose and Yang 2009). One of the main sources of getting information rapidly is from sponsored search, that is, searchers would click on the advertisement links which are listed on the top or the right side of a result page. These advertisement links are sponsored by the advertisers and shown in the search results page (Gupta and Mateen 2014). From the online advertising perspective, the companies increase their budget for sponsored advertisements and in the users' perspective, there is an increase in clicking the sponsored online advertisements (IAB 2013).

2.3 Research Hypotheses

Based on the review of literature, the hypotheses were evolved. The purpose of this research is to find out the best practices for e-commerce website design to enhance users' search satisfaction. Search satisfaction is a major determinant in order to improve the website from users' perspectives, so that the website can be displayed on the top of a search engine's search results page. The evolved hypotheses are given below:

- H1. Higher the search engine usage higher the level of user's search satisfaction.
- H2. High frequency of browsing positively influences the level of user's search satisfaction.

- H3. Enriching website features positively influences the level of user's search satisfaction.
- H4. Less search problems will lead to the higher level of user's search satisfaction.
- H5. More number of visits in search engine result pages will lead to the higher level of user's search satisfaction.
- H6. Adding more description text will lead to the higher level of user's search satisfaction.
- H7. Providing more number of related searches positively influences the higher level of user's search satisfaction.
- H8. Increasing search engine contents positively influences the higher level of user's search satisfaction.
- H9. Increasing the information accuracy by external links positively influences the higher level of user's search satisfaction.
- H10. Increasing the frequency of different data input positively influences the higher level of user's search satisfaction.
- H11. Increasing the number of keywords will positively influences user's search satisfaction.
- H12. Increasing the frequency of navigational behavior positively influences user's search satisfaction.
- H13. Increasing the frequency of different device usage positively influences user's search engine satisfaction.
- H14. Increasing the time spent on searching every day positively influences user's search engine satisfaction.
- H15. Decreasing frequency of advertisement clicking will improve the level of user's search satisfaction.

3 Research Methodology

Considering the research objectives, a questionnaire survey is designed to collect data from undergraduate business students from a Canadian University. The respondents were selected based on their online experience. As most of the students use search engines frequently for university work/assignments and shopping, student respondents were selected. The data was collected through an online survey using Qualtrics survey software. The data was analyzed using SPSS. Overall, the survey had collected 140 responses from business students and 25 responses were from other web users. Too much missing data were found in 64 responses out of 165. As a result, 101 usable responses were obtained. Approximately half of the respondents were male and thereby the sample is gender-balanced.

4 Data Analysis

Pearson correlation analysis was carried out on the conceptual model. Table 1 presents the overall correlations between each independent variable and the dependent variable.

Independent variables	Users search satisfaction	Hypotheses testing
Search Engine use/Quality	0.112**	H1 is validated
Frequency of browsing	-0.041	H2 (data did not support)
Website features	0.262**	H3 is validated
Search problems	-0.149**	H4 is validated
Number of page visits in the search results	0.087	H5 (data did not support)
Focus on the description text	0.208**	H6 is validated
Related search	-0.040	H7 (data did not support)
Search engine content	0.342**	H8 is validated
Accuracy of useful information from links	-0.011	H9 (data did not support)
Input data for searching	0.343**	H10 is validated
Number of key words	0.090	H11 (data did not support)
Navigational behavior	0.300**	H12 is validated
Type of device used for searching	0.243**	H13 is validated
Time spent on searching	0.093	H14 (data did not support)
Ads. Clicking	-0.236**	H15 is validated

**Correlation is significant at the 0.001 level; *Correlation is significant at the 0.001 level

5 Discussion

The managerial implications of the research results are given in this section. The data analysis concludes that better search engine use will positively influences the level of user's search satisfaction. For instance, if users get more results in a sorted order, they will feel more satisfied. A positive correlation shows that web users put much emphasis on their search experience. They have common principles to evaluate the search engines. The results should be in a sorted order with high level of accuracy, the number of target websites provided by search engines should be in a medium level, fewer advertisements, and the loading time should be short. As the Internet grows, search engines have become the main information collector. Web users use search engines more frequently to do many different activities such as online shopping and collecting academic information.

From the user's perspective, most of them spend 4–6 min on the top website and only around 2 min as the tolerance limit for the users to wait or spend on the irrelevant websites. Ryan and Valverde (2003) identified that the length of waiting time could affect the user's online experience. It is possible that more experienced users will have less tolerance for or be more sensitive to delays in downloading the results. The more time spent waiting, the more dissatisfaction will be accumulated.

5.1 Search Characteristics and Search Satisfaction

The data analysis concludes that increasing the frequency of different data input, navigational behavior and different devices used will increase the user's search satisfaction. Web users have a clear tendency to adopt the normal search behavior which is from up to downside. Most web users focus on the first 3–5 links on the first page; the more links clicked, there is a possibility that the accuracy of information may decrease. Website compatibility is another issue that affects the user's judgment. Web users trust more on the desktop or laptop websites than smartphone websites. Al-Khalifa (2014) claimed that the main difference between desktop websites and smartphone websites is the size of the version. Desktop websites have the full version with rich functions while smartphone websites are represented as the tailored version. It only contains the basic functions and services offered by its desktop counterpart. Web users use larger devices such as laptop or desktop than smartphone to ensure the accuracy of information though small devices are convenient and portable.

Users provide inputs for search or "web query". These inputs can be in different forms such as key words, nouns, verbs, noun phrases, web phrases, questions, and composite queries (Bendersky and Croft 2009). The composite queries comprised of the combinations of keywords, nouns, verbs, phrases, and questions. The queries with less key words or shorter phrases are more effective in retrieving accurate results compared to composite and longer queries (Vakkari 2011). That is the main reason why web users rely on the search keyword more than phrases and questions, which is supported by hypothesis 10.

5.2 Search Engine Characteristics and Search Satisfaction

Search problem is a common issue that web users face every day. Bill (2014) listed several "most common" search engine ranking problems, such as slow webpage loading time, 404 errors for broken links, and outdated information. These problems can be a threat to all websites. Basically, no web users want to meet these problems and they will lose patience if problems happen at any time. Reducing the problems means improving the quality of the websites. Web users also show interest in the search engine contents such as blogs, music, images and video, which are displayed on the top of the results page. When users perform a search, they can choose the format of the results.

5.3 Advertisements Clicking and Search Satisfaction

The data analysis concludes that reducing the advertisements will increase the user's search satisfaction. Advertisement is a method that web owners use to make a promotion to compete with other websites, and the location of different advertisements have different purposes. Chen et al. (2011) found that a type of advertisements are located normally to the right and above the organic searching lists. These advertisements often contain a promotion for a specific product. Most of the products are offered at a low price, but the quality is an issue. Web users conceptualize an idea that these advertisements are useless and seldom click on them. Kritzinger and Weideman (2015) claimed that the sharing of real estate space on the user's screen was problematic to users. Web users reduce the frequency of advertisements clicking and view these advertisements as the obstacle (Moxley et al. 2004).

Best Practices for SEO

Based on the research findings, the following best practices for search engine optimization from the user's perspective are given:

1. Original content: It is important that the content be original. Copying an article from other websites has been attempted by many people and usually does not work. The more original content, results in more searches. Although this is not a fully significant correlation because there are many other factors. Website owners cannot expect to get a thousand hits a day with a website with five items or articles. However, a website with a hundred original articles, is virtually assured a thousand visits.
2. Focus on the on-page design: It is the core for each website. Without a clear structure and navigational search, the website can be defined as a failure. It includes many elements such as font design, title, header and external link.
3. Fewer advertisements: Advertisements can attract customers and increase the traffic, but an inappropriate number of advertisements will cause fatigue. When one makes a change on a website, they must be aware that the number of advertisements should be placed in a reasonable number.
4. Regular updates: Updates are rewarded by Google and frequently updated websites show up at the top of the results.
5. HTML errors: Almost all the pages tend to have html errors. A page with clean html code and few errors with a simple structure for search engine robots will be rewarded in the form of a good position.
6. Social networks and forums: In addition to direct visits to get through these means, users can get links to websites, which benefits site owners, allowing them to provide a quote for service and helping them be known in the network. Groups and forums should be related to subject and should not be overly burdensome.

5.4 Future Research

With the rapid growth of mobile search, the evaluation of the websites on mobile devices is becoming a hot topic (Mao et al. 2018). Mobile search traffic will surpass the desktop search in the near future. The future research should focus more on increasing the mobile experience of the users. In the search engine optimization context, the future study should aim for increasing the ranking of mobile websites in mobile searching.

6 Conclusion

In conclusion, the research findings reveal the significant relationships for user's search satisfaction. The conceptual model recommends that website features, search engine contents and search problems have impact on user's search satisfaction. User's search behavior including the frequency of different data input, navigational search and different devices usage have positive effects on user's search satisfaction. Furthermore, advertisement clicking negatively influences the level of user's satisfaction.

From user's perspective, three aspects can be concluded for search engine optimization. One aspect is website content, it should be as original as possible. The contents should be authoritative and could not be imitated easily to increase the websites' competitive advantage; the second aspect is user interaction. As per the discussion in the previous section, social media is essential for web users to have a friendly communication with different websites. Finally and foremost, website design is always a big challenge. The structure should be as simple as possible to increase visual effect with some necessities, navigational search, page title, description text and non-text elements such as image are crucial for an effective website. In the future, search engine optimizers should be more considerate and make the whole website system simplified rather than professional. We believe humanization is the future of websites.

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References

- Alghalith, N.: Using course-embedded assessment: defining and assessing critical thinking skills of MIS students. *J. High. Educ. Theory Pract.* **15**, 77–83 (2015)
- Al-Khalifa, H.: A framework for evaluating university mobile websites. *Online Inf. Rev.* **38**(2), 166–185 (2014)
- Arora, P., Bhalla, T.: A synonym based approach of data mining in search engine Optimization. *Int. J. Comput. Trends Technol. (IJCTT)* **12**(4), 201–210 (2014)
- Bai, X.: In Google we trust: consumers' perception of search engine optimization and its potential impact on online information search (Order No. 1535565). Available from ABI/INFORM Global (1346703737) (2013)
- Barnard, L., Wesson, J.L.: Usability issues for E-commerce in South Africa: An empirical investigation. In: *Proceedings of the Annual Conference of the South African Institute of Computer Scientists and Information Technologists (SAICSIT)*, Pretoria, 17–19 September 2003, pp. 258–267 (2003)
- Bendersky, M., Croft, W.B.: Analysis of long queries in a large scale search log. In: *Proceedings of the 2009 Workshop on Web Search Click Data*, pp. 8–14. ACM, February 2009
- Bill, H.: Search Engine Rankings for January 2014. *Search Queries* (2014). <https://www.billhartzer.com/internet-usage/search-engine-rankings-for-january-2014>

- Broder, A.: A taxonomy of web search. *SIGIR Forum* **36**(2), 3–10 (2002). 3, Fall 2002
- Chen, C.Y., Shih, B.Y., Chen, Z.S., Chen, T.H.: The exploration of internet marketing strategy by search engine optimization: a critical review and comparison. *Afr. J. Bus. Manage.* **5**(12), 4644–4649 (2011)
- Craven, T.C.: Optimize keywords to improve SEO. *J. Fin. Plan.* **27**(1), 17–21 (2000)
- Crowley, M.: Optimize keywords to improve SEO. *J. Financ. Plan.* **27**(1), 17 (2014)
- Eisenberg, B., Quarto-vonTivadar, J., Crossby, B., Davis, L.T.: *Always Be Testing: The Complete Guide to Google Website Optimizer*. Sybex publisher (2008)
- Gershonowicz, J.: *Basic tips to transform your website's SEO* (2016)
- Ghose, A., Yang, S.: An empirical analysis of search engine advertising: sponsored search in electronic markets. *Manage. Sci.* **55**(10), 1605–1622 (2009)
- Gupta, A., Mateen, A.: Exploring the factors affecting sponsored search ad performance. *Mark. Intell. Plan.* **32**(5), 586–599 (2014)
- IAB: Interactive Advertising Bureau (2013). <https://www.iab.com>
- Kohli, S., Kumar, E.: Evolution of user dependent model to predict future usability of a search engine. In: IEEE conference in 2011 World Congress on Information and Communication Technologies, Mumbai, India (2011). <https://doi.org/10.1109/WICT.2011.6141259>
- Kritzinger, W.T., Weideman, M.: Comparative case study on website traffic generated by search engine optimisation and a pay-per-click campaign, versus marketing expenditure. *S. Afr. J. Inf. Manag.* **17**(1), 1–12 (2015)
- Lewandowski, D.: The retrieval effectiveness of web search engines: considering results descriptions. *J. Doc.* **64**(6), 915–937 (2008)
- Mao, J., Liu, Y., Kando, N., Luo, C., Zhang, M., Ma, S.: Investigating result usefulness in mobile search. In: *European Conference on Information Retrieval*, pp. 223–236. Springer, Cham, March 2018
- Martin, M.: Exploring search engine optimization strategies and tactics. *Soc. Sci. Res. Netw.* (2011). http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1876341
- Moxley, D., Blake, J., Maze, S.: Web search engine advertising practices and their effect on library service. *Bottom Line* **17**(2), 61–65 (2004). <https://doi.org/10.1108/08880450410536080>
- Ohshima, N., Amiri, E., Keshavarz, H.: Resource allocation in grid: a review. In: *International Conference on Innovation, Management and Technology Research (ICIMTR 2009)*. Elsevier, Malaysia (2009)
- Russell, K.: Search engine optimization. *Comput. World* **41**(23), 40 (2007)
- Ryan, G., Valverde, M.: Waiting online: a review and research agenda. *Internet Res.* **13**(3), 195 (2003)
- Song, G., Salvendy, G.: Effectiveness of automatic and expert generated narrative and guided instructions for task-oriented web browsing. *Int. J. Hum. Comput. Interact.* **59**(6), 777–795 (2003)
- Vakkari, P.: Comparing Google to a digital reference service for answering factual and topical requests by keyword and question queries. *Online Inf. Rev.* **35**(6), 928–941 (2011)
- Yalçın, N., Köse, U.: What is search engine optimization: SEO? *Procedia Soc. Behav. Sci.* **9**, 487–493 (2010)
- Yamin, F.M., Ramayah, T., Ishak, : W.H.I: Does user search behaviour mediate user knowledge and search satisfaction? *Int. J. Econ. Fin. Issues (IJEFI)* **5**, 34–39 (2015)
- Zhang, J., Dimitroff, A.: The impact of metadata implementation on webpage visibility in search engine results (Part II). *Inf. Process. Manage.* **41**, 691–715 (2005). <https://doi.org/10.1016/j.ipm.2003.12.002>
- Zhang, S., Cabage, N.: Search engine optimization: comparison of link building and social sharing. *J. Comput. Inf. Syst.* **57**(2), 148–159 (2017)