

NEW TECHNIQUES OF SEARCH ENGINE OPTIMIZATION IN WEB-DEVELOPMENT

Case Runfa

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Websites are flooding on the Internet. Increasingly, organizations and companies utilise websites as a tool to promote their business. However, implementing Search Engine Optimization for websites (hereinafter SEO) tends to be overlooked by webmasters.

The objective of this research is to explore new SEO's techniques and strategies that can be applied in website development for a case company named Runfa, which operates a local business in Tampere. This thesis study gives a general description of how search engines work, and adopts the Google search engine as the case search engine to explore new trends of SEO. New techniques and strategies of SEO are drawn from the analysis of the new trends of SEO.

Constructive methodology is employed in this thesis work to guide the process of website development, due to the nature of software development. This exploratory research is mainly based on literature reviews. Additionally, the owner of the case company was interviewed for collecting empirical data for this study. The interview with the owner of the case company was conducted for the sake of meeting the business requirements of the case company during the process of website development. The website function-design derives from a business requirement analysis. A questionnaire survey was conducted, with the aim to find out the most popular social media that could be embedded in the website for the purpose of promoting the local business in Finland.

This research proposes a series of recommendations that are relevant to a set of new techniques and strategies of SEO from the aspect of web-development. The techniques and strategies of SEO are especially suitable for local business promotion. A website was constructed for the case company, and the suitable techniques and strategies of SEO were embedded in the website development.

Key words Responsive design, SEO, search engine, page rank

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ABBREVIATIONS

UML	Unified Modeling Language
HTML	Hypertext Markup Language
CSS	Cascading Style Sheets
SEO	Search Engine Optimization
SERP	Search Engine Rank Page

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1 INTRODUCTION

The background and motivation of the thesis work are discussed in this chapter. In addition, a brief description of the case company and the thesis research objectives are presented. Further, the structure of the thesis is provided.

1.1 Background and Motivation

Websites have become increasingly integrated in business strategies for companies. The technologies of World Wide Web and the Internet are powerful, which have drawn billions and even more people who will eventually follow into the information era (Pressman 2005, 500). In the robust information age, the modern business environment that spawns websites is fast-paced and ever-changing, since websites can be a method to promote business efficaciously and economically.

Websites are overflowing on the Internet. The question how a website can make a positive impact on the business needs to be settled. The website should be found out easily by users through web search engines. Moreover, for customers and end-users, the website content should be relevant to their search queries. From the business development aspect, the websites are expected to gain more targeted visitors in order to increase sales or build brand images. Implementing Search Engine Optimization into the process of website building allows customers and end-users an easy access to the websites via search engine. Adopting SEO for website development can also facilitate the website value into the integration of business mission and vision.

To design and build a website, the consideration of SEO is indispensable. People can find the web pages through the action search form search engine. Virtually, search engines capture web pages first, and exhibit the filtered relevant results to users. However, at Lapland University of Applied Science, several programming languages, such as HTML, CSS, and PHP for website development, and the techniques of how to design a website from user interface aspect have been taught, while issues concerning SEO have only been touched

upon. With the rapid development of the information age, search engines constantly update their search algorithms in order to optimize their search results. The techniques and strategies of SEO are necessary to be refined.

The thesis researcher is curious about SEO. Further, the researcher is keen to explore and capture the latest suitable techniques and strategies of SEO when build a website for a case company. Further, an implementation work as web-development for a case company named Runfa is the focus in this thesis work.

1.2 Case Company

The company Runfa runs an Asian restaurant named Pieni Panda, which is located in Tampere, Finland. The company owner requires a website to attract more potential customers to come to their restaurant.

According to the interview with the company's owner, the mission of the company is to satisfy customers with authentic, delicious and diverse Asian foods from China, Vietnam, Japan and Thai. The vision of the company is to make Pieni Panda restaurant the most popular restaurant in Finland.

1.3 Research Objectives

The objective of this research work is to develop a website for the case company that is implemented by using the latest techniques and strategies of SEO. The art of SEO is derived from the understanding of how search engines work.

Consequently, the working principles of search engines need to be analyzed. Different search engines operate diverse search algorithms and exhibit different search results to users. The Google search engine is used as a case search engine to explore new trends of SEO, and the latest techniques and strategies of SEO can draw from the analysis of new trends of SEO.

The research proposes a set of recommendations to build a search-engine-friendly website which is also user-friendly. A website prototype for the case company was created as an outcome of this research.

1.4 Structure of the Thesis

This thesis divided into 8 chapters. Chapter 1 introduces the background information and motivation, and the research objectives of the thesis work. Chapter 2 discusses and provides arguments for the research methodology used in this research. Chapter 3 gives an introduction into search engines, and presents the general working principles of search engines. Chapter 4 provides the introduction of SEO, and focuses on analyzing the new trends of SEO with the Google Search Engine as a case search engine. Chapter 5 proposes an specific analysis of new techniques of SEO in terms of the website development. Chapter 6 presents the business requirements analysis of the case company in order to find out suitable functions for the website. Moreover, the blueprint of the website is painted out in this Chapter. The techniques and strategies of SEO are implemented to the website development in practice in Chapter 7. Chapter 8 concludes this research, and suggests directions for further relevant research.

2 RESEARCH QUESTIONS AND METHODOLOGY

The research questions are discussed in this Chapter initially. Further, the research questions are discussed in order to achieve the objectives of this thesis work. Lastly, the research methodology and development tools used in the thesis work are presented.

2.1 Research Scope

This research focuses on exploring new techniques and strategies of SEO to implement into the web development. The suitable techniques and strategies of SEO were implemented into the website development in practice. Analysing and discussing the suitable techniques and strategies of SEO allowed to make the website easily accessible for the customers and potential customers.

Regarding SEO, this thesis work only focuses on the organic SEO. This choice was made since “70% of the links search users click on are organic results” (Patel 2015). Further, this research utilizes Google as a case search engine to detect the suitable techniques and strategies of SEO that can be applied for the development of the website for the case company. Google is the most popular search engine, since Google offers accurate search results (Ledford 2010, 15). Google had a 65.2% share of web search volume worldwide, with 114.7 billion searches in December 2012 (comScore 2013, as cited in Lee 2014). In addition, Google is the most frequently researched search engine in research on SEO and ample literature is available.

2.2 Research Questions

Three research questions are discussed below. Analysing and addressing the questions aim at achieving the objectives of this research work.

1. How do search engines work?

The working principles of search engines need to be understood in order to explore and understand the techniques and strategies of SEO. Understanding

the working principles is important even for finding out about the new techniques of SEO. The new trends of SEO are based on the understanding of search engines. Each of search engine s differs slightly from others, since each of them adopts different search algorithms. Unfortunately, these search algorithms are kept as secrets from each other search companies. The literature depicts how search engine work derive the descriptions from search result analyses. This research can only give a general level description of the working principles of search engines.

2. What are the new techniques of SEO that can be applied into the process of website development?

The understanding of new trends of SEO is necessary, since the ranking algorithms of search engines are updated continuously by the search companies in order to improve the quality of their search results. Studying and analysing new trends of SEO is helpful to find out the latest techniques and strategies of SEO for the web-development. For the purpose of studying new trends of SEO, this research uses Google as the case search engine, since Google Search Engine is the most popular search engine.

3. What are the new techniques of SEO that can be applied into the process of website development?

The journey toward SEO is not easy, but implementing SEO for the website construction is an indispensable job for the sake of increasing web traffic. Since search engine companies keep updating their algorithms, the literature widely on this topic was outdated. The researcher explores the new techniques and strategies of SEO in order to make a search-engine-friendly website.

4. What kind of functions and structure should the website have to meet the case company's requirements?

The outcome of this thesis work is not only give a set of recommendations of how to build an easy accessed website. A new website is built for the case company. The functions of the website need to be approved according to the company's

requirements. Therefore, the company's requirements should be analysed in order to find out and apply the corresponding functions for the website.

2.3 Research Methodology

This research focuses on exploratory research. According to Habib, Maryam and Pathik (2014, 8), exploratory research is to “explore new ideas and concepts according to the conceptual models, hypothesis, and empirical evidence. The primary point of exploratory research is to give researchers pertinent information and form hypotheses about the subject.” Due to the nature of exploratory research, it can help the researcher to explore new feasible techniques and strategies of SEO to be applied into the process of web development for the case company. Relevant data which collected for exploratory research is mostly drawn from the analysis of literature. Secondary and tertiary sources capturing from the Internet are also used to support this thesis work.

This thesis involves development work of web-development. A commercial website is required to be built for the case company. Due to the nature of software development, constructive research methodology is selected for the practical part of the thesis work. According to Pasian (2015), “constructive research aims to address practical problems while conducting an academically appreciated theoretical contribution”. Literature review is also involved in the development work. The instructive knowledge drawn from relevant literature reviews can be a guideline for the web-development. A semi-structured interview is conducted with the owner of the case company in order to seek a good understanding of business requirements in the interviewee's point of view. Consequently, website function requirements can drive from the business requirements analysis. Further, a questionnaire survey is conducted in order to find out the feasible social media channels that can be embedded in the website from SEO aspect. The questionnaire was distributed by the Internet due to the economic consideration. The respondents of the questionnaire were cyber residents from Finland, since the website was built for promoting a local business in Finland.

Qualitative and quantitative research are used in this research. Wyse (2011) maintains that “qualitative research mainly refers to exploratory research, which is used to achieve an understanding of underlying reasons, opinions and motivations. Moreover, qualitative research is also conducive to uncover trends in thoughts, and dig deeper into the problem.” The interview conducted with the case company owner was necessary to conduct in order to obtain and analyze the case company’s requirements, and help the researcher to undertake the function design of the web construction. “Quantitative research aims to verify if the predictive generalizations of a theory hold true” (Habib et al. 2014, 9). The quantitative data involves a questionnaire conducted to find the most popular social media among the respondents. In addition, an experiment is conducted to verify the differences of search results between Google and Bing search engines. To verify the authenticity of the collected data through literature review is necessary, since the research topic is in the field of Information and communication technology which is developing rapidly.

2.4 Development Tools

HTML

HTML, which is short for Hypertext Markup Language, is the standard language for creating web pages. The term of “Hypertext is text displayed on a computer device, and the text includes links to navigate to other hypertext document”.

HTML is developed by World Wide Web Consortium which is the main international standards organization for the World Wide Web. (Coremans 2015, 1.) Back to the research topic, adopting HTML to create the website is helpful to take the act of search engine optimizing throughout the entire process of web building.

CSS

CSS, which is short for Cascading Style Sheets, is “used for taking control of the style of web pages” (Larsen 2013, 191). CSS can be used to generate rules

to govern how the content of elements should appear on the web pages in order to make the web content more interesting to read.

Eclipse IDE

Eclipse IDE is an open software developing tool, and developed by the community – Eclipse Foundation (Eclipse Foundation 2016). Eclipse IDE is choosing as a development platform for code developing and testing.

XAMPP

XAMPP stands for Cross-Platform, Apache, MySQL, PHP and Perl, and XAMPP is an open source cross-platform web server developed by the community Apache Friends (Apache Friends 2016). In this thesis work, XAMPP is utilized for creating a local web server for the purpose of testing.

UML

UML stands for Unified Modeling Language, which is “a general-purpose visual modeling language. UML is used to specify, visualize, construct and document the artifacts of a software system. UML is used to understand, design, browse, configure, maintain and control information on the systems”. (Rumbaugh, Jacobson & Booch 2005, as cited in Maciaszek 2007, 13.) The usage of UML in the thesis work helps contribution to the system function design of the website.

Photoshop

Photoshop is an outstanding photo editing and manipulation software, which developed by Adobe Systems Incorporated (Adobe Systems Incorporated 2016). Photoshop is used to achieve high quality image.

3 SEARCH ENGINE

To know the working principles of search engine is necessary in order to achieve better understanding of SEO. This chapter presents the concept of search engine and the working principles of search engine.

3.1 The Introduction of Search Engine

The emerging of search engine is inevitable due to the increasingly development of computerized. Matthew Gray created the first search engine named Wandex in 1993. Wandex was the first program using a set of software programs named web crawlers to fetch web pages through links. Crawlers can both index and search the indexed pages on the web. The technology crawling to the web has been becoming the basis for all search crawlers until now, i.e. Google is one of the most common used search engines. (Ledford 2010, 24.)

Search engine is hard to define. The basic principle of search engine is to allow users to search the indexed information by words or phrases, and return users a series of ranked search results that are relevant to terms that users typed in. On the back end, search engines release a large number of web crawlers to detect and collect information in every web page. The collected information is usually keywords or phrases that are probable representing the essence of content in the web page, and the information will be indexed and stored in a database. In addition, on the front end, search engines are generally known by their interface that users can type words or phrase into a search box. Further, when user clicks the button “search”, search engine will display a large volume of ranked web links that are relevant to the search terms the users typed-in. The relevant links are retrieved by crawlers from the database in the back-end. Search engines generate the ranked results by using a set of algorithms and search metrics. Search engines devote to serving users the most relevant search results in order to provide a good user-experience. (Ledford 2010, 4-5.)

3.2 The working Principle of Search Engine

To describe how search engines work is a difficult job, since the working process of search engine is sophisticated. Moreover, every search company keeps the information of the search engine's construction as a business secret. However, the information that how search engines work is vitally essential to search engine optimization. (Ledford 2010, 5.)

Due to the complexity and intangibility of search engine, this chapter can only give simple discussion how search engine works. The working process of search engine can be divided as three phases: crawling and collecting, indexing and page ranking.

3.2.1 Crawling and Collecting

Search crawlers will be the first character to be introduced when to meet how search engines work. The crawlers are search engines' automated robots that are programmed for collecting information such as text and links from website, as well as cataloging and storing the information into massive databases (Ledford 2010, 6). For the sake of improving the efficiency of crawling and collecting, search engines release a mass of crawlers to crawl web pages distributively (Zan 2014, 25).

When a crawler sends a request to the web server, the web server will respond by sending a series of code in HTML back to the crawler. The differences between the user and crawler sees is the crawler can only view the pages in a text interface. The crawler cannot read graphics or other types of media files. (Ledford 2010, 298; Zan 2014, 25.)

In the phase crawling and collecting, crawlers crawl the entire World Wide Web through the path – links, since the link structure of the web servers to bind all of the pages together (SEOmoz, Inc 2016a). The process of crawling and collecting is generally by downloading a web page, and analyzing the internal links, afterwards crawlers travel to other web pages of pointed links. In theory,

the crawlers can reach every web page by crawling along links. However, in effect, crawlers cannot crawl all the web pages due to the insufficient bandwidth and time limitation. In addition, the amount of websites over the World Wide Web is tremendous, and the structure of websites is extremely complicated. Therefore, for the purpose to make crawlers reach as many web pages as possible, the way how to attract crawlers come to the web pages is important. (Ledford 2010, 298; Zan 2014, 25.)

The responsibility of crawlers is to crawl as many web pages as possible to capture and classify massive information from those web pages into databases. The crawlers capture the web pages what they consider important. Crawlers will take four aspects into measure if the web page is important. The four aspects are the page weight of website, the frequency in updating, the inbound links, and the distance to the home page. (Zan 2014, 25.)

The page weight of website which means that a website with high quality will be considered as high weight of website (Zan 2014, 27). The known elements that can affect the quality of a website are domain and Uniform Resource Locator (Hereinafter URL), the content of web page, the structure of link building, the usability and accessibility, the Meta tags, the structure of web page (Ledford 2010, 6).

The reason why the frequency is improved in updating is because that crawlers will store the information of the page when the crawlers fetch the web page. The crawlers will not come frequently when the second time they come to the page and find the captured information is nothing different as previous'. Conversely, if the content of the page updates frequently, the crawlers will increasingly visit the page. (Gao 2014, 12.)

The inbound links have to exist as a bridge between pages from pages, since the links are the path for crawlers visit pages to pages. Otherwise, the pages will not be visited by crawlers. In addition, the inbound links of high quality can increase the depth of crawling where the outbound links on the web pages. (Zan 2014, 27.)

In general, the home page is the highest weight of the website, and most of external links are point to home page. Further, home pages are the most frequent visited pages by crawlers. Hence, the pages that are closer to the home page acquire higher weight. (Zan 2014, 27.)

For avoid duplicating, when search engines are downloading a web page, search engines will create two different forms. The first form records the websites that have been crawled by crawlers, the second form records those websites that have not been visited. When a crawler captures a URL, the crawler will download and analyze the URL. Thereafter, the crawler will write the URL into the first form. Therefore, when another crawler finds the URL which is recorded on the first form, the crawler will abandon the URL. To avoid duplicating can enhance the working efficiency of search engines. Moreover, crawlers will detect the content of the web pages when the crawlers reach the web pages. The website will be considered as a low weight website if the most of content of the website is duplicated from other website, which will probably lead to be no longer crawled by crawlers. (Gao 2014, 12; Zan 2014, 27.)

3.2.2 Indexing

The web pages that crawlers captured cannot be used for ranking process, since the huge number of web pages is stored in the databases. The computation is too overloaded for search engines to manage. (Zan 2014, 27.) Hence, all the crawled pages should be indexing to prepare for the next process – page ranking.

Indexing process refers to building a database structure which can be queried, and by querying the database search engine can generate a sorted list of documents (Croft, Metzler & Strohman, 2011). However, search engines understand all the pages base on the content of text. The pages that crawlers captured consist plenty of formatting tags and other codes such as JavaScript, and these codes could not be leveraged for querying. Search engines will analyze and extract useful text content for the usage of querying. (Zan 2014,

28.) In the figure 1, only the text “Pieni Panda” will be extracted and used for querying.

```
<!DOCTYPE html>
<html>
<head>
  <meta charset="UTF-8">
  <title>Pieni Panda</title>
  <script type="text/javascript" src="script.js"></script>
</head>
```

Figure 1. Example of HTML Code

Besides, search engines will extract some special codes that are containing text information, such as the text information inside of Meta tags, annotations of images or Flash files, and anchor text. After extracting the useful text content of the web pages, search engines can obtain a set of keywords that can reflect the main content of the web pages. Meanwhile, search engines record the frequency, location and the format of the keywords. Therefore, to the search engine, every page is turned to a set which is consists of plenty of keywords, and search engine will generate an index vocabulary to record those keywords from each web page. (Zan 2014, 28.)

Table 1 describes a simplified structure of index vocabulary. In the index vocabulary, every document corresponds to a document ID, and the content of each document is simplified to a set of keywords (Zan 2014, 28). Further, the keywords are turned to keyword ID in the search engine library. The process to generate an index vocabulary and put the index vocabulary into search engine library is called forward indexing. (Zan 2014, 28.)

Table 1. Simplified Index Vocabulary Structure (Zan 2014, 32)

Document ID	Content
Document 1	Keyword 1, Keyword 2, Keyword 3,, Keyword L
Document 2	Keyword 2, Keyword 4, Keyword 7,, Keyword M
Document 3	Keyword 1, Keyword 4, Keyword 38,, Keyword X
...
Document x	Keyword 50, Keyword 54, Keyword 97,, Keyword Y

However, forward indexing is not enough to prepare for the next step page ranking. Inverted index is the most commonly used method by search engines so far. (Croft et al. 2011, 9)

Table 2. Simplified Structure of Inverted Index (Zan 2014, 32)

Keywords ID	Document ID
Keywords 1	Document 1, Document 6, Document 131, Document K
Keywords 2	Document 314, Document 516, Document 766, Document P
Keywords 3	Document 1, Document 6, Document 944, Document N
.....
Keywords Z	Document 99, Document 101, Document 999, Document Z

Table 2 illustrates the process of inverted indexing. Search engines rebuild the database of forward index to generate another database called inverted file (Zan 2014, 28). In the inverted file, every keyword maps to a series of documents. By using inverted index can dramatically reduce the respond time of querying. When a user search a keyword, search engines can rapidly locate the keyword and retrieve those documents that contain the keywords. (Zan 2014, 28.)

3.2.3 Search Ranking

After last two mentioned phases clawing and collecting, and indexing, search engines are ready for processing the queries and generating the ranking results for users. In the front end, When users type words into the searching box, and click the button “search”. Hereafter, in the back end, the ranking program starts to invoke the index databases, and display pages of ranking result to users. (Zan 2014, 33.)

This thesis work only discusses organic search results. Organic search results are free listing where the web pages will naturally appear if they are relevant to the keywords. Figure 2 uses Google search engine as an example to describe two different search results – paid search results and organic search results. The search results inside of red box are called paid search results, and the

search results inside of green box are organic search results. Paid search results are advertisements that are relevant to the keywords that users typed in (Brecht 2014). Organic search results are free listing where the web pages will naturally appear if they are relevant to the keywords (Wylie 2012, 247).

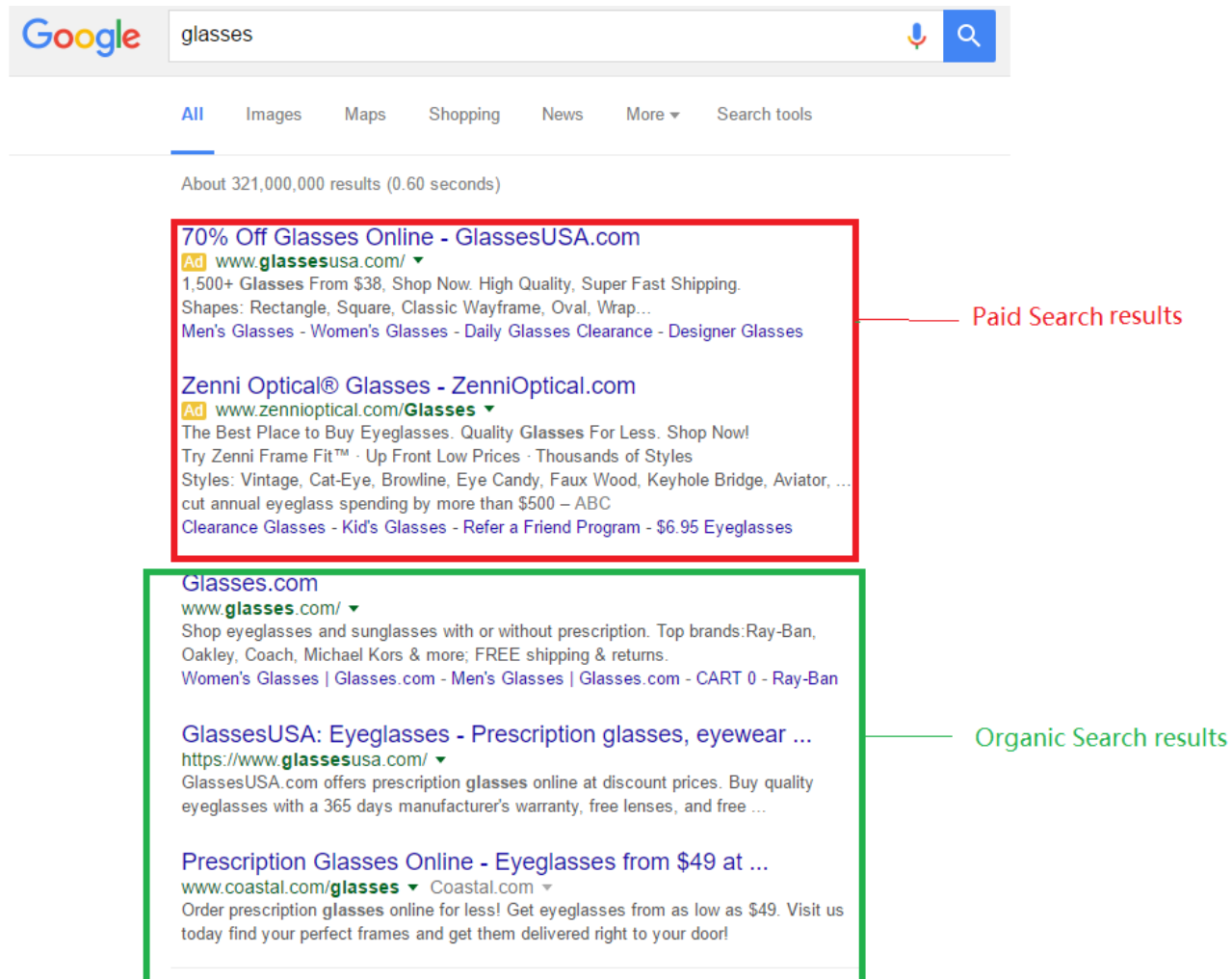


Figure 2. Google Search Result Page

The way how search engines rank web pages is a myth. All the literature that depicts how search engines rank their results is through making reasonable assumptions. According to the assumptions, website developers make efforts to tailor their web pages to meet the ranking requirements. The search ranking is really tricky, and different search engines adopt different ranking criteria. (Ledford 2010, 14.)

Table 2 describes that inverted index can help to match the documents with keywords. If users search keyword 1 and keyword 3, search engines only need to find all the documents including both keyword 1 and keyword 3. However, the matched documents can be hundreds of million. In reality, users will not concern for all the web pages. Users mostly will only browse first two pages of ranking results. In other words, users only care about the first twenty results. Therefore, search engine should only calculate the most important part of pages. (Zan 2014, 33.)

The researcher used two different search engines, Google and Bing, to explore if the two different search engine would bring different search results. Besides, the researcher wonders how many search results the two search engines would be processed.

Figure 3 and Figure 4 below display the first Search Engine Result Page from Google and Bing search engine respectively, and the search results are relevant to the keyword SEO.

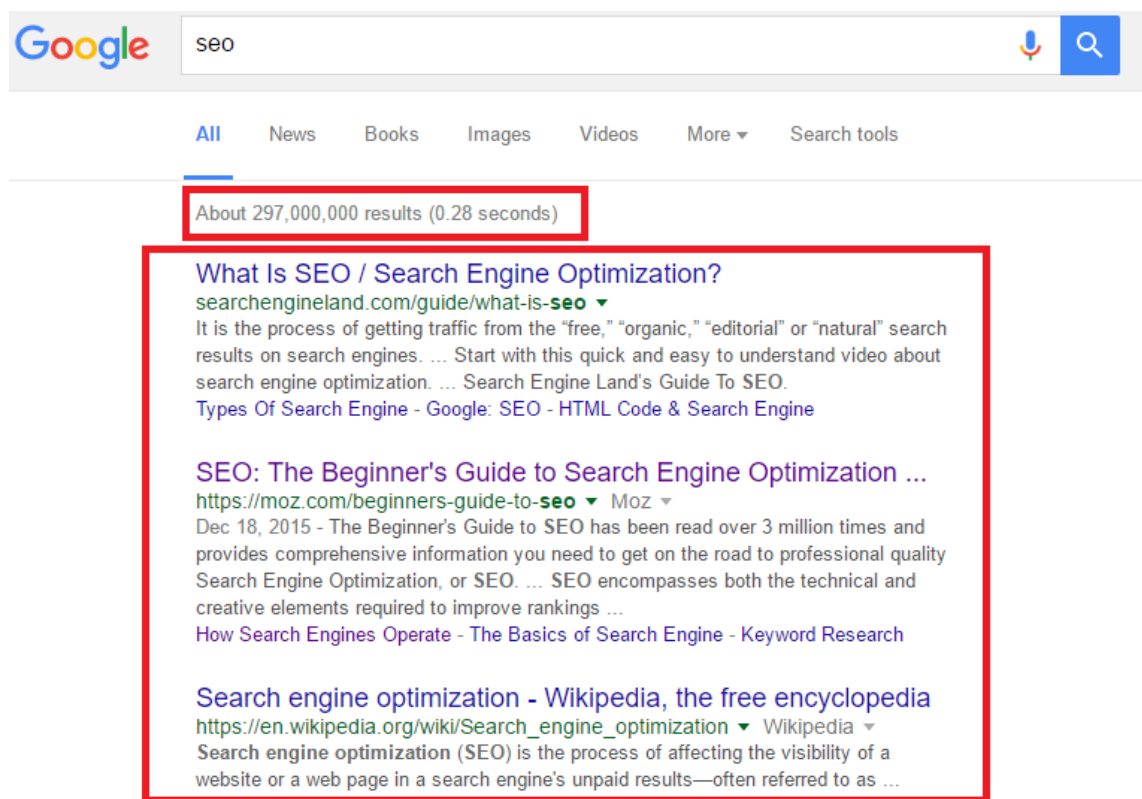


Figure 3. Search Result Page of Google

Figure 3 indicates that Google find about 297,000,000 results that are relevant to the keyword SEO. On the other hand, figure 4 illustrates that Bing find 16,800,000 results as to the same keyword.

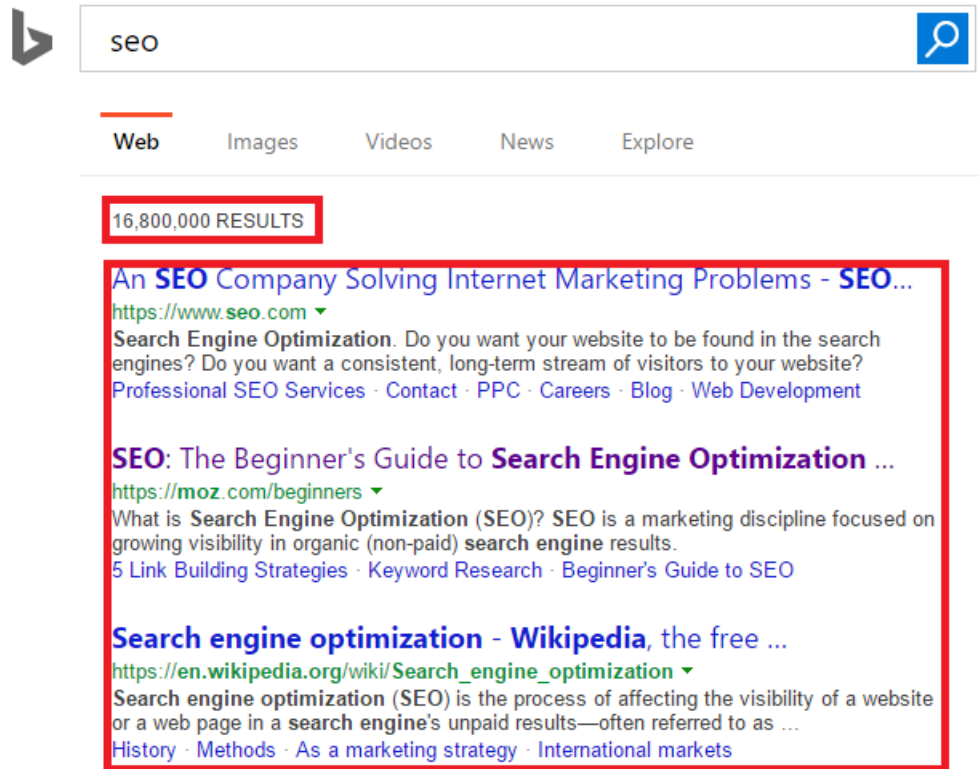


Figure 4. Search Result Page of Bing

Figures 3 and figure 4 indicate that users can get different search results by using different search engines. Figure 3 exhibits that Google only displays 22 pages out of 219 processed results to users, while Figure 4 exhibits that Bing displayed 41 pages out of 403 results to users. Figure 5 exhibites that Google only displays 22 pages about 219 processed results to users.

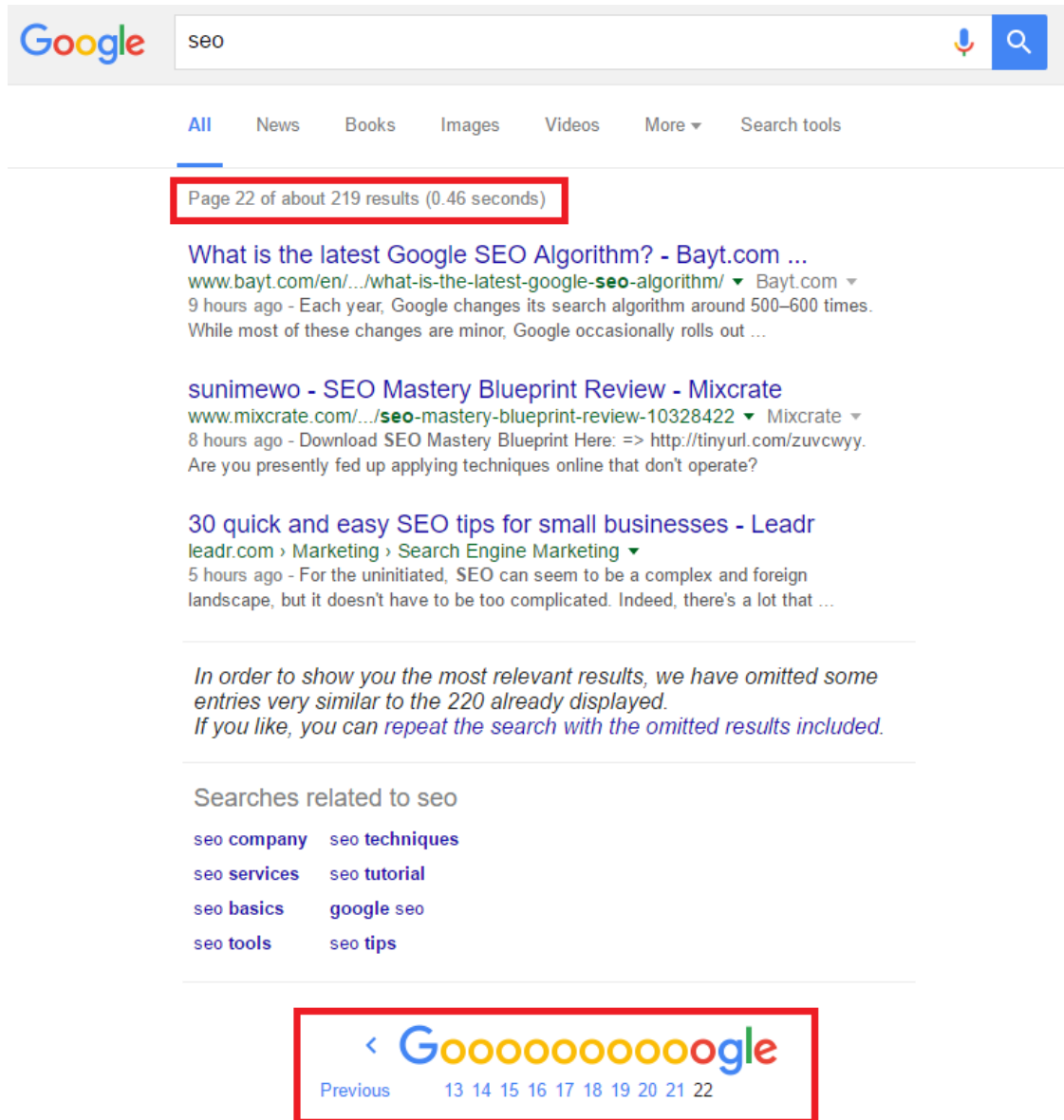


Figure 5. Google Displayed 22 pages Including about 219 Results

Figure 6 exhibits Bing displayed 41 pages about 403 results to users. Figure 3, 4, 5, 6 demonstrate that different search engines bring different search results to users. Besides, search engines will only display part of processed results to users.

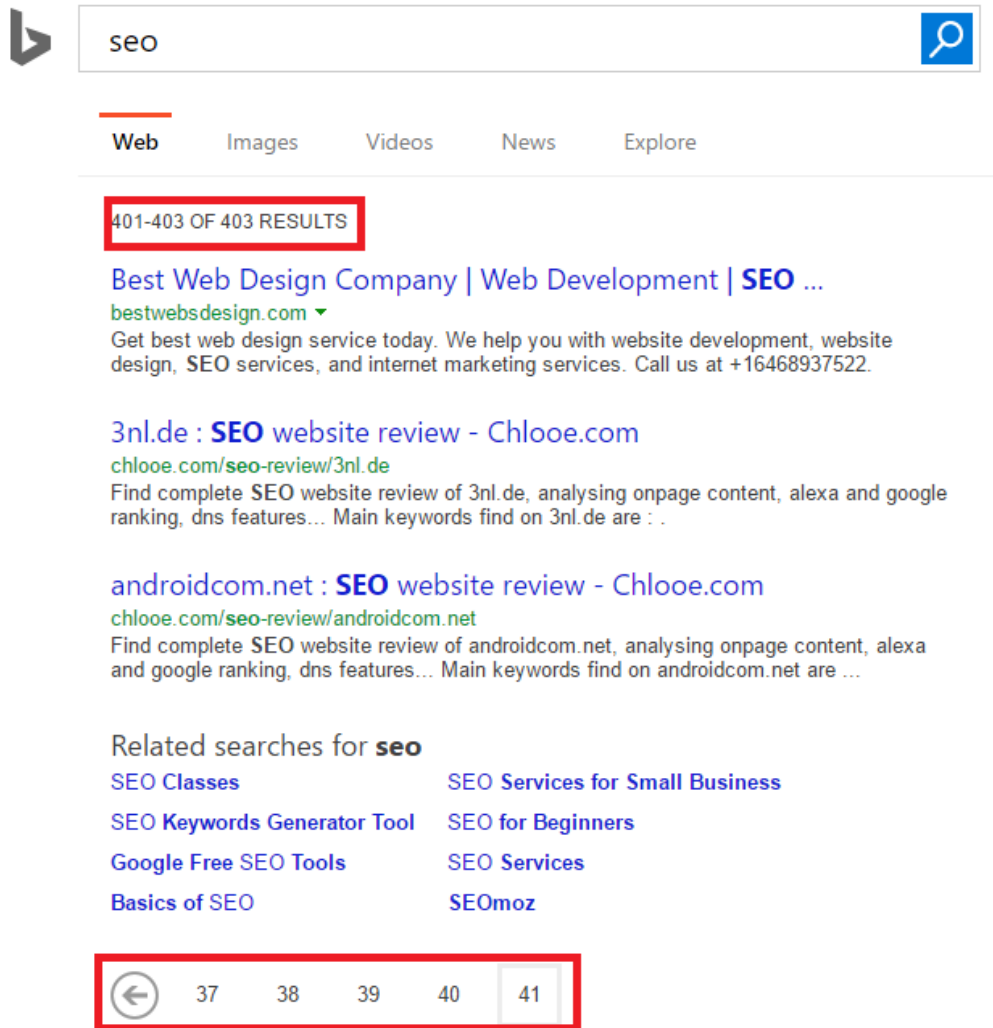


Figure 6. Bing Displayed 41 Pages Including about 405 Results

In front of hundreds of million relevant results, most of search engines will only calculate hundreds of results that are relevant to the keywords, which can afford users' requests. Search engines will select and display most important results to users. The page weight is one of the most important elements for search engines to judge the importance of web pages. (Zan 2014, 35.) Search engines will select a batch of web pages based on their weight, and then execute correlation calculation of keywords for these web pages. (Zan 2014, 35.) The following discussed several main aspects that can affect correlation calculation.

The words used frequency is a consideration which will affect relevancy of pages. The most common used words emerge frequently, and these common used words are usually broad terms. These common used words make slight affect to search. For example, the word "the" does not make any sense to the

search words. However, when users are searching less common terms benefits targeted searching. Therefore, the weight of most common used words is lower than the less common used words. Ranking algorithm pays more attention to less common used words. (Zan 2014, 35-36.)

In general, under the situation without keyword stuffing, the more keywords appear in a page the relevancy of the page is higher. Since plenty of website intended to deceive search engine to obtain a higher rank by repeating keywords in large amounts, the keywords density make small effect to rank now. (Zan 2014, 36.)

The location and format of keywords makes contribution to the relevancy of the pages. The relevancy of the page is high when the keywords are located in important position, such as title tags or head tags. If the keywords appear in the format of anchor link, the page can probably obtain higher relevancy as well. (Zan 2014, 36.)

The ranking process is largely completed after the calculation of correlation. There are some other filtering algorithms in order to fine-tune the rank, and the filtering algorithms are mainly aim to punish the websites on suspicion of cheating. (Zan 2014, 36-37.)

4 SEARCH ENGINE OPTIMIZATION

SEO is introduced in this Chapter. The new trends of SEO are discussed, which draw from the study of Google search engine, due to ample literature on Google search engine is available. The analysis of new trends of SEO is preparing for perceiving new techniques of SEO.

4.1 The Introduction of SEO

SEO is also named search engine marketing or search marketing. SEO is a set of activities that can be performed to advance website organic rank on the SERPs in order to increase the web traffic, and please coming customers via search engine. (Grappone & Couzin 2011,4.)

Website should be indexed by search engine before users can see it in the search results. The techniques of SEO are based on the understanding of organic search mechanism, which means the website should be search engine friendly. Whereas, the ultimate aim of SEO campaigns are to support the business goals, and gain target visitors. Therefore, the website should also be user-friendly. (Grappone & Couzin 2011,4.)

Search engines always update their algorithms, which make an undisputed impact on the search results ranking. Therefore, the strategies of SEO should keep respond to the changes in search by concentrating on the new trends of SEO. Search engines are only the bridges between the websites and end-users, consequently, the implementation of SEO is customer-oriented, and the beneficiaries of SEO are both end-users and business organizations.

4.2 New Trends of SEO

Due to the eternally changing of search engine algorithms, the strategies and techniques of SEO should quickly adapt to the changes and respond accordingly in order to win the rat race of ranking on search engine result pages (hereinafter SERPs) (Patel 2016). Prompt, ample and relevant literature can be

searched from the Internet, which allows the researcher to grasp the latest trends and predictions of SEO. Further, the sources are collected from reputation authors, blogger and forums.

4.2.1 Diminishing Significance of Keywords

The ranking factor are shifting from the keywords queries searching to relevant and logical content structure building based on the understanding of users' searching intention (Demers 2016). Google became smarter by updating a series of algorithm the search results on SERPs, since some websites deceiving Google intended to achieve high position on the SERPs by piling up lager amount of keywords insignificantly (Patel 2015).

Panda emerged as the spam-fighting algorithms launched by Google in 2011. Panda aims to perceive the websites with low quality content, and fade those website away from SERPs. If a website is full of spam content, or duplicate vast of irrelevant content from other sites, the website will get penalties from Panda. Google has updated Panda several times. (Yu 2016.) Slegg (2016) indicated that Panda has officially become to Google's core ranking algorithm now.

Because of the development of semantic technologies and machine learning, Google can understand users' queries in a conversational way. Google updated the algorithm Hummingbird in 2013, which aimed to refine semantic search capabilities. In return, Google achieved a better understanding on context. (Yu 2016.)

Further, Google did a Quality Update in 2015 in order to improve user-experience and stimulate the generation of high-quality web content. Moreover, the an algorithm named RankBrain was launched in 2015, which could help Google to implement artificial intelligence analysis on users' intents and behaviors. (Yu 2016.)

Although Google did not want to share the details about these algorithms, Google suggested to make quality content and ponder what content customers are willing to see, or what search queries customers will conduct (Schwartz 2015). Keywords can still have some effect on search ranking, since keywords can help Google to understand users' searching requirements (Patel 2015). In addition, Google intends to penalize those websites that copy content from other websites. Therefore, to make unique and well-written content for the website is not only the approach to reach high search ranking but also the key to serve a good user-experience. (Kumar 2015.)

4.2.2 Increase Brand Visibility

SEO can be considered as an effective method to build brand visibility, and Social media can be a desirable approach to increase brand visibility. Google will also collect data from social media networks such as Facebook, Twitter, Pinterest and Google+. Relevant content for brand promoting which is active appearing on social media networks can contribute to improve the ranking. (Patel 2015.) Patel (2015) indicated that some brands achieving high ranking on SERPs is not because they execute a good SEO strategy, just because those brands are active in social media channels.

Links used to be regard as a high weight factor in terms of ranking, since links can create a relationship between pages by linking them together, and links are the bridges between crawlers and pages. If a page does not link to any other web page, the crawlers cannot find the page, as a result, users cannot see the page through searching. On the contrary, a web page which has more links can get more chance to be visit. That the more links the website held used to achieve higher ranking. Therefore, some webmaster started to post a large amount of irrelevant links on the pages. (Demers 2016.) To avoid the situation of link abuse, Google updated a ranking algorithm named Penguin in 2012 to fight with spam-links(Yu 2016). Latestly, Google updated penguin on 24 April 2016. Penguin aims to penalize those websites that intent to occupy top ranking in SERPs by spawning large amount of irrelevant backlinks. (Sullivan 2016.)

The quantity of links is no longer pertinent to occupy high search ranking, but rather the quality of links structure (Demers 2016).

Moreover, that Co-citation emerged as an important ranking factor. Co-citation along with Penguin and other anti-spam algorithms strike spam-links. Patel (2014) defined Co-citation as the situation that a website mentions or links to two unlinked websites respectively, and the two unlinked websites are implied linked.

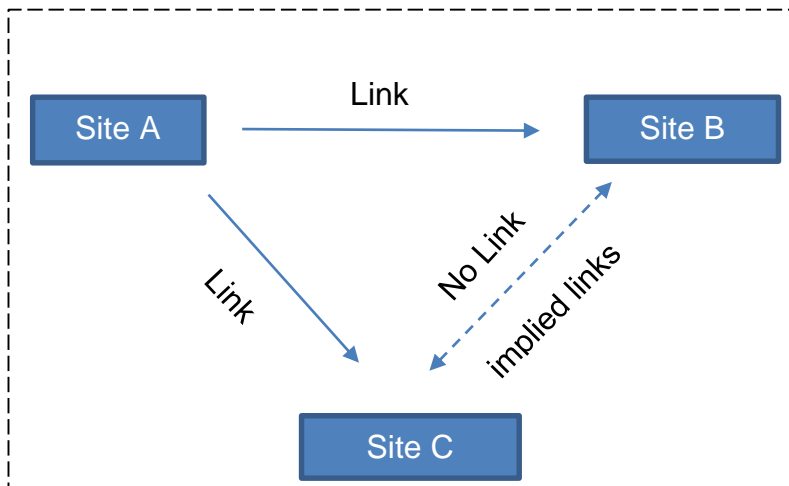


Figure 7. Co-Citation (Patel 2014)

Figure 7 gives an instruction what "implied links" is. Site A mentions or links to Site B and Site C. Site B does not directly mention or link to Site C, but Site B and Site C are implied linked. Co-citation can build a relationship between two sites that have not been linked directly. (Patel 2014.) Building a well Co-citation strategy is helpful to broaden the visibility of the business and earn more trust from search engines (SEOMoz, 2016e). In addition, the emerging of Co-citation also approved the approach that using social media networks built brand visibility.

4.2.3 Mobile Search Friendly

Desktops used to be the main device for Internet surfing. As the ever-increasing usage of mobile, mobile devices have been starting to scramble the share of Internet content consuming. (Burton 2016.)

A research, which involved 10 countries including American and Japan conducted by Google (2015a), demonstrated that mobile devices conducted more Google searches compared with computers. Consequently, Google has taken mobile-friendliness as an important ranking factor since 2015, and launched a new algorithm named Mobilegeddon which intent to stimulate the generating of mobile-friendly pages. (Meunier 2015.)

Compared with WIFI network connections, Cellular data networks are much more slower. The design to achieve high efficiency of loading is extreme crucial for mobile search. Mobile content should be more easily to read than desktop. According to the report from Google (2015b) indicated that “the average word count for top-ranking mobile pages in 2015 was 868”, and the number of mobile pages was much lower than desktops’ which was in the range of 1,140-1,285 words.

4.2.4 Local Search and Voice Search

20% of desktop and 50% of mobile searches are conducted in the hope of finding local results (Spahiu 2016). Pigeon, which was a new algorithm updated by Google in 2014, aimed to improve local search results (Schwartz 2014). The Pigeon can benefits local business. In addition, Google always intents to retrieve relevant local data to users even if users have not specific their location in their search. Figure 8 demonstrates the search results from Google’s the first SERP when the researcher searches the keyword restaurant. Google feeds back plenty of restaurants that are surrounding with the location to researcher’s location rather than the restaurants in America.

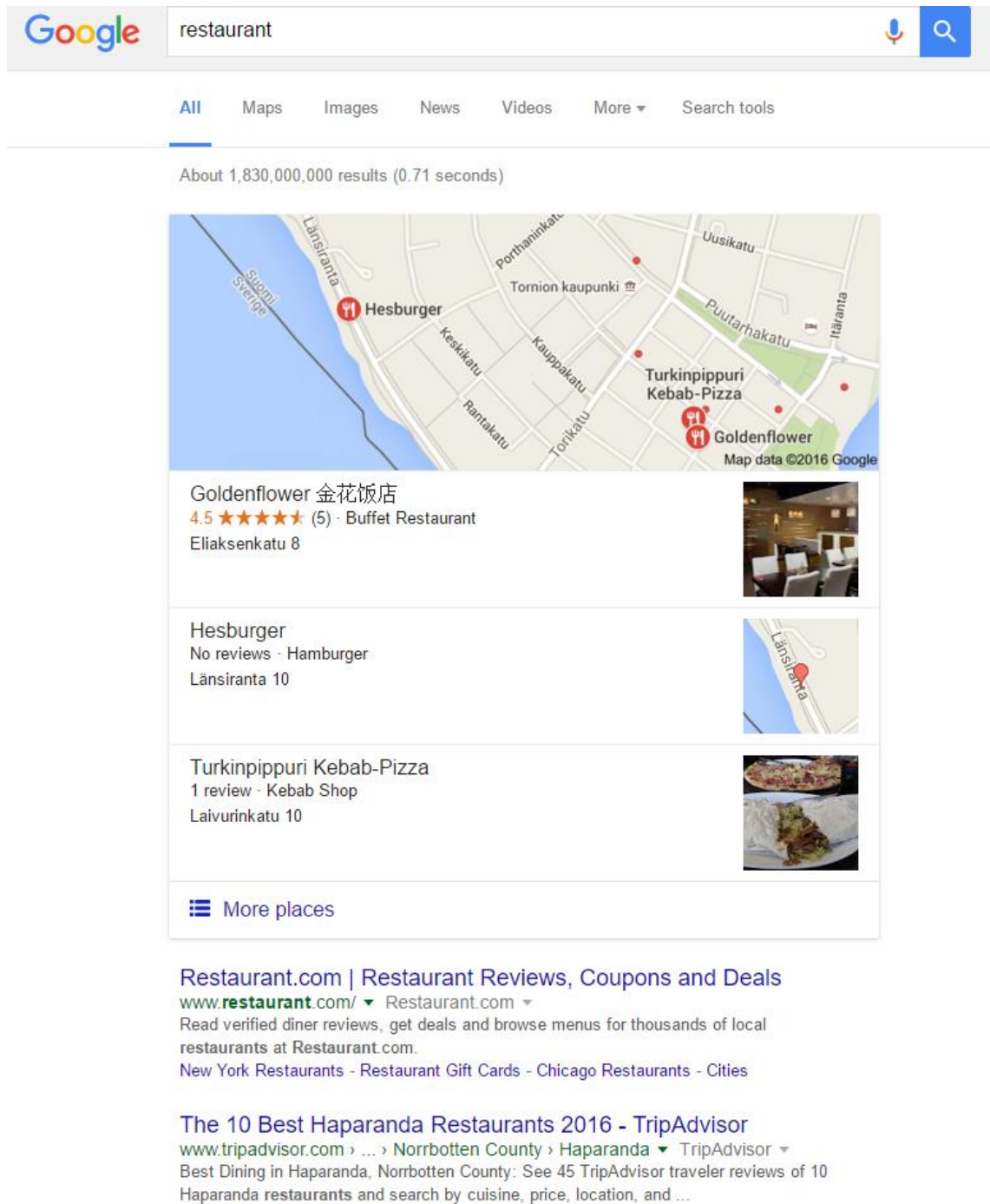


Figure 8. Example of Local Search

Due to the convenience draw from vocal search allows to get results quickly. All of Google, Windows and Apple have released voice based search systems – Google Now, Windows Cortana and Apple Siri. Voice search with the potential become more popular than type search. (kumar 2016.) Further, the algorithm Hummingbird also devotes to serving users' more conversational and voice based search experience (Kumar 2015).

5 NEW TECHNIQUES AND STRATEGIES OF SEO

The new techniques of SEO are discussed in this Chapter. This Chapter presents answers to the second research question. According to the analysis of the new trends and prediction of SEO, the latest techniques of SEO are emerged by synthesizing and refining the existing techniques. Nevertheless, the Refined techniques of SEO are also crucial to study in order to not fall behind the SEO fashion. This chapter will focus on discussing the suitable SEO solutions for the case website building.

5.1 On-Page SEO

On-page SEO refers to optimize the content and HTML code of a web page in order to gain more traffic and achieve higher rank in SERPs (SEOMoz, 2016d).

5.1.1 High-Quality Content

High quality content should supply a demand to meet users requirements, and construct with relevant topics and themes rather than accumulate by a set of bland words or phrase (Demers 2016). The page filled with with high density keywords cannot achieve high ranking any more, and probably get penalty from search engine due to the crumsy content and bad-user-experiece. (Demers 2016.) Even the weight of keyword is not as high as past, but search engines still rely on keywords to understand users' searching requirements and websites' intentions. Keywords still can somehow make affect to search ranking, especially the Long-tail keywords. (Yu 2016.) The techniques of keywords selection can help to conduct high quality content.

Anderson (2004) proposed the Long-tail theory that online service took more advantage than traditional retailers in terms of trade; a fraction of active-demand on line products could bring a massive of profits, but each of remaining less-demand products that are in a large amount could only contribute slight profits. However, the sum of the profits from those less-demand products could

be equal to or more than those active-demand products'. The Long-tail theory can also applied for keywords research. (Anderson 2004.)

Figure 9 describes the Long-tail theory. Figure 9 where the horizontal axis represents the sales volume of products or the number of clicks made by users, and the horizontal axis illustrates products or keywords. The Broad Head area represents active-demand products or keywords, and Long-tail part represents less-demand products. For example, when users start to search products, they probably search some Broad Head keywords that are popular but general such as mobile phones. However, users usually conduct searching specifically. Finally, the users might be start to narrow down their searching range to Nokia mobile phones. When customers or potential customers start to conduct specific searching, they turn to use Long-tail keywords to narrow down their targets. Using Long-tail keywords can help customers get closer to make a purchase. Likewise, Optimizing a set of Long-tail keywords for a website can facilitate more transactions. The Long-tail Keywords should be selected as the words can simplify and illuminate the business goal and intentions. (Ledford 2010.)

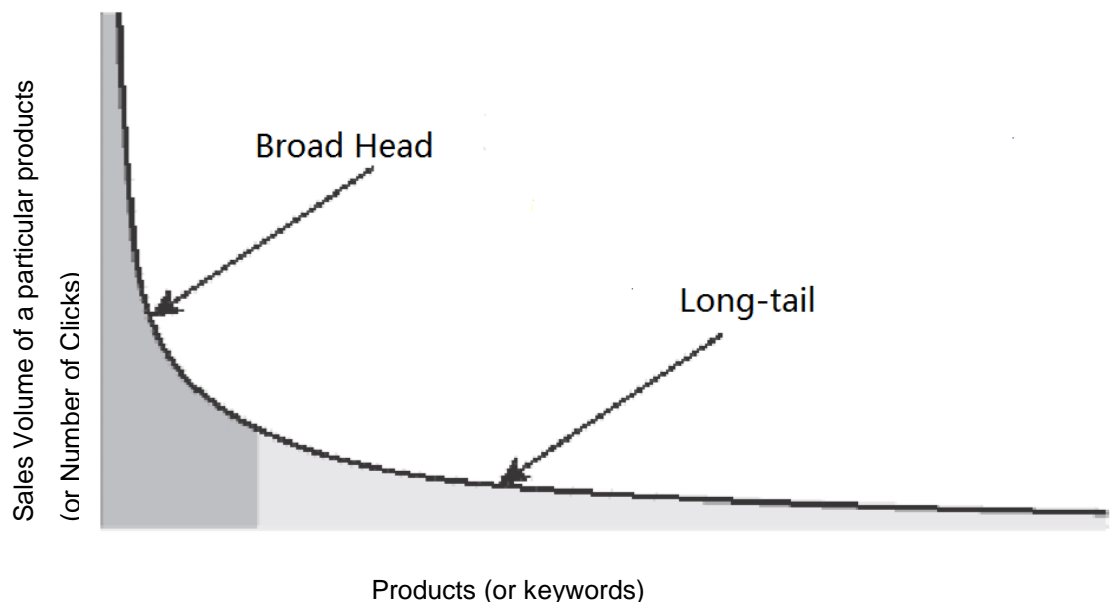


Figure 9. Long-Tail Theory (Ledford 2010)

Building high-quality content for a website should equip a well-structured architecture. Every web page should target a specific topic elaborated by a

group of explicit and relevant keywords, which can help search engines and visitors to understand the content of the page easily. The most important content or products should be found easily, which is better to put close to and link to the homepage.

The conversion rate is foremost to a web page. When a visitor lands on a particular web page and finds out their expected information or completes a purchase, the conversion of the web page is engaged. The conversion rate of a web page is higher, which means the content of the web page is more important and useful to customers. Web titles, headers and pictures can be leveraged as a useful element to prompt visitors if the web page content is relevant to their requirements. (SEOMoz 2016c.)

5.1.2 Tags

Title tags can be used to define the topic of a web page. Title tags are very important elements for SEO. Title tags should highly summarize the content of the particular page. The title tags should be no more than 60 characters. (SEOMoz 2016b.) Choosing a Long-tail keywords to write a descriptive page title, and each web pages owns a unique web title, which can help users and search engine efficiently determining if the web page is a relevant search result. For instance, using the brand name as a title tag is a good choice. (Google 2016a).

Meta tags provide machine readable metadata information of HTML page to search engines, and are used inside of the Head section. Meta tags do not appear in the web page, but exist in the web page source code. (Google 2016a.)

Keywords meta tag used to describe keywords of the particular web page. Google has given up the usage of keywords meta tag since 2012. Since plenty of webmaster used to stuff keywords into keywords meta tag to fool search engines for the purpose to reach a high search rank (Cutts 2012). Google prefers to the usage of description meta tag. Description meta tag can be used

to make a snippet as brief introduction of the web page, which is helpful to make search engine quickly understand the web page. (Cutts 2012.)

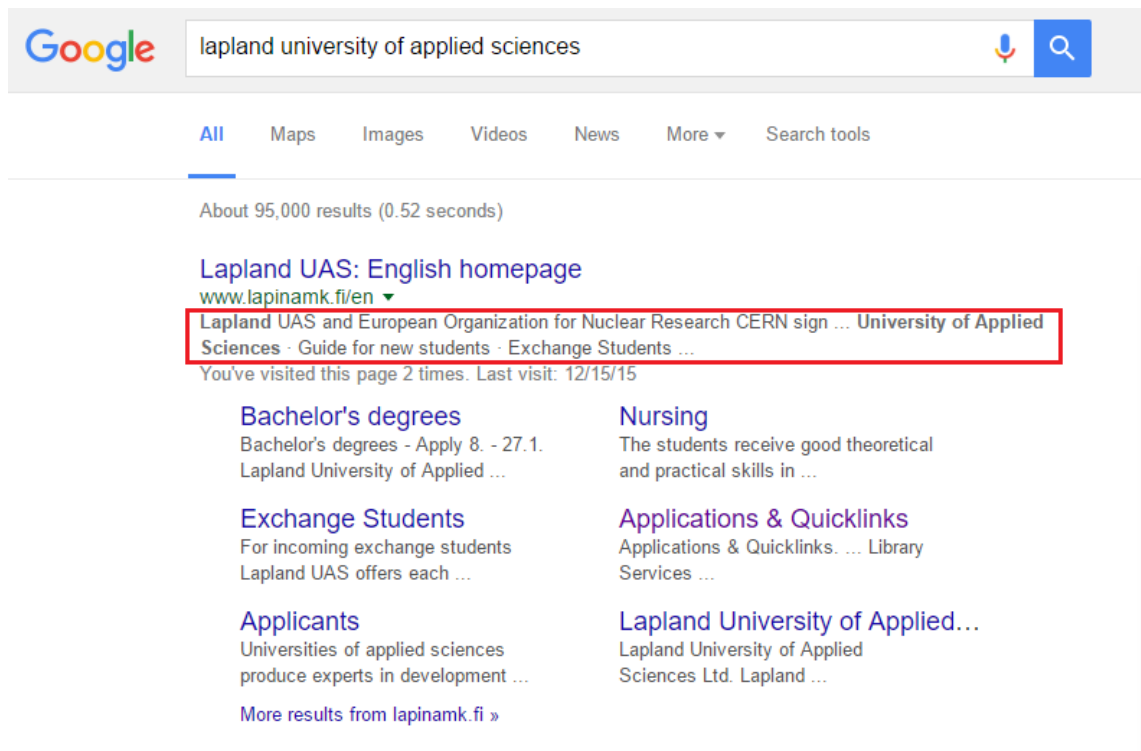


Figure 10. Example of Meta Description

Figure 10 indicates that content of Meta description appears along with the search results, which just under the website title and URL. Description meta tag is worth to use, but the content of description tag should be unique, concise and relevant information of every web page (Anderson 2016). The length of meta description should no more than 160 characters.

Google does not want to detect unscrupulous and irrelevant description tags, or find out duplicating description meta tags appeared in every web page. Google will generate snippets of the web page automatically if Google find out all the description meta tags that are not match the content of the web page. Google regards a good description meta tag as an sign of a quality page. A good description should be human-readable, which is written for users not only for search engines. (Anderson 2016.)

5.1.3 “Alt” Attributes

“alt” attribute is used to create brief text attached with image in order to annotate the image (Google 2016a). The previous study on search engine working principles articulated search engines could not identify a picture so far. However, search engines can familiarize a picture extracted from the understanding of the “alt” text attached with the picture (Google 2016a). Descriptive text can be also used near the image to deliver a better understanding of the image to users, such as “the picture above is the specialty of our restaurant”. (Google 2016a.)

```

```

Figure 11. Example of “Alt” Attributes

Figure 11 gives an example of the usage of “alt” attributes. The codes displayed in Figure 12 refers to as uploading a picture named panda.png into a web page, and using “alt” attributes. When search engines read the line of codes that displayed in Figure 12, the search engine will consider the image is relevant to panda.

5.1.4 URL

A URL, which is the fundamental network identification, designed as human-readable text to replace IP addresses on the World Wide Web. Devices such as computer and mobile can connect to the server through URL. (Indiana University 2014.) A high quality URL should be SEO-friendly as well as user-friendly. Using HTML links to replace JavaScript can make the site can be easily accessed by crawlers. The URLs should be as short as possible but also informative. The average length of URLs ranked on the top of Google SERPs is 37 characters. A short URL is easy to remember and understand for users. A URL can be used to give a meaningful description of the web page for visitors and search engines. That makes the URL informative can help visitors or search engines to deduce the relevance of current page to visitors’ search query. Putting

keywords that are relevant to the web page content is a wise choice, but the structure of the URL should not be unnatural with keywords stuffing. A good structured URL can help to increase the page conversion rate from users. (Burton 2016.)

Figure 12 illustrates when the words inside of the results URLs on Google SERP are the queried words, the words will be highlight. That make the URL easily readable for users is a essential factor to deliver a user-friendly experience.

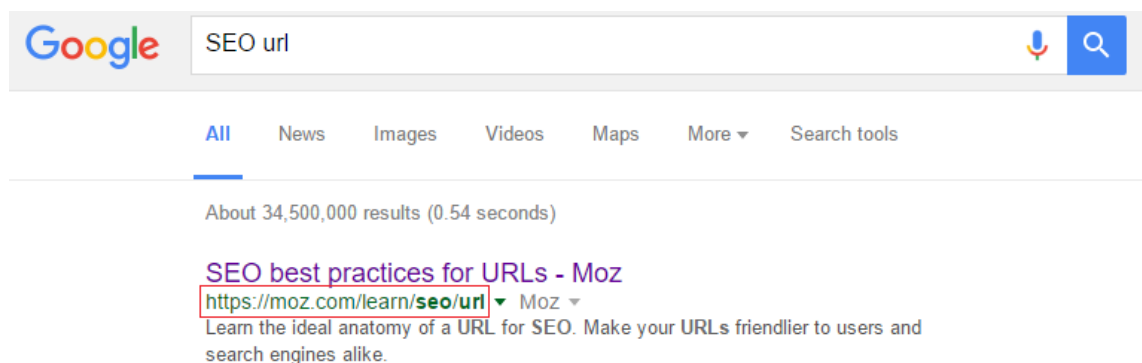


Figure 12. Keywords Inside of URL

Comparing with the URL 1 and URL 2 displayed in Table 3, URL 1 is too long. From visitors perspective, visitors barely to identify the content from URL 1, since URL 1 contains some unknow parameters. The URL 2 is concise and easily readable for visitors. Visitors can roughly surmise that the page of URL 2 is about the restaurant information of Lapland Univeristy of Applied Sciences.

Table 3. URL

URL 1	http://seek.com.au/users/apply/index.ascx?Sequence=60&PageNumber =1&JobID=10124560
URL 2	http://www.lapinamk.fi/en/Who-we-are/Contact-info/Restaurants

5.2 Mobile SEO

Since mobile searches are widespread, build a website which is mobile-friendly is necessary. A mobile-friendly website should be easy to load and respond to the screen size of diverse devices (SEOMoz 2016c).

Responsive design is a set of tools and techniques that empowers web designer to build a website that can respond to content. The emergence of web responsive design is to acquire better exhibition of web content which be able to adjust to different devices such as laptops, mobile phones, tablets and desktops. The way how a responsive website displays the content depending on the type of the device being used. (Wisniewski, 2013.)

Google recommended using responsive design for website development, since one responsive website can respond to all types of devices with only one URL. Webmasters do not need to build multiple websites to fit different devices for the same content, and the website crawlers need only crawl the responsive website once. Further, responsive website. To the users, responsive design can also improve user-experience. Especially for mobile users, they do not need to double-tap the screen or zoom in for the sake of acquiring explicit view of the web content. (Google, 2015c.)

The code displayed in Figure 13 refers to Responsive Meta Tag. Responsive Meta Tag guides web browsers to arrange the width of the web page to fit the width of different devices' screen in order to deliver a better user-experience to users. Especially, when users view a web page on a mobile-phone with small screen, they can read the web content clearly without zoom-in the page.

```
<meta name="viewport" content="width=device-width, initial-scale=1">
```

Figure 13. Example of Responsive Design Code

5.3 Local SEO

Mobile searches are mainly turns to local search. Local SEO refers to adopting a series of SEO techniques in order to enhance the visibility of local business in SERPs. The case company operates an Asian restaurant as a local business in Tampere.

Google (2014) made a study that 50% consumers conducted search intending to find local information which including store address, contact information and operation hours as well as product description. NAP, which stands for business name, address and phone number of a local business, is a strong local signal. NAP information should be displayed correctly on the website (Barby, 2015). NAP can appear in title tags, header tags, meta description and footer but without keywords stuffing, which can reinforce local SEO for the local business. Moreover, business hours, which are also an essential element for brick and mortar business, should be placed in a conspicuous position in a web page. (Barby, 2015.)

Google has changed Local Pack from seven listing to three listing since August 7th 2015. (Alpha Brand Media, 2015) Google Local Pack refers to Google local Results, and the search results display business name, address and map.

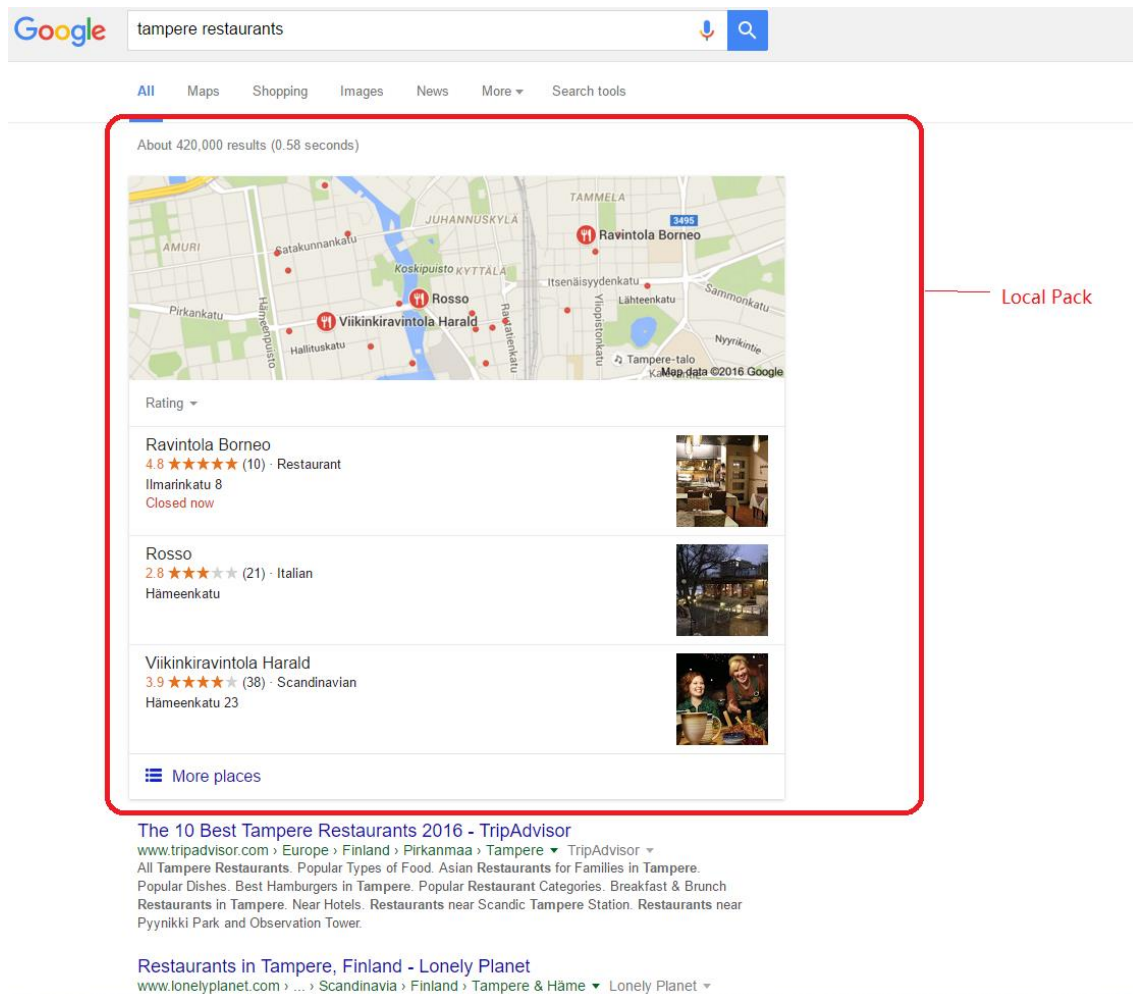


Figure 14. Example of Google Local Pack

Figure 14 above makes an example to interpret what Google Local Pack is. When researcher search Tampere restaurant, Google displays Local Pack on the top in the first SERP. There are three packs listing displaying tree different business location in Tampere. Therefore, the business can gain more exposure if the business can be seen in the local pack.

To make the local business arising in the top-three pack out from large amount of competitors is not an easy work. To claim and fill out the business information on Google My Business is eligible to make the business signals appear on Google Maps and other Google properties. The business information includes website URL, NAP, operating hours, pictures, description and business categories. Earning positive review from Google My Business page can also help for improve the rank on Local Pack. However, not only positive reviews but also negative reviews can be seen by users. The business should pay attention

on negative reviews, since bad reviews can harass the business drastically. (Google, 2016c.)

Further, highly structured and predictable data can deliver an easy organized manner to search engines. The website www.schema.org that is created by Google, Bing and Yahoo. Schema.org provides a wide range of vocabularies for the usage of information markup inside of web pages. The value of schema.org markup is to interpret what is the meaning of the text string inside of the web page to search engines. Schema.org is Not only Google but also other major search engines such as Microsoft, Yahoo and Yandex can all understand the vocabularies from Schema.org. (SEOMoz, 2016g.) Schema.org markup can be used to mark up NAP of the business in order to offer a better precise interpretation to search engines.

Figure 15 gives an example of using Schema.org markup to mark up the information of address. When web crawlers crawl to the code displayed in Figure 15, the search engine can identify the address more precisely.

```
<div itemprop="address" itemscope itemtype="http://schema.org/PostalAddress">
  <span itemprop="addressLocality">Philadelphia</span>,
  <span itemprop="addressRegion">PA</span>
</div>
```

Figure 15. Schema.org Markup for aAddress

5.4 Social Media

That integrating social media into SEO can increase brand exposure facilitates further growth with user interaction. By using social media, the business promoters can have more opportunities to communicate or interact with more customers or potential customers. Combining the techniques and strategies of organic SEO and social media can promote local business and advance local business in the SERPs. (SEOMoz 2016c.) The requirements of social media for business promotion will only gradually increase (SEOMoz, 2016f).

Web crawlers will also crawl to the social media pages, and collect information on the pages. More places mention about the brand, which is implicit linking to

the website. (Stephens, 2016.) Chapter 4.2.2 has indicated that Co-citation is helpful to lead a higher rank on SERPs. Social media can be good tools to build Co-citation for the website in order to achieve a higher rank on SERPs.

The researcher has conducted a questionnaire. The script and the report of the questionnaire is displayed in Appendice 2. The objective of the questionnaire is to investigate what are the most popular social media that people usually use. Further, the researcher intends to find out if people approve of the manner that social media can be good tools for restaurant business promotion. 68 people have joined in the survey in total. From the data analysis in the survey, Facebook ranks to the No. 1 as the most people used social media, amongst the 68 people. Instagram ranks as the second popular-used social media, and LinkedIn ranks as the third popular social media among those responders. Most of responders use social media frequently as many times per day. Most of responders consider social media as a good tool to promote restaurant business, and most of responders would like to read restaurant business news on social media. To post basic business contact information and product description on social media is necessary. Further, most of responders indicate they would like to see the business reviews and rating.

6 WEBSITE DESIGN

6.1 Requirement Analysis

Requirement analysis, also named business analysis, is a set of activities to determine and specify consumers' requirements (Maciaszek 2007, 30). For the sake of developing a keen understanding of business requirements in the interviewee's point of view, an interview is conducted between the business owner and the researcher. Consequently, system function requirements can draw from the business requirements analysis. Semi-structured interview was conducted as it allowed informant the freedom to express views in detail. The case company owner was selected as the sole interviewee since the owner was the initiator who required to build a new website for the company. The transcript of the interview is displayed in Appendix 1.

According to the restaurant owner's description, plenty of coming customers required to read food menu on the Internet. Therefore, the company's owner requested to build a website for the restaurant. Due to lack of computer skills and bustling with routine work, the boss only needed some simple functions for the website. The functions enabled to display essential information of the restaurant such as opening hours, location of the restaurant, contact information and food menu for the customers or potential customers. In addition, social signals appear on the website, which is helpful to business promotion.

6.2 Function Design

The researcher adopts Unified Modeling Language (hereinafter UML) to design the website, since UML allows to use a wide range of diagrams to specify the design. Function design within a set of interpretive diagram can offer a legible understanding of the system. The researcher utilise the use case diagram for website function requirement analysis and design. A use case diagram represents the relationship between actors and use cases, as well as other additional definitions and specifications (Maciaszek 2007, 124).

Figure 16 below introduces the use case diagram. The use case diagram contains all the function of the website. There are two main user actors who are normal users and website administrators. There are six functions designed for the website. All the users can view the basic information of the restaurant including NAP, opening hours, food menu. All the users can hang out on any different web pages within the website by clicking buttons on the navigation menu. Home page is easily accessed. Wherever users locate in the website, they can link to the home page directly by clicking a home button. All the users are able to link to relevant social media pages to interact with the restaurant business. In addition, Normal users can give feedback to the administrator through a web form, and the administrator receives the feedback through E-mail system. Only administrator can modify the web content, or send files to the web server.

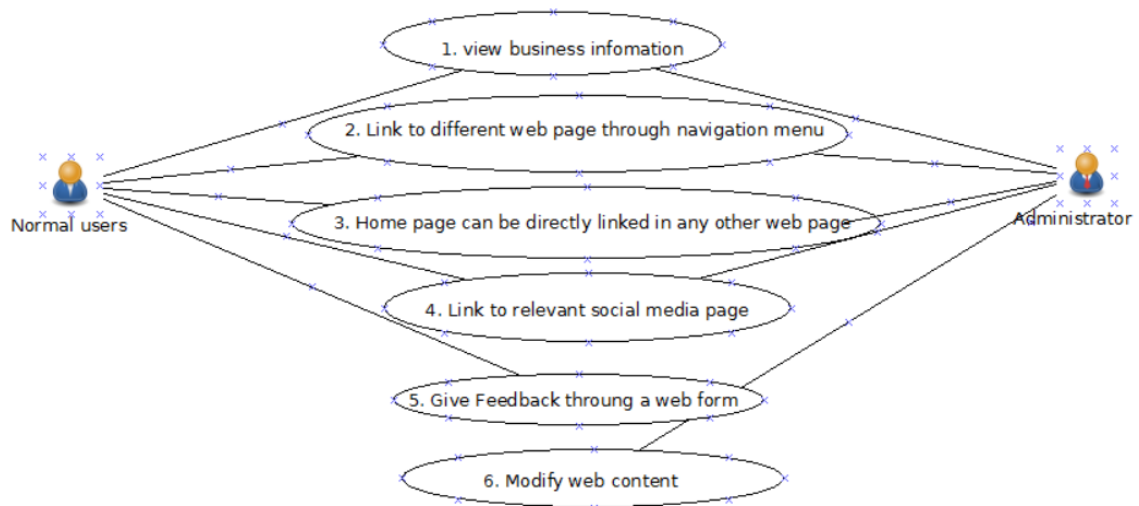


Figure 16. Use Case Diagram

6.3 User Interface Overview

The Figure 17 constructs a visual implementing of user interface of the website. There are five main sections within the website. They are home page, services, A La Cart Menu, Contact us and footer.

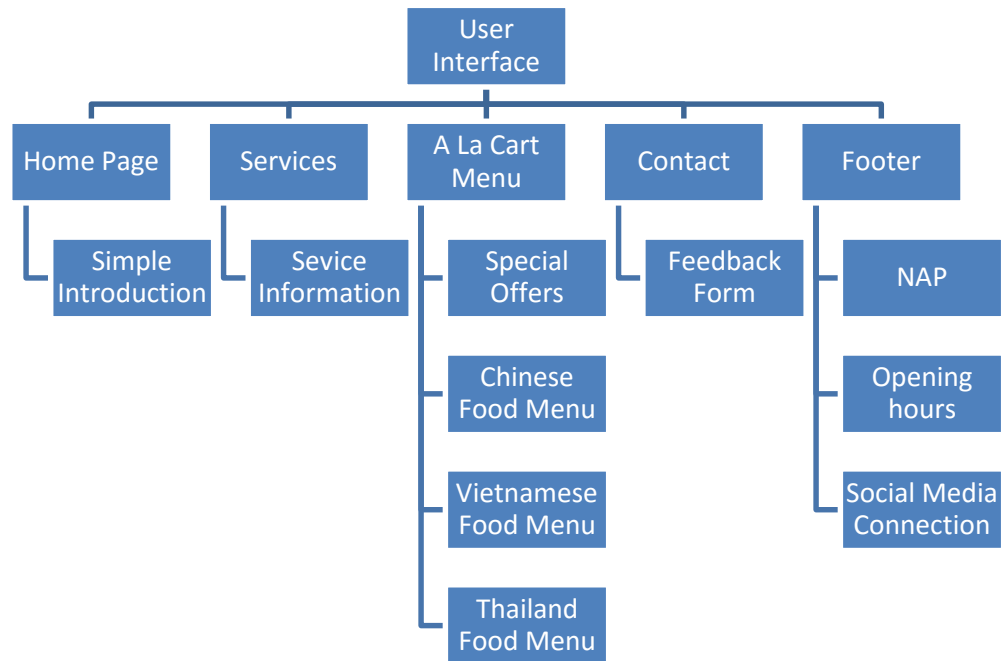
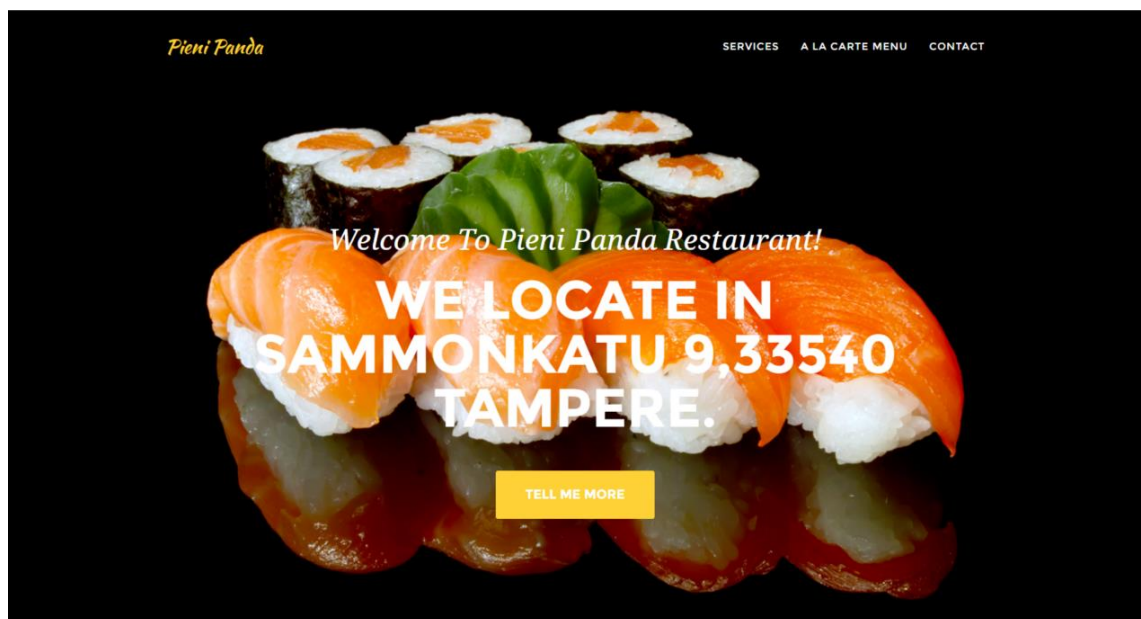


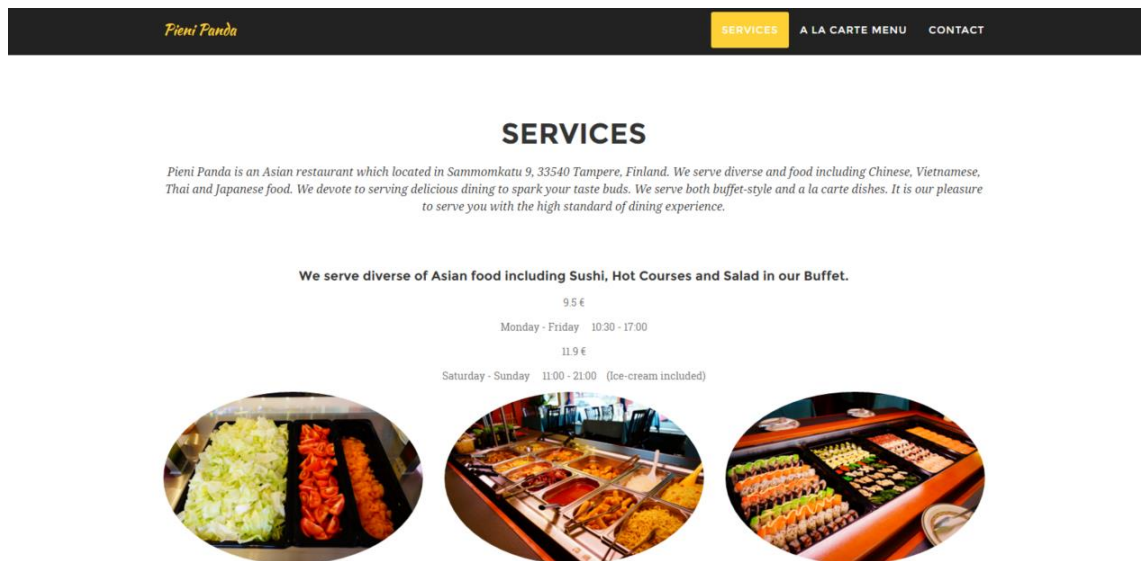
Figure 17. Structure of User Interface

Picture 1 is the layout of website's home page. Home page is a user welcome page, which only presents simple simple layout to users. The home page give a brief introduction of the Pienipanda restaurant. The website logo and navigation is exhibited in the home page. Users can link to other section by clicking the button within the navigation bar.



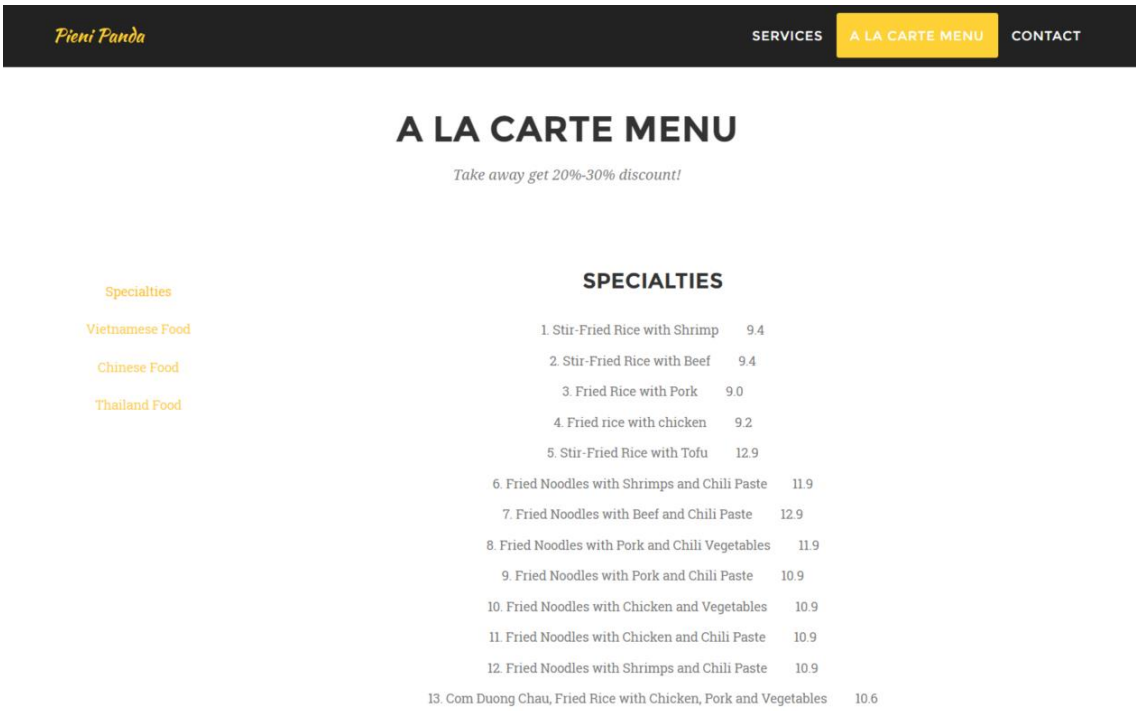
Picture 1. Home Page Layout

As picture 2 exhibits the services section of the website. The service description is provided in this section.



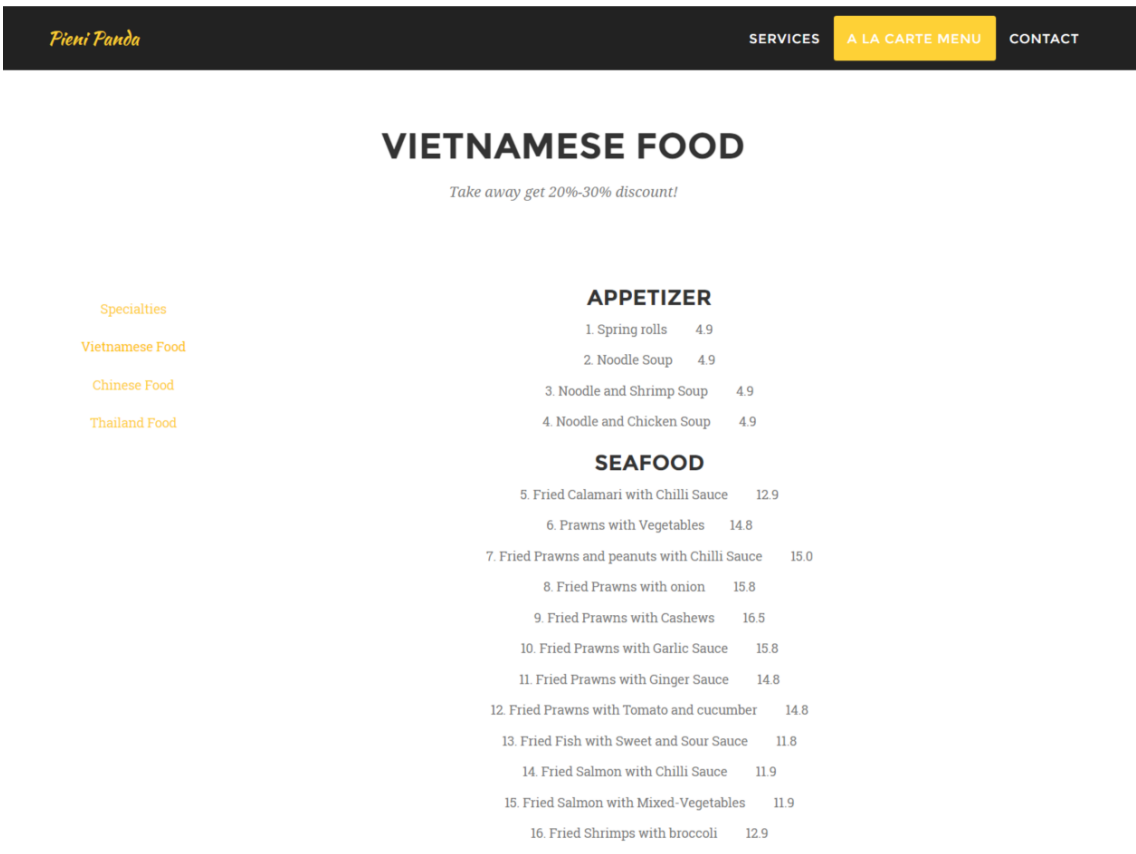
Picture 2. The Services Section Layout

Picture 3 is the layout of A La Carte Menu. The A La Carte Menu include four sub-sections, they are specialties menu, Vietnamese food, Chinese food and Thailand food menu. The food menu is displayed in this section. In this section, a side navigation bar is offered as a shortcut for users to link to different categories of food menu. The side navigation bar includes four buttons that can link to specialties menu, Vietnamese menu, Chinese menu and Thailand menu respectively.



Picture 3. A La Carte Menu Layout

The picture 4 is the layout of Vietnamese food menu. The layout construction of Chinese and Thailand food menu is same as Vietnamese food menu.






Picture 4. Vietnamese Food Menu Layout

Picture 5 is the layout of contact section of the website. Customers or potential customers can send feedback to the web administrator by filling and submitting the form within the contact section, and the web administrator can receive the feedbacks from web administrator's email-box.

Picture 5. Contact Section Layout

The picture 6 displays the layout of Footer section. The business NAP and opening hours are displayed in this section. In addition, this section also provides the links to go to relevant social media pages.

<p>LOCATION</p> <p>Sammonkatu 9,33540 Tampere, Finland</p> <p>PHONE NUMBER</p> <p>+358 (0)3 255 3304</p>	  	<p>OPENING HOURS</p> <p>Monday-Friday:10:30-21:00</p> <p>Saturday-Sunday:11:00-21:00</p>
--	---	---

Picture 6. Footer Section Layout

7 IMPLEMENTATION OF THE WEBSITE

7.1 On-Page SEO

The website's URL will be www.pienipanda.fi, since Pieni Panda is the business name of the restaurant, and this URL is easy to remember. The restaurant is located in Tampere Finland, therefore the website domain is chosen as .fi.

The figure 18 displays the content of meta description tag. The meta description tag gives an introduction of the restaurant.

```
<meta name="description" content="
Pieni Panda is an Asian restaurant which located in Tampere, Finland.
We serve diverse and food including Chinese, Vietnamese, Thai and Japanese food.
We devote to serving delicious dining to spark your taste buds.
We serve both buffet-style and a la carte dishes.
It is our pleasure to serve you with the high standard of dining experience.
">
```

Figure 18. Meta Description

Website title is Pieni Panda – A fine Asian restaurant in Sammonkatu 9, 33540 Tampere. The web title give a brief description of the restaurant. The address of the restaurant is also included in the web title.

The figure 19 displays one of the “alt” tags, the “alt” tag is used to describe the content of the picture, since the web search engines cannot understand the content of a picture.

```
</img>
```

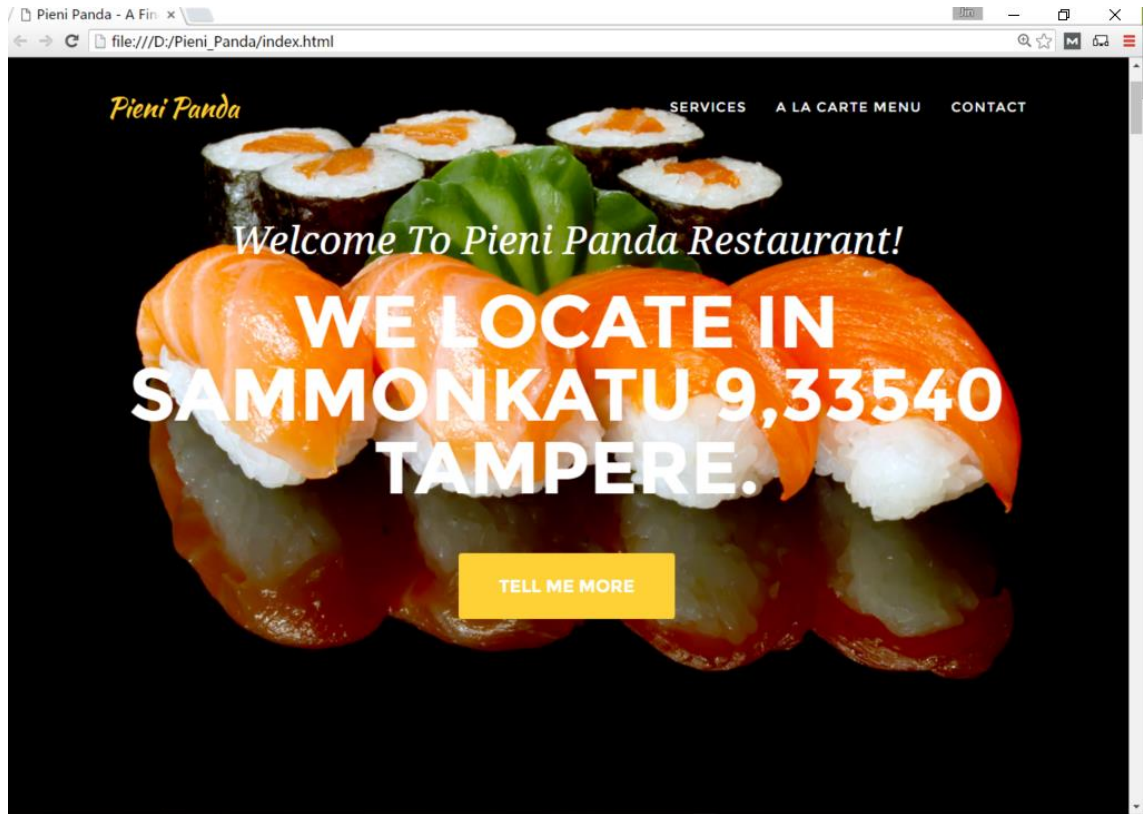
Figure 19. Example of "Alt" Tag

7.2 Mobile SEO

Responsive design is used to develop the website, since it delivers a better exhibition of web-content to mobile users. The most beneficiary of responsive design is mobile users, because the most limitation of a mobile device is the

screen size. The screen size of the mobile devices is much smaller compared with laptop or desktop's.

The picture 7 displays the layout of the home page in a laptop device, and the picture 8 displays the layout home page in a mobile device. Due to the limitation of the mobile screen size, the web page layout in mobile devices is different from other devices such as laptop and desktop.



Picture 7. The Page Layout in Laptop Device

However, as picture 8 displays, the web content can still be displayed well in mobile devices. The navigation menu is toggled in the web page layout of mobile devices in order to save space for the web content.



Picture 8. The Page Layout in Mobile Device

Figure 20 is the code of the toggled navigation menu design for achieving better content performance in mobile devices.

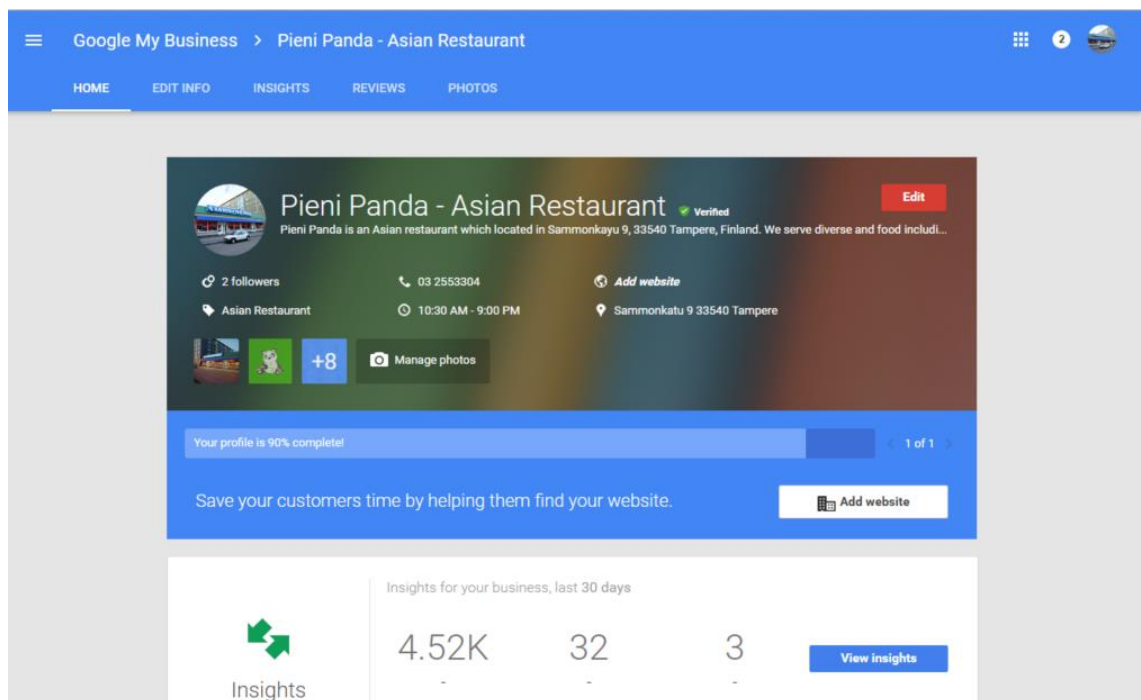
```
<!-- Navigation -->
<nav class="navbar navbar-default navbar-fixed-top">
  <div class="container">
    <!-- Brand and toggle get grouped for better mobile display -->
    <div class="navbar-header page-scroll">
      <button type="button" class="navbar-toggle" data-toggle=
        "collapse" data-target="#bs-example-navbar-collapse-1">
        <span class="sr-only">Toggle navigation</span>
        <span class="icon-bar"></span>
        <span class="icon-bar"></span>
        <span class="icon-bar"></span>
      </button>
      <a class="navbar-brand page-scroll" href="#page-top">Pieni Panda
    </a>
    </div>

    <!-- Collect the nav links, forms, and other content for toggling -->
    <div class="collapse navbar-collapse" id=
      "bs-example-navbar-collapse-1">
      <ul class="nav navbar-nav navbar-right">
```

Figure 20. Code of Toggled Navigation Menu in Mobile Devices

7.3 Local SEO

Implementing local SEO into the website development is necessary, since the case company runs a local business in Tampere. As picture 9 displays, the research has the restaurant business verified in Google My Business. Verifying a local business can help Google search engine to achieve a better understanding of the business.



Picture 9. Google My Business

The researcher has marked up the business NAP using Schema.org markup. Figure 21 displays the codes of business location and phone number marking up.

```
<div itemscope itemtype="http://schema.org/Restaurant">
  <h5 class="text-muted ">Location </h5>
  <p class="text-muted ">
    <div itemprop="address" itemscope itemtype="
      http://schema.org/PostalAddress">
      <span itemprop="streetAddress">Sammonkatu 9</span>,<span
        itemprop="postalCode">33540</span> <span itemprop="
          addressLocality">Tampere, Finland</span></div></p>
  <h5 class="text-muted ">Phone number </h5>
  <p class="text-muted "><span itemprop="telephone">+358 (0) 3
    255 3304</span> </p>
</div>
```

Figure 21. Code of Schema.org Markup

The researcher queried the Google search engine using the keywords Pieni Panda ,just after the researcher finished verifying the company's business on the Google My Page. As the figure 22 the Google search engine displays a unique section which gives a brief introduction of the case company's business including the, NAP, location on the map, pictures, opening hours and customer reviews.

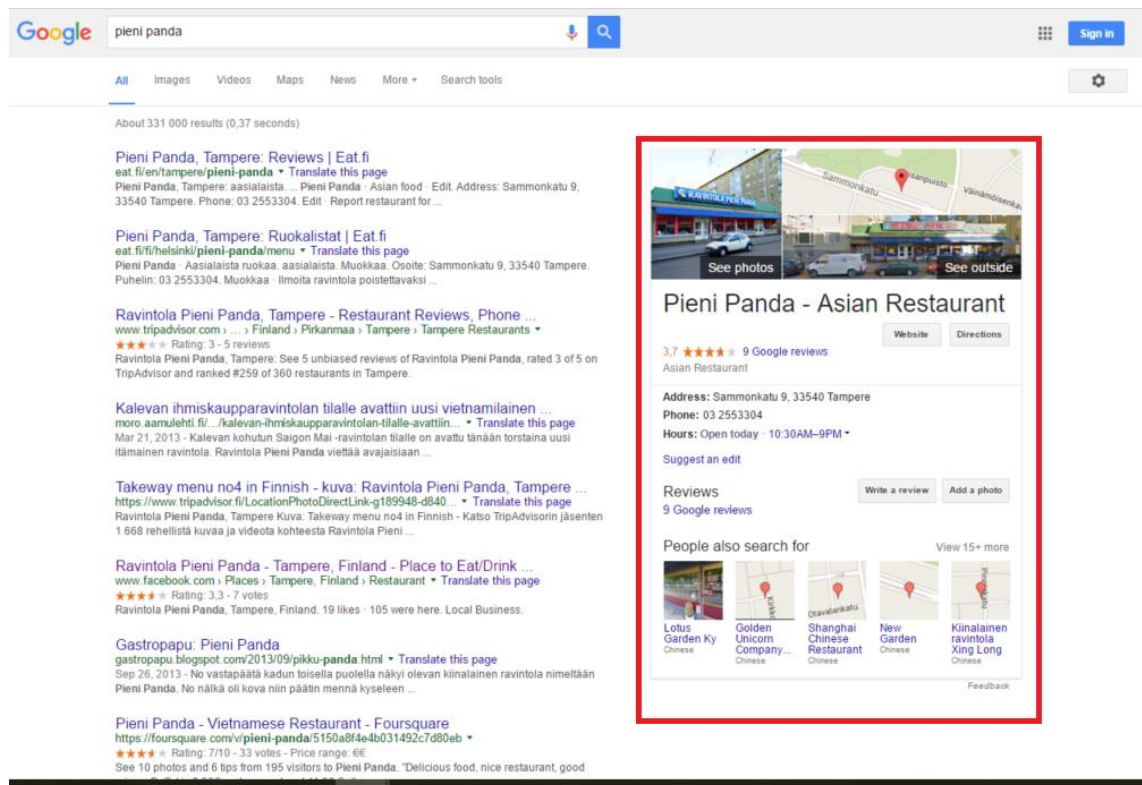
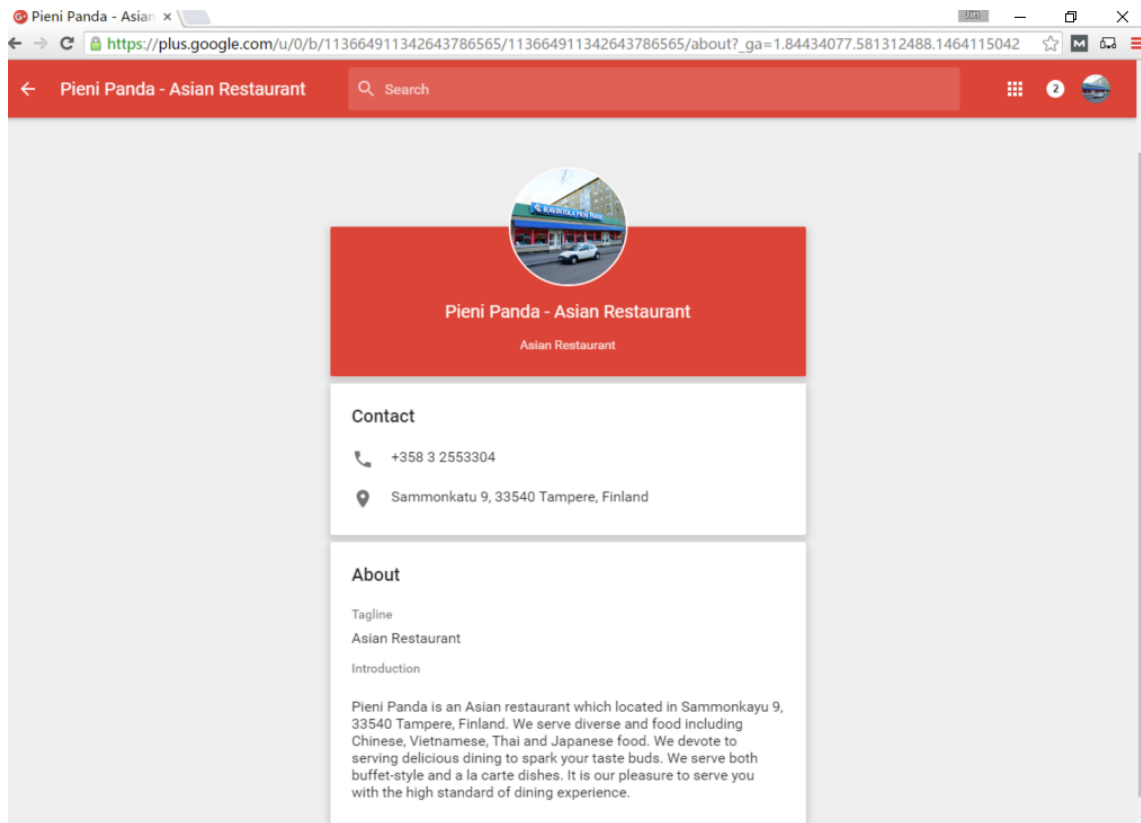


Figure 22. Google My Business Page

7.4 Social Media

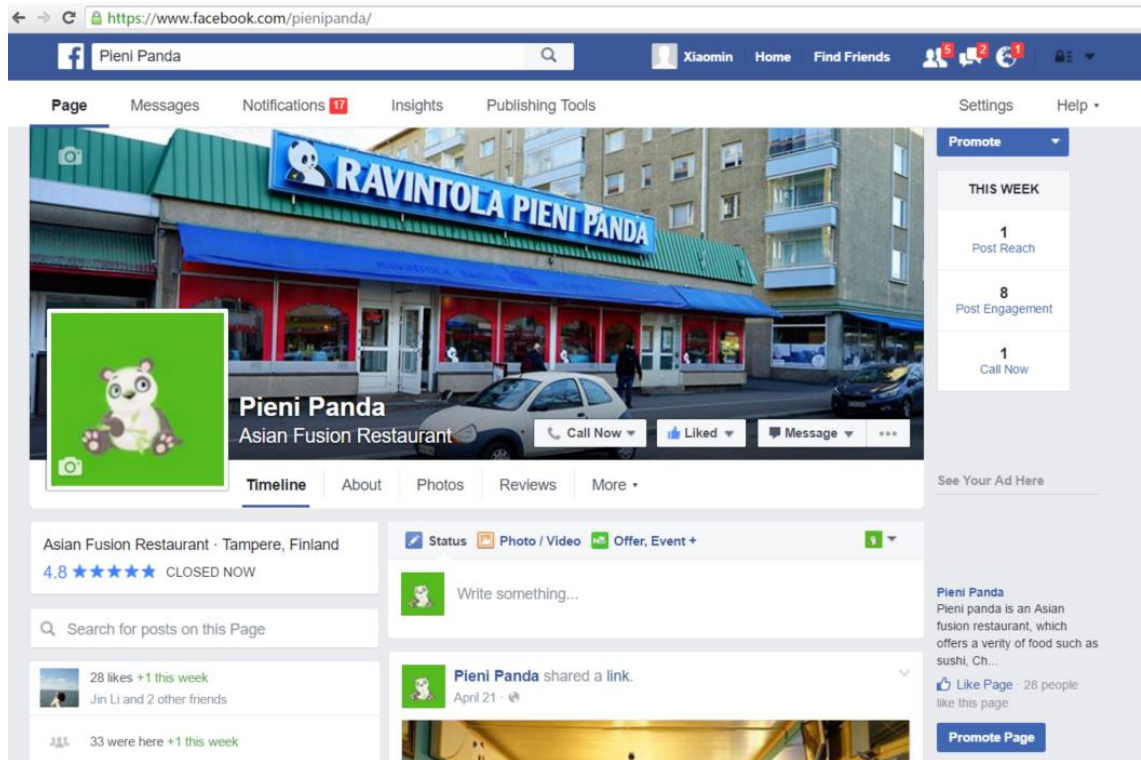
Google encourages people to create a Google+ page for their business. The researcher created a Google+ page for the restaurant, which can help the Google search engine verifies the business accurately. Picture 10 is the layout of the Google+ page.



Picture 10. The Google+ Page

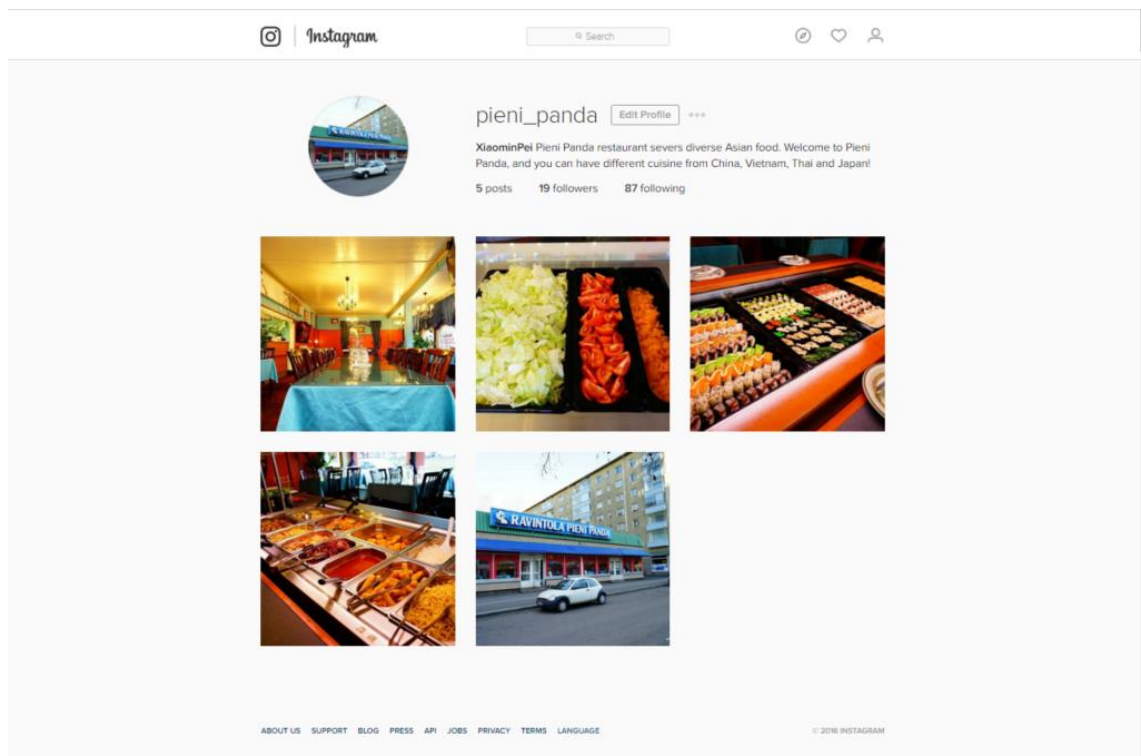
Social media is not only a tool that is helpful for SEO but also good for business promotion. Facebook and Instagram both are very popular social media. From the analysis of the questionnaire, Facebook ranks to the most popular social media among the respondents, and Instagram is the second most popular social media amongst the respondents. Therefore, the researcher also chooses Facebook and Instagram as the main social media channels to promote the business of the case company.

Picture 11 is the web page of Facebook that used to promote the local business.



Picture 11. Facebook

The researcher also created a user account in Instagram for the case company. The figure 12 is about the case company's information on Instagram.



Picture 12. Instagram

8 CONCLUSIONS

Websites can be a good tool for business promotion. Applying SEO for website-development can magnify the contribution of website to the case company's business, especially for brand image building. The objective of this thesis work was to find out the latest techniques and strategies of SEO that could be applied to the web-development for the case company. The new techniques and strategies of SEO were drawn from the analysis of new trends of SEO, and the new trends of SEO were derived from the continuous tracking to search engines.

The quality of web content is very important. The search engines can analyze the text content of websites via semantic technologies and machine learning. The web-builders should pay attention on high-quality content building, rather than keyword stuffing. The description Meta tag can give a brief description of the web content for search engine, and search engines can get a better understanding of the topic of the web content via description Meta tag. The "alt" tags can help search engine to understand a picture inside of the web page, since search engines cannot read pictures. The URL of the website should be easy to remember for customers and potential customers.

Mobile device is prevalently used by people today, and the group of mobile searchers will keep expanding. Responsive design is a wise choice for mobile SEO, since responsive design focuses on improving the mobile-users' experience. The techniques and strategies of Local SEO is necessary if the organizations or companies run a local business. Business owners can verify the local business on the Google My Business page, which can help the Google search engine to understand the business more precisely. Using schema.org vocabulary to mark up the business NAP and opening hours can notify search engines a precise information what are the business NAP and opening hours. The Social media can be a good tool for SEO, since search engines will also retrieve social media web pages. In addition, social media can also be a good tool to interact with the customers and potential customers in order to promote the business.

However, the working principles of every search engine are regarded as secrets of every search companies, and each search engine runs different search engine algorithms. This research gives a general understanding of search engines. This research proposes a series of feasible new techniques and strategies of SEO especially for local business promotion. Since the website was required to be built for a local business in Tampere, the research work also gave an additional analysis of Local SEO. The new techniques and strategies of SEO were delivered as well. SEO will not be obsolete as long as search engines are still required. Due to the development of semantic technologies and machine learning, search engines can achieve a well understanding of web content. Building a high-quality content website in a user-friendly manner is essential for SEO. Social media are not only good tools for SEO but also valuable channels for business promotion.

The website was built out for the case company. SEO is a sustained strategies, therefore the website can be noticed by search engines continuously. Moreover, the ultimate aim of SEO is to deliver a user-friendly website for users rather than build a website which only satisfies search engines. However, continuously tracking search engines' tendency is necessary, since the current popular techniques and strategies of SEO might be obsolete once search engines update a new algorithm.

Search engines were not retrieved the developed website so far, since the developed website is a brand new website. New websites usually will not be retrieved by search engines immediately. The crawlers need time to come to the website. The researcher would like to study the art of SEO continuously, and keep tracking the website by analyzing the search ranking of the website on different search engines.

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APPENDICES

Appendix 1. Interview transcript

Appendix 2. Social media questionnaire

The interview transcript with the case company owner conducted on 3 February 2016 is displayed in Appendix 1.

Interviewer: Could you describe what main business the company operates?

Interviewee: The Company runs an Asian restaurant named Pieni Panda which located in Tampere Finland. We serve diverse Asian food including Chinese, Vietnamese, Thai and Japanese.

Interviewer: Who are the mainly customers?

Interviewee: The coming customers are native residents, and most of them are regular customers. I would like to have a website, since I think that building a website for the restaurant may have the possibility to capture more customers.

Interviewer: What is the purpose that you want a website for the business?

Interviewee: Plenty of customers came and ask if they could read the menu on the Internet. Our restaurant business is just on the road, to have a website can probably attract more potential customers. The website should give brief introduction of our restaurant and display the basic information of our restaurant, such as opening hours, locations, and menu.

Interviewer: I can also make a function which can allow customers make reservation and order form the website. How do you like it?

Interviewee: Well, it sounds cool, but I am afraid I do not have enough time to manage the services on line. We only have three works in the company.

Besides, I am brainless to use computer actually. It will be fine just leave the website as it simple.

Interviewer: What do you expect to your restaurant in the future?

Interviewee: I hope my restaurant can become the most popular restaurant in Tampere, and I want to open my own restaurant chain in Finland.

Questionnaire: Social Media for Restaurant Business Usage



Business

Social Media for Restaurant Business Usage

Hi,
This questionnaire intends to investigate what are the most popular social media that can be used for restaurant business promotion.
We sincerely invite you to join our survey! Thank you for your support!

1. How old are you?

☐ <18
☐ 18-25
☐ 25-35
☐ 35-50
☐ >50

2. What are the following social media that you use? (Multiple choice)

☐ Facebook
☐ Google+
☐ Yelp
☐ Twitter
☐ Instagram
☐ LinkedIn
☐ Pinterest
☐ Others

3. How often do you use social media?

☐ Many times per day
☐ Once per day
☐ Every couple of days
☐ Seldom-used

4. Do you think that social media can be good tools to promote restaurant business?

☐ Yes
☐ No

5. Would you like to see the news of a local restaurant on the social media that you use?

☐ Yes.
☐ No. Why?

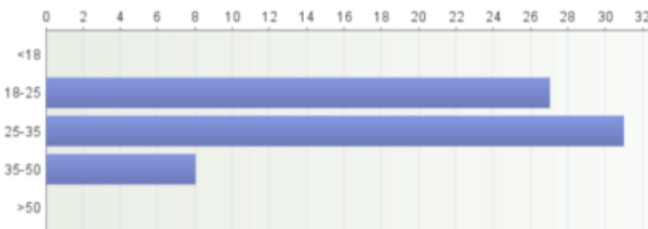
6. What kind of restaurant information do you like to read from social media?

☐ Address
☐ Phone number
☐ Business name
☐ Opening hours
☐ Food menu
☐ Special offers
☐ Others

Following is the finding results of the questionnaire.

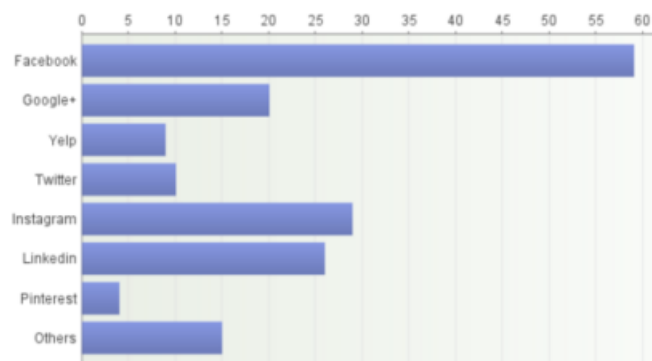
1. How old are you?

Number of respondents: 66



2. What are the following social media that you use? (Multiple choice)

Number of respondents: 68



Open text answers

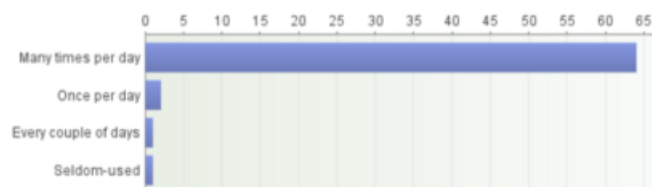
[Show all](#)

Others

- qq~
- qq
- researchgate
- Chinese social media, such as wechat moment.
- Snapchat

3. How often do you use social media?

Number of respondents: 68



4. Do you think that social media can be good tools to promote restaurant business?

Number of respondents: 67



5. Would you like to see the news of a local restaurant on the social media that you use?

Number of respondents: 67



Open text answers

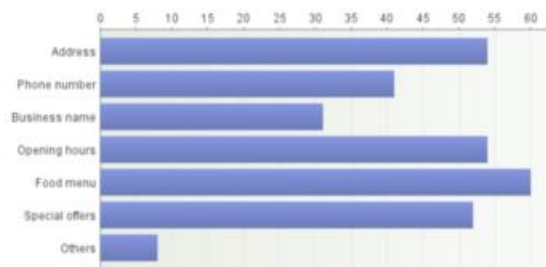
Hide

No. Why?

- It's not necessary to see the comments for choosing restaurant
- not like receive it
- it's annoying
- If the discounts count as news then yes, otherwise I didn't care
- Annoying
- I don't really care about social media, I only use Facebook and Twitter to check the school projects.
- I don't need to know the news about a restaurant, I need to know that they give good food in general.
- I do not want to see commercial ads on the social media

6. What kind of restaurant information do you like to read from social media?

Number of respondents: 67



Open text answers

Hide

Others

- Price
- coupon for discount
- Friends' introduction.
- Website
- Ratings
- Food's origin, e.g. how does the restaurant get the meat, vegetable? How was they grown?
- some friend of mine posting about the restaurant, like a picture, that "this was good food", that could convince me to go and try it out. I don't need exactly the address, I need a link to Google maps so it will make the route planning for me to the place. I need their phone number only if I order. I need to know how much the delivery cost. I need special offer only if its time for that e.g. I need "the saturday sales/offers" only on saturday.
- reviews