

# Search Engine Optimization

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**Abstract - Search Engine Optimization (SEO) is the process of restructuring a website to raise its ranking among search result for particular queries. This paper contains the Introduction to SEO and potential it has. This paper will also provide best practices that approved by most of search engines and compilation of practices discussed by practitioners of SEO.**

**Index Terms: SEO, Crawler.**

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## I. INTRODUCTION

SEO is the way we SEO) is the process of restructuring a website to raise its ranking among search result for particular queries such that intended target audience will easily find the page. This paper is basically divided into four section in first section will be discussing about how web search begins what kind of changes it went through, how search really works i.e. what happens when you type a query and click search.

Next section is completely dedicated to SEO in this will be discussing about why one should go for SEO. If you can't hire an outside agency to do the work then what kind of practices we can use to perform an in-house SEO. Further sections look into different tools that can be helpful in keeping the track of traffic and security of the webpage.

The last section closes by summarizing the paper by giving some key takeaways.

Note:- In this paper we try to follow some conventions such as we consider Google as our main search engine although all the practices discussed in this paper are applicable to all search engines.

## II. EVOLUTION OF SEARCH

Google began as research project in 1996 at Stanford University, CA, USA. This research project was develop by Larry Page and Sergey Brin to search the web as they were doing PhD at SU. Google was started on an algorithm developed by Larry and Sergey that ranks pages on web.

Initially Google has no Ads. So when Google start add advertising it was necessary that these ads should be as relevant as search result themselves. It was also very important that these Ads should be distinctive from search

results so that user will know what exactly ads and what search results are. So, there was a clear separation between ads and search results from the very beginning.

In 1999-2000 we have the search engine that works wonderfully for web pages but Google realize that as they are getting better user also growing their needs, they don't just want webpages to be search result but they want best possible information available on internet whether it is a picture or book so Google try to add Google Image. Google Image is the first one of the non-textual content search engine. As images speak thousand words it help you in describing things that can't be expressed in words such as color pink what's the best way to explain what color pink is other that Image of that color itself.

When 9/11 happens in back 2001 Google failing its user as they search for "TWIN TOWER NEW YORK" and results which showed up have nothing relevant to this sad event. This was basically because of Google crawl its index a month ago. So Google decide to add News as a specialized search as it crawl news quickly and provide multiple point of view on same story to the users.

In 2002 web is becoming richer and user actually want Google to find something if it exist on web, they don't care if it is text, video or image. So Google comes up with this notion of Universal Search where user can find any type of content at one place.

Recent addition to Google are Quick Answer which provide specific bit of information on the same search page and you need not to navigate to any other result. Like if you are looking for Cricket score it will show you on the same page or what the height of empire state building is? Now you need not to go to any page you answer will be there on same search result page. [1]

## III. HOW SEARCH WORKS

Web search engines usually follow the hypertext linking structure and crawl these link using an automated

program that is called crawler. This crawler went from one page scan its code extract hyperlinks and then fetch them, read the code of these fetch pages and again apply the same process to all the hyperlinks on these pages. Exclusions can be made by the use of robots.txt. These hyperlinks and contents of these fetched page then be analyzed and indexed (for example, words can be find out form headings, alternate text of hyperlink, titles of html page, content of page, meta-tags, geo-tags). Information of web pages is organized and stored in an inverted index for future use. A query is text submit by the user can be a single or multi-word phrase. Indexing has many advantages the major one is it speeds up the response time of search engine. Many search engines uses different strategy for what to store or not about webpages, Google stores complete or partial source page as well as all the Meta data for web pages whereas search engines such as AltaVista, index each word of web pages. As web is very dynamic and things changes within seconds, Search engine uses the data or webpages it indexed, sometimes when we search some phrase its text might be present in the cached or indexed page version that present in repository of search engine but webpage content might have changed, so the result is always based on index of search engine. User mostly want the search text is prefer to be present on search result page. [2]

When user fires a query to a search engine (in form of text) , the search engine uses and analyze its index and generate search result listing according to algorithm they follow, each search result contains an link, title of page and some part of web page text (usually contain search text). The index is a form of table of content that will hold the information with position of occurrence of a word on what all documents. As around 2007 the Google.com search engine has facility for search by date by clicking 'Show search tools' in the leftmost column of the initial search results page, and then selecting the desired date range. Some search engines allow its user to use Boolean operators such as AND, OR and NOT among words in search query text. Boolean operators are for exact match searches that provide facility to users to add more search terms in their search queries and search engine looks for operator and produce results depending if user want both or all terms to be present, some terms to be excluded or other combinations. Many of search engine has an advance feature called proximity search that will facilitates user to provide how many words they allow between any two particular keywords. Concept Based search allow the use of statistical analysis of pages user looking for. Natural Language search allow users to ask

questions in written form as one ask to another human. Humans are tend to query search engines in natural language quite often as it help them to have a feel of asking the query to another human.

The Efficiency of a search engine depends on the how much relevant results it produce to users. There will millions of web pages, documents, textual material available on internet that contain a particular word or phrase say there will be millions of webpages on query 'Taj Mahal' available on net the search engine duty is to provide the list in which best suited webpages should appear on top then follows. Most internet searchers utilize techniques to rank the outcomes to give the "best" results first. How a web crawler chooses which pages are the best matches, and what arrange the outcomes ought to be appeared in, differs broadly starting with one motor then onto the next. The strategies additionally change after some time as Web use changes and new systems advance. There are two fundamental sorts of internet searcher that have advanced: one is an arrangement of predefined and progressively requested catchphrases that people have modified broadly. The other is a framework that produces an "upset file" by investigating writings it finds. This first shape depends considerably more intensely on the PC itself to do the main part of the work.

Most web crawlers are business wanders upheld by publicizing income and, subsequently, some utilize the act of permitting sponsors to pay cash to have their postings positioned higher in indexed lists. Those internet searchers which don't acknowledge cash for their web search tool results profit by running pursuit related advertisements close by the consistent web crawler results. The web indexes profit each time somebody taps on one of these advertisements. [3]

#### **IV. SEARCH RESULTS**

A search engine results Page (SERP), the page that is generated by search engine that contains list of relevant documents or web pages that matches the user query in order of relevance, the most relevant on top then follows. Each result in this SERP contains three information, firstly title of page, second link to that page and third a short text from that page that contain portion of matched keywords in it from search query text. A SERP is page that contains all the links of the relevant documents with respect to a query or all the link relevant to search query. [5]

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**Figure 1**

Search results usually contains two components:

**A. Organic SERP listings:** This is the natural SERP produce by search engine. Word “natural” here signifies that results are depend on internal metrics and algorithm of search engine. The pages that score well in these metrics and algorithm will become the part of SERP listing.

**B. “Paid” Search, Adwords listings:** These are results that are paid or sponsor they appear on SERP listing because they are relevant but list high on result in separate section. To differentiate them from other results search engine usually either show them in separate section or use different color theme or both. [2]

**V. DEFINING SEO**

This section will be providing you with definitions of SEO that will help us in understanding it in a more proper way. These definitions are handpicked from different source so they give multiple points of view about SEO.

Search engine optimization (SEO) is the process of enhancing the position of a website or a web page in search results naturally. Word "naturally" here signifies that this process of SEO will suggest some alteration in the web pages so they will be rank up among the search result, such methods are un-paid therefore often called “natural”, “organic”, “algorithmic”.

SEO will try to bring up the rank so that intended audience or user can easily reach the page. More frequently the site visited by users search engine

continuous to increase its rank. SEO is not limited to textual searches, it also involve image search, academic search, video search, local search and other form of searches.

SEO in simple words is the altering of website in order to increase its ranking in search results for a particular set of keywords.

**VI. SEO ADVANTAGE**

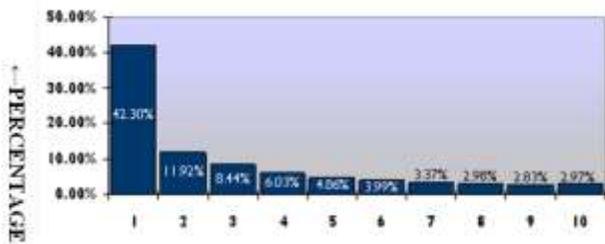
There are many arguments that can prove that unpaid SEO technique will boost the traffic to your site and many of visitors will be retain by the site.

**A. SEO increase profits and traffic**

This is simple math: If you use a paid SEO then you need pay these search site each user visit your site through their search engine. For example if you pay them Rs. 12 to search engine and you have around 54 visitors per day then you are supposed to pay Rs. 648 to the search engine per day and let us scale to an year then Rs. 2,36,520 per year. To have high rank organically is just a onetime investment that will restructure your site and you will need not to pay recurrently to anyone like in Pay per Click. Nowadays, you need to pay more per click as days were gown when you are supposed to pay 10 or 12 rupees per click, 100-120 rupees per click has become the common trend. Adding more to this major search engines charges more for competitive keywords. Surveys has proved most of the clicks to sponsor or paid sections are false and you need to pay but no visits. Competitors use a JavaScript to exploit you very easily by creating false clicks.

**B. No extra work**

You can track traffic every day that comes to your site if you use Pay Per Click (PPC). You need to made modification to your account everyday as like adding new keywords that are more trending, removing those that bring no visitors, modifying couple of existing keywords so they be more effective, changing Ads so they remain catchy. PPC needs ample amount of extra work because you might lose money rather say waste it if you don't keep an eye on traffic and its behavior. Similarly, with other strategies that use paid or sponsor SEO to increase traffic. Free traffic can only be gestate through organic SEO. With SEO, no need to keep a watch on traffic all time its do the stuff automatically, so you can create strategy for marketing or user retention in this time.



**Figure 2**

*Shows how click probability decrease with increasing result pages*

**C. Organic results are true results**

Surveys and report shown that people have tendency to trust results that are grown organically more than paid or sponsor results. It is a known fact that search engines get their bread and butter from paid ads.

Organic traffic is best as it require lesser effort and there is greater trust in organic results of a conventional user. Figure 2 will depicts that rank of a page in SERPs is directly proportional to their rank. Higher rank or being no. 1 will raise your 40% chances of being click and get a visit. [6]

**VII. SEO BASICS & BEST PRACTICES[7]**

SEO requires a few modifications so that website can be more crawl-able, these changes will help search engine to easily understand your page.

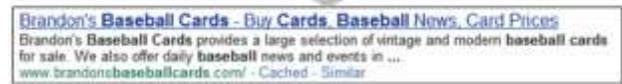
**A. Create unique, accurate page titles**

A title tag is the face of a web page it informs both users and search engines what is page is all about. Commonly the HTML document contains <head> tag which have the <title> tag. It is advisable that creator should have different titles in his mind for each page for its site.

```
<html>
<head>
<title>Business Bondings</title>
<meta name="description" content="Business Bonding a consultancy firm that will provide its services to hospitality industry, leather industry across city of Agra and expanding its network among western UP.">
</head>
<body>
```

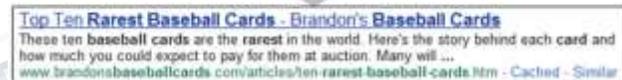
**Figure 3**

*Figure 3 shows the title of the index page for consultancy firm site, title shows the firm name.*



**Figure 4**

*When a user fires the query their result snippet as shown has title first and all the matched terms of title and user query terms appear in bold*



**Figure 5**

*When a user fires the query a more relevant and navigated page appears as this page suits the query more rather than homepage of web site shown in Figure 4*

Title should describe the content of page accurately. Avoid using a title which is of no relevance with content of the page and "Untitled" or "New Page 1" such default or vague titles should not be used. Try to a lot unique and new tags for title of each page. Avoid providing similar tags to multiple of group of pages as this will not be inform search engine clearly as how these pages are different from each other. Use brief, but descriptive titles. Titles can be both composed and indicative. If page title is too long, Google will crop and show a small portion of it in its search results.

**B. Make use of the “description” meta tag**

Search engines get an abstract about the page using meta tag. Page description meta tag can be of few words or phrase or can be as long as a sentence or two. Some content analysis tools available in market that will help you in finding whether the text have been used for meta tag is of appropriate length or not. The <head> tag is the place which usually contain description meta tag of your HTML document similar to <title> tags.

```
<html>
<head>
<title>Business Bondings</title>
<meta name="description" content="Business Bonding a consultancy firm that will provide its services to hospitality industry, leather industry across city of Agra and expanding its network among western UP.">
</head>
<body>
```

**Figure 6**

*Description meta tag shows the brief introduction about the site content and what user might see if he/she further visit the site.*



**Figure 7**

*When a user fires a query as per query demands a web site homepage appears as a result snippet, one can observe that description meta tag content is display as part of snippet*

**C. Improve the structure of your URLs**

Easy to Remember URLs are better than long URLs that cannot be remember for long. Creating tags and filenames, folders not only help search engine to crawl your site easily and also help you to keep your site better organize. Short and easy to get URLs help other content writers and coders to create link to your page. Users and

readers cannot remember very lengthy and mysterious URLs but URLs contain few recognizable words are easy to understand.

Search results contain URLs, shown with each document in the search result listings with document title and snippet. Words in URLs that matches the search query will appear in bold. Search engines have develop the technology that are good in crawling all kind of complex and simple URLs, but it is better to keep your URL as simple as you can for both users and search engine.

**D. Offer Good Content and Services**

Your website rank is largely depends upon how much you referenced by other websites say if some blogger read one of the webpage of your site and then like the content , now he discuss and create a hyperlink to your webpage is an referencing such links to your site from other websites are crucial in raising your site rank. This can only be possible if you offer great content. The Google AdWords Keyword Tool may suggest you what all relevant keywords are on your site and in what frequency they appear. No other factor will influence the website rank more than compelling and creative content. Content is King is true. Users direct other users when they see and find know good content. This could be through blog posts, social media services, email, forums, or other means. Quality content bring word of mouth publicity and referencing.

**Write easy-to-read text**

Users will enjoy the content if it is well written and easy to grasp. Text should have fluidity, without spelling mistakes, images should not contain text because search engine can't read text from images.

**Keep organized your content**

Content should be organized in such a way that user have clear vision where an topic begins and where it ends. This can be done by breaking the content in logical chunks, it also help user to find the content they want faster. Never forget to place subheadings, layout separation. Never dumping large amounts of text on varying topics onto a page without paragraph.

**Create updated, different content**

New content and updated will help you retain your user and will also get you more new users. Avoid duplicate or near duplicate content as it only bring irritation to users and readers.

**Create content for your readers, not crawlers** Your website should be designed keeping user needs in mind rather than search engine solely, this does not advise to neglect or ignore the needs of search engine but keep a balance between both as they both are crucial to you.

Never add many random keywords keeping search engines in mind as they are annoying or nonsensical to users as paragraph of text like "frequent synonyms, misspellings to divert user" this will create no value and be irritating for users Try to hide content from users, but make it available search engines.

#### **E. Anchor text should be meaningful**

##### **Use Appropriate Anchor Text**

Whenever we use the anchor tag `<a href="..."></a>` we write the text in between these tags so that reader might get the idea of what will be the content it linked to. This text is some information about the page this link is and help Search engines and users with this information. These links are of two types they might be internal i.e. linking to some page of our site or external i.e. linking to some page outside of the current site. In both the case suitable anchor text helps both users and search engine in navigation.



**Figure 8**

**The anchor text shown in above figure correctly describing the link page content.**

##### **Choose indicative text**

The anchor text should be descriptive so it will provide readers an idea that what might be the page contain that is link to this link. Never use text such as "click me", "link" and "new page" as this add no value to what is on the other side.

##### **Create short text**

Anchor text should be short and descriptive it should be few words of length to a short phrase. Never use lengthy anchor text as sentences or paragraphs.

##### **Links format should be easy to spot**

Use color scheme as they can differentiate among anchor text and other text. It should not be the case that link be miss by the user or he or she accidentally clicks it. Never use CSS or style scheme that makes it difficult to

differentiate links and regular text or make links look like regular text.

##### **Internal Links too deserve anchor text**

Pay some attention to internal links anchor text as it will help Google or other search engine to navigate your site better. One should never forget internal links while dealing with outside website links. Never use lengthy text as it is of no use and avoid creating unnecessary links as this complicate the navigation of your site.

##### **F. Use images efficiently**

"alt" tag of HTML contain image related information.

Images are useful for any site as they express more than any textual matter can. There is a popular say that image speaks 1000 words. One should use different filenames for each image and should take full advantage of "alt" tag as this will provide you a facility to display a text alternatively when or while image is loading or cannot be loaded for some reason. If a user has slow connection then while image was loading it is the text in this alt tag will be display to user. If browser of any user does not support images then also alt is helpful. Images should not be used for navigation although you can use them but they provide less information about navigation so generally it should be avoided to use image for navigation internally to your site or to any outside website.

Alt tags text and image filename add a lot of meaning for projects such as Google Image because they are truly understand the content of image by this meta data.

##### **Use concise filenames, alt text**

Filenames and alt text supposed to be short and descriptive as they provide all the information to crawler for what they intent. Never use common names for images such as "image1.jpg", "pic.gif", "1.jpg", these file name provide no value to crawling process of search engine as they act as black box for crawler, instead if we provide meaningful name to file then crawler has the information what this file might be about, although never add unnecessary text or keywords or copying and pasting entire sentences for alt text.

##### **Provide alt text while image is used as link**

Whenever we use image as link it is advisable to provide alt text this will inform search engine crawlers what the linked page is about, this is very helpful if search engine uses focus crawling. Don't use long and descriptive alt text for images as they will difficult for crawlers to understand, it is advisable not to use images a lot for your

site navigation as this will consume lot of bandwidth of users.

### **G. Cautious while using heading tags**

#### **To highlight important text use heading tags**

Heading tags (not to be confused with the <head> HTML tag or HTTP headers) are used to present structure on the page to users. There are six sizes of heading tags, beginning with <h1>, the most important, and ending with <h6>, the least important.

Never use heading tags for text that not provide any structure to the content of page. The overuse of heading tags will also make the page full of headings. Heading tags can be avoided by use of other appropriate tags as <strong> to make text bold or <em> this tag is also use to emphasize the text or highlight it.

Make use of heading tags very judiciously. Using heading tags a lot will not only confuse the readers about ending and beginning of topic but also make the content over crowded. [7]

```

<head>
<body>
<h1>Business Bondings</h1>
<h2>Consultancy Firm in Old Barn</h2>
<p>A Leather consultancy firm in Old Barn near new Boston Industry people are hopeful
as it give new opportunity.</p>

```

**Figure 9**

**If your webpage contains multiple headings then use h1 for main heading and h2 for subheadings**

### **VIII. TOOLS**

This section will throw some light on some of the available tools that will be of real help in optimizing the website.

#### **A. Google Keywords**

Google Keywords or Google Insights are some of the freely available tools on internet provided by Google Inc. These tools will help us in finding the keywords that one should include in content, title, headings. This tool suggest us what kind a query or keyword user may type while he or she looking for your website such as if you sell electronics good such as pen drives then user may type pen drive, Flash Drive, USB stick, 32 gb stick and many more all such possible suggestion and related query will be shown.

Other than these it will also show what kind of geographical region user are writing what kind of query or frequent used keyword in that geographic area. [9]

#### **B. Google Webmaster**

This tool is quite helpful as it provide us with all the metrics that you need to measure your success. Webmaster will provide information such as how much your website is readable or crawl-able by Google, What pages are visited more, from which geographic region you getting most visits. This all information is helpful in deciding which content user want and reading, what pages we should concentrate more and many more.

This tools is a must for every website owner as this tool features as notification email will be generated if someone try to hack your site or Try to install a Malware. [8]

### **IX. SUMMARY**

In last this paper will be discussing some key takeaway points which will help you whenever you want to perform in house SEO.

Use images but not images of text, Try to keep your Content Management System up to date, Malware should not be at your site. Content must be updated, original and fresh. Promote your site via Blog, Social Media.

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#### **XI. FURTHER READING**

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