FACTORS AFFECTING WEBSITE SPEED AND PERFORMANCE

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Abstract

This paper mainly discusses about the factors that affect the website performance as well as the page speed. The developers mainly think of giving better look to the website so that they think it might attract many users towards their website in this process they include large files and images and forget to follow some metrics which affect the website speed and also load time. The main thing that attracts the users is the speed of the website not the looks of the website.

Keywords – Website speed, Large-files, CDN, HTML, CSS, Page-Weight.

1.INTRODUCTION

E-commerce is one of the most efficient ways of buying and selling of goods or services electronically on the internet. Various other types of online activities like auctions, ticketing and banking can also be accomplished using e-commerce. It is the essential part of many businesses that rely on the sale of physical products or services online. Digitally enabled transactions include all transactions meditated by digital technology and platform, that is, transactions that occur over the internet and the web.

There are different types of e-commerce.

- Business-to-consumer (B2C): It is the most common kind of e-commerce. When shoppers buy something from an online store, they are involved in this e-commerce.
- Business-to-consumer (B2B): It is when businesses sell raw goods or parts through E-commerce to other companies that will then use those materials to create their own products.
- Consumer-to-consumer (C2C): It is when consumers sell to other consumers. Some of the examples are eBay and Craigslist etc.
- Consumer-to-business (C2B): It is when consumers sell their products or services to businesses.
- Business-to-administration (B2A): It refers to transactions between businesses and public administration, which includes areas such as social security, employment and legal.
- Consumer-to-administration (C2A): It refers to transactions between consumers and public administration, where consumers pay for services like taxes and legal document preparation.

2.Importance of E-commerce

The main goal to E-commerce website is to increase the sales of a particular product and also increasing the popularity among users. Now-a-days in the global market E-commerce is the main component for a business strategy and also it is main for the expansion of the business, as E-commerce helps to gain customers around the globe. The trend that accelerated digitalization of the economy, by spreading the importance of E-commerce and also many people now-a-days are moving towards online shopping which is at their comfort and this trend will continue and in the near future at-least 95% of customers will shift to online shopping. With the introduction of these E-commerce sites startups and small-sized enterprise are directly competing with large companies like amazon. With the increase in online customers from past 2 to 3 years the companies are forced to adapt new technologies so that they can provide seamless user experience and good service to the customers. E-commerce played an important role while COVID-19 pandemic where people used to order their daily routine stuff from comfort of their home.

3.Influencing end users
- Use age-old pyramid methodology

Many sectors deploy a channel route to market: automotive, IT, retail, estate agents to call but a couple of. By giving your channels relevant social media content to publish on your behalf, you'll propagate your messaging and proliferate its delivery via multiple sources.
- Deliver content of value

Since channel partners often don't have the resources to get social media content, they could just bite your arm off for a daily and relevant stream of content - be it news items, customer case studies, new solutions, whitepapers, etc., that's pre-targeted to their audience.

4.Key factors for an efficient response

The term "end users" refers to one who buys an item or service. In order to create a product and make it successful, the team which create, develop, test and market it must think on the behalf of the end users not of their own needs, when one thinks on the behalf of end user, we get to known needs of them and we will be able to create a successful product.

Creating user friendly products: By doing this we will have a great chance of making the product successful right from the start. The landing page of the website must be attractive and encourage the customer to click on the product and purchase the product that they are looking for. The description of the product or the category in which the product must be self-explanatory and should be divided into sub-categories so the customers can understand easily and quickly find the product that they are looking for.

Call to Action: This means leading customers through the site with calls to action and you are specific to what you want them to do. For example, if you have a sale, your call to action must be "Click Here to Save 30%!" it may be common to you and most of the users, but there is still a lot of users who do not known that the sale is going on who to let them known about the sale and attract them towards the site.

Images and Description: There are drawbacks as well for the online sites because one cannot see the physical device or touch the devices that they are searching for. So, it is important to have quality images of the product and also images from all possible angles to give a feeling to the user that the product he is looking for is real.

Compatibility of the site: Now-a-days every house has at-least 2-3 mobiles phones and every adult is using a mobile phone so number of users visiting from mobile will increase so it is important for the website to be compatible so that it provides the same experience as in the desktop.

5.RELATED STUDY
- **Adams M (2013):** In this the author has discussed about the page metric according to google which help us to increase the page speed and also mentioned some techniques to improve the website performance such as Minify java-script, Remove Unused CSS, Caching of the website. [1]

- **P.Bringula (2015):** The author has mentioned 4 factors that affect the website speed like website data size, data buffering in the website not only the factors the author has also mentioned about the tools that help us to check the website speed such as ping-doom and GT-Metrix. [2]

- **Vince Baker (2016):** In this blog the author has discussed about the Website loading time he has mentioned that every website today loads within 2 seconds and mentioned the factors that might slow down the website loading time. The key factors are Including many plugins, using heavy Themes. He also included about some website data and what makes them to load faster. [3]

- **Robert Gibb (2016):** The author has discussed about the Page load time he has defined what the page loading time means and he has also addressed about the issues that may affect the page loading time and mentioned some tools and measures to increase the page load time. [4]

- **Eric Sachs (2017):** Here the author mentioned about the general load time which would attract the users and also mentioned the techniques that slow the website speed and mentioned to use Page speed insight tool to check the page speed and the key factors that the author mentioned are Internet speed at the user's end, Pc performance of the user, version of the browser that the user is currently using.[5]

- **Vitaliy Kolos (2017):** The author has discussed about the parameters that affect the web-page speed the key parameters are Online ads, Including many plugins, Absence of CDN and mentioned that by avoiding these mistakes can speed the website and mentioned about the size of online and there threshold how they need to be.[6]

- **Hazel Raoult (2018):** The author has proposed 5 factors that slows the website speed. The key factors that the author mentioned are Blocking of resources, Image optimization and Heavy Theme. [7]

- **William Craig (2018):** The author has proposed top 10 techniques which help us to increase the website performance and loading time of the website. The key techniques are Optimization of content, Http requests, Number of redirects in the website. [8]

- **Catherina Garcia (2018):** Here the author has discussed about the factors that are affecting the word-press loading time he has mentioned some factors like Hotlinking, Cache Plugin and including images and files of large size is decreasing the speed of the website and has discussed how to increase the page speed. [9]

- **Jayanth K V (2019):** The author has mentioned about the factors that are affecting the website speed and he also proposed some strategies to optimize the website and has also proposed two simple approaches that would increase the website speed. [10]

- **Rahul Krishnan (2020):** The author has discussed about the factors that are affecting the website performance. The key factors are Location of server, Number of Hits, Unknown Malware and included that by avoiding these we can improve the website performance and also the user interaction in the website.[11]

- **Dan (2020):** The author has proposed various parameters required for testing the performance of a website. The key parameters that the author mentioned are Latency, Third-party resources, page weight. The author also discussed about various factors that may slow down the website and has also decreased few measures to fix it. [12]

- **Yura (2021):** In this article the author has mentioned about some factors that decrease the website performance which may affect in the google search rankings. The key factors that the author discussed are Poor coding standards, Bad server, Location of Style-Sheets in the code. He also mentioned some tools through which we can also check our SEO rankings and help us increase the website speed. [13]

6.RESULTS AND DISCUSSION

Research shows most of the web users except the website to load within two second or less than that and if the loading time of website is more than 2 seconds then they tend to leave the website. This may be not a big deal, but 80% of online customers who face this loading time issue says that they won't go back to that site to buy, and most of the users also tell their friends about the issue that they faced will buying the products in a particular site. The website loading time plays a crucial role in attracting the users towards the website. Research shows that even a one second delay in the website would cost around 10% reduction in customers. Here the company is not losing money, but it is losing its potential customers who increase their business. If the website makes about $20,000 a day one second delay in loading time would cost you around $500,000 a year, so loading time of the website plays a crucial role in shopping behavior.

Table 1: Parameters affecting website speed and performance

Author name and year	Title	Key Parameters	Effect on website speed	Technique to improve
Adams M (2013)	Study of factors affecting web page loading speed	Internet	As the website runs on internet if the internet speed of the user is slow the website loading also gets slow	Having a good internet speed will improve the loading time of the website and also user interaction will become better.
Adams M (2013)	Study of factors affecting web page loading speed	No CACHING	If there is no http caching in the website takes long time to reload the data.	We need to enable http caching so that the copy of data will be locally stored and thus it helps in reload time of the website.
P. Bringula (2015)	Study of factors affecting web page loading speed	Page weight	Even though the internet speed is higher and all the files like images, script are large files then it might slow the website.	Here the file size should be 2mb or less than that so that the rendering of the website is faster.
Vince Baker (2016)	Website optimization factors	Absence of CDN	If there is no CDN then the user using from large distance can have loading problem.	We need to host the website using CDN so that it brings immense value to your website in terms of speed, efficiency and enhanced security.
Robert Gibb (2016)	5Factors that affect website speed	More Http requests	While visiting any website most of the time is spent for downloading the resources of the website like images, stylesheets etc. which slows the loading time	To reduce http requests for images, one thing you can do is to use CSS sprites to combine multiple images. If you have multiple stylesheets and JavaScript libraries, consider combining them to reduce the number of HTTP requests.
Eric Sachs (2017)	Factors Affecting website loading speed	Placing Java Script and CSS Files in html document	If the java script and CSS files are in html document then they are downloaded every time an HTML document is	We need to place the java scripts and CSS in the external files so that the loading time of the website increases and it makes

			requested. This doesn't take advantage of the browser caching and increases size of the html document.	easy to maintain and update the website.
Vitaliy Kolos (2017)	Factors affecting web page load time	Placing Script reference at the top.	Browsers can only download two components per hostname at the same time. If you add your scripts towards the top, it would block anything else below it on the initial loading of the page. This makes it feel like the page is loading slower.	To avoid this situation place script references as far down the HTML document as possible, preferably right before the closing <body> tag.
Willam Carig (2018)	10-Factors affecting website speed and how to check	Placing stylesheet reference at the bottom.	If we place the stylesheet reference at the bottom of the <head> tag then the rendering of the page takes more time.	To avoid this we need to move the stylesheet to <head> tag of html document helps your pages feel like it is loading faster because doing so allows your pages to render the styles progressively.
Hazel-Raoult (2018)	10 Factors decreasing the website speed	Number of Redirections	If we place more redirections then for every redirection it forces the browser to a new URL which decreases page-loading time	To avoid, this we need to combine some files so that the number of redirections reduces in the website.
Catherina Garcia (2018):	Factors Affecting word-press loading speed	Hot-Linking	If we use an image from another server directly without uploading it in your website then this will affect the bandwidth of the website and increases the loading time of the page.	To avoid, this we can use h-Panel, an FTP client, a content-delivery-network (CDN),and WordPress plugins.
Hazel Raoult (2018)	10 factors decreasing website speed	Online Ads	Over 40% of the ads slow down the website speed as their size is large and most of the website now-a-days are having 60 network requests.	To avoid this the maximum number of network requests should be 15 and maximum ad threshold must be 300KB.
Willian craig (2018)	10 Factors decreasing the website speed and how to check	Third party resources	If the website has a third party resource then the browser takes long time to go to that request render it and again render that to the user this might take a long time for the page to get loaded.	To avoid, this we need to reduce the third-party resources there should be less than 10 resources in a website. The loading time of the website without the third-party resource is 2.69 seconds.
CATHERRINE GARCIA (2018)	Factors Affecting word-press loading speed.	Location of the server	The location of the server plays a major role in website loading time, if the location of server is far from the user then the website takes long time to render as it has to go through many different open networks.	To avoid, this we can use CDN or we can place the server at the nearest location so the reading and writing of the data in the website will be faster, thus, increasing the loading time of the website.
Jayant k V (2019)	Website Optimization Strategies	Number of Hits	If more number of users are accessing the website at once then also the website loading time increases for each user as the server delas with the request in the order they arrive.	The developer can solve this by ordering a more powerful server which be able to deal with more number of requests at once.
Jayant k V (2019)	Website Optimization Strategies	DNS	The DNS directly affects the data transfer speed between the website and internet user. As DNS must view all the content before displaying it to the	To avoid, this we need to use DNS cache: repeated visits to a website typically bypass the DNS lookup server, thereby speeding up page load times.

			customer so choosing the less quality speed DNS effects the loading time.	
Jayant k V (2019)	Website Optimization Strategies	Many Plugins	Using too many unnecessary and heavy plugins is a factor affecting website speed. Some plugins that are not used still work and take up some resources. They increase the database, the server has to process many queries, the speed of the website is slower.	Check the plugins being installed on the website. Uninstall plugins that are not used often that affect website speed. Search and replace extension with integrated 'all in one feature.
Rahul Krishnan (2019)	Top 5 factors affecting your website speed	Effect of Browser	The browser the user is using to open the website also effect the website speed as some browser's are bit slow. Using old version of the browser can also effect the loading time	The best practice is to use Updated version of the browser to speed the rendering of the website.
Rahul Krishnan (2019)	Top 5 factors affecting your website speed	Poor coding standards	Adding unnecessary code will hamper the loading time of the page as the browser needs to check all the validations every time the website renders to the user.	By removing all unwanted and dead code line breaks and spaces in your this could show significant difference in website speed.
Rahul Krishnan (2019)	Top 5 factors affecting your website speed	Image optimization	Website uses large size of images with a size of 4.5 mb which takes long time to load and render it to the user this might reduce the speed of the website.	We need to use 200kb images so that the image optimizes and renders quickly as the image size is small.JPG helps to reduce the image size.
Dan (2020)	5 Factors that can affect our website and harm your bandwidth	Web hosting	In this case of a shared server environment, the web host may not be able to accommodate all your website needs.	Therefore, you need to switch your web host or upgrade your current web hosting plan if your website hosts a huge volume of files or is hit by traffic spikes failing which would slow down your website.
Dan (2020)	5 Factors that can affect our website and harm your bandwidth	Fancy animated widgets	Fancy animation and complex widgets require complex data processing both on the server and client-side which reduce the page loading time.	Subtle animated effects are not only good in terms of usability but they are also good in terms of page loading time. For example, if you want to give users the information that the content is loading, it's better to use a skeleton screen for that.
Yura (2021)	Factors that affect website speed	Compatibility	If the system that user use to run the website has lower ram or low graphics or outdated processor this also can slow the website speed.	The user need to have latest processor and good ram so that the speed of the website increases.
Yura (2021)	Factors that affect website speed	Heavy theme	if you use a theme with too many features, complex layout, the heavy design will increase the page-size. It'll make many requests to the server.	Using premium theme optimized for design and features, optimized SEO code, no redundant code. Currently, on the market, there are many units providing beautiful and diverse themes for all types of

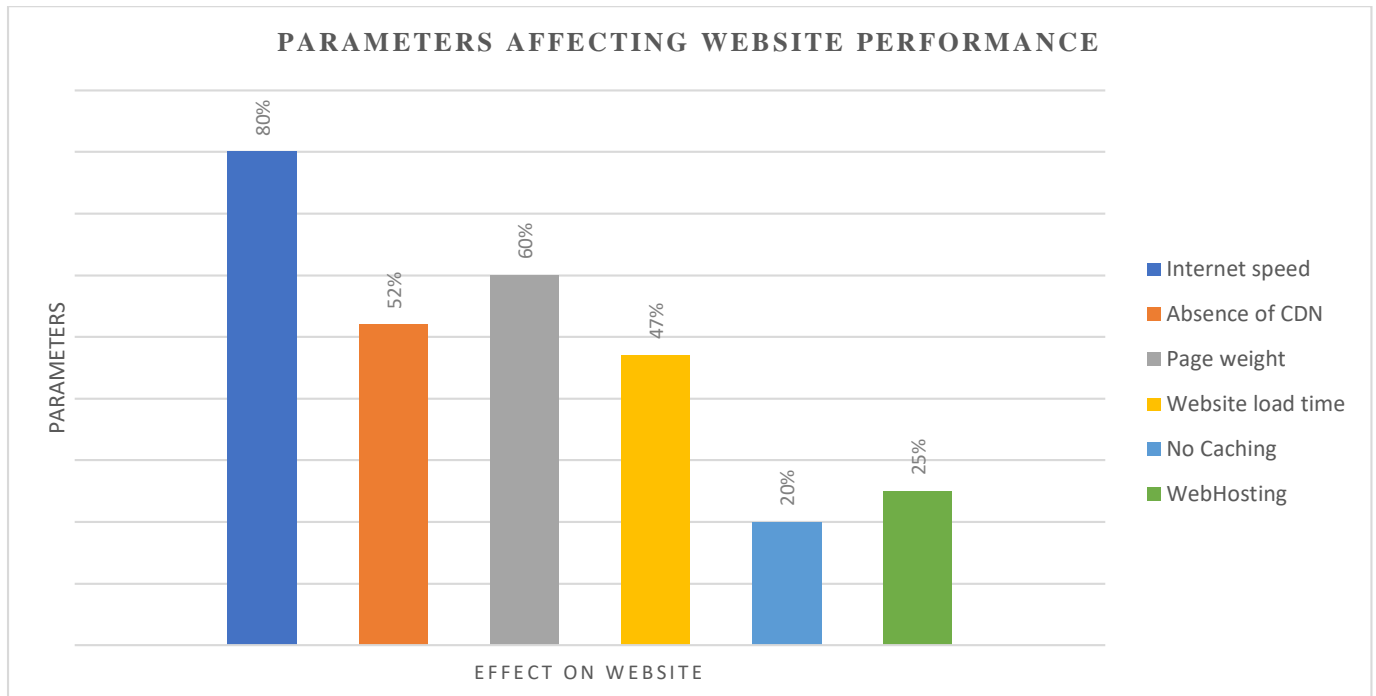|			Besides, the quality of the theme is also an issue that needs to be considered. Some themes that have not been thoroughly tested have many redundant code snippets.	websites. You can select themes that suit the purpose of your website.

Fig-1 Effect of parameters on website performance in percentage
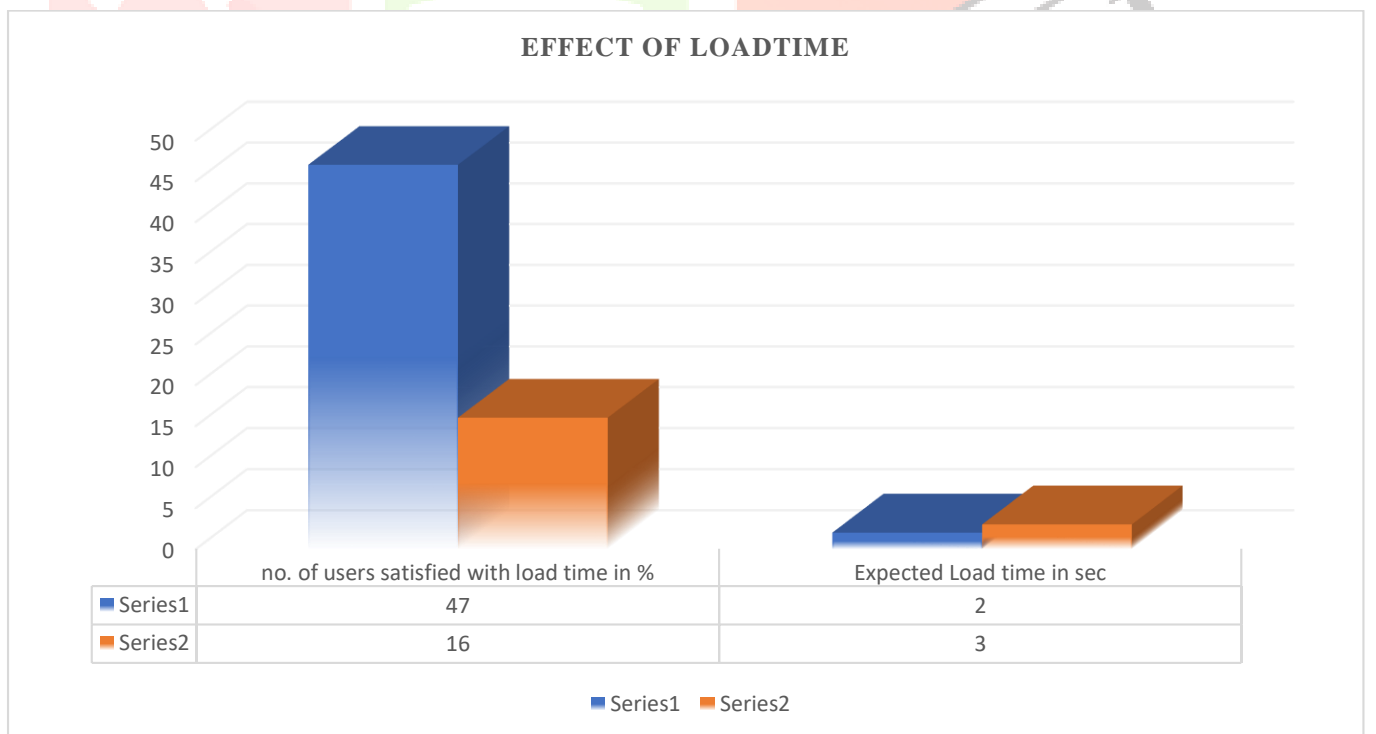

Fig-2 Effect of Load-Time in Shopping Behavior

7.CONCULSION

Therefore, by avoiding the above parameters mentioned in the table we can increase the speed of the website thus increasing the customer interaction with website. There are some web-site to check the website which might clearly indicate where the problem is in the website. Main parameters that might cause the issue of speed are not having CDN this makes a big problem for the users

using from other countries and also the size of files in the website also affect the speed mostly so by avoiding these we can speed up the website.

REFERENCES

[1] https://www.peakhour.io/blog/common-issues-that-impact-site-speed/

[2] Research paper written by Jatinder Manhas on Factors Affecting the website speed.

[3] Google developer Website. [Online]. Available: https://developers.google.com/speed/article.

[4] website Optimization: http://www.websiteoptimization.com/.

[5] Factors affecting speed: https://www.geekdashboard.com/factors-affecting-loading-speed-of-website/.

[6] About online ads: https://www.statuscake.com/blog/over-40-of-online-advertisements-are-too-large-and-slow-down-websites/.

[7] About Third party resources slowing the speed: http://www.websiteoptimization.com/speed/tweak/third-party/.

[8] website speed and tools to check https://sneeit.com/4-factors-affect-website-speed-and-how-to-check/.

[9] Bob Wescott, The every Computer Performance Book.

[10] Tips for Decreasing Web Page Load Times by William Craig (Article).

[11] Factors Affecting Web Portal Information Services Usability: A Canonica Correlation Analysis by Rex P. Bringula(Article).

[12] 6 Factors Affecting WordPress Loading Speed by CATHERRINE GARCIA(Article).

[13] https://www.plerdy.com/blog/website-speed-factors-and-tools/.