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**Usability Optimization Of Websites Using Field Data From
Analytics and Yandex Video Sessions**

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Abstract

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Master's Thesis

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Usability has become an important quality factor in the process of web development, which should be considered alongside functionality and schedule. It is also one of the primary requirements for the users, much more than just a good looking design and conversion, a crucial aspect of business websites depends on the usability of websites. Additionally, search engines, which are the most significant traffic providers for websites, have included user satisfaction as one of the key ranking factors.

This study proposes a model to improve the conversion rate of websites operating in service directory model which compares products and services of other businesses by applying the website usability principles in combination with field data of real users of the website to optimize the website for usability.

Both Quantitative and Qualitative data is collected and analyzed to understand user behavior on websites. Firstly, the usability metrics from Google Analytics are used to find out the usability issues of the website. As data from google analytics was answering only what-questions of the usability research but not why-questions associated with usability issues, qualitative analysis is conducted using video session recordings along with Heuristics usability guidelines. Based on the qualitative analysis, the website design elements are redesigned. The impact of the change is measured using the conversion rate goals set in Google Analytics. Literature review on usability testing and user behavior analysis laid the foundation for this research on what elements to check, how to observe trends that can translate to conversions while studying their video sessions on the websites.

The data-oriented UI redesign of betting-sites.me.uk website elements associated with usability issues improved the conversion rates of the website from 15.1% in January - April 2019 to 49.55% during July 15 - Aug 5, 2019. Besides, the average time on the website, a critical summative website usability metric increased from 58 seconds in January - April 2019 to 90 seconds in July - Aug 5, 2019, which implies the improvement in user satisfaction. Based on the announcement google made about the importance of usability as a ranking factor, it is believed that changes conducted in the research had a considerable impact on the improvement of SERP's of the website.

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List of Acronyms and Abbreviations

SEO	Search Engine Optimisation
SEM	Search Engine Marketing
UX	User Experience
UI	User Interface
UT	User Testing
BR	Bounce Rate
TOS	Time On Site
CRO	Conversion Rate Optimization
YSV	Yandex Session Videos
UT	Unmoderated Testing
MT	Moderated Testing
GA	Google Analytics
HTML	Hypertext MarkUp Language
WWW	world-wide web or internet
DOM	Document Object Model

1 Introduction

1.1 Background

Websites have become one of the critical sales and marketing channels for a significant proportion of businesses operating in inbound marketing model [1], and usability has become an important quality factor alongside functionality of the website [2].

A substantial percentage of these businesses get traffic to their websites by optimizing their websites with search engine optimization and search engine marketing techniques [3]. In both the forms of generating traffic, search engines consider users' satisfaction on the website as one of the key ranking factors in their search engine ranking algorithms [4].

Usability of websites is also positively correlated to increasing conversion rates, users trust in the website, enhancing purchasing behavior, and retaining them for a longer time [4]. Besides all this, websites have less 2.6 seconds to create an impression on users [6]. If they do not find what they are looking for in that period, users tend to move to other websites as they have many other options from search engines ranking pages [7].

Based on the importance of the usability for improving the conversion rate of the website, this study of usability optimization using field data has been carried out as a real-time job for CLean Rank, an Internet Marketing Company on the website betting-sites.me.uk. The company provided all the necessary support and necessary plugins and tools.

A detailed literature review on user design principles, usability analysis, usability testing, analyzing the search intent of the website, usability optimization has been done before moving on to the stages of observing data, categorizing, analyzing, observing videos of user sessions and optimization of landing pages based on the observational and statistical trends.

1.2 Research Problem

1.2.1 Backlogs in Standard Usability Evaluation And Testing Methods.

There are numerous usability testing and evaluation methods to help software and website developers to develop usable products [8]. Exclusively for websites, there are existing guidelines on how to evaluate the usability of website design.[8]

Formative usability testing methods in the traditional sense often test only a few users for a few sets of tasks in a lab environment. A significant proportion of these methods concentrate only on initial phases of the designing and development, which cannot give the complete picture of how a potential user would react with the website in a real setting.[9]

Moreover, in a practical setting of real usage of websites by real users, different types of users might face different types of issues. Usability analysis and testing with pre-planned tasks and only a few users would not help in figuring out issues faced by different user types, especially the issues that are negatively influencing the conversion rates on the websites [9]. Analyzing key usability issues faced by in-the-field-real commercial user type and optimizing the website usability for them can improve the commercial activity of conversions and leads [10].

1.2.2 Neglection of User's Search Intent

A significant percentage of websites depend on search engines for traffic, and the factor of search intent is an essential part of users journey for websites operating in such a model. Including the search intent of the user in the usability analysis and testing methods, can simplify the process of usability optimization [9]. Search intent of the user can be identified with the type of keywords they use in the search engines to find the website [11]. Additionally, free website analytic tools GA and YM can collect data points that can be explored in multiple usability testing methods for websites and also in finding out the user's search intent [12].

The proposed approach in this study evaluates the usability of the website with Heuristic website usability evaluation guidelines. Then the website usability is optimized for the commercial activity, considering the business goals of the target user type of the website.

The optimization process is conducted in an iterative way using the in-the-field data from Google Analytics and Yandex Metric. The success of each iteration is measured by the conversion rate of goals set in Google Analytics.

1.3 Research Questions

Usability evaluation and testing have to be completely objective, but there is still quite a debate on the influence of administrator conducting the tests and participant bias by the administrator, impact of verbal or task-based instructions used in most of the usability tests [13]. Widely accepted usability testing methods in the industry are formative, and there is no comparative study on the validation of those test results in the real setting. Research questions for this research are designed to answer all such objectives [14].

R.Q1 What are the implications of the potential visitor's interaction with the website.

R.Q2 How to make use of those implications to optimize the website usability to improve the conversion rate of the website.

1.4 Research Methodology

This research consists of two stages. Firstly, a literature study on usability evaluation and testing methods is done. Then, quantitative and qualitative field data is analyzed to optimize the design in an iterative process. The later stage is conducted on a research design developed from the inputs of the literature study.

The literature study covers:

- Popular formative and summative usability testing methods
- Impact of real users in usability testing
- Web Usability Metrics, Measurement, and Issues
- Usability optimization and Its Importance in CRO and SEO

Following the study of literature on usability, its importance and ways to optimize usability on websites, an iterative field study was chosen to figure out a better usable website front-end on the whole which is also commerce friendly.

1.4.1 In the Wild Iterative Research:

Data (both quantitative and qualitative) collected is used to summarise out fundamental usability issues on the website. Heuristic evaluation and literature review of previous research on measuring user behavior are used to summarise.

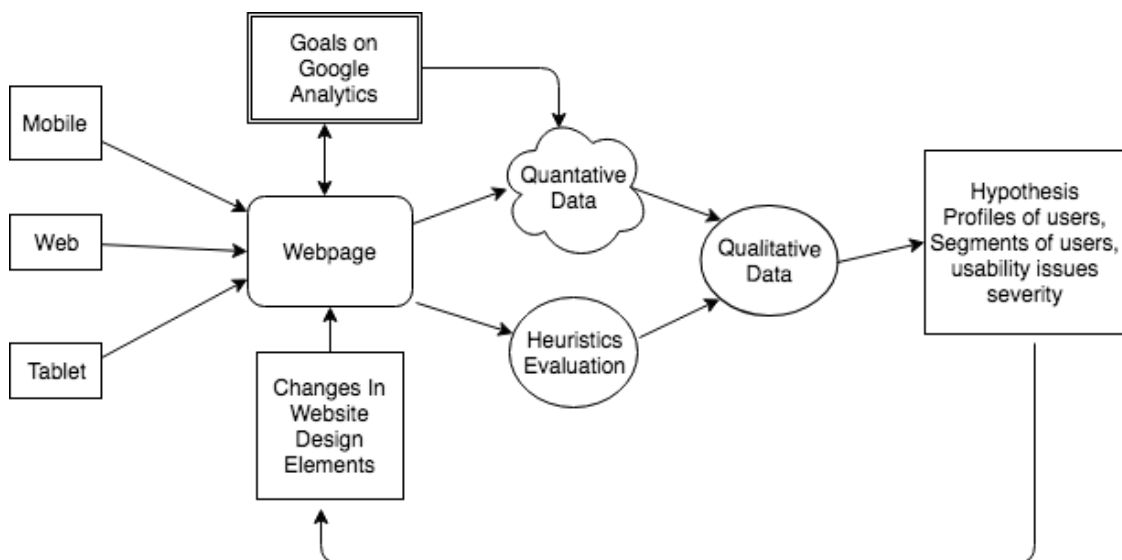


Figure 1: Research Design to observe the trends in user behaviour

Quantitative data of generic usability metrics from google analytics are analyzed to get an overview of the website performance in the usability perspective. Effective and efficiency factors of usability metrics from those metrics are formulated. Google Analytics segments are created to formulate assumptions about the usability of the targeted traffic of the website.

Based on those metrics, what aspects to evaluate in video reply sessions are listed. Questions for Qualitative usability evaluation and testing are created based on inputs from the previous iteration of the research. The effectiveness and efficiency of the design were evaluated by measuring the usability performance with goals set on google analytics and comparing them with the performance numbers from previous iterations.

1.5 Thesis Structure

To conduct the research, the subject website betting-sites.me.uk needed traffic. For traffic generation, the website was appropriately optimized for all on-page search engine ranking factors [15]. As Google is the topmost search engine, the website was optimized for google.co.uk as UK traffic was targeted. In the whole research analysis of the website is done only on UK traffic

As the vital aspect of the research is about optimizing the website in terms of usability, the thesis documents detail only the procedures and research done in the process of usability evaluation, inspection, testing, and usability optimization. Conversion Rate is used to measure the optimized usability of the website.

The first chapter of the research report gives a brief introduction to the importance of usability of the website and financial benefits of a usable website. The problems associated with the present usability testing and evaluation methods for websites are also discussed.

The next chapter is about the literature study. A literature study on topics related to usability testing and evaluation of the websites is done. Previously done researches, books, and journals on think-aloud methods, user talk through, cognitive walkthrough, usability metrics to measure the usability, impacts of a usable website are studied.

Following chapter explains the analysis of the website based on google analytics data. The experiment chapter details the performance optimization of the website in terms of CRO in iterations, which also reflects better usability. The last chapter explains data analysis and future possibilities in optimizing the usability of the website using field data.

2. Related Work

2.1 Usability

Usability is a quality attribute to measure how easy is it to learn using a system, how efficient a system can be used once learned, how easy a system is to remember after a certain period and how pleasant is it to use the system [16]. From a technical perspective user journey to finish a particular task on the website to achieve the goal on visiting the

website, should be error-free to make the design effective, should spend the minimum time to make the design efficient [16]. User should not have any cognitive load while traversing through that journey. In simple terms, the cognitive load should be reduced to increase usability [17].

2.1.1 Websites Usability

Websites are usually a presentation of information about a specific topic or business. Presenting it in a proper information structure to ensure the user understands the information swiftly, gets what he came to the website in minimal time is the usability definition in the field for website [18]. Usually, usability refers to making the front-end design of the website, but factors on the back end and databases also have a considerable impact on the usability of the website. For instance, time taken to load a website page on the browser is also a factor that defines usability [19]. Probably the essential requirement for the websites is easy findability. No matter how good the website is designed on the front, information architecture, user-friendly navigation structure are the prime factors that define the usability of a website for a potential user in the field [20].

2.2 User Centered Design

It is a design approach that puts the user as the central element of its design process to enable the designer to create a design that provides a better experience for real users. It is an iterative process of understanding the possible user problems with the help of developing personas, conducting research with interviews and testing the website structures with tests like tree tests [21].

2.2.1 Importance Of Usability Evaluation From Customers Perspective:

Usability evaluation aims to find the usability bugs on the website. Although usability must be evaluated from the customer perspective for better insights, a wide range of standard practices on how to make a user-centric design does not involve any real users in the processes [16]. Analyzing a website from that perspective can provide fundamental insights into fixing the obvious issues related to design functionality and usability before moving to more severe issues. Successful usability evaluation is a process that involves the following aspects:

- Figuring out usability issues as early as possible to reduce the risk to minimal.
- Evaluating from the customer perspective
- Finding the problems of usability is done, but not the fixing of them
- Defects in the design are tracked by analyzing the user's journey to the completion of a precise task
- Keeping the developers of the website in the loop of such findings of usability issues

Making sure if the usability tests for the website are worth the money and time spent on testing [22].

2.2.2 Heuristic Evaluation

It is a usability inspection method where website design is cross-checked with a universal checklist for creating a usable website.

- Making the system status visible to the user: The process of the website activities should be visible to the user. The user should never be left in may-be thoughts or doubts. The users should always be aware of what is happening on the back-end of the website. For instance, when a website's page is waiting for the loading of the booking engine on it, the user should be informed about the loading of the booking engine with some visuals
- Matching systems and real-world: The website should speak the language of its users instead of some technical system-oriented terms. The content organization should be in a logical order following the real-life conventions.
- Consistency: Users are not supposed to be left in confusion about the irregularities in the design consistency.
- Standards: Setting standards of consistency in design elements avoids confusion for the user.
- Error Prevention: Preventing the errors from an expert point of view before going to the testing stage
- Recognize rather than recall: User remembering every design element and their functionality on a website is often unrealistic. The better way than recalling is making the user recognize the function of the design element intuitively.
- Flexibility and efficiency of use: A website design should satisfy both inexperienced and experienced user of the website.

- Aesthetic and Minimalist Design: Avoiding the Irrelevant information on the websites that will block the highlighting of vital information.
- Helping Users Recognize and Recover From Errors: As the naming itself conventionally explains, the website should have a mechanism to help users to recover and come back to the initial state once faced with the errors
- Help and Documentation: Documentation is not just for the large software systems. All the outcomes of user activities on the website should be documented and provided as a resource for users to refer to while facing errors or not to be able to figure out how to use the website [23].

<i>Adjective</i>		<i>Noun</i>	
ambiguous	inconsistent	accelerator	information
cluttered	misleading	action	item
confusing	missing	animation	label
contradictory	non-intuitive	button	layout
distracting	non-standard	character	menu item
excess	obscure	colour use	message
faulty	poor	concept	metaphor
hard to find	redundant	control	object
hidden	slow	convention	option
illogical	superfluous	design element	order
imprecise	system-oriented	dialogue	phrase
inadequate	unnecessary	error message	sequence
inappropriate	vague	exit path	step
incomplete		feedback	structure
OTHER:		format	terminology
		functionality	undo/redo option
		graphic	window
		help	word
		OTHER:	

Figure 2: Nielsen's table of adjectives and nouns to define the usability problems.[24]

Using the 10 dimensions and usability definitions from the table, usability problems on website from different perspective from the website level can be identified [24].

2.2.3 Contextual Design

Contextual design is a process that helps designers create innovative user-centered designs, that fits people's lives based on collecting the data collected from the field. It is about observing what and why aspects of users related to their work activities while the user is in his real-life setting. It is a front end design process where contextual inquiry is

made with the comprehensive, latest data collection and analysis methods used in the industry. Data-driven changes are proposed for the website designs, and tests are iterated with real customers, followed by more changes in the product designs. This iteration process is rapid contextual design, which is often used in companies that work in an Agile environment.

Usability evaluation under Contextual design process starts with the designer having a comprehensive understanding of the project by getting to know all minute to major aspects of the project. Determining the user needs, meanings of their activities, emotions and interpreting that as data is the next step in bringing the insights to design from contextual design process [25].

2.3 Search Engine Optimization

Search engines are the tools that have transformed the way websites are used these days. They are responsible for the immense growth of websites we have in the present times. Search engines primary goal is to present the reliable websites relevant to the keyword inserted into them [26]. They have numerous algorithms to index and sort the websites according to reliability and relevance. According to google.com, a search engine that holds 90% of the search engine market has mentioned usability as an essential ranking factor[27]. By tracking numerous metrics on the website using the server logs, search engines collect information such as page load time, bounce rate, exit rate, page views, time spent on the website and use them to rate website's usability. For instance, a website with less bounce rate, exit rate, and more page views and time on site is a good site in terms of usability.

The most important ranking factors amongst all the factors, according to google, were backlinks and content. Although on-page factors play quite an important role in the process of optimizing the website for the search engines, off-page factors, backlinks play the differentiating role in the ranking of websites in search engines like google [28].

2.3.1 Backlinks

Backlinks, which are considered as the crucial ranking factor, were built using content marketing. Interesting content in the form of web guides and infographics were created on

linkable topics related to the niche of the websites. Email marketing, mobile marketing, building websites with WordPress were the topics used in this research to fetch backlinks [29].

2.3.2 Outreach for Links

Content developed is posted on the website, and those pages were outreached to potential bloggers relevant to the niche via email while following the anti-spam laws of the respective country the blogger is from [30].

2.4 Web Metrics For Usability Analysis

Web metrics are collected from clickstream data. For that, a javascript code is installed on the website under analysis. Web Analytics Association classifies web metrics into counts, ratios, and KPI's. A count is a fundamental measure used to analyze the numerous website factors performance on their own. For instance, the counts of the number of new visitors, counts of the number of sessions are the generic factor that defines the website performance. A ratio is a measure of countable factor divided by other countable factors. For example, the average number of sessions per visitor is a ratio. KPI is a count or a ratio that is infused with business strategy and provides meaningful information [31]. New visitors over a given period, the average number of page views by visitors, average session duration time over a period of time are some typical metrics used in website traffic analysis. Each of these web metrics reveals different aspects of website visitor's behavior with the website.

2.5 Impact Of Usability In Conversion Rate

A conversion occurs when a visitor is completing a specific target action of a website [31]. A website can have many conversion goals based on the nature of the website. The total number of conversion can be used as an indicator for the overall performance of a site while the conversion rate tells about the quality of a single visit [32].

The following table from a previous thesis by Tommi Riihimäki explains the important web metrics and their connections to the conversions, which in terms relates to the usability.

Table 24. The relationships between web metrics and conversions

Group	Web Metric	Total Number of Conversions	Conversion Rate
1	Search Engine Traffic	Strong connection	Strong connection
1	Impressions on Google	Strong connection	Strong connection
1	Clicks on Google	Strong connection	Strong connection
2	New Visits	Strong connection	Minor connection
2	Total Page Views	Strong connection	Minor connection
2	Unique Page Views	Strong connection	Minor connection
3	Return Visits	Strong connection	No connection
3	Referral Traffic	Strong connection	No connection
3	Direct Traffic	Minor connection	Minor connection
3	Average Position on Google	Minor connection	Minor connection
3	Rate of Return Visits	No connection	Minor connection
4	Average Page Views	No connection	No connection
4	Average Time on Page	No connection	No connection
4	Bounce Rate	No connection	No connection

Figure 3: Connection between web metrics and conversions [32]

2.6 Usability Measurement

There have been multiple types of research done specifying the important usability metrics and integrating all metrics into one single usability metric [33]. Website usability measures vary with the niche of the website and type of the business model being used. Selecting the right usability metric to measure is the key to usability optimization [34]. Multiple researchers have pointed different usability issues and metrics to measure in their research, but Kasper Hornbæk, Effie Lai-Chong Law with his detailed literature study on the topic, was quite comprehensive for researchers on usability measures.

Analyzing that comprehensive study gives the measure of important aspects to consider in usability analysis of a website

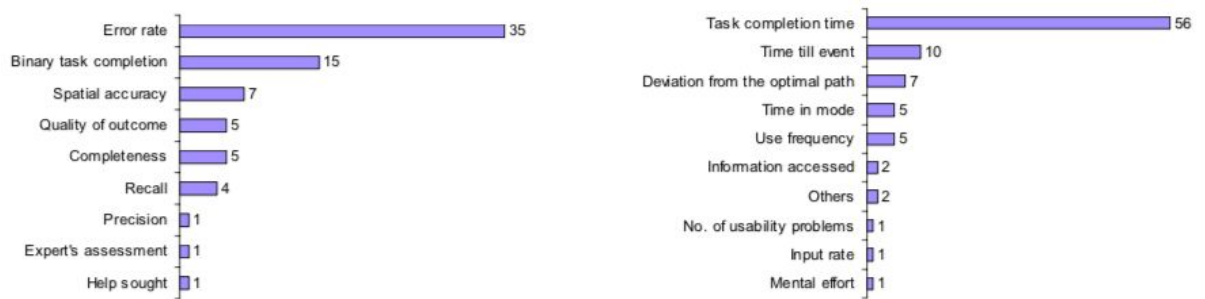


Figure 4: Popular Usability Issues based on literature study[35]

2.6.1 Usability Issues

Based on the type of the website and the niche it is operating, there can be numerous usability issues. Based on the Systematic literature review on usability aspects from Mohammad I. Zarour and Mubarak Alharbi, following usability issues were essential for a website operating in the services comparison model.

1. Anything that prevents task completion is a usability issue
2. Anything that takes the user off the user journey course
3. Confusion levels on traversing the website.
4. A user performing the wrong action
5. Content misinterpretation
6. The inability of the user to interpret the navigation bar [36].

2.6.2 Severity Rating

The severity rating system uses the combination of a few issues that usually are known to have an impact on user behavior on websites and the frequency of their occurrences in the process of a user traversing through the website to finish a business task. Measuring the frequency of the usability issues can help us prioritize the design issues to be solved on the website. Nielsen provides a way to combine the impact on the user experience and frequency of use on severity ratings. This severity rating system is intuitive and easy to explain[37].

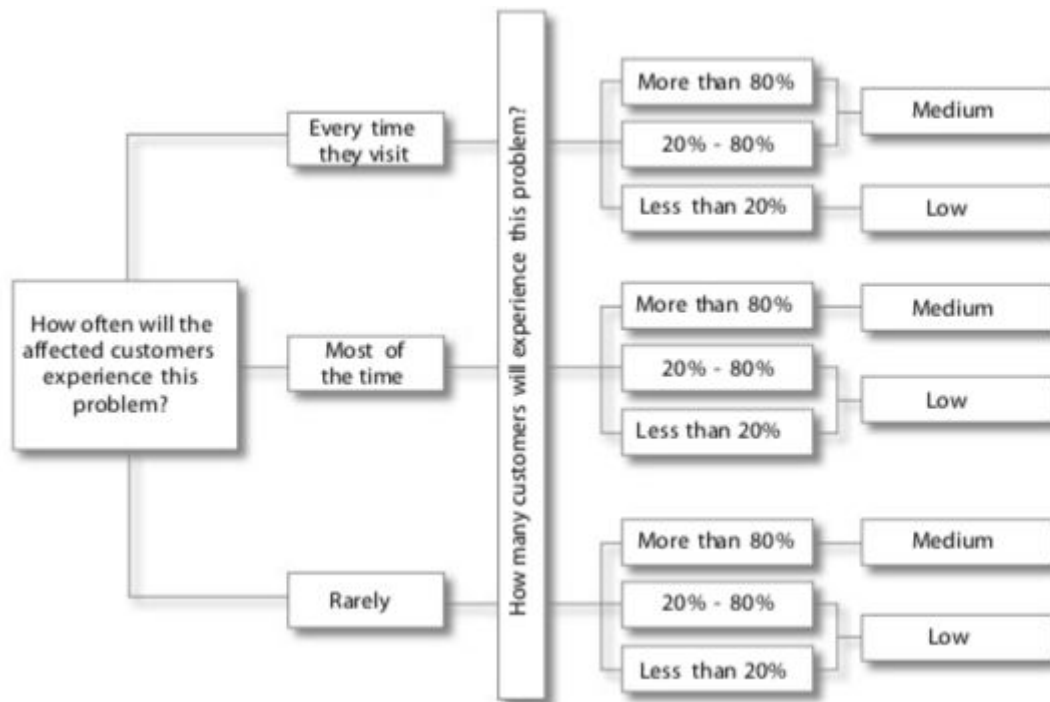


Figure 5: Prioritizing usability problems based on frequency of occurrence [38].

2.7 Usability Testing

Web usability testing evaluates the ease with which website visitor learns using the website, remembers it. It also evaluates the smoothness and error-free nature in the user navigation on the website, the efficiency with which visitors use the website, their effectiveness in using it and the satisfaction they get in using it [40]. Usability testing is a process to find out the possible problem areas of the websites where visitors are facing difficulty in accomplishing their goals. Usability testing is done with a longitudinal approach throughout the project from conception to execution. There are different usability testing methods being used to test the designs, but they can be classified primarily into two ways of testing [39].

2.7.1 Moderated Usability Testing

It is the testing that is done in a real setting such as a lab, a house or office tools like skype to observe the ease of use of the website under a moderator experienced in usability testing and guides the user. Users are chosen, classified based on their

experience with the field as experienced or inexperienced users and are known to the moderator in such usability tests.

Think Aloud Usability Testing is an example for moderated testing where moderated explains the tasks to 5-10 users and asks them to talk out loud what they are thinking and why they are doing a certain thing on the website is performing a certain task. The observations are collected to optimize the usability of websites by doing the required changes[39].

2.7.2 Unmoderated Usability Testing

Unmoderated testing is the usability testing methods where users activity on the website is tested without the moderator in the scene while the user is being tested for using the website. Users are known, but they are natural, and there is no requirement to classify the users in such methods. Unmoderated tests are more applicable to the real field studies. In practical terms, there is a wide range of potential users for commercial websites.

Enhancing the website usability with usability tests on small samples based on simple classifications such as knowledge of users will not give a comprehensive understanding of website usability for real users. A better way would be optimizing the usability of the website for a big percentage of potential users instead of some random sample with intentions to follow the moderator [41].

2.7.3 Formative And Summative Tests

Most of the usability analysis and testing methods plan a set of tasks with questions for a set of 5-10 users in a moderated or unmoderated environment to find usability problems. Summative evaluations with measurements of the usability of the website or software are not conducted that often. Based on the literature study, there are twice formative qualitative usability testing methods compared to the measurable summative usability testing methods [40].

When the problems are described in the qualitative usability testing research, the impact of the changes is not often tested. Considering the fact that google analytics and Yandex session videos are free and when the website is getting potential traffic from the search engines, observing the traffic in regular intervals and doing summative and formative tests

in an iteration model can be a time and cost-effective way to find the best usable design of the website [40].

2.8 Problems With Present Testing Methods

Choosing a few users guiding them to use a website in a certain angle to perform a defined action in a defined way makes the decision very subjective. As technology and life are closely connected, a visitor to the website should understand the context of using the website on their own. So the results of regular usability tests, expert group discussions, questionnaires and observations of users performing some predefined task takes the context of reality and life and makes the opinions biased, either of the users or expert testing the users from his perspective [42]. Moreover, Mostly, all these usability tests are done with a tiny sample. Combining these biased decisions makes these tests unreliable in the field.

Moreover, there is a readily available possibility of testing the websites with real users with the technology of server logs collections. Tools like google analytics, Yandex, Hotjar have invaluable data to help us improve the usability of the websites by testing the users in their own setting. Understanding such contextual insights will give deep insights into real design problems [43].

2.9 Web Analytics

Web analytics is the process collection of website or web app data followed by analysis and reporting of data collected about the web application to give an overview of how an average user is using the website. To be more precise, it is the study of the visitors, their navigation pattern, and traffic pattern. It can also be used to create segments of users, observe their behavior pattern, and optimize the website for a wide range of potential users. Web analytics can be classified into two types. Analytic tools that use server logs and analytics tools that use scripts and cookies [44].

2.9.1 Transaction Logs

Every time browser fetches a website from a server, the browser details are logged in the server before the server responds to the client request from the browser. So basically every time a user is visiting a website, the server hosting the website will collect all demographical, technical details of the user. The data from the transaction log is raw and complete. There is no problem of data not being collected from the users that are blocking cookies [45].

2.9.2 Google Analytics

Google Analytics is an analytics tool that uses cookies and javascript code combined with google search engine data to give us insights not just into the user data about demographics, technical aspects but also to the nature of user who is browsing and the purpose of the user who came to the website [46].

A GA Javascript script code with unique id corresponding to the site is installed on the header of the website for which, the tracking of the web analytics data has to be done [47].

2.9.2.1 Bounce Rate

Bounce rate the measure of the number of visitors who leave the website from the very page they used to visit the website. The higher bounce rate on websites is a bad ranking factor for search engines and is a negative indicator of user satisfaction [48].

2.9.2.2 Time On Site

Time on site is the number which explains the average time spent by the user on the website. With the increase in the number of users spending more time on the website, the average time on the website would increase. It is one of the quantitative indicators of usability on websites. [48]

2.9.2.3 Conversion Rate

Conversion rate is a ratio of the number of users who are clicking on the designated goal button on the website to the number of users who visit the website over a given period of

time. The increase in conversion rate, as specified in numerous researches is positively correlated to the user satisfaction of the website [49].

3. Preliminary Website Evaluation

3.1 Overall Web Usability Metrics

It was essential to figure out how were potential commercial users behaving with the websites as it was the part of answering one of the research questions. To understand that based on the literature reviews done by others on web usability metrics, bounce rate and time on site were two primary indicators of how users are satisfied with the website. The conversion rate was also associated with usability. So conversion rate was also considered as a usability metric in this study.

3.1.1 Commercial Goals Of The Website

The website was started with an intention to provide a platform for betting enthusiasts to compare top betting sites and their trade-offs based on reviews from betting expert. The primary goal of the website is for the users to click on the betting websites claim bonus or play now buttons. The primary requirement for that was to establish trust in the users that this website is experts in the field and are genuine.

3.1.2 Overall Bounce Rate

Bounce rate and average time on site are primary indications of how users like the website [50]. Bigger bounce rate percentage is an indication of a bigger proportion of users are leaving the website after checking just one page on the websites.

Website's overall bounce rate for the initial analysis was 80.16%, and considering the surveys of analysts and researchers, the bounce rate of more than 60% is not a good indicator of satisfied users. One of the goals of this research was to reduce it.

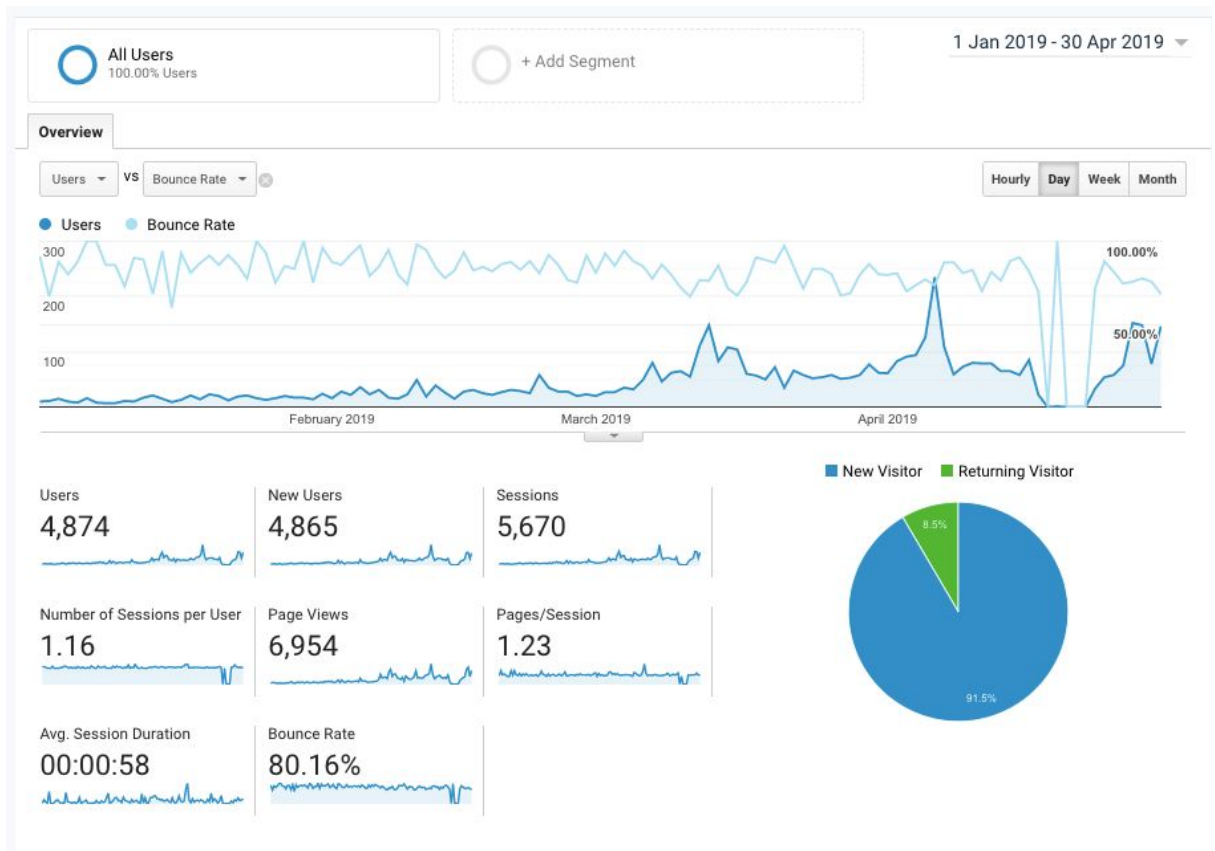


Figure 6: Bounce Rate and Average Time on Site from Jan 1, 2019 - April 30, 2019

3.1.3 Overall Time on Site

Time on site is an average measure of how long users are spending on the website. The longer time on site numbers indicates users are spending more time to read and browse around the website.

The bounce rate on the website for the period of January 1, 2019 - April 30, 2019, was 58 seconds, which is based on facts from the literature study is much less than the average time on site for a website operating in service comparison model.

3.2. User Segmentation

One of the key considerations of this research was to find out how potential commercial users are behaving with the website and how usability on the website is converting them

from normal users to potential customers. To figure out what user group is the potential commercial users of this website segmentation features in Google Analytics were used

3.2.1 Geographical Location Of The Visitors

The other trend that has been observed is that a big percentage of the users coming to the website were from the UK, the country that website was targeting. So it was decided to optimize the usability of the website for the cultural and website usage nature of the visitors from the United Kingdom.

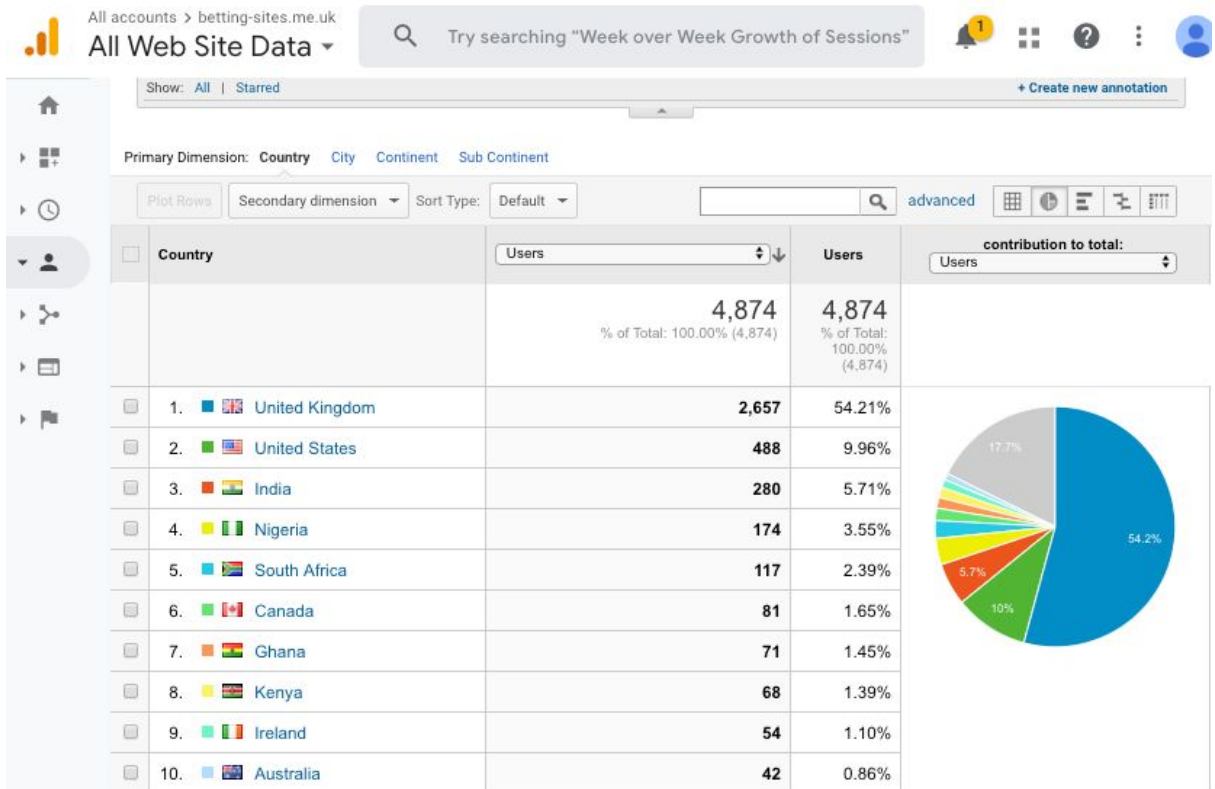


Figure 7: Traffic distribution of the website by country from Jan 1, 2019 - April 30, 2019

So I have decided to study the trends of the potential users, that is the visitors from the united kingdom.

3.2.2 Device Priority

CLean Rank emphasized from their beginning for their websites to be mobile responsive, but they always analyzed the usability from the desktop version. They missed that mobile is the primary source of traffic for betting-sites.me.uk.

Observing the traffic percentages of devices used mostly for browsing the website, mobile traffic from the UK was substantially higher than the traffic provided from other devices.

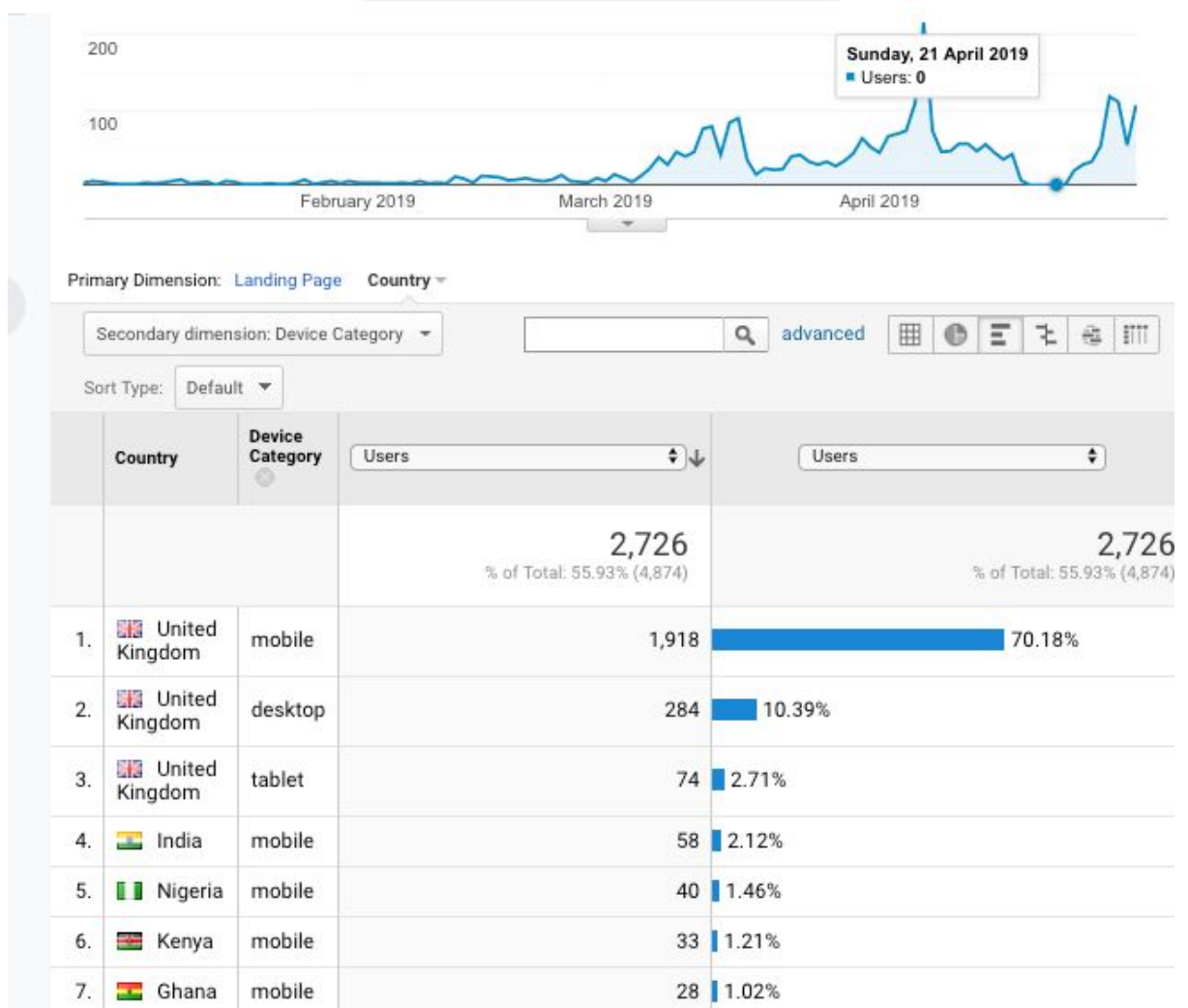


Figure 8: Traffic distribution of the website by device from Jan 1, 2019 - April 30, 2019

Observing this, it was clear that mobile was the primary source of the traffic. Bounce rate, average session duration, conversions on all devices were clear indicators of the unusable design that is not conversion friendly.

Optimizing the website usability for the traffic from mobile was necessary to improve conversions and overall usability.

3.2.3 Search Intent Of The Visitors

Around 80% of the traffic coming to the website was coming from the transitional phase keywords, which are one step away from becoming a customer of one of the betting sites in the UK online betting market.

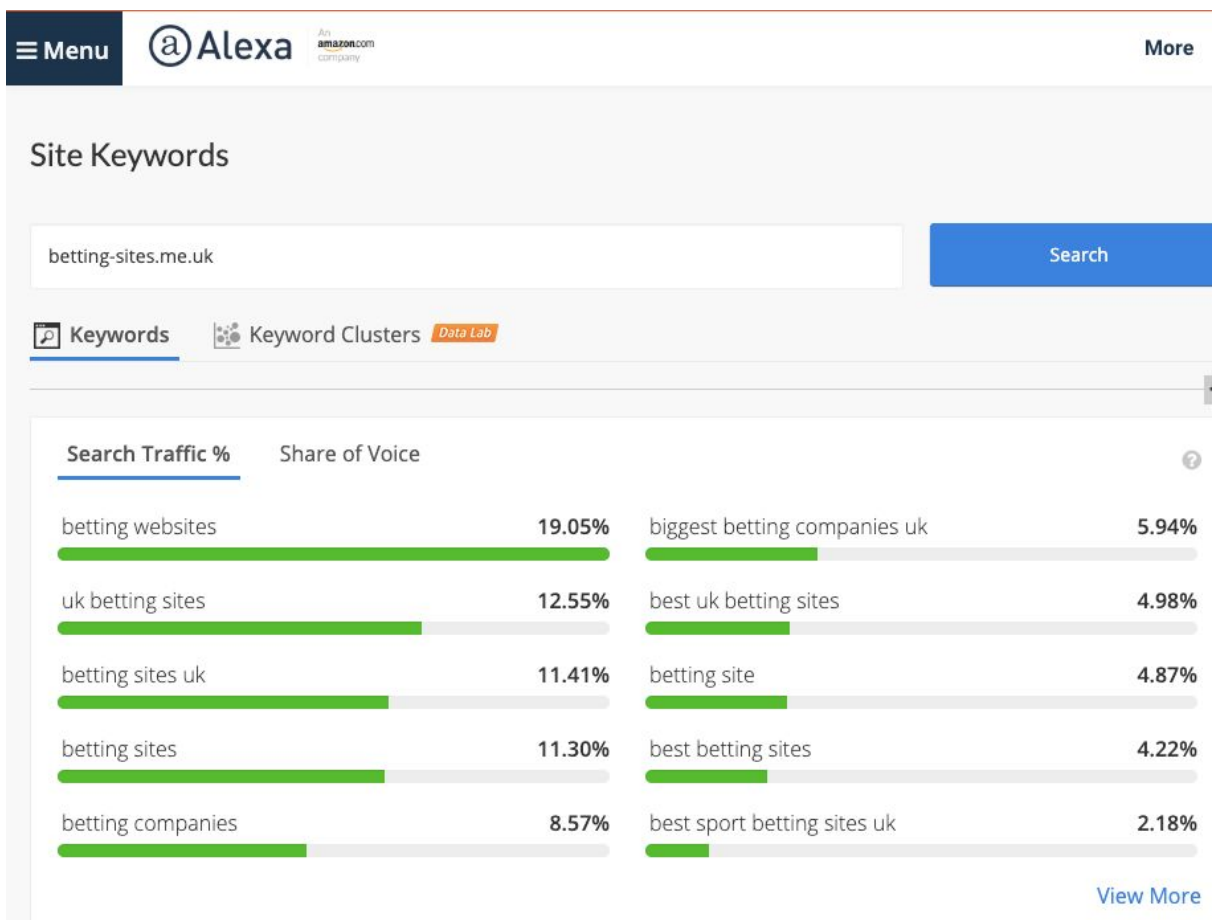


Figure 9: Search intent of the keywords used for the website

The intention of users who are searching for these keywords is to figure out the best betting sites amongst the top sites in the market.

Studying the bettings sites market by doing the competitor analysis, another factor that influences the buying decision of most of the users is the bonuses the betting companies offer.

The traffic coming to the website always has been with these transitional keywords as the website content was optimized around those keywords for the search engines considering the commercial capacity of those keywords.

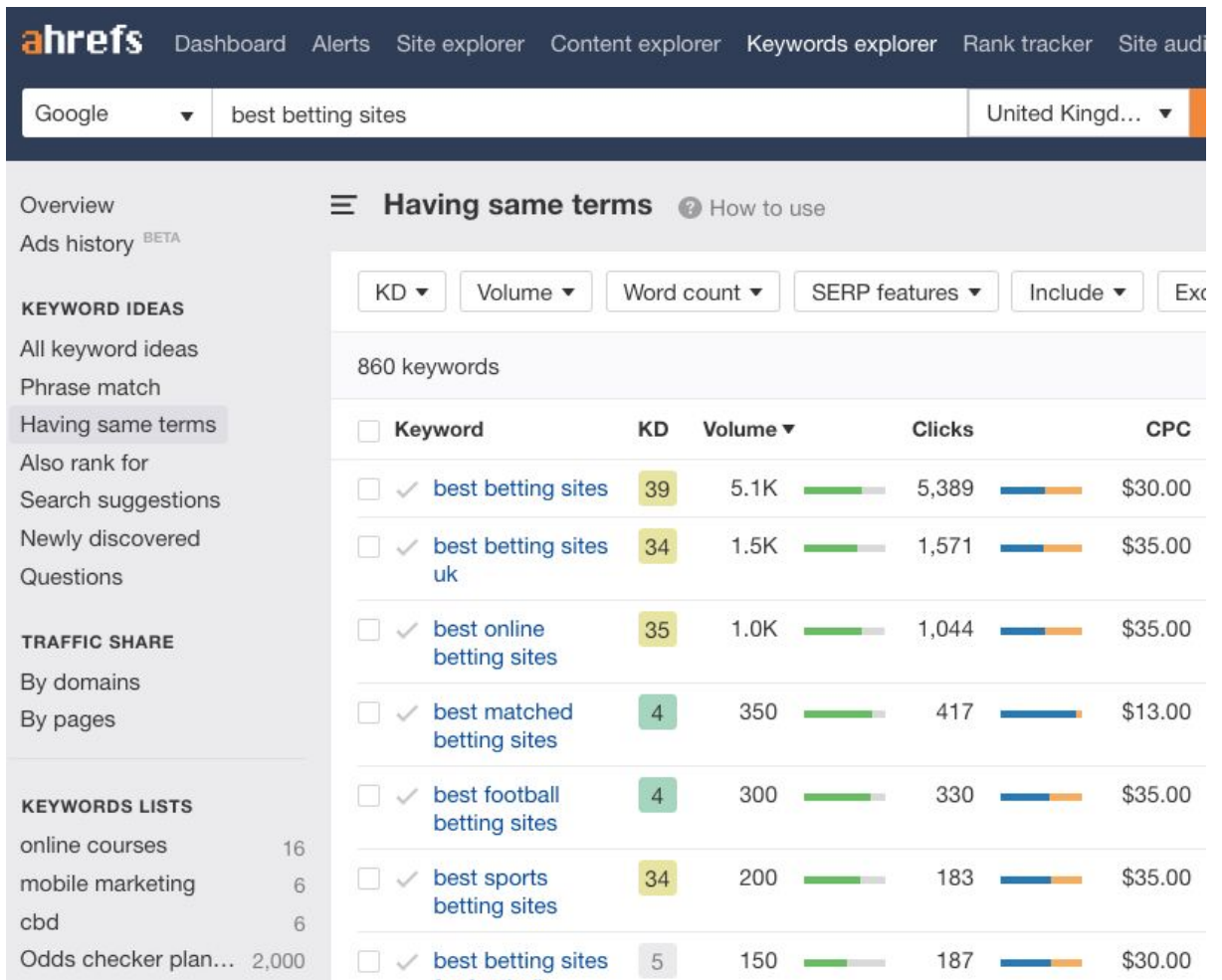


Figure 10: Commercial nature of keywords.

The clicks and cost per clicks for those keywords explains the commercial capacity of those keywords.

3.2.4 Landing Page

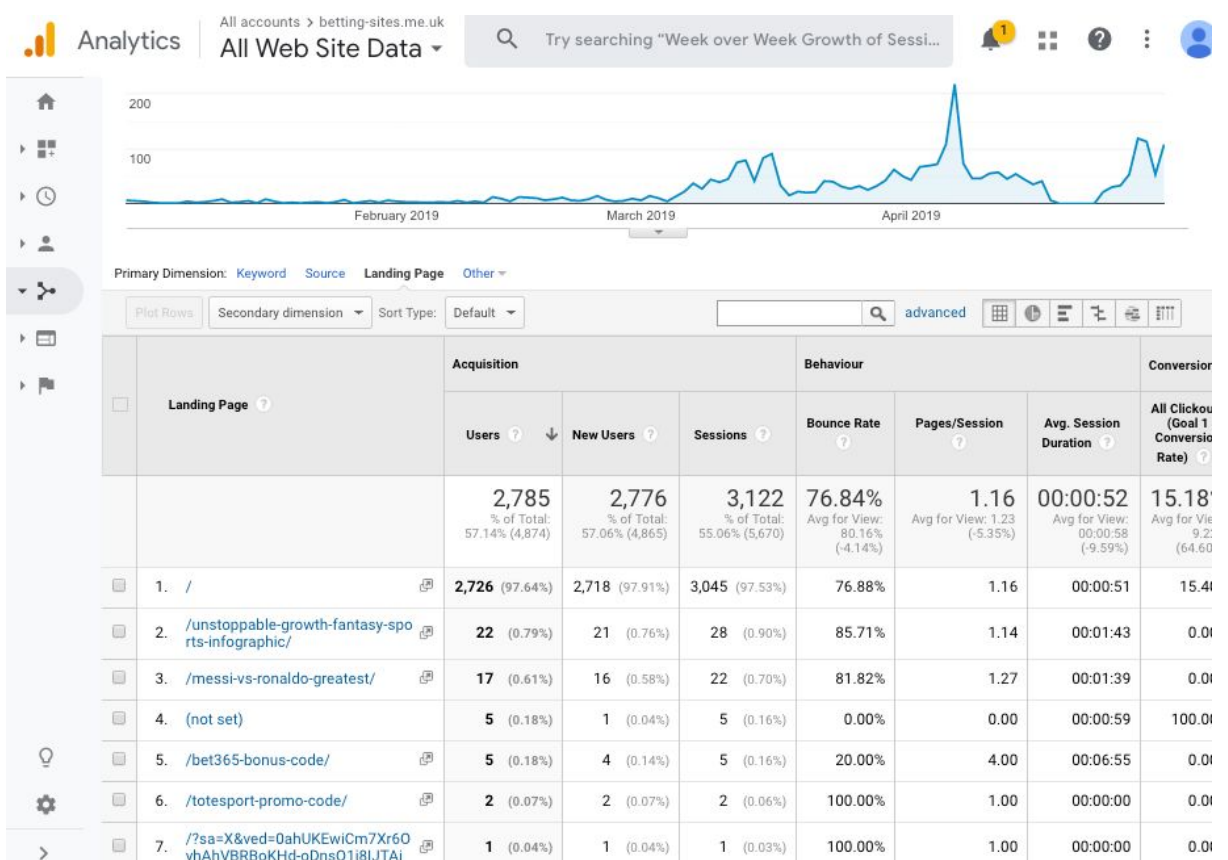


Figure 11: Traffic Distribution By Landing Pages from Jan 1, 2019 - April 30, 2019

Observing the traffic, keywords the website is targeting, the homepage of the website is considered as the main landing page. Also, Clean Rank indicated that the significant percentage of their commercial activity on the website happens on the homepage, and that is the page they wanted to optimize for usability. Besides, improving the usability of the website in general, the landing page was considered a crucial part of the quantitative research and conversion optimization.

4. Experiment

4.1.1 Selected User Groups

Based on the initial evaluation of the website using google analytics data, the present performance was studied. Evaluating the metrics for overall and segmented traffic bounce rate, time on site and conversion rates, the website users, both commercial and general users, were leaving website soon without doing much on the website. Based on the initial evaluation of the traffic for the website and business goals of the website, users from the geographical location of the United Kingdom, landing on the website using commercial keywords in Google.co.uk search engine and browsing the homepage from mobile devices were considered as the potential commercial users. The traffic of this user group was studied to improve commercial activity on the website.

4.1.2 Usability Factors Analysed.

Based on the literature study, completion rate and error rate are considered as the most important things to guide the usability optimization for websites. Heuristic guidelines were used as a reference to observe the videos and find out potential usability issues and errors.

4.2 First Iteration User Behaviour Observation

Traffic Month: Jan 2019 - April 2019

The initial design for the period of Jan 2019 - April 2019 was a generic Wordpress template. The goal was to do the changes to the front page skin and relocate the design elements to find out what design was providing the best task completion and conversion rate.

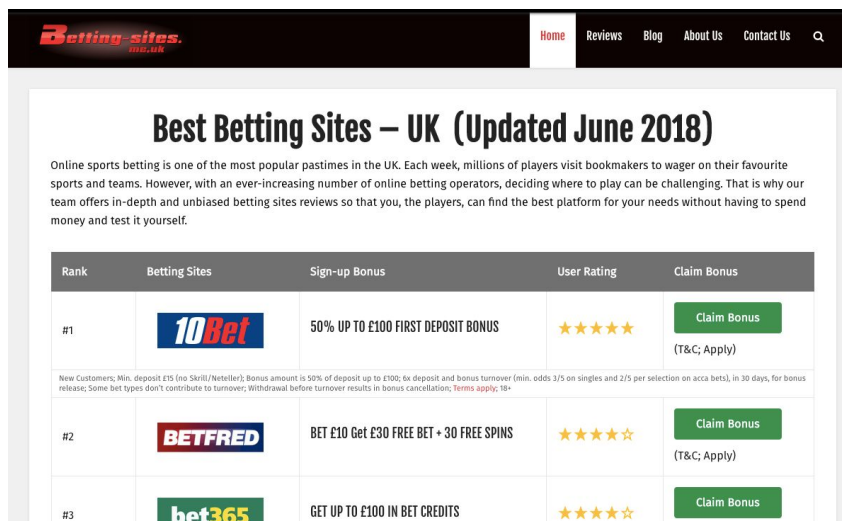


Figure 12: Website front-end in the month of January 2019 - April 2019

4.2.1 Observations From Yandex Session Videos In First Iteration

Based on the potential user group from initial evaluation, using the filters in the Yandex session videos, users were filtered with sessions of users who were using mobile devices to check the landing page from the United Kingdom internet providers. On filtering out, there were 121 user session videos, and out of them, five users were randomly picked.

Business goals of the website were driven by users clicking on the betting sites “Claim Bonus” buttons mentioned in the table. So the task for the research was to observe what are the errors and how long the user is taking to complete the task of clicking “Claim Bonus” buttons on the table.

For observing the videos, heuristic evaluation principles were used to decide on what usability issues were the users facing.

Usability Issues	User 1	User 2	User 3	User 4	User 5	Usability Issue Frequency
Time On-Site	82 sec	68 sec	45 sec	32 sec	71 sec	59.6

Task Completion	Yes	no	no	no	Yes	2/5
Number Of Clicks	1	0	0	0	2	N/A
Random Scrolls	No	No	No	Yes	No	1/5
Scrolling without checking the Intro	Yes	Yes	Yes	Yes	No	4/5
Are the buttons clear? Are there any Random Clicks	No	Yes	Yes	No	No	2/5
Checking Table	Yes	Yes	No	No	Yes	3/5
Is the user feeling clutter on the website?	No	No	No	No	No	0/5
Is the user engaging with content	Yes	No	No	No	Yes	2/5
Errors	0	0	0	0	0	0

Table 1: Frequency of design issues from Yandex videos observations January 2019 - April 2019

On videos, it was observed that not all users were completing the task of clicking on the “Claim Bonus” buttons. No quantified errors were blocking the users from clicking on the buttons in the table. From observing the videos through heuristic guidelines lenses, the intro part of the website was not checked. Introductions in the header part were written to build trust in the user. All users were directly going to check the table. The content part of the website, which is located below the table on the website was only checked by 2 out of 5 users.

As the frequency of the “user not checking the introduction” was high, the suggestion for changes was mostly based on improving the intro part as it was a key area to improve the trust in users.

4.2.2 Design Suggestions Based On Video Observations and Initial Evaluation

Based on the evaluation, there were few suggestions given to the design team to come up with a new front-end design skin.

- The introduction part of the website where the website tries to build trust in the users was not checked by most of the users. Based on Google Search Engines guidelines to improve the trust, it was suggested to include a photo of the person who manages the process of testing of betting sites to review in the introduction part.
- Along with that, it was suggested to include the affiliate disclosure part in the first fold of the website.
- To improve trust, it was suggested to change the title in a way that it sells trust to the user.

4.3 Second Iteration User Behaviour Observation

Traffic Month: Feb-April 2019

Based on the suggestions from the first iteration, the design was changed with different title and authors picture on the header.

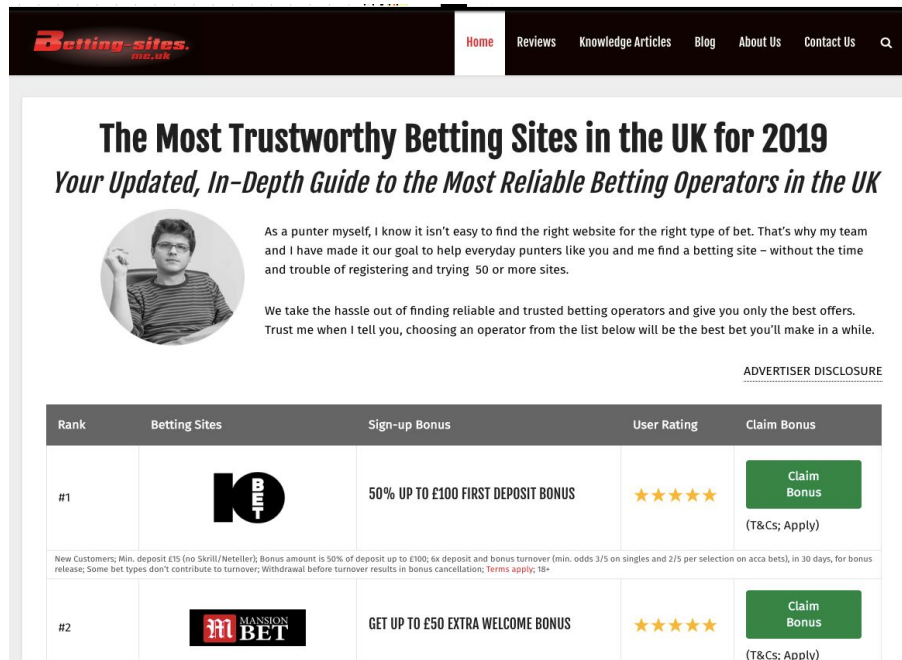


Figure 13: Website front-end in the month of May 1, 2019 - July 15, 2019

4.3.1 Overall Web Usability Metrics In Google Analytics For Second Iteration

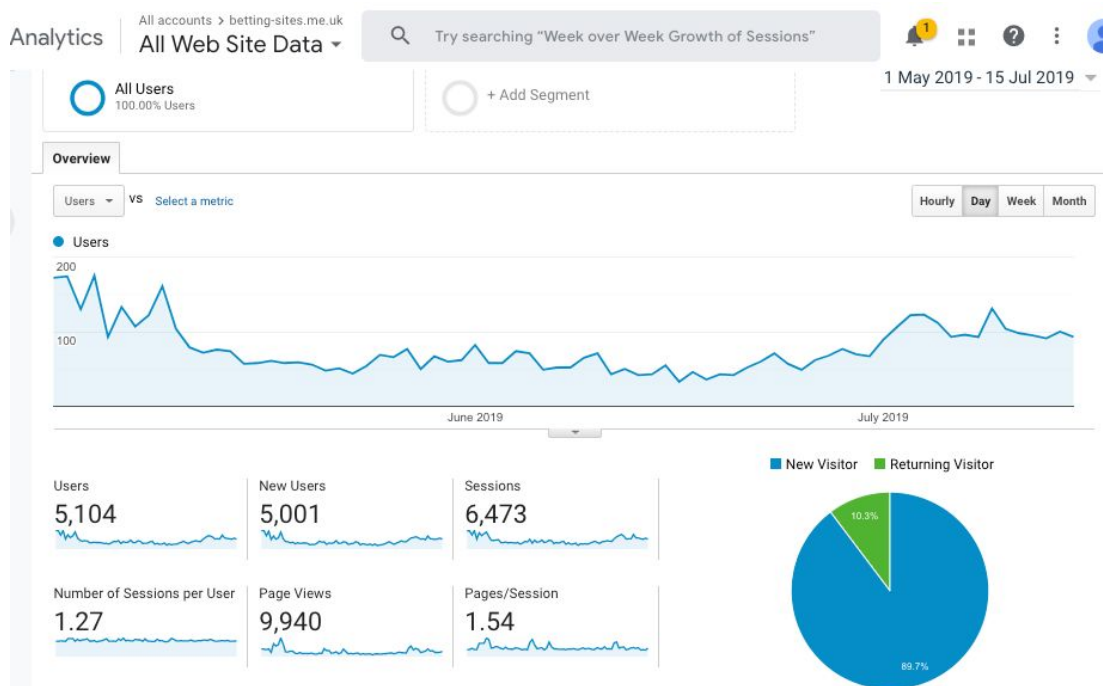


Figure 14: Overall Bounce Rate and Average Time on Site from May 1, 2019 - July 15, 2019

After implementing the new changes from the first iteration design suggestion on the design, a few improvements in the usability of the website were observed. Bounce decreased from 80.16% to 74.51% and time on site increased from 58 seconds to 93 seconds.

4.3.2 Web Usability Metrics Of The Targeted Users In Second Iteration

One of the key aspects of this research was to analyze the usability of the website for the commercial users and find a design that increases conversions and improves the usability of the site as a whole.

Considering the initial observations of google analytics, data, the targeted traffic of this website was audience from the UK checking the landing page from their mobile devices. Observing the bounce rate, time on site and conversion rate of the website for that specific target, commercial usability of the site was analyzed.

Country ?	Device Category ?	Users ?	New Users ?	Sessions ?	Bounce Rate ?	Pages/Session ?	Avg. Session Duration ?	All Clickouts (Goal 1 Conversion Rate) ?	All Clickouts (Goal 1 Completions) ?	All Clickouts (Goal 1 Value) ?
		2,570 vs 2,726	2,489 vs 2,718	3,015 vs 3,045	70.15% vs 76.88%	1.23 vs 1.16	00:01:06 vs 00:00:51	21.49% vs 15.40%	648 vs 469	US\$0.00 vs US\$0.00
1. United Kingdom	mobile	5.72% ↓	8.43% ↓	0.99% ↓	8.76% ↓	6.18% ↑	27.60% ↑	39.54% ↑	38.17% ↑	0.00%
01-May-2019 - 16-Jul-2019		1,781 (69.03%)	1,714 (68.86%)	2,056 (68.19%)	70.72%	1.12	00:00:51	22.71%	467 (72.07%)	US\$0.00 (0.00%)
01-Jan-2019 - 30-Apr-2019		1,918 (70.18%)	1,913 (70.38%)	2,171 (71.30%)	75.86%	1.13	00:00:52	16.86%	366 (78.04%)	US\$0.00 (0.00%)
% Change		-7.14%	-10.40%	-5.30%	-6.78%	-1.32%	-1.64%	34.73%	27.60%	0.00%

Figure 15: Targeted Bounce Rate and Average Time on Site from May 1, 2019 - July 15, 2019

Based on filters and preferences settings in Google Analytics, the usability metrics of the website for targeted traffic were analyzed. As per the targeted traffic, the bounce rate on mobile devices for the UK traffic decreased from 75.86% to 70.72% and time on site

increased from 73 seconds to 111 seconds. The conversion rate on mobile devices for UK traffic was improved from 16.85% to 22.71%

But the desired metrics were not achieved, so, videos of users further analyzed using heuristic guidelines.

4.3.3 Observations From Yandex Session Videos For Second Iteration

Using the filters as for the first iteration, targeted users on Yandex Session Videos for traffic were filtered. Out of 158 filtered target users, random 5 users were selected for the second iteration of the experiment.

Usability Issues	User 1	User 2	User 3	User 4	User 5	Usability Issue Frequency
Time On-Site	91 sec	85 sec	49 sec	22 sec	78 sec	N/A
Task Completion	Yes	No	No	Yes	Yes	3/5
Number Of Clicks	2	0	0	0	3	N/A
Random Scrolls	Yes	Yes	No	Yes	Yes	4/5
Scrolling without checking the Intro	No	No	No	No	No	5/5
Are the buttons	Yes	No	No	Yes	No	2/5

clear? Are there any Random Clicks						
Checking Table	Yes	Yes	Yes	Yes	Yes	5/5
Is the user feeling clutter on the website?	No	No	No	No	No	0/5
Is the user engaging with content	Yes	Yes	No	Yes	No	3/5
Errors	0	0	0	0	0	0

Table 2: Frequency of design issues from Yandex videos observations April 2019 - July 2019

Observing objectively 5 potential users from the targeted traffic zone on mobiles, users were checking the table with trust but not all of them were converting to customers. Another key observation was that users who were clicking on the conversion buttons were coming back to the website to search for more betting sites. 4 out of 5 users were skimming through the content to know more about the website.

4.3.4 Design Suggestions Based On Observations

- As the users were not sure of what each of the betting websites is famous for, they were checking the real website and coming back to the table to check more sites. So the first suggestion was to make it easy for the user to know about the betting website right there in the table. So the suggestion was to add a few highlights of each betting website to the table.

- As most of the users were scrolling down the table to skim through the content and were coming back to check the table, a suggestion was made to add a go to the top functionality in the bottom-right corner of the website.

4.4 Third Iteration User Behaviour Observation

Traffic Month: July 16, 2019 - August 2019

Based on the suggestions based on the video observations in the months of May 2019, following design was implemented on the website. The colors of the header were changed to improve the trust in the users based on the color psychology and competitor analysis.

The most important change in this iteration was that features of betting sites were added to the table so users don't have to go back and forth between real betting websites and comparison website, betting-sites.me.uk.

The screenshot displays the website's interface for August 2019. At the top, there is a navigation menu with links for 'Our Approach', 'Reviews', 'Knowledge Hub', 'Blog', 'About Us', and 'Contact Us'. Below this is a hero banner with the text 'The Most Trusted Betting Sites in the UK for 2019' and a video player showing two men shaking hands. The main content area is titled '10 Best UK Betting Sites – August 2019' and contains a table of betting sites.

Casino	Rating	Welcome Bonus	Key Features	Get Started
888sport	Users Rating (13) ★★★★★ Expert Review	100% Up To £100 Deposit Bonus	<ul style="list-style-type: none"> Creative Novelty Bets £30 Welcome Bonus Fast Payouts 	Play Now
10Bet	Users Rating (12) ★★★★★ Expert Review	50% Up To £100 First Deposit Bonus	<ul style="list-style-type: none"> Hundreds of Sports Leagues Bet on E-sport Events Constant Promotions 	Play Now
totesport	Users Rating (12) ★★★★★ Expert Review	Get Up To £35 In Free Bets	<ul style="list-style-type: none"> 14 Horse Race Betting Platform £5 Minimum Deposit Cashback Options 	Play Now
bet365	Users Rating (6) ★★★★★ Expert Review	GET UP TO £100 IN BET CREDITS	<ul style="list-style-type: none"> Best Live Streaming Service Countless In-play Betting Options Great on iOS/Android 	Play Now

Small text below the table: Open Account Offer. Up to £100 in Bet Credits for new customers at bet365. Min deposit £5 and 1x settled bet requirement to release Bet Credits. Min odds, bet and payment method exclusions apply. Returns exclude Bet Credits stake. Time limits and T&Cs apply.

Figure 16: Website front-end in the month of July 2019 - August 2019

4.4.1 Overall Web Usability Metrics For The Third Iteration

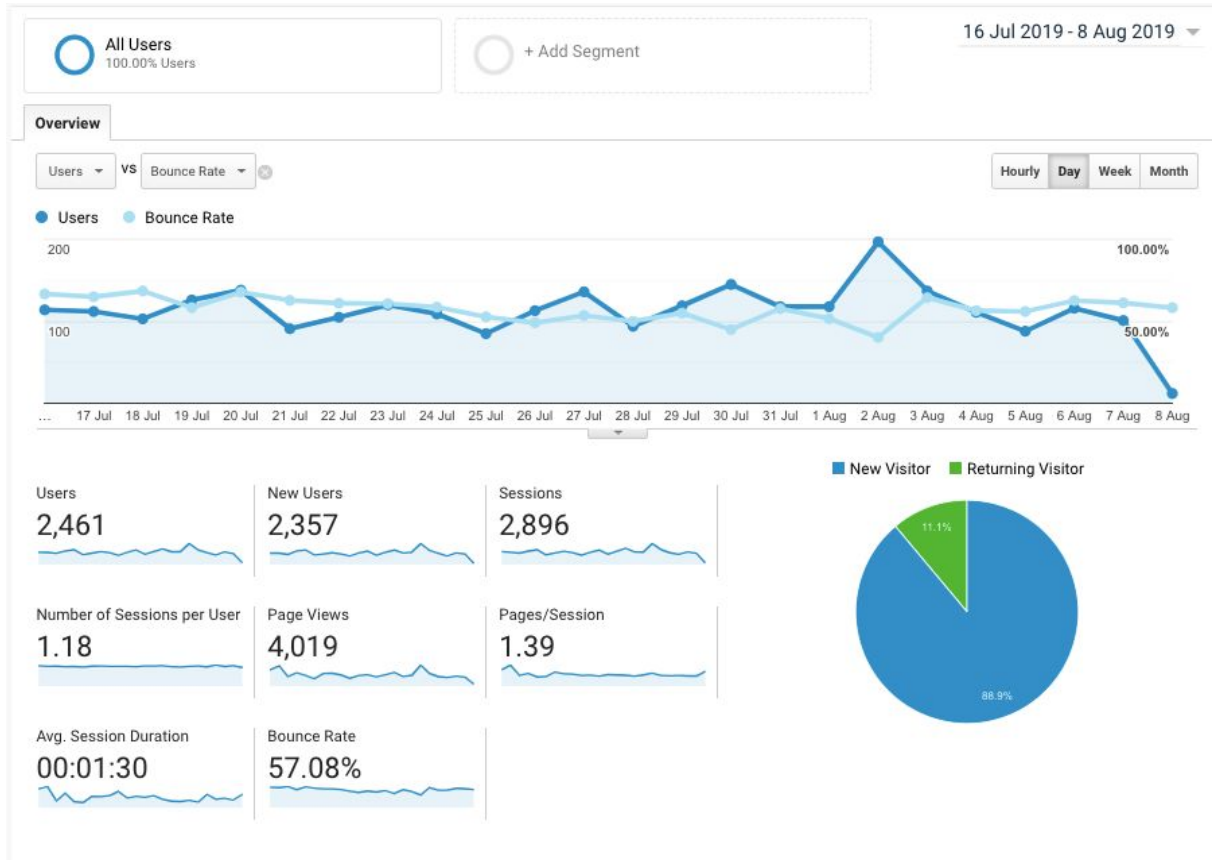


Figure 17: Stable time-on-site and decreased bounce rate from July 16, 2019 - August 5, 2019

Following the changes from the second iteration, the overall bounce rate fell substantially from 74.51% to 57.08% which is in the accepted bounce rate range. Time on site was almost stable with a decrease of 3 seconds from 93 seconds in the second iteration to 90 seconds in the third iteration.

4.4.2 Usability Metrics Of Targeted Traffic For the Third Iteration

For the commercial targeted group, the usability metrics and conversion rate increased substantially. Bounce rate on mobile decreased from 70% to 47%, while time on site

increased by 34% compared to the second iteration data. The conversion rate on mobile devices was increased by 120% compared to the previous iteration with the present value of 49.55% for the period of July 15, 2019, to August 5, 2019.

Analytics | All accounts > betting-sites.me.uk | All Web Site Data

Try searching "How to set up a property"

Country	Device Category	Acquisition			Behaviour			Conversions		
		Users	New Users	Sessions	Bounce Rate	Pages/Session	Avg. Session Duration	All Clickouts (Goal 1 Conversion Rate)	All Clickouts (Goal 1 Completions)	All Clickouts (Goal 1 Value)
		33.16% <small>1,681 vs 2,515</small>	33.94% <small>1,608 vs 2,434</small>	35.37% <small>1,904 vs 2,946</small>	26.45% <small>51.63% vs 70.20%</small>	6.79% <small>1.15 vs 1.23</small>	16.82% <small>00:01:17 vs 00:01:06</small>	107.12% <small>44.22% vs 21.35%</small>	33.86% <small>642 vs 629</small>	0.00% <small>US\$0.00 vs US\$0.00</small>
1. United Kingdom	mobile									
	16-Jul-2019 - 08-Aug-2019	1,168 (69.32%)	1,113 (69.22%)	1,334 (70.06%)	47.83%	1.09	00:01:09	49.55%	661 (78.50%)	US\$0.00 (0.00%)
	01-May-2019 - 15-Jul-2019	1,751 (69.37%)	1,684 (69.19%)	2,014 (68.36%)	70.95%	1.12	00:00:52	22.44%	452 (71.86%)	US\$0.00 (0.00%)
	% Change	-33.30%	-33.91%	-33.76%	-32.60%	-2.16%	34.34%	120.78%	46.24%	0.00%
2. United Kingdom	desktop									
	16-Jul-2019 - 08-Aug-2019	223 (13.23%)	218 (13.56%)	235 (12.34%)	62.55%	1.19	00:00:55	31.91%	75 (8.91%)	US\$0.00 (0.00%)
	01-May-2019 - 15-Jul-2019	342 (13.55%)	337 (13.85%)	367 (12.46%)	67.03%	1.37	00:01:10	22.89%	84 (13.35%)	US\$0.00 (0.00%)
	% Change	-34.80%	-35.31%	-35.97%	-6.68%	-13.20%	-21.82%	39.44%	-10.71%	0.00%

Figure 18: Final comparison of improved bounce and conversion rate.

5. Conclusion

The usability metrics were optimized in the gradual steps in every iteration. The conversion rate of the website, which is supposedly having a positive correlation with the usability of the website has substantially increased from 15.1% in January - April 2019 to 49.55% in between July 15 - Aug 5, 2019.

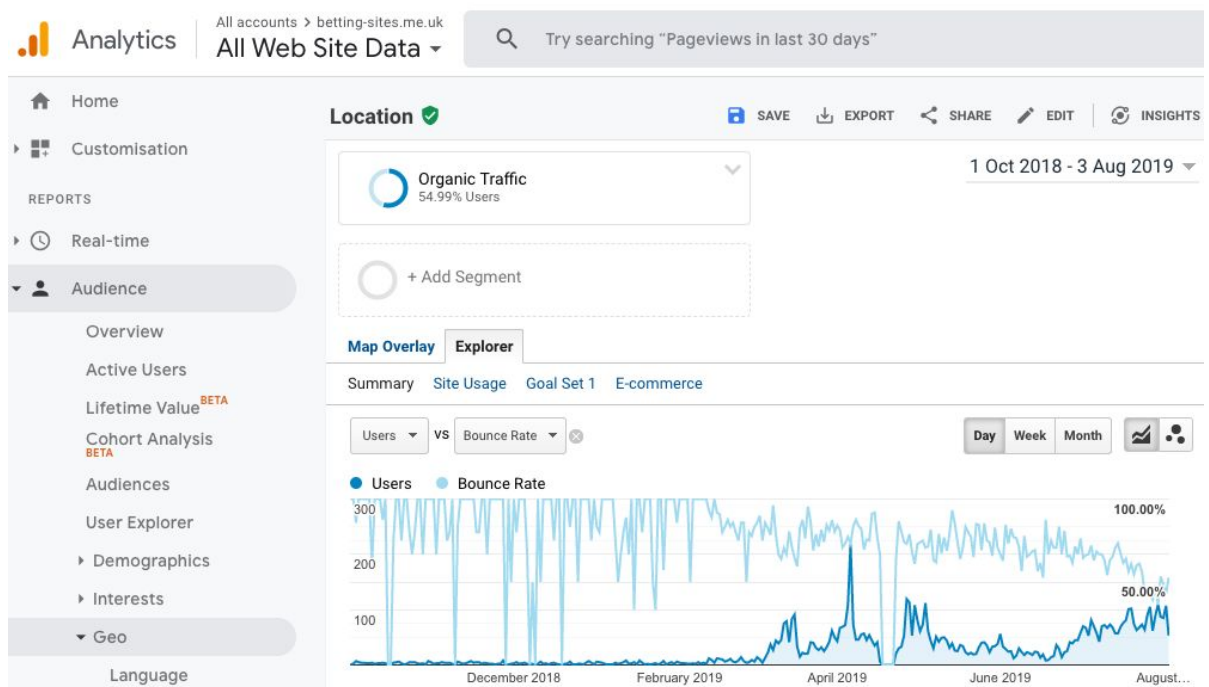


Figure 19: A gradual decrease in the bounce rate after every iteration is observed.

The other important metrics which were important for the overall improvement in the usability of the website were bounce rate and time on the site. The overall bounce rate of the website has substantially decreased from 80.16% in January - April 2019 to 57.08% in July 15 - Aug 5, 2019. As for the time-on-site, it has increased from 58 seconds in January - April 2019 to 90 seconds in July - Aug 5, 2019

Considering the overall and targeted traffic, a substantial percentage of traffic both on mobile and desktop version were bouncing off the website. The observation of field data implied the header part of the website, the layout of the table, the contents on the table were the crucial usability aspects that users were interacting with.

A comprehensive literature study by Joash Sujana Samuel Roy, W. Patrick Neumann, Deborah I. Fels on user-centered design methods and their application in the older adult community identified the need for a new approach to include the crucial user groups. As a solution, an approach which identifies usability problems based on real-time field data and changes in iterations were explored.

Moreover, the user intent for the websites operating in the services comparison model varies based on the niche the website is operating in. So it is a good practice to optimize

the usability of websites based on their respective users. Applying usability aspects and principles can direct the process of finding the ideal design for better conversions.

5.1 Future Work

he layout part of this research as assumed from the existing market standards and competitors websites. Future studies can work on figuring out a way to come up with a layout that is unique for a particular niche.

In the process of finding the right design for conversions, rapidly changing the most crucial parts of the design had some negative impacts like a loss on the search traffic for a few days. A study can be done how to slowly change the designs at the elementary level to not hurt the search traffic.

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