INTERNATIONAL HELLENIC UNIVERSITY

Implementing Analytics On Google Merchandise Store

ID: 3305180033, 3305180030, 3305180028, 3305180027

Web Analytics Course

School of Science and Technology

MSc in e-Business and Digital Marketing

Academic Year: 2019 - 2020

Index

Introduction 3

Main Element's Definition 3

Metrics Report (Part A) 5

Google Analytics Dashboards & Observations 5

Data Analysis (Part B) 16

Conclusions 23

Back up files 23

Introduction

In the scope of "Web Analytics" course and in order to complete this course's assignment, our team retrieved data from Google Merchandise Store, which we accessed through Google Analytics platform and the Demo Account that it's available for such use. The main goal of this work focuses on delivering a Data Analysis Report, which will reveal significant issues that the e-shop has to deal with and simultaneously, will contribute to their resolution by providing specific proposals for each one of them. Hopefully, the results of this analysis will urge e-shop's stakeholders to conduct further investigation and take actions to improve the problems our team has noticed, in order to optimize its whole functionality.

We followed five steps in order to fulfill our goal. First of all, we defined the period that we were going to analyze, which will provide us a wide view over e-shop analytics results and provide indications to be used for our further suggestions. Then, we chose the most crucial KPI's we thought will be valuable for our survey and constructed our metrics report by asking significant questions and answering with specific data retrieved from Google Analytics source. Following, we quoted the data gathered from the above-mentioned export and analyzed them to detect insights that will be subjected to further examination. To ascertain that these interesting observations did not happen by chance, we used the Scientific Python (Scipy) and statistical Python libraries (Stats.models) for statistical analysis (namely normality, difference of means and correlation tests), to further analyze the data and confirm whether our observations are statistically significant. Eventually, we discussed our findings and propose improvements valuable for consulting e-shop's management.

Main Elements' Definition

As already mentioned, our team decided to establish a certain time period in which all significant metrics will be examined.

The chosen time period is between January to March 2018 and the relevant period for year 2019, namely January to March. We examined these quarters, between two successive years, because we wanted to interpret audience behaviors and other indications that will lead us to form a better strategy for the relevant forthcoming quarter of 2020 [1, 2].

The next element that concerned us was what KPI's are interesting to be examined to form an interesting first metrics report with them. So, we ended up to the following:

[1] Wholewhale. https://www.wholewhale.com/tips/how-to-compare-periods-of-time-in-google-analytics/
[2] Oberlo. https://www.oberlo.com/ebooks/get-sales-dropshipping/data-analysis

KPI's

- Number of Visits per User
- Unique & Returning Visitors
- Visitors' Location
- Visitors' Demographics
- Users by Browsers & Devices
- Landing Pages
- Exit Pages
- Frequently visited pages
- Session Duration by Users
- Pages per Session
- Bounce Rate
- Bounce Rate by Browsers
- Average Page Load Time
- Conversion Rate

Furthermore, we answered the following questions in order to make useful comparative tables of the before-mentioned data (shown in the metrics report), so as to learn more about e-shop audience behavior, as well about our e-shop's performance [3]:

- What is our Audience?
- Do we have visitors who return to our site?
- What is our demographics' distribution?
- Is our website interesting enough for our users?
- Do we have any insights regarding browsers? May they have any issues?
- How is the website traffic developing?
- What is the website's organic traffic?
- Do we have quality in our traffic? How much time do the visitors need to convert or bounce?
- What is our pages speed?
- How much time do our visitors spend in our pages?
- How many pages are being visited?
- What is our conversion rate? Do visitors get what they need?

[3] Datapine. https://www.datapine.com/kpi-examples-and-templates/google-analytics?fbclid=IwAR1R3fix6TJuwHv9Z6wySNS_oICTMCjfOkjDx2D8SsMCwsIrH0MUq7l3ksw

Metrics Report (Part A)

Google Analytics Dashboards & Observations

Herewith, we presented our metrics report, consisted of the comparative tables between the years 2018 and 2019, with our observations for each one.

Audience Data

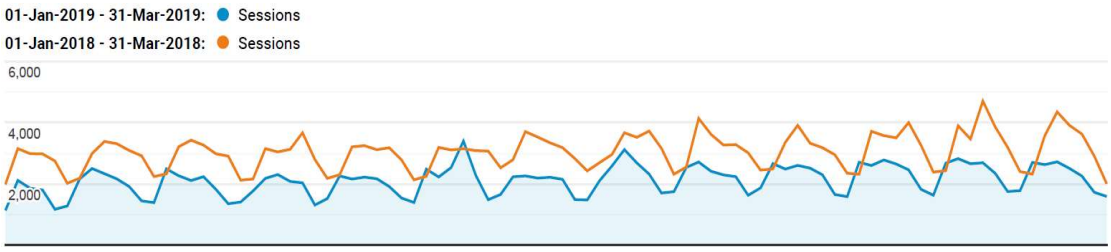
Users

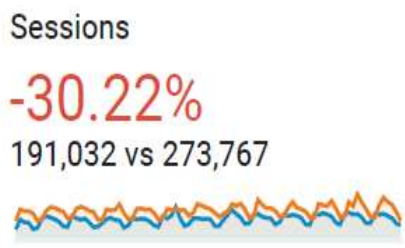
First of all we wanted to observe the audience of the site in the time period that we set. (January - March 2018 to January - March 2019)

According to google analytics we observe that both the number of Sessions and Users decreased compared to 2018. So, we should make a further investigation to find out what may be the cause for that and if that decrease is a significant one.

Sessions

We observe the same with Sessions as they decreased by 30% in 2019. Identifying the reason that such a decrease happened is vital for stopping the bleeding of traffic that is happening.



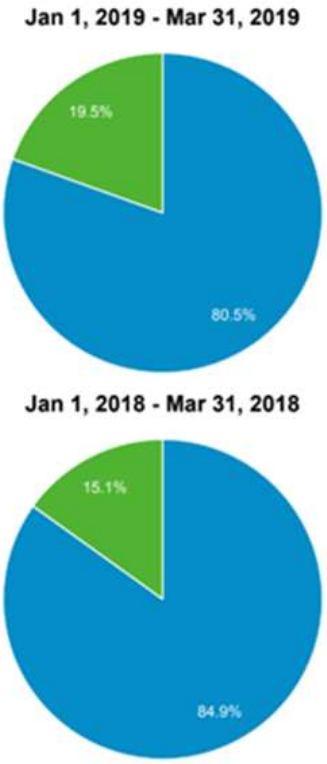


Number of unique and returning visitors:

In the time between January and March 2019 we found out that the larger amount of visitors are the new users and not returning ones. This may lead to the assumption that the interface of the site is not as interesting as to keep the users engaged. It could also mean that is not

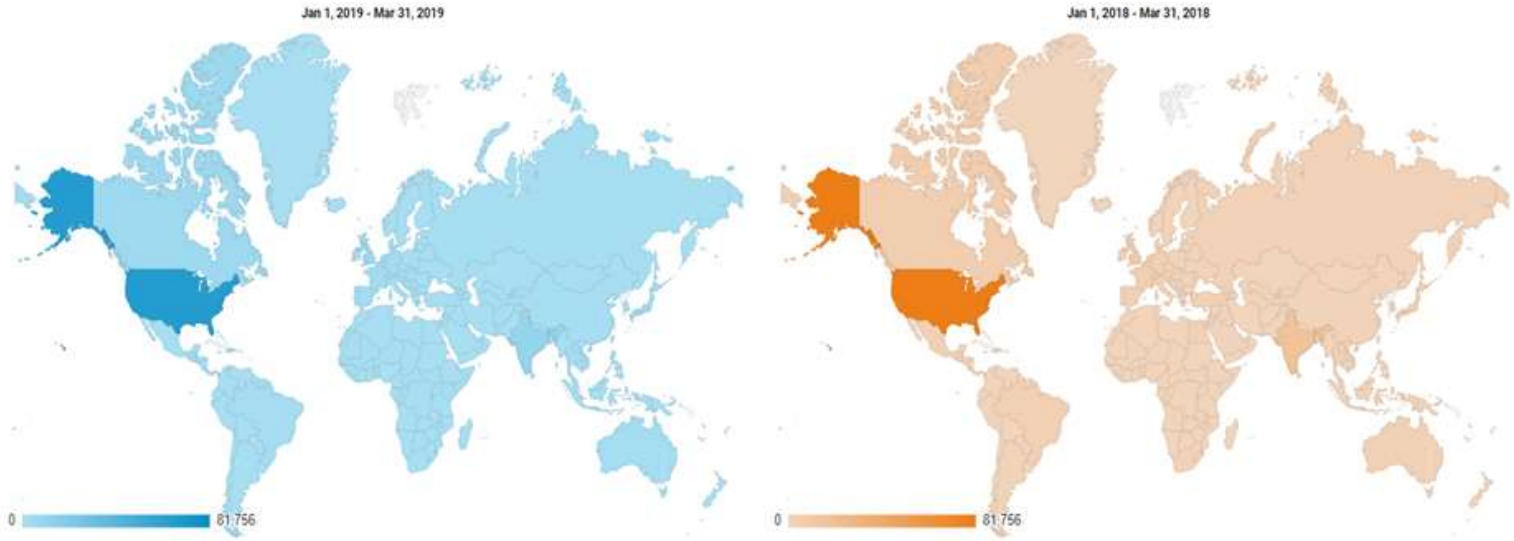
user friendly. By checking the correlation between new users and page views we could test that out and see if their percentage is significant.

User Type	Users ▼	Users	Contribution to total: Users ▼
	33.12% ↓ 139,333 vs 208,336	33.12% ↓ 139,333 vs 208,336	
1. New Visitor			
Jan 1, 2019 - Mar 31, 2019	**131,142**	80.47%	
Jan 1, 2018 - Mar 31, 2018	**200,749**	84.89%	
2. Returning Visitor			
Jan 1, 2019 - Mar 31, 2019	**31,821**	19.53%	
Jan 1, 2018 - Mar 31, 2018	**35,729**	15.11%	



Visitor's location:

We observe that our main audience in both 2018 and 2019 is USA. As for the distribution of users to other countries we see a rough difference. So, these insights will help us target the right audience, keep those users and even increase them in the future.

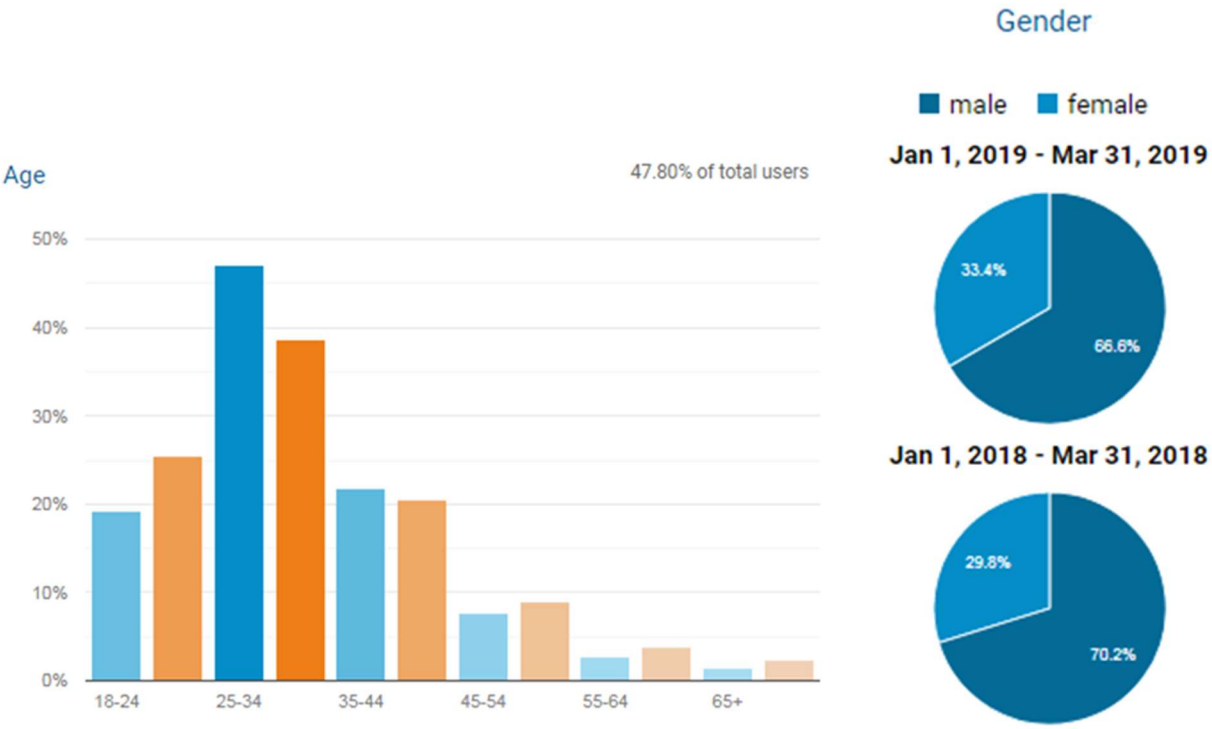


Country	Acquisition			Behaviour		
	Users	New Users	Sessions	Bounce Rate	Pages/Session	Avg. Session Duration
	33.12% ↓ 139,333 vs 208,336	34.32% ↓ 131,162 vs 199,701	30.22% ↓ 191,032 vs 273,767	14.63% ↓ 40.29% vs 47.19%	17.41% ↑ 4.56 vs 3.89	41.94% ↑ 00:03:01 vs 00:02:08
1. United States						
01-Jan-2019 - 31-Mar-2...	**65,784** (46.83%)	59,977 (45.73%)	97,296 (50.93%)	30.28%	5.55	00:03:32
01-Jan-2018 - 31-Mar-2...	**81,756** (39.11%)	75,306 (37.71%)	120,214 (43.91%)	34.38%	5.16	00:02:44
% Change	**-19.54%**	**-20.36%**	**-19.06%**	**-11.93%**	**7.63%**	**29.63%**
2. India						
01-Jan-2019 - 31-Mar-2...	**10,135** (7.21%)	9,744 (7.43%)	12,275 (6.43%)	51.71%	3.19	00:02:08
01-Jan-2018 - 31-Mar-2...	**16,859** (8.07%)	16,602 (8.31%)	20,024 (7.31%)	55.86%	2.64	00:01:28
% Change	**-39.88%**	**-41.31%**	**-38.70%**	**-7.42%**	**21.02%**	**45.81%**
3. United Kingdom						
01-Jan-2019 - 31-Mar-2...	**6,737** (4.80%)	6,081 (4.64%)	8,057 (4.22%)	51.84%	3.25	00:02:01
01-Jan-2018 - 31-Mar-2...	**8,775** (4.20%)	8,554 (4.28%)	10,457 (3.82%)	62.65%	2.49	00:01:17
% Change	**-23.23%**	**-28.91%**	**-22.95%**	**-17.25%**	**30.78%**	**57.18%**
4. Canada						
01-Jan-2019 - 31-Mar-2...	**5,497** (3.91%)	5,279 (4.02%)	7,511 (3.93%)	35.73%	4.76	00:03:31
01-Jan-2018 - 31-Mar-2...	**6,158** (2.95%)	5,979 (2.99%)	8,182 (2.99%)	39.10%	4.58	00:02:39
% Change	**-10.73%**	**-11.71%**	**-8.20%**	**-8.60%**	**4.02%**	**33.15%**
5. France						
01-Jan-2019 - 31-Mar-2...	**3,379** (2.41%)	3,201 (2.44%)	4,663 (2.44%)	53.21%	3.32	00:03:14
01-Jan-2018 - 31-Mar-2...	**4,453** (2.13%)	4,361 (2.18%)	5,610 (2.05%)	59.79%	3.08	00:02:11
% Change	**-24.12%**	**-26.60%**	**-16.88%**	**-11.01%**	**7.99%**	**47.57%**
6. Germany						
01-Jan-2019 - 31-Mar-2...	**3,315** (2.36%)	3,158 (2.41%)	4,037 (2.11%)	53.60%	3.44	00:02:08
01-Jan-2018 - 31-Mar-2...	**5,540** (2.65%)	5,390 (2.70%)	6,566 (2.40%)	61.39%	2.82	00:01:26

Other demographic data (gender, age):

By checking out the differences in various metrics between both genders we want to achieve a balance between the two. If the result is of significance then we need to examine what could be done furthermore to approach the lacking gender.

Also by checking for significant differences between the Age groups we can see how our content and landing pages perform differently in each age group and adjust it accordingly.

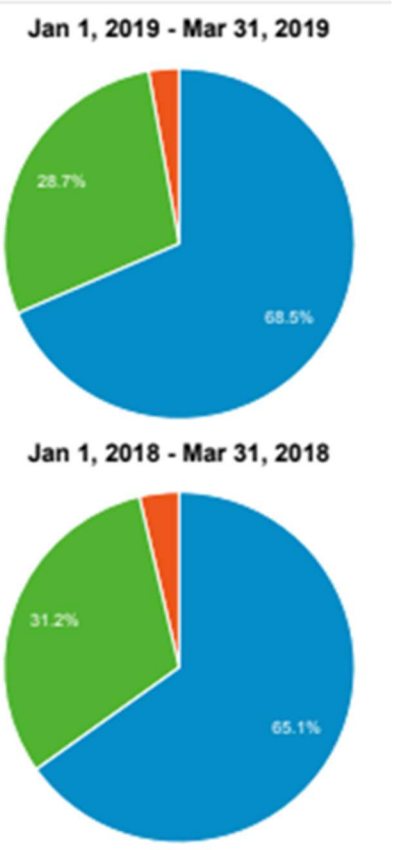


Browser and access device:

By comparing metrics of different browsers and devices that the users utilize, we can observe if there is a need for technical improvements (i.e bigger load times), if the interface of our page needs a change (i.e low conversion rate/ high bounce rate) and in general the digital behavior of our users.

1. Chrome		
Jan 1, 2019 - Mar 31, 2019	105,787	75.77%
Jan 1, 2018 - Mar 31, 2018	138,805	66.81%
2. Safari		
Jan 1, 2019 - Mar 31, 2019	22,905	16.41%
Jan 1, 2018 - Mar 31, 2018	30,928	14.89%
3. Firefox		
Jan 1, 2019 - Mar 31, 2019	3,873	2.77%
Jan 1, 2018 - Mar 31, 2018	7,330	3.53%

1. desktop	
Jan 1, 2019 - Mar 31, 2019	96,820
Jan 1, 2018 - Mar 31, 2018	134,840
2. mobile	
Jan 1, 2019 - Mar 31, 2019	40,505
Jan 1, 2018 - Mar 31, 2018	64,639
3. tablet	
Jan 1, 2019 - Mar 31, 2019	3,967
Jan 1, 2018 - Mar 31, 2018	7,562



Audience Behavior

Common exit pages:

From this analysis we ought to see from which pages the users leave our site. This is important because we can identify out of the ordinary pages that appear here (i.e other than home, checkout, basket and thank you pages) and then focus our testing on these pages to see what features of that page make users leave the site.

Two observations should be mentioned here. First, that Home page is the first exit page that can be explained from users psychology, that they always return to home page before exiting and secondly we observe that this page - /google+redesign/shop+by+brand/youtube – has a high exit rate, so interesting content may be missing or need of interface optimization.

Page	Exits ↓	Pageviews	% Exit
	30.22% ▼ 191,001 vs 273,700	18.07% ▼ 871,543 vs 1,063,778	14.82% ▼ 21.92% vs 25.73%
1. /home			
Jan 1, 2019 - Mar 31, 2019	**47,974** (25.12%)	161,375 (18.52%)	29.73%
Jan 1, 2018 - Mar 31, 2018	**75,507** (27.59%)	217,254 (20.42%)	34.76%
% Change	**-36.46%**	**-25.72%**	**-14.46%**
2. /google+redesign/shop+by+brand/youtube			
Jan 1, 2019 - Mar 31, 2019	**15,012** (7.86%)	30,942 (3.55%)	48.52%
Jan 1, 2018 - Mar 31, 2018	**52,308** (19.11%)	95,846 (9.01%)	54.58%
% Change	**-71.30%**	**-67.72%**	**-11.10%**
3. /basket.html			
Jan 1, 2019 - Mar 31, 2019	**12,260** (6.42%)	48,989 (5.62%)	25.03%
Jan 1, 2018 - Mar 31, 2018	**8,267** (3.02%)	51,589 (4.85%)	16.02%
% Change	**48.30%**	**-5.04%**	**56.17%**
4. /google+redesign/apparel/mens/mens+t+shirts			
Jan 1, 2019 - Mar 31, 2019	**6,811** (3.57%)	25,071 (2.88%)	27.17%
Jan 1, 2018 - Mar 31, 2018	**3,470** (1.27%)	9,110 (0.86%)	38.09%
% Change	**96.28%**	**175.20%**	**-28.68%**
5. /asearch.html			
Jan 1, 2019 - Mar 31, 2019	**5,937** (3.11%)	22,058 (2.53%)	26.92%
Jan 1, 2018 - Mar 31, 2018	**5,754** (2.10%)	18,583 (1.75%)	30.96%
% Change	**3.18%**	**18.70%**	**-13.07%**

Common Landing pages:

The following report shows that Home page is the first landing page for e-shop's searchers. As this is a common fact, effort should be made to keep it friendly and decrease its loading time.

Landing Page	Acquisition		
	Sessions ↓	% New Sessions	New Users
	30.22% ▼ 191,032 vs 273,767	5.88% ▼ 68.66% vs 72.95%	34.32% ▼ 131,162 vs 199,701
1. /home			
Jan 1, 2019 - Mar 31, 2019	**91,894** (48.10%)	69.47%	63,839 (48.67%)
Jan 1, 2018 - Mar 31, 2018	**125,093** (45.69%)	70.90%	88,693 (44.41%)
% Change	**-26.54%**	**-2.02%**	**-28.02%**
2. /google+redesign/shop+by+brand/youtube			
Jan 1, 2019 - Mar 31, 2019	**20,078** (10.51%)	89.14%	17,897 (13.64%)
Jan 1, 2018 - Mar 31, 2018	**76,121** (27.81%)	91.28%	69,484 (34.79%)
% Change	**-73.62%**	**-2.35%**	**-74.24%**
3. /google+redesign/apparel/mens/mens+t+shirts			
Jan 1, 2019 - Mar 31, 2019	**9,162** (4.80%)	82.34%	7,544 (5.75%)
Jan 1, 2018 - Mar 31, 2018	**7,017** (2.56%)	87.25%	6,122 (3.07%)
% Change	**30.57%**	**-5.62%**	**23.23%**
4. /store.html			
Jan 1, 2019 - Mar 31, 2019	**7,613** (3.99%)	70.60%	5,375 (4.10%)
Jan 1, 2018 - Mar 31, 2018	**4,817** (1.76%)	60.76%	2,927 (1.47%)
% Change	**58.04%**	**16.19%**	**83.64%**
5. /google+redesign/apparel			
Jan 1, 2019 - Mar 31, 2019	**5,300** (2.77%)	70.42%	3,732 (2.85%)
Jan 1, 2018 - Mar 31, 2018	**3,504** (1.28%)	68.32%	2,394 (1.20%)

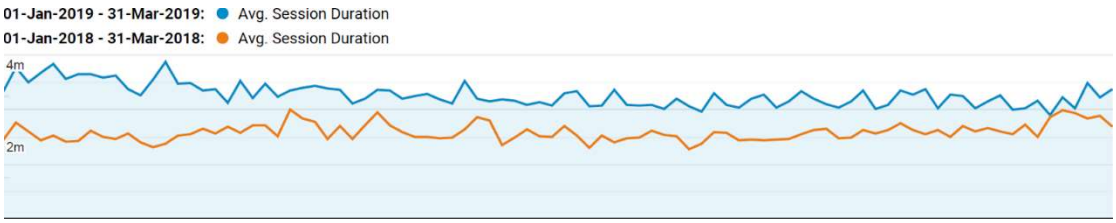
Frequently visited pages:

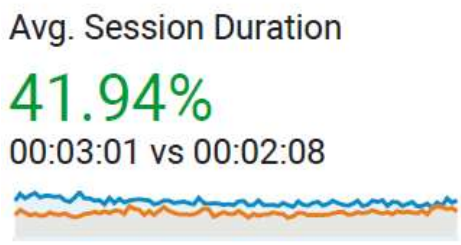
We noticed a decrease in views of most popular pages (including basket, home). In order to tackle this obstacle, it is vital to optimize and adjust our home & cart pages and add some more payment methods to the payment page. Suppose that we find that this difference is significant, we shall focus on what would make the users visit the home page and add products to the cart, even if they finish the transaction later.

Page	Pageviews
	18.07% ▼ 871,543 vs 1,063,778
1. /home	
Jan 1, 2019 - Mar 31, 2019	**161,375** (18.52%)
Jan 1, 2018 - Mar 31, 2018	**217,254** (20.42%)
% Change	**-25.72%**
2. /basket.html	
Jan 1, 2019 - Mar 31, 2019	**48,989** (5.62%)
Jan 1, 2018 - Mar 31, 2018	**51,589** (4.85%)
% Change	**-5.04%**
3. /google+redesign/bags	
Jan 1, 2019 - Mar 31, 2019	**33,964** (3.90%)
Jan 1, 2018 - Mar 31, 2018	**38,935** (3.66%)
% Change	**-12.77%**
4. /google+redesign/shop+by+brand/youtube	
Jan 1, 2019 - Mar 31, 2019	**30,942** (3.55%)
Jan 1, 2018 - Mar 31, 2018	**95,846** (9.01%)
% Change	**-67.72%**
5. /signin.html	
Jan 1, 2019 - Mar 31, 2019	**29,370** (3.37%)
Jan 1, 2018 - Mar 31, 2018	**42,975** (4.04%)
% Change	**-31.66%**

Length of time spent per visit:

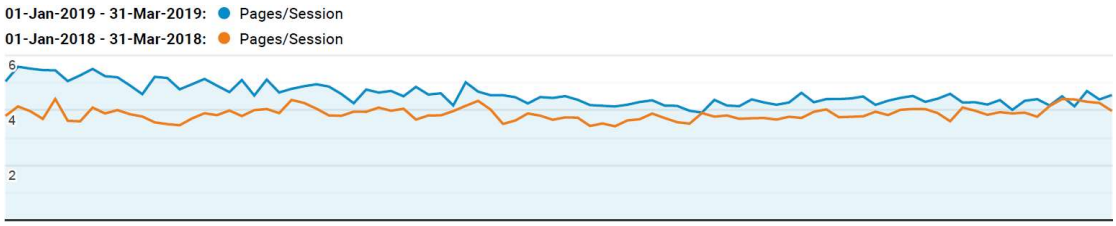
In most cases our clients spent only a few seconds on our page. In some cases this amount of time is zero. Clearly, this means that the users who reach us, aren't interested in any of our products. It is crucial for us to investigate the reason for this shortcoming. What we intend to test is if the difference between 2018 and 2019 is significant enough and if it is what we could do to raise the percentage even more.





Number of pages per visit:

The number of Pages per Session shows us how engaging our content is since users go further into our page. The 17,41% we see is a nice change of climate from the decreasing sessions and users we observed in previous reports.

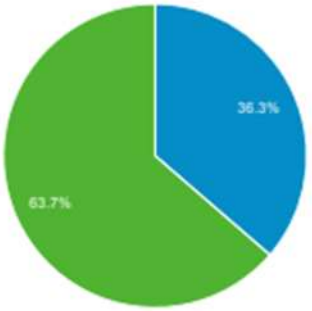


Bounce rate:

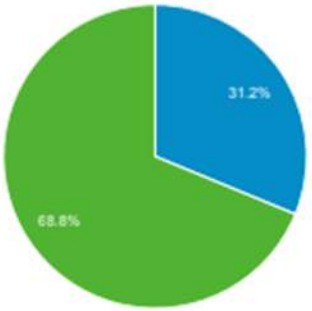
As bounce rate is the percentage of people leaving immediately our page without engaging with it at all, we obviously want it to drop each year. In general, we observe that Google Merchandise store has a medium bounce rate, and has decreased as shown in the dashboard, so this is quite a good indication. Anyway, it is of high importance that we should always make efforts to decrease it, so that users would stay on the e-shop and finally convert.

Gender	Bounce Rate ▼	Bounces	Contribution to total: Bounces ▼
	18.46% ⬇ 37.95% vs 46.54%	46.09% ⬇ 36,268 vs 67,276	
1. female			
Jan 1, 2019 - Mar 31, 2019	**41.22%**	36.34%	
Jan 1, 2018 - Mar 31, 2018	**48.84%**	31.22%	
2. male			
Jan 1, 2019 - Mar 31, 2019	**36.31%**	63.66%	
Jan 1, 2018 - Mar 31, 2018	**45.57%**	68.78%	

Jan 1, 2019 - Mar 31, 2019



Jan 1, 2018 - Mar 31, 2018



Conversion rate:

The bigger conversion rate a website has, the better.

The general picture, according to the dashboards below, is that pages that were already returning conversion rates in 2018, these also produced the conversions in 2019, in a little bit higher rate. Also, we observed that the general number of completions has decreased, so measure for action should be taken. Such measures can be conversion rate optimization strategy, optimize our mediums to complete conversions, test our site step-by-step, optimize its design, SEO, examine the offers, campaigns, offer guarantee on some products and provide high speed on loading e-shop's pages.

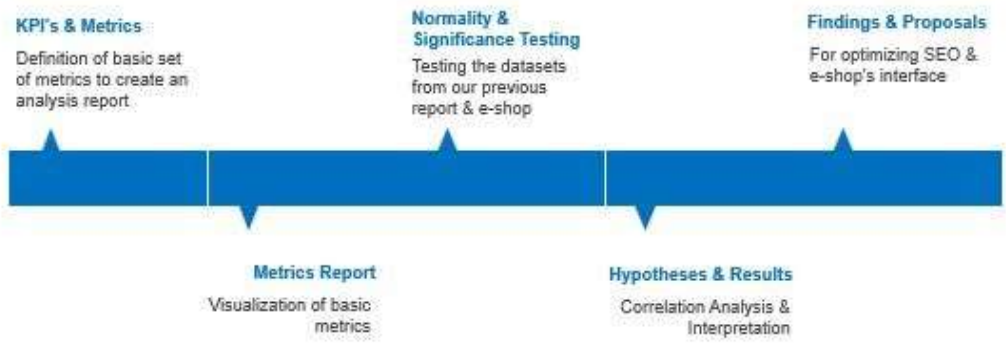
Furthermore, we see that Google & other referrals are the mediums we should mostly focus on to take actions & gain visits & conversions.

	Goal Completion Location	Goal Completions	% Goal Completions
1.	/yourinfo.html		
	Jan 1, 2019 - Mar 31, 2019	4,651	13.50%
	Jan 1, 2018 - Mar 31, 2018	2,594	4.78%
	% Change	79.30%	182.39%
2.	/basket.html		
	Jan 1, 2019 - Mar 31, 2019	3,950	11.47%
	Jan 1, 2018 - Mar 31, 2018	4,170	7.69%
	% Change	-5.28%	49.19%
3.	/home		
	Jan 1, 2019 - Mar 31, 2019	1,850	5.37%
	Jan 1, 2018 - Mar 31, 2018	2,699	4.98%
	% Change	-31.46%	7.95%
4.	/google+redesign/bags		
	Jan 1, 2019 - Mar 31, 2019	1,012	2.94%
	Jan 1, 2018 - Mar 31, 2018	1,258	2.32%
	% Change	-19.55%	26.70%
5.	/payment.html		
	Jan 1, 2019 - Mar 31, 2019	969	2.81%
	Jan 1, 2018 - Mar 31, 2018	254	0.47%
	% Change	281.50%	500.84%

	Source / Medium	Goal Completions	% Goal Completions
1.	google / organic		
	Jan 1, 2019 - Mar 31, 2019	13,170	38.24%
	Jan 1, 2018 - Mar 31, 2018	16,113	29.70%
	% Change	-18.26%	28.73%
2.	mall.googleplex.com / referral		
	Jan 1, 2019 - Mar 31, 2019	8,100	23.52%
	Jan 1, 2018 - Mar 31, 2018	11,498	21.20%
	% Change	-29.55%	10.95%
3.	(direct) / (none)		
	Jan 1, 2019 - Mar 31, 2019	7,966	23.13%
	Jan 1, 2018 - Mar 31, 2018	9,184	16.93%
	% Change	-13.26%	36.61%
4.	google / cpc		
	Jan 1, 2019 - Mar 31, 2019	1,761	5.11%
	Jan 1, 2018 - Mar 31, 2018	1,176	2.17%
	% Change	49.74%	135.84%
5.	Partners / affiliate		
	Jan 1, 2019 - Mar 31, 2019	939	2.73%
	Jan 1, 2018 - Mar 31, 2018	1,031	1.90%
	% Change	-8.92%	43.44%

Data Analysis (Part B)

Methodology used:



Parametric Methods

- Pearson r correlation
- Two sample t-test
- One way analysis of variance (ANOVA) test

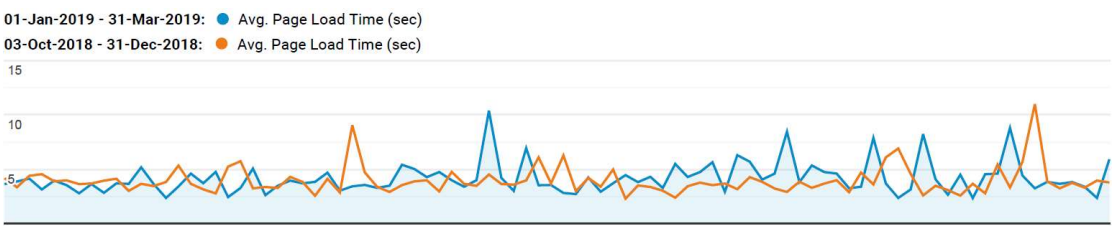
Non- Parametric Methods

- Spearman rank correlation
- Wilcoxon-Mann-Whitney (WMW) ranksums
- Kruskal–Wallis test

In this part of our work, we conducted normality tests both by visualizing the dataset with a QQ plot and by conducting a shapiro test for all variables. No pair of variables used in both correlation and difference significance tests were drawn from a normal distribution, so all of our tests were conducted with non- parametric methods. Therefore, for the correlation test we used the Spearman Test and for the significance tests we used Kruskal - Wallis followed by Wilcoxon-Mann-Whitney (WMW) rank (for testing two groups of variables) sums tests to determine the significance of the difference we observed in the reports. Below, we briefly present the findings of some of the tests we have conducted, which we picked because we believe will provide the best areas for improvement. The full process used and the rest of the tests can be found in the backup files attached.

Difference Statistical Significance tests

Avg. Page Load Time (sec) 2018 vs 2019

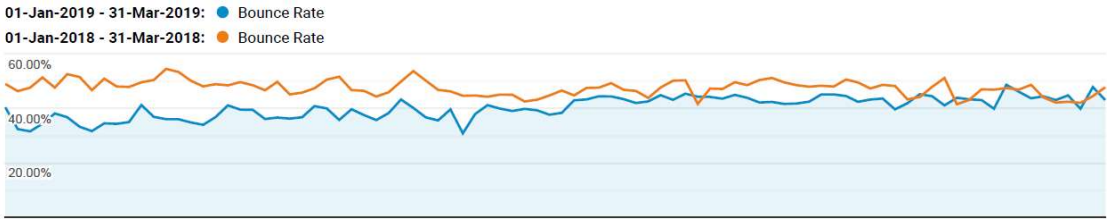


Why: We want to see whether our page is optimized better this quarter than last year's quarter.

Result: There is a difference between 2018 and 2019 which is statistically significant, The average page load time was bigger in 2018. That means that our page was optimised better.

Proposals: Focus and test each browser and device individually to prioritise each one differently and further reduce Avg. Load time in 2020.

Bounce Rate 2018 vs 2019

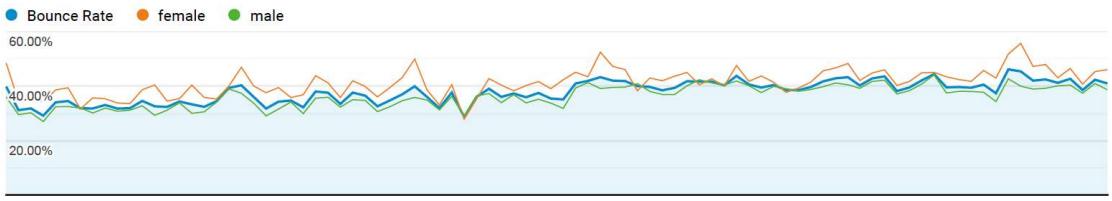


Why: This comparison can help us ascertain if the effort we put in during the year to reduce Bounce rate of our site paid off or was for nothing..

Result: The results here are statistically significant, so we can safely say that we managed to decrease the Bounce rate of our site year to year.

Proposals: Keep testing and finding problematic areas to further decrease Bounce rate in 2020.

Female - Male Bounce Rate



Why: We want our content to be engaging to both genders so we wanted to check whether the difference we noticed in our report was significant in order to adjust our content to engage the failing gender more.

Result: We checked that the difference we noticed is significant and the female bounce rate is bigger. We need to adjust our content towards female users.

Proposals:

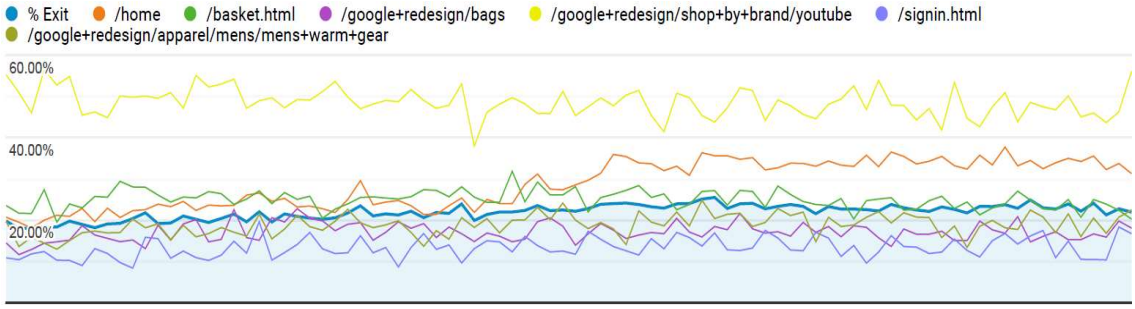
Keyword Optimization is a way to direct targeted people to specific pages in our e-shop. So, by setting the right keywords and keyword phrases corresponding to the right landing pages, certain groups of people that are specifically interested in our e-shop would be led to it and therefore bounce rate will be reduced.

Ads-targeting in the right group of people (women), while providing the content they like, would make them stay longer in the e-shop to buy or learn details about the products of their interest.

Another complementary proposal is to find the referral that provides the most women traffic and place more interesting topics regarding our e-shop in there that by clicking it, it will lead directly to the cart or to product description.

Or create a landing page friendlier to women's interests and needs and make the popular referral lead to it.

Percentage of Exit per Page

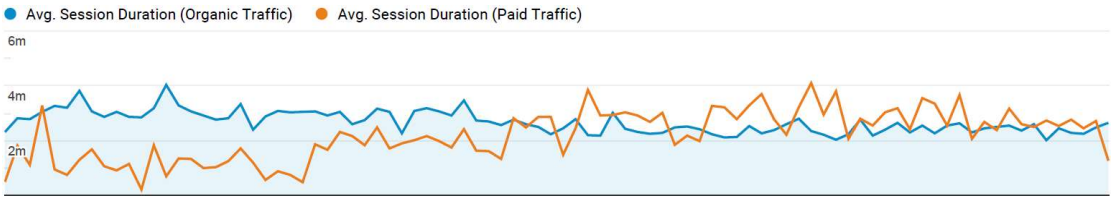


Why: This can be used to see if our users leave our site from different than expected pages (i.e not home, basket, checkout, thank you page).

Result: We checked the differences in percentages and results are statistically significant. In particular /google+redesign/shop+by+brand/youtube is the most frequent exit page which is unexpected.

Proposals: Investigate this page's UI and UX elements as well as the products offered in that page to identify what is pushing users away from this particular page.

Organic - Paid Session Duration



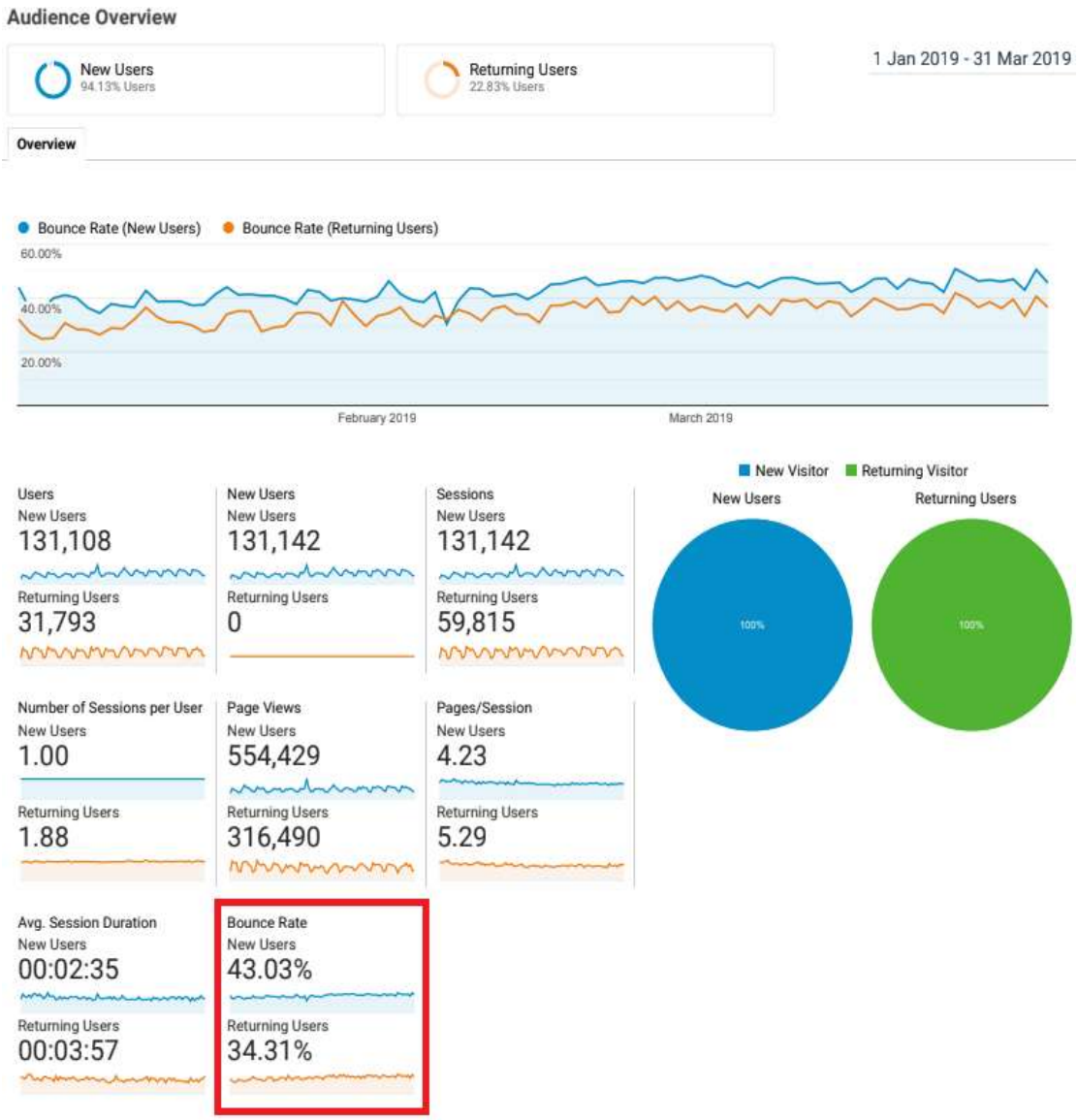
Why: This can be used to see if the leads generated from our paid ads are more engaged and stay more on our website than the organic ones.

Result: We checked that the result is statistically significant. The organic traffic session duration is bigger than paid so our paid leads quality is not on par with the organic ones.

Proposals: We need to better match our campaign content and copy and also the content of the pages so they complement each other to minimize the chance that paid

users come to our page with different expectations than organic ones so they are incentivized to explore our page more as organic users do.

New vs Returning User Bounce Rate

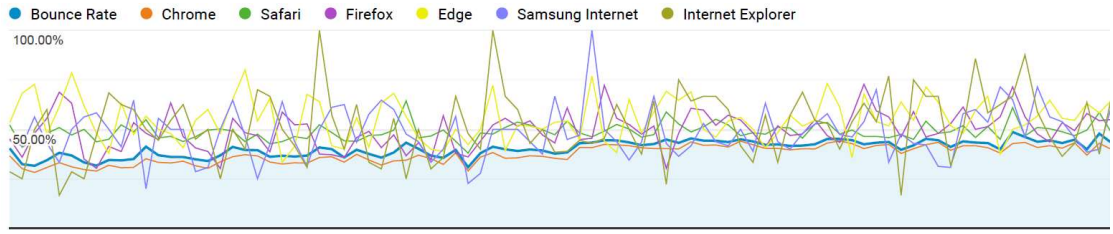


Why: To check if New Users do Bounce more so we can adapt our acquisition process to better qualify New Users and help them land on the appropriate content.

Result: We concluded that the difference between the two is significant. The Bounce rate for the New users is on average bigger than that of the Returning Users.

Proposals: Check underperforming traffic Channels in terms of Bounce Rate and revamp them to better match the user intent that clicks them and map them to the appropriate landing page.

Browser Bounce Rate

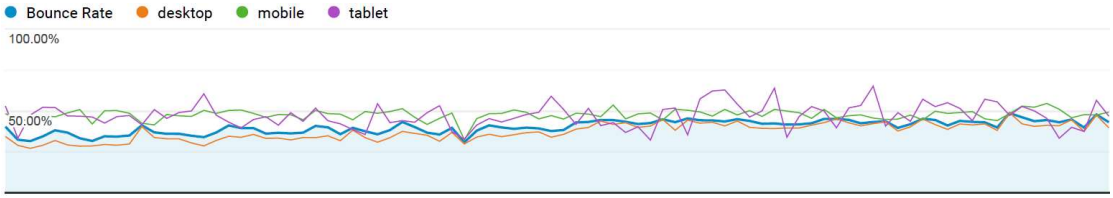


Why: This metric can help us identify lackluster browser performance on both the technical and UI side so we can redesign and optimise both aspects of the page.

Result: The results here are statistically significant. Seems that our page needs some adjustment and optimization to operate more fluidly in some browsers.

Proposals: Our best browsers are Chrome, Safari and Firefox. We need to prioritise the worst performing ones in terms of developer support (i.e updates with bug fixes or optimisations) to bring them up to speed with the others and the best performing ones in terms of advertising budget and effort.

Device Bounce Rate

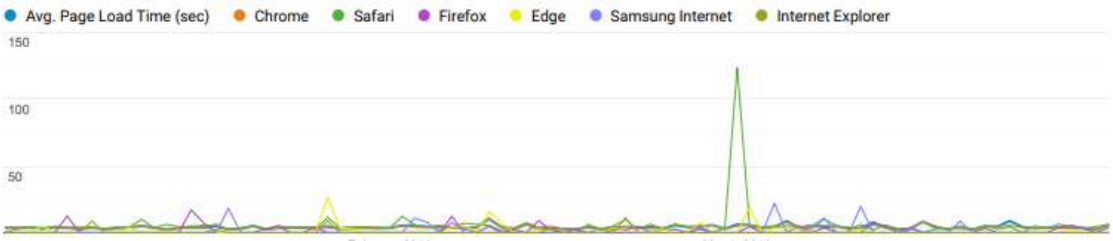


Why: This metric can help us identify scaling and compatibility issues with different screen sizes and operating system versions.

Result: The difference was checked to be significant regarding Desktop/mobile and Desktop/tablet, but not significant regarding mobile/tablet. Tablet bounce rate is by far the largest.

Proposals: This means that we need to focus most of our advertising efforts on our desktop version for further improvement and scaling while we invest technical resources to fix tablet and mobile issues.

Avg. Page Load Time Per Browser

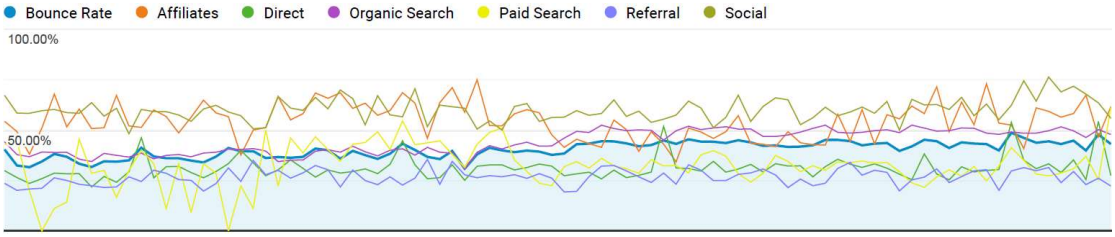


Why: To identify potential technical optimisation issues and inform the developers to fix them for better customer experience.

Result: In almost all the variables that we examined, we noticed that the difference was of statistical significance., Safari and Chrome had an increased load time which is alarming since these two browsers have the most traffic.

Proposals: Try to keep the load time under 4 seconds but prioritise Chrome and Safari (the main ones with the most Conversions and Revenue) and then the rest in terms of developer effort and resources while prioritising advertising on the best ones.

Bounce rate by Channel



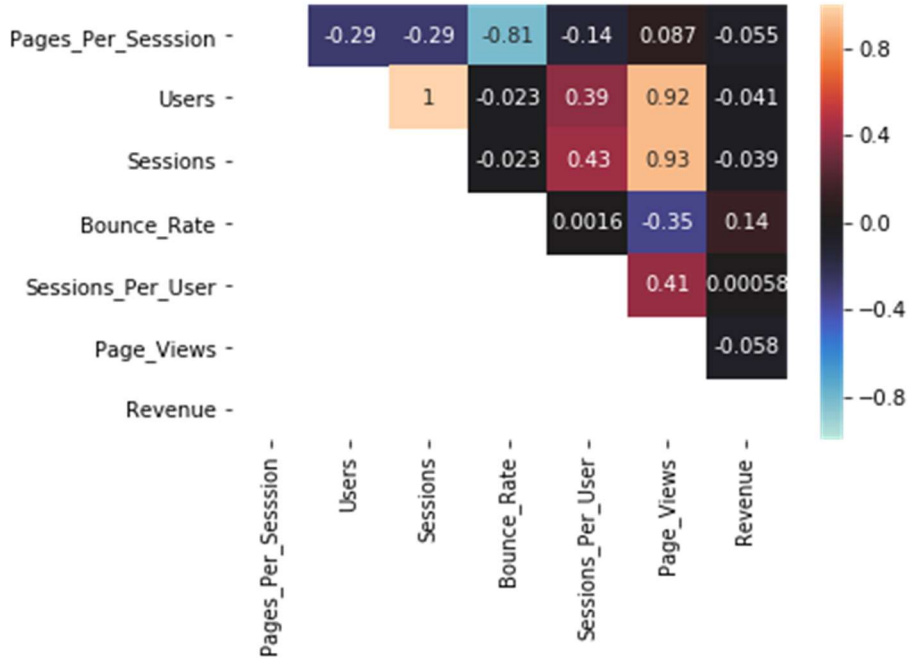
Why: As we concluded in the New vs Returning Users Bounce Rate we need to identify the channels that need either technical fixes or revamps in content to decrease bounce rate especially for first comers.

Result: Many variables are included (Organic search bounce rate, direct bounce rate, referral bounce rate, etc). In any case the difference was checked to be statistically significant. The best performing channels where Organic, Paid and Social.

Proposals: Prioritize the best performing channels (i.e Organic, Paid and Social) while revamping the landing copy and creative parts of the non performing ones to stimulate the users to engage with our content.

Batch Correlation test

Correlation Matrix of batch tested variables



P-Values of above test

	Pages_Per_Sesssion	Users	Sessions	Bounce_Rate	Sessions_Per_User	Page_Views	New_Users	Conversion_Rate	Revenue
Pages_Per_Sesssion	0.000000e+00	5.918755e-03	6.010701e-03	1.827236e-22	0.195920	4.146060e-01	1.539435e-04	4.071506e-01	6.061057e-01
Users	5.918755e-03	0.000000e+00	1.654701e-116	8.263892e-01	0.000159	2.034491e-38	8.707113e-66	1.132998e-02	7.023897e-01
Sessions	6.010701e-03	1.654701e-116	0.000000e+00	8.326522e-01	0.000022	6.866677e-39	2.171257e-63	1.236486e-02	7.132797e-01
Bounce_Rate	1.827236e-22	8.263892e-01	8.326522e-01	0.000000e+00	0.987907	7.998988e-04	3.452937e-01	3.029895e-01	2.006605e-01
Sessions_Per_User	1.959201e-01	1.585030e-04	2.153865e-05	9.879072e-01	0.000000	5.715305e-05	5.445043e-04	5.597084e-01	9.956883e-01
Page_Views	4.146060e-01	2.034491e-38	6.866677e-39	7.998988e-04	0.000057	0.000000e+00	3.631210e-28	2.471122e-02	5.844334e-01
New_Users	1.539435e-04	8.707113e-66	2.171257e-63	3.452937e-01	0.000545	3.631210e-28	0.000000e+00	1.812495e-02	9.085167e-01
Conversion_Rate	4.071506e-01	1.132998e-02	1.236486e-02	3.029895e-01	0.559708	2.471122e-02	1.812495e-02	0.000000e+00	1.702841e-12
Revenue	6.061057e-01	7.023897e-01	7.132797e-01	2.006605e-01	0.995688	5.844334e-01	9.085167e-01	1.702841e-12	0.000000e+00

Individual Correlation Tests

Organic and Paid Views:

Why: We wanted to see if more Paid Traffic leads to more Organic Traffic also.

Result: The two variables are positively correlated (as Paid Page Views Increase, Organic Page Views Increase) and the test result is statistically significant.

Proposals: As Searchers who see an ad may be more likely to click an organic listing, or Searchers who've been previously exposed to a site/brand via ads may be more likely to click>engage>convert or Paid results do strongly impact organic click-through rate, especially in certain queries or Paid ad clicks may lead to increased links,

mentions, coverage, sharing, etc. that can boost organic rankings or Bidding on search queries can affect the boarder market around those searches by shifting searcher demand, incentivizing (or de-incentivizing) content creation, etc, our proposal is to care to buy some crucial paid keywords, keyword phrases to accommodate our organic efforts.

Site speed and bounce rate:

Why: We wanted to check if any change (increase/decrease) in our Average Load Time is translated in increase/decrease to bounce rate.

Result: The two variables are positively correlated (as Average Load Time Increases, Bounce Rate Increases) and the test result is statistically significant.

Proposals: Focus on each browser and device individually to further reduce Avg. Load time. This will assist in lowering simultaneously the bounce rate.

Sessions per user and bounce rate:

Why: We intended to test, how a change in sessions per user is going to impact (positive / negative) the bounce rate

Result: The two variables are weakly positively correlated (as sessions per user Increase, Bounce Rate Increases slightly) but the correlation observed is significant.

Proposals: If the sessions per user increase, that means that the same user needs more sessions to "get" our message and proceed to action. And this increases the possibility of bouncing. So we need to reduce this number of sessions. To achieve this we need to simplify the processes in our website and make him aware that he's going to need the minimum number of steps to conclude a transaction.

Conclusions

From our metrics and data analysis report we have identified that there are plenty of solutions that Google Merchandise store could obtain in order to optimize its interface and its organic traffic, thus increasing conversion rate and gain sales and profit. We strongly believe that the overall yearly decrease in key areas can be overcome with the proposals we made in our analysis and with continuous A/B testing to two or more versions of the areas we highlighted. Lastly, we prompt the stakeholders of this report to further investigate the potential technical issues we raised and prioritise them accordingly.

Backup Files

(Attached in separate folder with the submission of the coursework)