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ANALYZING USER BEHAVIOUR AND PAGE VIEWS BASED ON VISITOR TRAFFIC IN KOLEJ UNIVERSITI POLY-TECH MARA WEBSITE USING GOOGLE ANALYTIC

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ABSTRACT

The approach of the Internet has affected organizations in numerous features. The website has become an integral part of the organizations, from publicizing the organization's profile to giving web services. This study is to evaluate and analyze user behaviour pattern at Kolej Universiti Poly-Tech MARA (KUPTM) website using Google Analytics (GA) as one of the web analytic tools. Website design and its services have become a crucial part for Higher Education Institutions (HEIs) to attract users in visiting their website. Therefore, the use of web analytic tools can be an effective solution in measuring, analyzing and identifying the traffic sources for a website. Google tag was added to all KUPTM's website and the measurement periods has been done between May 2019 and October 2019. Results have shown that the number of visitors is significantly higher during the weekdays and are affected by external stimulus. An external stimulus, such as promotional activities would increase the number of website visitors. The visit trends show weekly fluctuation in the numbers. It records high numbers of visits during the weekdays and fewer visitors during the weekend. The fluctuation could be due to the number of visits were from internal users, i.e. KUPTM employees and students. The capability of Google Analytics to analyze website traffics in terms of collecting data regarding page views, user interaction flow and visitor behaviour will benefit the organization for making a decision.

Keywords*: Web Analytics, Google Analytics, Education website, Page Views, Visitor Behavior, User Interaction Flow*

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1. Introduction

The website has increasingly become an integral part of organizations. Most of the organizations use the website to achieve marketing or business objectives. (Bleier *et al.*, 2018; Campbell & Schau, 2019; Du *et al.*, 2019; Eckhardt *et al.*, 2019; Gai & Klesse, 2019; Gebhardt *et al.*, 2019; Henderson *et al.*, 2019; Hughes *et al.*, 2019; Meire *et al.*, 2019; Sunder *et al.*, 2019). Organizations use a website that provides many types of services. The services

vary from site to site. The services contain e-commerce, transactional services such as tracking mail and shipping by providing services through Application Programming Interface (API) to other web services. Research by Pengnate & Sarathy (2017) emphasizes design features in a website is the main factor in convincing user's action and experience. It is because the user's action is typically based on their general impression of the website but not by the certain issues and functions of the website. This research studies the entire features in terms of website design, specifically in visual appeal as well as user-friendliness that can give a thorough explanation about user's action towards a website. As a result, they find out the visual appearance of the website will impact the user trust of the website content and user behaviour towards the website (Pengnate & Sarathy, 2017). Therefore, the website's design certainly a key factor in influencing user's behaviour towards the website. Thus, each organization need to be more careful when determining the design of their website. For that reason, making an attractive website can assist an organization in increasing a benefit, which is one of the most significant highlights of business achievement.

In the past year, Kolej Universiti Poly-Tech MARA has made an extensive and systematic effort to upgrade its website, in order to increase its presence in the digital world. An important component of the effort is the mobile centred design. This is due to an increasing number of website access through mobile devices. (Bartikowski *et al.,* 2018; McCorkindale & Morgoch, 2013; Ramos *et al.,* 2019). Mobile's access websites or applications also said to be a widely used method for marketing medium as it may attract the consumer easily. This is due to the application, or mobile version website is designed perfectly to the small screen of the handphone (Liu *et al.,* 2019)

Therefore, in order to gauge the effectiveness of the design, the website traffic and user navigation patterns were analyzed. User behaviour has been studied over the years to determine the design effectiveness (Bufquin *et al.*, 2019; Cyr & Head, 2013; Dianat *et al.,* 2019; Guan *et al.,* 2014; Scholz *et al.,* 2018). Understanding user behaviour enables either individual or organizations to gain valuable insights into how users perceive their products. This, in turn, will remove the guessing work whether the design is good or bad. It is because by discovering user behaviour, we can identify user activities such as their navigational path when visiting the website. Normally the user will follow multiple navigations to visit from one page to another page. User activities are stored in web server logs. These logs contain the sequence of web events generated by each user known as a click-stream (Hernández *et al.,* 2017). This kind of data is very valuable to be analyzed and study in order to improve website contents and structures. This will give website providers, in this case, KUPTM, ability to fine-tune and increase the number of relevant information or contents that are of interest to the visitors. Web analytic tools are usually used to gather information about a website (Fagan, 2014; Samarasinghe & Mannan, 2019; Saverimoutou *et al.,* 2019). There are two main methods for gathering information in web analytics. They are page tagging and using log files in web server known as web server logging (Apaolaza & Vigo, 2019; Buber & Diri, 2019; Liu & Kešelj, 2007; Wei *et al.,* 2018). Web server logging is a traditional method to collect data. Web server logging is less intrusive and does not require page modifications while page tagging has a number of advantages. To begin with, client scripts may have access to additional information about the client, for example, computer screen size and colour depth. Second, JavaScript can track client-side user actions or activities such as keyboard pressing and mouse clicking. This is particularly useful in today's context of rich internet applications (RIA). This method is normally used by third-party service providers, such as Google Analytics and Open Web Analytic (Zheng & Peltsverger, 2015).

This project will use Google Analytics as an analytic tool that will produce the desired outcome. Google Analytics has been used widely to analyze website traffics (Davidson *et al.,* 2018; Franzen-Castle *et al.,* 2019; Gordon *et al.,* 2016; M'ikanatha *et al.,* 2018; Pakkala *et al.,* 2012). In our research, we select Page tagging as the mechanism offered by Google Analytics

to track visitors. Page tagging used identification code or tag that are placed in pages that web providers want to track. The tag can be either a general tag used for general pages or customized to keep track of a certain event. The customized tag can be associated with 'add to cart button' for example, in an e-commerce site. Once the user arrived at the tracked page, the tag usually in JavaScript will send data to a server for later analysis. The information gathered may include from metrics on the number of page visitors, number of returning visitors to how long a user spends on the page or return on investment.

Compared to using tagging, which needs other services to receive data from tag's code, log files, on the other hand, passively log all interactions on a page. Data collected in the log file could be mined using programming languages, and type of information retrieved is richer than the common tag services (Dhanalakshmi *et al.*, 2017; Liu & Kešelj, 2007). In particular, for the website, the landing page is the first moment where the user is introduced to the website has to offer. The landing page contents are where users are directed to explore more on the website's contents and functionalities by clicking the provided hyperlink. Landing pages content may impact on user experience and impression of the website (Kromer, 2019; Scholz *et al.*, 2017; Stubb & Colliander, 2019).

Additionally, other analytic tools are significantly used in various area of research. Research by Muhammad & Zain (2018) discussed a project that applies an analytic tool which is Elastic stack tool for log data analytics purpose. There are varieties of ways how Elastic stack tool can be used to produce and generate data in terms of website performance improvement, network traffic monitoring, e-commerce optimization, marketing and many more. Besides that, a project by Ameen *et al.* (2019) shows there are several tools or methods used in analyzing or predicting data for decision making. It is offered by data mining tools and analytic tools in order to solve different cases and environment (Ameen *et al.*, 2019). Many researches in Educational Psychology (EP), Learning Analytics (LA) and Educational Data Mining (EDM) have been carried out to study and predict Students' Academic Performance (SAP), most especially in determining failures or dropouts to prevent the occurrence of the negative outcome.

This paper aims to analyze user behaviour from landing page in Kolej-Universiti Poly-Tech MARA through the implementation of Global Site Tag in Google Analytics (GA). Results show that by using Google Analytics; we can analyze website traffics in terms of collecting data regarding page views, user interaction flow and visitor behaviours.

This remainder of this paper is prepared as follows. The next section discusses the methodology used for this project. It will show the overall process that has been done to obtain the data of the user behavior. Then, the subsequent section will show the data gathered and depict the analysis based on the data recorded. A discussion about the finding also has been made in this section. Finally, a conclusion is drawn to describe the achievement of this project as well as some recommendation for future research.

2. Methodology

In this research, we apply the page tagging method provided by Google Analytics tool. Figure 1 depicts the process flow from the beginning until the end of the process. The process starts with the activity of request from visitors to access the website. However, initially, the website will be placed with a Google Analytics (GA) tag that is embedded in its backend. Once the website accessed by the user or visitor, the tag will trigger a data to be transmitted through its server. Data like tracking visitor will be pushed into a Google analytic database. Google Analytics can visualize the result obtained from the data collected through the implementation of the Global Site Tag element attached to our website. Google Analytics has been used to track visitors in website traffics (Soriano-Redondo *et al.*, 2017; Wozney *et al.*, 2019). Web

administrator can then view the report and monitor their visitors via dashboard based on the filtering options chosen.

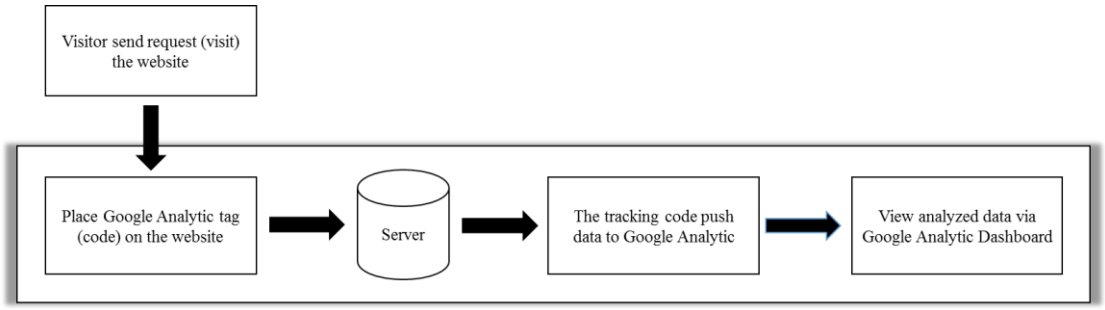

Figure 1: Process Flow

The implementation of analytic starts by requesting Google Analytics Tracking Code which can be obtained after creating or signing into the Analytics account at www.google.com/analytics. Next, web administrators need to set up a property which represents the website or app to be monitored in the Analytics account. We can find the given tracking code under this Property (Tracking Info) tab. It is also required to set up a reporting view by creating filtered perspectives of our data such as the total time a user spends on the website, technology used and others.

Finally, we need to insert this tracking code or GA tag or also known as global site tag (gtag.js) to the website code in order to measure how users interact with the website. The gtag.js is a JavaScript tagging framework and API that allows website administrators to send event data to Google Analytics, Google Marketing Platform and Google Ads. This global site tag is pasted immediately after the <head> tag on every page of the monitored website.

In our scenario, the GA tag or known as global site tag that is used to track KUPTM website traffic as placed on all KUPTM's website pages. Figure 2 shows the tag used to track the website. It was placed in the first entry after <head> html tag. The tag is identified by a unique id UA-xxxxxxxxx-x, where x is a number between 0 until 9.

```
<!-- Global site tag (gtag.js) - Google Analytics -->
<script async src="https://www.googletagmanager.com/gtag/js?id=UA-
   xxxxxxxxx-x"></script>
<script>
  window.dataLayer = window.dataLayer || [];
  function gtag(){dataLayer.push(arguments);}
  gtag('js', new Date());

  gtag('config', 'UA-xxxxxxxxx-x);
</script>
```

Figure 2: GA tag tracking code (gtag.js)

The measurement period was between May 2019 and October 2019. During this measurement period, normal promotion for student intake was carried out: - January 2019 and April 2019. A similar campaign was carried out before the measurement period in the first study. The campaign involved diverse media including traditional media, social media and MARA education fair venues.

3. Results and Discussions

Figure shows information from KUPTM's GA dashboard. The data was captured between 1st of July 2019 until 5th October 2019. The visit trends show weekly fluctuation in the numbers. It records high numbers of visits during the weekdays and less visitors during the weekend. This trends is also observed in a various recent and previous research papers (Holland *et al.*, 2020; Minatogawa *et al.*, 2020; Pakkala *et al.*, 2012). The fluctuation could be due to the number of visits were from internal users i.e. KUPTM employees and students. This is due to in relation to all internal users that are using the KUPTM's Wi-Fi facility are redirected to KUPTM's website once they were authenticated and a large part of the website caters for current students and employees. Therefore, we could conclude that most of the website visitors came from internal users during the weekdays. On the other hand, the external users are recorded to visit the website largely during the weekends. The website records the highest number of visits, six thousand sessions, on 4th September 2019. This trend is coinciding with the new academic session registration week for KUPTM.

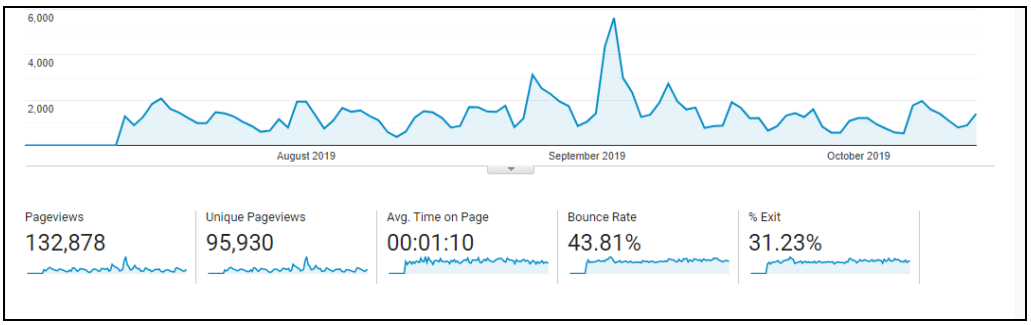

Figure 3: Visitor behaviour provided by Google Analytics dashboard from KUPTM website (daily data 1 July – 5 October 2019)

Table 1 shows the percentage of visits according to web page categories during the measurement period from 1st of July 2019 until 5th of October 2019. The pages are organized in six categories. KUPTM's academic programs categories consist of information about the programs from foundation to postgraduate program. Academic information categories contain information from the academic calendar to registration instructions. The information is mainly targeted to KUPTM's current students. KUPTM's information categories consist of pages that have information about the university such as history, the board of governors, the university's senate and contact information. And the last two categories are facilities and student activities. The highest page visited are pages pertaining to academic programs on offer followed by the index page. This can be contributed to the marketing and registration activities which took place between July and September 2019. This indicates that the marketing activities had generated interest to potential students to find further information about the programs and KUPTM. The marketing activities create opportunities to engage users with the brand and increase the number of interactions between the brands and their associated values with users. The association of benefits offered by the brand, in turn, increases the number of visitors (Holland *et al.*, 2020).

Table 1: Page views, measuring period 1 July - 5 October 2019.

Page categories	**Visits**
KUPTM's academic programs	41%
Academic information	13%
Index	37%
KUPTM's information	6%
KUPTM's facilities	2%
Student's activities	1%

Figure 4 shows how user interacts with the website from the first landing page. The landing page is the first web page a visitor reached a website. The figure also contains second and third interactions. These interactions indicate that users had followed the hyperlink provides at the landing pages. It also indicates a deepening interest to seek further information from the snippet or description provided about the link. Most of the visitors reached KUPTM's website through the index page. 50% of the visitors left the page after reaching the index page. This matches the previously discussed results that most of the KUPTM's website visitors are internal users. Around 40 per cent of the visitors interact with the website further than the other interactions. This indicates that to retain visitors' interest, the information provided must be compelling enough. The further the interactions or the deeper the interactions indicates more user engagement (Liu *et al.*, 2019; Minatogawa *et al.*, 2020).

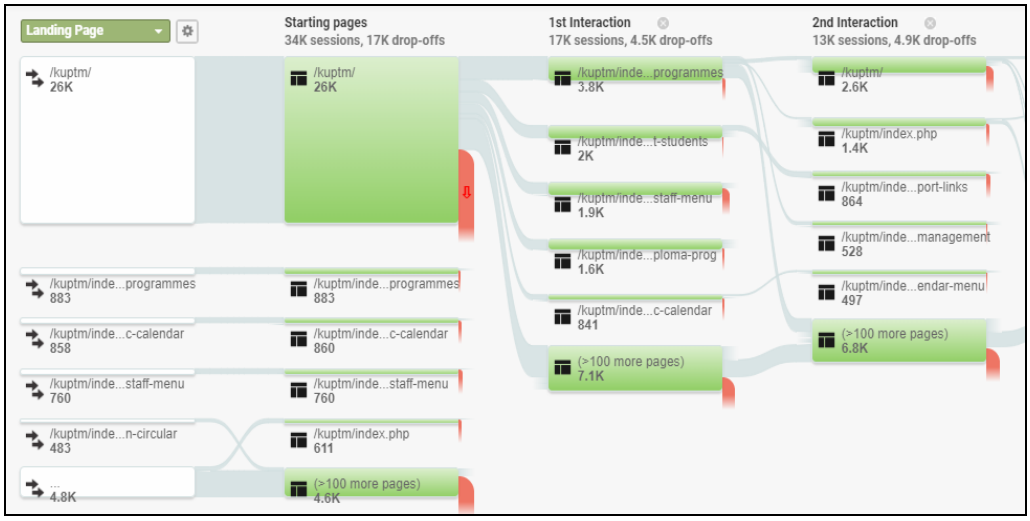

Figure 4: Visitor interaction flow from the landing page provided by Google Analytics from KUPTM's website

4. Conclusions

The usage of web analytic tools such as Google Analytics has provided a better solution in measuring, analyzing and identifying the traffic sources for a website. In this paper, we observe that the number of KUPTM's website visitors are mainly from internal users. User

visiting patterns fluctuates, where a higher number of visits were on the weekdays and reduce in the weekends. The number of visitors increased due to external activities such as promotional activities. These results were obtained by analyzing the page views, user interaction flow and visitor behaviour. In future works, this study can be enhanced by analyzing other components offered by Google Analytics such as understanding the technology used by the visitor to access site content because if mobile usage is down compared to other devices, then improvement should be made to mobile version of the site.

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