

Application of Analytical Hierarchy Process for Social Networking Site Selection among UUM Students

Zakiah Hashim^{1*}, Zurina Hanafi², Azatuliffah Alwi³, Ruzleeta Zakaria⁴, Lim Soo Lee⁵

^{1,2,3,4,5}School of Quantitative Sciences, College of Arts and Sciences, Universiti Utara Malaysia, 06010 UUM Sintok, Kedah, Malaysia

*Corresponding author: zakiah@uum.edu.my

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ABSTRACT

Social media has become an essential tool for communication and entertainment, particularly among students, with platforms like Facebook, Instagram, and TikTok gaining widespread popularity. This study examines the factors influencing the social networking preferences of Universiti Utara Malaysia (UUM) students. Using the Analytical Hierarchy Process (AHP), the study identifies four primary criteria namely content, privacy, usability, and functionality and evaluates three platforms: Facebook, Instagram, and TikTok. The findings indicate that UUM students prioritize content when selecting social networking sites (SNS), followed by functionality, usability, and privacy. Among the platforms assessed, Facebook was found to be the most preferred, with students favoring its variety of content and features over Instagram and TikTok. These findings offer valuable insights for SNS operators, advertisers, and administrators, enabling them to better understand the preferences of university students. By aligning strategies with students' decision-making factors, SNS platforms can enhance their engagement and meet the evolving needs of this demographic. The AHP model used in this study provides a structured approach to understanding student preferences, benefiting stakeholders aiming to optimize their platforms for this audience.

Keywords: social media, analytical hierarchy process, social networking sites, university students

1 INTRODUCTION

The popularity of social networking sites (SNS) has rapidly increased in recent years, gaining widespread recognition and accessibility due to the global reach of the internet. SNS include a diverse range of websites and applications, such as chat platforms like Facebook and Instagram, as well as online gaming and virtual worlds like YouTube and Reddit. These platforms are experiencing rapid growth and have become widely accessible channels for communication and entertainment, particularly among the younger generation [1]. According to [2], internet users spend an average of 144 minutes per day on social networking sites (SNS), an increase of more than 30 minutes since 2015. In 2021, the global social media user base surpassed 4.26 billion, with projections suggesting it will approach six billion by 2027.

As reported by [3], while Facebook remains dominant in the SNS landscape, platforms such as Instagram, LinkedIn, and YouTube are also widely used by SNS users in Malaysia. Additionally, TikTok is rapidly gaining popularity, particularly among younger consumers.

SNS have become essential platforms for communication, education, and entertainment across a wide range of age groups, including undergraduate students. Students widely use SNS, which have become increasingly popular and are recognized as valuable tools for education. The frequency SNS use has been shown to have both positive and negative impacts on academic performance and daily life. Furthermore, the choice of specific SNS platforms also plays a significant role in shaping these outcomes [4], [5], [6]. However, with the growing prevalence of social networks, undergraduate students face the challenge of selecting among various platforms. The purpose of this study is to investigate the priorities, preferences, concerns, and behaviors of social networking usage among undergraduate students at the School of Quantitative Sciences (SQS), Universiti Utara Malaysia (UUM), with a particular focus on selecting the most preferred SNS. Therefore, this study aims to apply the Analytic Hierarchy Process (AHP), a multiple-criteria decision-making method, to identify and prioritize the factors that undergraduate students consider when choosing an SNS. By utilizing AHP, the study seeks to determine which criteria are most important in students' decision-making process, providing valuable insights into their social networking preferences.

2 LITERATURE REVIEW

SNS are widely recognized as crucial tools in contemporary social and economic life. Social media encompasses a range of online platforms, such as blogs, forums, and well-known social networks like Facebook, LinkedIn, Twitter, YouTube, among others [7]. A previous study highlighted that the continuous global expansion of SNS greatly influences both daily life and various industries, particularly tourism and hospitality, with significant implications for marketing, business management, and research activities [8]. Based on a study conducted by [9], it was found that moderate engagement with SNS is associated with positive academic performance, while excessive use leads to a decline, emphasizing the importance of usage levels in influencing students' academic outcomes.

2.1 Factors Affecting the Selection of SNS

The study of selection criteria and choices in SNS is crucial, as it reveals users' priorities, preferences, and concerns in relation to their behavior on SNS and their broader consumer behaviour. There are four distinct criteria such as content, functionality, usability, and privacy that contribute to transforming social networking sites into influential and powerful tools. Over the past decade, virtual SNS such as Facebook, Twitter, and others have greatly enhanced the online environment by allowing users to share their ideas, opinions, and personal information through photos, videos, and other forms of media. However, [1] in their study found that there is a significant issue with the use of social networking sites by younger generations, particularly concerning the negative effects of content that can harm their emotional well-being. Furthermore, several studies have consistently examined the impact of SNS content strategies on user engagement behavior. The findings revealed that rational content, when presented in photo format, generates a significantly higher number of likes [10], [11].

[12] found that while college students spent considerable time posting personal updates on Facebook, they predominantly used the platform to view content shared by friends and stay updated on their activities without engaging in direct communication.

Functionality was identified as an important criterion for undergraduate students when selecting SNS [13], [14]. Currently, SNS offer functions that allow users to explore, identify, cultivate, and assess potential opportunities within specific markets through various online social applications. Studies by [15] revealed that college students predominantly use Facebook to connect with friends, whether they see frequently, rarely, or to make new acquaintances, often using the platform to organize offline meetings and events. [16] found that promotions displayed directly on Facebook walls have a greater impact, while [17] highlighted that micro-entrepreneurs' tendency to use social networking sites (SNS) for their businesses contributes to the effectiveness of market strategies in the business innovation sector.

A recent study on the usability of SNS has highlighted various aspects, including their impact on purchase intention and their role in enhancing user experience, with the overall usability of SNS emerging as a significant trend. [18] stated that higher website usability increases the likelihood of users remaining loyal to the site. A well-designed and usable website enhances user experience, fostering a greater sense of satisfaction, security, and confidence in the site. Meanwhile, [19] identified customer engagement as a key metric for evaluating the effectiveness of SNS and emphasized how SNS usability helps marketers in shaping their communication strategies.

Privacy awareness is the extent to which users are aware of privacy issues and possible violations as well as their comprehension of social media privacy procedures [20]. [21] found that college students exhibited a high level of awareness regarding privacy settings when using SNS. According to [22], students who are more aware of their privacy also worry more about the security features of SNS. Concerns about security and privacy both have a big impact on how much faith people place in social media.

2.2 Application of Analytical Hierarchy Process (AHP) in the Selection of SNS

The Analytic Hierarchy Process (AHP), developed by Saaty in the late 1970s, is a versatile decision-making method used in various fields to address complex decisions involving multiple criteria. This method enables the structuring of problems into hierarchical levels and the subsequent prioritization of the significance of each factor. Additionally, it allows for the quantification of alternatives, facilitating the collection of preference data from respondents.

[23] applied an AHP to select a SNS, identifying four key attributes namely content, functionality, usability, and privacy. [24] applied the AHP to determine the criteria and priorities in selecting SNS among college students from various public and private universities in Malaysia, with findings indicating a significant increase in privacy awareness and concern, as privacy threats could no longer be overlooked. A recent application of the Fuzzy Analytic Hierarchy Process (FAHP) in the selection of SNS was conducted by [13] among students at UiTM Perlis. The study found that Instagram was the most preferred SNS, followed by Facebook and Twitter, with the selection process being primarily driven by functionality, although content, usability, and privacy also played significant roles in shaping the decision. Meanwhile, [25] also employed a FAHP approach to evaluate and rank five popular SNS which are Instagram, Facebook, TikTok, Twitter, and YouTube among students at

Universiti Teknologi MARA Cawangan Kelantan (UiTMCK), using four primary criteria namely content, functionality, usability, and privacy and eight sub-criteria, with content being the most important criterion and advertisements as the preferred sub-criterion.

3 RESEARCH METHODOLOGY

3.1 Research Design

Figure 1 presents the research design, which provides a detailed description of the study.

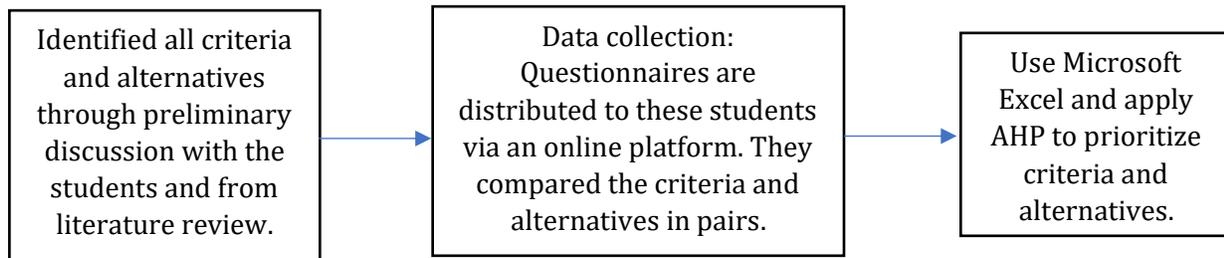


Figure 1 : Research design

Based on the preliminary discussion and review of past studies, four criteria (content, functionality, usability, and privacy) and three alternatives (Facebook, Instagram, and TikTok) were identified. The questionnaire was then distributed to undergraduate students from the School of Quantitative Sciences (SQS), UUM, through Google Form. A total of 100 SQS undergraduate students, including 25 males and 75 females, participated in this study. Through the questionnaire, participants assessed the relative importance and preference of the criteria and alternatives using a scale ranging from 1 to 9, as shown in Table 1. Finally, all the data collected from the questionnaire were input into Microsoft Excel and analyzed using the AHP to determine the priorities of the criteria and alternatives based on the responses of the 100 SQS students.

Table 1 : Preference scale for AHP pairwise comparison

Scale	Preference
1	Equally Preferred
3	Moderately Preferred
5	Strongly Preferred
7	Very Strongly Preferred
9	Extreme Strongly Preferred
2,4,6, and 8	Intermediate values

3.2 Model Development

An AHP model was developed in this study to identify the most preferred SNS among SQS undergraduate students. Several steps will be followed to construct the AHP model in this study. Firstly, the hierarchical structure is established according to the illustration in Figure 2.

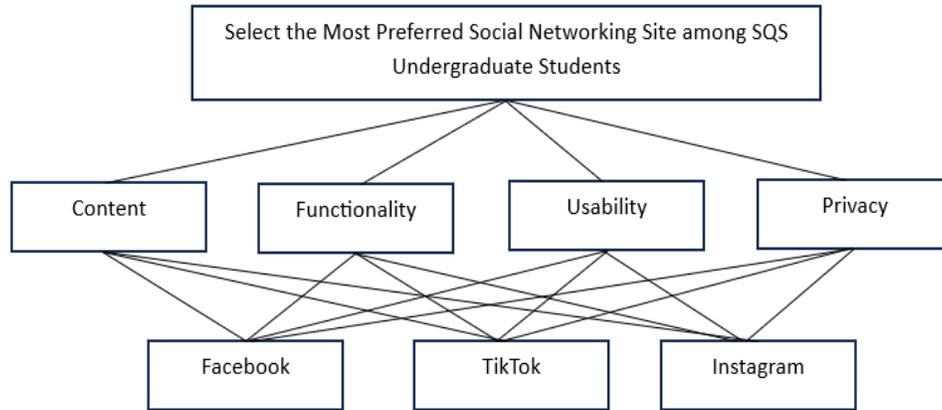


Figure 2 : Hierarchy structure of selecting SNS

This study identifies four criteria namely content, functionality, usability, and privacy for selecting a SNS, along with three SNS alternatives: Facebook, TikTok, and Instagram. Figure 2 illustrates the hierarchical structure, with the overall objective at the top, followed by the four criteria that contribute to achieving the objective on the second level, and the third level outlining how each of the three alternatives contributes to each of the four criteria. Secondly, the development of matrix using pairwise comparison is carried out. In a pairwise comparison, two SNS alternatives are evaluated based on a specific criterion, and a preference is established. Additionally, a pairwise comparison of the criteria will be conducted to rank them from most important to least important. A numerical scale ranging from 1 to 9, developed by Saaty, is used to assign values to various levels of preference, as shown in Table 1. The completed questionnaires are first analyzed and then converted into matrix format, as shown in equation (1).

$$M = \begin{bmatrix} 1 & a_{12} & \dots & a_{1n} \\ a_{21} & 1 & \dots & a_{2n} \\ \dots & \dots & 1 & \dots \\ a_{m1} & a_{m2} & \dots & 1 \end{bmatrix} \quad (1)$$

The above matrix is used to compute the weight for each alternative and criteria using Microsoft Excel. The synthetization process is then conducted to derive the preference matrix, which allows for the calculation of the overall score for each decision alternative. The next stage in the AHP calculation involves determining the Consistency Ratio (CR) of the ratings. The consistency ratio assesses the degree of consistency in the respondents' judgments, who are regarded as experts, in relation to one another. For decisions to be considered trustworthy and reliable, the Consistency Ratio (CR) must be

equal to or less than 0.10 [26]. The Consistency Index (CI) must be determined prior to calculating the Consistency Ratio (CR). Equation (2) presents the formula for calculating Consistency Index (CI).

$$\text{Consistency Index (CI)} = \frac{\text{Average of Consistency Measure} - n}{n-1} \quad (2)$$

Where n denotes the number of rows in the matrix.

The Consistency Ratio (CR) calculation is as presented in equation (3):

$$\text{Consistency Ratio (CR)} = \frac{\text{Consistency Index (CI)}}{\text{Random Index (RI)}} \quad (3)$$

The Random Index (RI), established by [26] is outlined in Table 2:

Table 2 : Random index

n	2	3	4	5	6	7	8	9	10
RI	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.51

If the degree of consistency is below 0.10, the results are considered acceptable; otherwise, the pairwise comparison procedure must be reevaluated and repeated until an acceptable result of 0.10 or lower is achieved.

4 RESULTS AND DISCUSSION

This section begins with an overview of the demographic information of the surveyed SQS students. It then presents the results of the priorities assigned to the criteria and alternatives in selecting SNS by SQS students. Finally, the section provides a detailed discussion of the observations and implications derived from the AHP results. In this study, a total of 100 participants were gathered through an online survey. The demographic information was shown in Table 3 below.

Table 3 : Demographic profile

Demographic	Classification	Frequency
Gender	Male	25
	Female	75
Ethnicity	Malay	13
	Chinese	72
	Indian	13
	Others	2

Time spends on SNS per day	1 - 2 hours	5
	2 - 3 hours	10
	3 - 4 hours	20
	4 - 5 hours	22
	5 hours and above	43

In terms of gender, the number of female respondents (75%) was higher than that of male respondents (25%). Specifically, 43% of the respondents reported spending approximately 5 or more hours per day on social networking sites, while only 5% used the sites for 1 to 2 hours per day. This indicates that most SQS undergraduate students engage extensively with SNS. The high level of internet usage among college students has attracted the attention of various marketers.

Table 4 : Overall ranking for criteria

Criteria	Preference vector	Ranking
Content	0.4855	1
Functionality	0.2461	2
Usability	0.1615	3
Privacy	0.1069	4

According to the AHP analysis, the results presented in Table 4 display the priority of criteria among 100 SQS undergraduate students. Content is identified as the highest priority, with the highest preference vector of 0.4855, indicating that it is the most significant factor for students when choosing SNS. Functionality ranks second, with a weight of 0.2394, followed by usability with a weight of 0.1615. Privacy is ranked last, with the lowest weight of 0.1069. This study indicates that SQS undergraduate students place the highest importance on content when selecting SNS. High-quality content can effectively engage users, encouraging them to return to the platform regularly. Internet users often encounter posts and news on popular SNS, which helps maintain their ongoing interaction with these platforms.

The overall score for each SNS is determined by multiplying the values in the criteria preference vector by the corresponding preference matrix for each SNS. The product of this multiplication produces the AHP ranking for the three SNS, as shown in Table 5.

Table 5 : Overall ranking for SNS selection

SNS	Score	Ranking
Facebook	0.6064	1
TikTok	0.2696	2
Instagram	0.1240	3

The most preferred SNS among SQS undergraduate students is Facebook, with a score of 0.6064, followed by TikTok (0.2696) and Instagram (0.1240). The previous analysis clearly shows that Facebook ranks highest across all four criteria: content, functionality, usability, and privacy. An article by [27] emphasizes Facebook's role as a major source of information, allowing users to stay updated on the latest news and global events. This highlights the significant content on Facebook, which contributes to its top ranking. In terms of functionality, Facebook offers a wide range of features that cater to students, providing a platform for users to interact with friends, join networks and groups, share photos and videos, create discussions, organize events, promote products, write comments, and stay updated with the latest news. Regarding usability, Facebook again outperforms both TikTok and Instagram. Its global popularity can be partly attributed to its user-friendly interface, which is often praised for being straightforward and easy to navigate. Even novice users can quickly grasp and utilize all of its features. Facebook provides convenient tools for students to post and share photos and videos. Additionally, it offers advanced privacy settings, allowing users to control who can view and like their content. As a result, Facebook stands out as a secure platform for sharing photos with a selected group of individuals.

5 CONCLUSION

In conclusion, this study demonstrates the value of the AHP method in understanding the decision-making process behind SNS selection among university students. By identifying content as the top priority, followed by functionality, usability, and privacy, the study highlights the importance of engaging and high-quality content in maintaining user engagement. The preference for Facebook among SQS undergraduate students further emphasizes the role of content and platform features in shaping social media choices. The insights provided by this study can serve as a valuable resource for SNS operators and marketers, offering a deeper understanding of student preferences and guiding the development of more effective and targeted marketing strategies. Overall, the application of AHP in this context not only contributes to the academic understanding of SNS selection but also holds practical commercial value for enhancing user engagement and improving social media communications.

A limitation of this study is the sample size, which is restricted to 100 randomly selected SQS undergraduate students for AHP analysis. Consequently, the preferences and behaviors identified may not be fully representative of the broader student population, particularly those from different institutions or regions. Given potential regional differences in the popularity

and use of specific social networking sites, the findings may not be generalizable to students from other geographical areas or cultural contexts. Future research involving a larger and more diverse sample would be beneficial to improve the external validity of the results. A future research agenda could also benefit from incorporating a more extensive set of criteria, covering a broader range of SNS. Additionally, researchers should consider including additional variables that contribute to a more holistic understanding of the factors influencing SNS selection.

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