Social Media Platform Recommendations for aZen Networks

An Interactive Qualifying Project

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Abstract

This project aims to provide aZen Networks with a ranking of five social media platforms- Instagram, Facebook, TikTok, Twitter, and Pinterest- in order of effectiveness for affiliate marketing. These platforms were evaluated on three major factors- Platform characteristics, Openness, and Virality, these were meant to encompass all relevant features pertaining to affiliate marketing. The data for these factors was collected from databases and direct observation and interaction with platforms. Data analysis was completed through Analytic Hierarchy Process (AHP), Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), and Simple Multi-Attribute Rating Technique (SMART) and sensitivity analysis was performed to determine the validity of results. The final platform ranking is Instagram, Facebook, TikTok, Twitter, Pinterest. Future recommendations include exploring other platforms and improving the robustness of the methodology with a higher sample size.

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Executive Summary

Affiliate Marketing

This project aims to provide aZen Networks, the sponsor company, with a ranking of platforms in order of effectiveness for social media affiliate marketing. aZen Networks is a novel affiliate marketing company that differs from traditional methods in its quantity over quality approach. Affiliate marketing involves a business hiring an affiliate to promote a product to customers; it is a three-layered marketing strategy encompassing businesses, affiliates, and customers. A common variety of affiliate marketing, and the one most relevant to this project, is influencer affiliate marketing. In this approach, the affiliate is an "influencer" or a person with a large following on social media and therefore has considerable influence over their audience. They promote a product and encourage their followers to purchase using a unique URL that attributes the follower's purchase to the influencer's promotional efforts. The influencer often earns a commission from each purchase that comes from their link, making affiliate marketing a very low risk marketing option as it only incurs a charge when promotion is successful.

aZen Networks

aZen Networks modifies this approach by creating a "collective influencer." Instead of hiring a small number of people with large social media followings, aZen Networks allows anyone to join the network regardless of following. These people promote products to a much smaller audience, but because there are so many aZen Networks users, the overall reach is comparable to typical influencer marketing.

Project goal

aZen Networks is a young project and therefore could benefit from an understanding of affiliate marketing effectiveness on different social media platforms. This project aims to provide aZen Networks

with this information in the hopes it will assist them in allocating time, effort, and resources in platforms that provide them with the most return. aZen Networks provided five social media platforms of greatest interest to them that require evaluation. Thes platforms include Instagram, Facebook, TikTok, Twitter, and Pinterest.

Methodology

The platforms were evaluated based on three major factors: platform characteristics, openness, and virality. Platform characteristics include information about platform features and information about platform users. Openness is defined as how simple it is for users to find each other or platform interconnectedness. Virality refers to the likelihood with which a post can amass a considerable number of likes, comments, views, shares, or other relevant metrics. These three major factors include several subfactors. Each platform was evaluated on a total of fourteen factors. The data for these information points was found using either secondary data sources such as Statista database or collected through primary data acquisition and observation interacting with platforms. Once data was collected, the Analytic Hierarchy Process (AHP), Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), and Simple Multi-Attribute Rating Technique (SMART) were used to evaluate factors and rank the platforms using original factor data and inputs from aZen team members.

Key Findings

The final platform ranking is Instagram, Facebook, TikTok, Twitter, Pinterest. Instagram consistently scored highest for AHP and TOPSIS and was the most consistent top performer after a robust sensitivity analysis. It was second place for SMART but by a slight margin. Facebook was consistently ranked second place using all ranking analysis methods and stayed second throughout most of sensitivity analysis. TikTok was ranked third by AHP, last by TOPSIS, and first by SMART. It has the largest variety of scores from any platform, but it averages out to third place and sensitivity analysis

solidifies that position. Twitter and Pinterest were very closely ranked by the analytical methods, but Twitter was able to score slightly higher than Pinterest. Twitter was ranked fourth by AHP and SMART and third by TOPSIS. Pinterest was ranked fourth by AHP and TOPSIS, but last by SMART. However, Pinterest is ranked first when virality was prioritized during AHP sensitivity analysis, so it receives a large boost from that factor.

Recommendations

We recommend aZen Networks consider how they are conducting affiliate marketing on Instagram, as well as Facebook and TikTok, as analysis on these platforms indicates they are strong options. It is important to note every platform has its strengths and weaknesses which are shown by sensitivity analysis. As mentioned before, Pinterest has a particularly high virality score, therefore if a specific marketing campaign needs to go viral, Pinterest may be the better option as opposed to our first-place platform, Instagram.

There is also value in this project for aZen Networks from gaining an understanding of the analysis methods used to rank the platforms. AHP, TOPSIS, and SMART are all useful ranking methodologies for making managerial and business decisions. These methods were unfamiliar to aZen Networks before the project but are established tools for comparing and ranking alternatives which will be beneficial for the company in the future.

For future work we recommend looking into more platforms than the five researched in this project as there are still many platforms with great potential for affiliate marketing. There are also several steps that could be taken to improve the robustness of results. One option would be to increase the sample size of various data points. For example, the factor exploring the metrics of viral posts on platforms was done using only one social media account. If this data had been collected from multiple accounts, it would have improved results. This difficulty is explained more in-depth in the limitations

section. Increasing the number of responses to our survey sent to the aZen Networks employees to weigh factors for AHP and SMART analysis would have improved the accuracy of those weights. However, getting more survey responses would have involved asking people outside of aZen Networks to respond to the survey, which was not possible due to time constraints.

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1 Introduction

This interactive qualifying project (IQP) aims to satisfy the needs of our sponsor, aZen networks. This company provides an affiliate marketing service with a unique business model. Affiliate marketing is a marketing variety in which a company pays an individual with a large social media following, an "influencer," to promote their products. This influencer is considered an affiliate. When their followers purchase promoted products, the influencer earns a small amount of revenue.

aZen Networks adaptation of this model is to create a "collective influencer" where many people with smaller followings promote products instead of a few influencers with large followings. They utilize existing affiliate programs such as the Amazon affiliate program or Shopee Affiliate program. These programs give users an "Associate ID" so they can create affiliate links and place these links on their social media posts. When viewers of these posts click the links, Amazon or Shopee will pay their Associate ID (Suman, et al., 2022).

aZen Networks users can post premade advertisements on their social media accounts. They can promote these products by liking, sharing, commenting, and or other social media activities on potential consumers accounts. When people click these links and purchase products, the users earn a small commission in the form of "zEna token" a cryptocurrency made by aZen networks.

aZen Network is a consolidation of three separate apps: aZen Connect, aZen Hub, and aZen AI (artificial intelligence). All three are components of the aZen network and work together to provide both an affiliate marketing service and earn revenue for its users. aZen Connect is for users of the network, aZen Hub is for merchants, and aZen AI is a self-operating app meant to generate passive income for users. The AI app will log into user's secondary accounts and post advertisements for them, generating money for the user with no human input. These advertisements can be either AI generated or designed by a human.

aZen networks is a new company and requires market research into which social media platforms, marketing strategies, and types of products will be the most conducive to its success. As the business model relies on user postings, there is also a need for a large and active community. aZen Networks is focused on answering these questions; this project will address some of these issues.

To address this need, this IQP project will focus on determining which social media platforms are most effective for aZen networks' needs. Five main platforms of interest: Instagram, Pinterest, TikTok, Facebook, and Twitter- decided by aZen networks- will be analyzed in depth. This analysis will be completed using three factors: platform characteristics, openness, and virality. The specific research question is: what is the ranking of the platforms of interest in terms of fit for affiliate marketing? To answer this question data was collected on fourteen factors relevant to social media affiliate marketing and subsequent analysis using the ranking methodologies AHP, TOPSIS, and SMART.

Platform characteristics include details about platform users and platform features (Perrin, 2015). The openness factor represents social connectedness on social media. Openness will be determined by how easy it is for people to make accounts, the ratio of public and private accounts, and restrictions on multiple accounts (Cho, et al., 2019). Virality is defined as the ease by which a post can amass a considerable number of views and likes or other engagement metrics on a given platform (Puriwat, et al., 2021). Further detail and justification on the use of these factors for evaluation of social media platforms is discussed in section two. The information from this initial data acquisition and analysis will give aZen Networks an understanding of the current state of affiliate marketing on social media and allow them to decide how they want to fit into the marketplace.

The need is clear. Without knowledge of suitable platforms, aZen Networks may face significant challenges in effectively reaching its target audience. The success of their business model relies heavily on user engagement and promotion through various platforms. In summary, the success of aZen

Networks hinges on a comprehensive understanding of the social media landscape. Without this information, they risk inefficient resource allocation, misalignment with target demographics, and a diminished ability to build a large, active community. The project's emphasis on analysis and comparison of social media platforms is not only a necessity but also an important step toward ensuring the long-term viability and success of aZen Networks in the competitive world of affiliate marketing.

This report details our actions to achieve our project goal of ranking platforms in terms of fit for affiliate marketing and provide aZen Networks with valuable information. The following section, background, provides essential information on affiliate marketing and its history that are useful for understanding the context of the project. It also contains details on aZen Networks business and the factors we chose to rank platforms, their explanations, and justifications. Next is the methodology which recounts where data points were sourced from, provides explanations of the decision models AHP, TOPSIS, and SMART and how they were used in this project, and explains how the surveys were written and conducted. The findings and results sections present the data collected from the three decision models, their rankings, and highlight any notable results. The limitations section describes any steps in our process that may have biased or affected results or steps that could have been improved if approached in a different way. Finally, the conclusion sections summarize the major findings of the project, provide recommendations for future work, and give suggestions to aZen Networks on how this project can be useful to them.

2 Background

The background section of this report provides a comprehensive overview of affiliate marketing, explains aZen Networks business model and use of affiliate marketing. Given the importance of evaluating the platforms detail on the factors used in the platform ranking as well as their justifications represents a substantial portion of this section. Affiliate marketing is described in sections 2.1 Affiliate

marketing and 2.2 Historical context of affiliate marketing. Section 2.3 aZen Networks and affiliate marketing outlines the relationship between aZen Networks and affiliate marketing, and the final section 2.4 Factors for platform comparison provides explanations of all fourteen factors and reasons for their selection.

2.1 Affiliate marketing

Affiliate marketing is a marketing method that involves a company paying an online personality or influencer to drive customer traffic to their products (Suman, et al., 2022). It involves three major units- businesses, affiliates, and customers as shown in Figure 2-1.

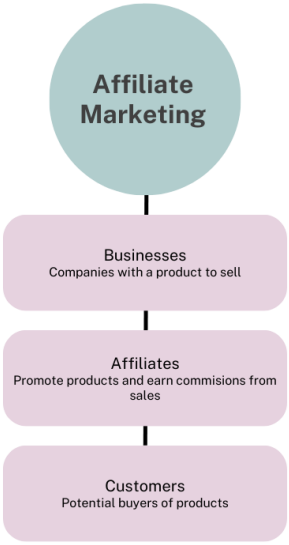

Figure 2-1. The three components of affiliate marketing

These components engage with each other on numerous levels. There are business-to-business (B2B) and business-to-customer (B2C) marketing connections, although B2B affiliate marketing is less common than to B2C affiliate marking. There is also a business-to-affiliate (B2A) relationship as the business must collaborate and compensate them. This compensation could be a flat rate or a

commission; commission is often the preferred choice as it makes the affiliate marketing performance based. (Suman, et al., 2022).

By leveraging a large network of affiliates, businesses can greatly expand their reach and number of sales. The influencer includes a link to the product in their post and is compensated every time a follower uses their link to purchase the product. Affiliate marketing can be more cost-effective for companies as they only pay a commission when a transaction occurs, and a sale is finalized. (Dwivedi, et al., 2017). An important factor in optimizing return on affiliate marketing is understanding the type of content and attitude of users specific to each social media platform. For example, long-form content commonly seen on the video-sharing platform YouTube, promotes a more intimate and trustworthy connection with the influencer, while short-form content, common on TikTok, has less interpersonal connection, but can generally reach a larger audience.

When an influencer creates a trustworthy image for their followers, the followers feel more inclined to purchase from the influencer because of their reliability as opposed to an advertisement from an unfamiliar source (Abdelhady, et al., 2020). This is one reason why a solid understanding of the differences between social media platforms is important; marketing campaigns can be made to complement the distinct attributes between platforms. Whether more viewers but a less personal connection or fewer viewers but a stronger, trustworthy connection would be better for sales is an important consideration for a company.

Affiliate marketing may be a lower risk advertisement model compared to traditional methods. With many people now using advertisement blocking programs, advertisements that are built into a social media influencer's content are more likely to reach potential consumers. This embedded content can have more impact on consumer impressions of products than traditional pop-up or banner advertisements. Frequent internet users tend to disregard these types of display advertisements. These

traditional displays have lost efficiency as the internet has matured and incur a cost every time a user is shown a display ad, whereas affiliate links are commission based and their expense comes from the number of successful transactions (Mazurek, 2011).

Although affiliate marketing sounds advantageous in this context, it also has drawbacks. If a company needs to promote a product quickly, they may not be interested in affiliate marketing as it is often difficult to predict the success of a product's performance. Additionally, depending on the success of the affiliate campaign it could be cheaper for a company to take a more traditional approach because there is a certain cost, and it does not increase as a product gains popularity.

2.2 Historical Context of Affiliate Marketing

The same concept of affiliate marketing has been seen much earlier with referral systems and commission-based sales, but the pioneering program is widely considered to be PC Flowers & Gifts (Venugopal, et al., 2013). Launched in 1989, the company sold flowers and gift items, but embraced the dot-com boom of the late 20th century and worked to establish a robust online presence. Recognizing the need for cost-effective methods to drive traffic and generate sales, PC Flowers & Gifts established the first affiliate marketing program, understanding the potential of leveraging a network of affiliates to enhance online visibility. Businesses and individuals were able to earn commissions on sales generated through their referrals. This performance-based marketing approach had its advantages over traditional advertising methods. This approach was extremely successful for PC Flowers & Gifts resulting in them generating an excess of six million dollars per year by 1993, and while it was viewed as a "marketing toy" at the time, it has since become a staple of online marketing practices due to its success (Venugopal, et al., 2013).

The first company to use affiliate marketing on a larger scale was Amazon with its Amazon Affiliate Program. It is one of the largest affiliate programs in use and has had great success and

longevity since it began in 1994. Any individual can sign up to become an Amazon affiliate; it is very simple and has a low barrier of entry. Amazon affiliates can choose what products they want to promote and earn a small percentage of sales through their unique affiliate link. Amazon has a wide variety of products, providing affiliates with diverse opportunities for promotion (Kaur, 2018).

These programs were facilitated by technological advances such as the rise of the internet and subsequent growth of e-commerce and developments in tracking capabilities. An important component of affiliate marketing is the ability to attribute a purchase to an influencer so they can be appropriately compensated. Originally this attribution was done through unique URLs, but the technology has advanced to the point where information can be stored on a user's device to track their activity beyond a single browsing session, and even across devices. This flexibility means affiliates can be attributed to a purchase even if it is not immediate. While this capability is very useful for affiliate marketing, it has led to some privacy concerns for consumers. To address this concern, countries have introduced new privacy legislation which is becoming more difficult to adhere to. Many emergent country or region-specific regulatory stand as potential barriers to affiliate marketing (Amarasekara and Mathrani, 2016).

Affiliate marketing is a fast-growing industry as the current marketing environment is dominated by digital marketing, of which affiliate marketing is a subcategory. It is a multi-billion-dollar industry and accounts for around ten percent of all e-commerce sales. Seventy-five percent of companies use affiliate marketing while ninety-five percent of companies believe it is profitable (Suman, et al., 2022). It allows companies to take a more hands-off approach to their marketing practices; they find a few affiliates to do the marketing for them and can use the social media analytics and information from their sales as metrics for success (Suman, et al., 2022).

2.3 aZen Networks and Affiliate Marketing

Affiliate marketing employs various strategies to drive online sales and revenue. The most well-known instance of this is influencer marketing, where affiliates create content such as tutorials or reviews, and naturally integrate affiliate links to these posts. Social media plays a crucial role in affiliate strategies, as influencers leverage their following to promote products and services. Aside from influencer affiliate marketing, there are alternate strategies such as e-mail marketing which entails affiliates sending targeted messages containing affiliate links. There are also data driven strategies which utilize analytics to optimize campaigns and target specific audiences. Ultimately, successful affiliate marketing involves a dynamic combination of these strategies, tailored to the affiliate's niche, audience, and promotional channels.

aZen Networks is employing a new model of affiliate marketing, with some shared elements to preceding affiliate programs, but has a unique characteristic in its creation of a "collective influencer." Taking advantage of the wide reach of the internet and its billions of users, aZen Networks uses a quantity over quality approach where they encourage people, regardless of the size of their social media following, to post affiliate links and engage with posts to market products. Even though these people may have a much smaller reach than a well-known influencer, if there are thousands of aZen Network users, the overall impact will be the same. aZen Networks has their largest user base in Africa and South-East Asia, where the US dollar has a much higher purchasing power, and therefore if they can expect to earn ten USD per month from their affiliate marketing efforts, which will be a considerable amount for them.

Due to the nature of aZen Networks affiliate marketing design, they require information about the platforms they advertise on both about the features of platforms and characteristics about users of

these platforms. This project attempts to provide aZen Networks with useful information on these topics by ranking social media platforms on relevant attributes.

2.4 Factors for Platform Comparison

To quantify the suitability of social media platforms for affiliate marketing, a set of criteria were chosen which represent important factors for success. These factors were subdivided into three factors: platform characteristics, openness, and virality (see Table 2-1 for the major criteria, and sub-criteria definitions, and references). Platform characteristics pertain to both user demographics and available features of social media platforms. Openness is the "connectiveness" of the platform, or in other words, how easy it is to find and engage with other users. Virality refers to the ease with which a post can go "viral" or amass a considerable number of likes, views, comments, or shares. Table 2-1 shows a complete list of all the criteria used to rank platforms along with definitions and their sources. The- sources labeled aZen Networks are factors specifically requested by aZen Networks and their selection process is explained further below.

Table 2-1. List of factors with extended definitions and source.

Major Factor	Sub Factor	Definition	Source
Platform Characteristics	Userbase size	The percent user market shares the platform has.	aZen Networks
Platform Characteristics	Userbase income	The percent of the users on a platform that are high income.	Li, et al., 1999
Platform Characteristics	Time spent on platforms	The average daily time spent in minutes on a platform.	Akar, et al., 2011
Platform Characteristics	Presence of shop features	The number of shopping features present.	Saprikis and Avlogiaris, 2021
Platform Characteristics	Percent advertisers using influencer marketing	Percent of advertisers using influencer marketing on a platform.	Bashar, et al., 2012 Pradiptarini, 2011
Openness	Ease of opening new accounts	The number of information points needed to create an account.	aZen Networks
Openness	Allows multiple accounts	If the platform allows multiple accounts from a single user.	aZen Networks
Openness	Public/private accounts	The percent of the userbase that sets their accounts to “private” mode.	aZen Networks
Openness	Recommendation page	If the platform has an algorithmic recommendation page.	Chen, et al., 2004
Openness	Recommend posts from non-friends	If the platform recommends posts from users outside the friend group.	aZen Networks
Openness	demotes off-links on posts	If the platform demotes posts with links to other websites.	Dolega, et al., 2021
Openness	Region based recommendation	If the algorithm considers a user’s region.	aZen Networks
Virality	Number of engagement methods	The number of engagements methods available. Includes, liking, commenting, etc.	Chattopadhyay, 2020
Virality	Metrics on public posts	The number of likes and comments on a mixture of popular posts.	Spiller, et al., 2015

Platform characteristics are crucial for affiliate marketing. These characteristics help tailor marketing strategies to the preferences and behaviors of the platform's users. Additionally, thorough knowledge of a platform's features allows for the most effective utilization of marketing techniques and maximizes the potential for success. For aZen Networks specifically, the size of the user base, the average amount of time spent on the platform, user income, whether it has a "shop" feature, and the amount businesses spend advertising on the platform are important aspects to consider. The number of platform users was a factor aZen Networks requested because a larger user base will increase the potential number of viewers of an advertisement as there are simply more people using the platform. Research implies a positive correlation between frequent internet and social media use and favorable attitudes toward social media marketing. This suggests that individuals who spend more time on these platforms are more likely to respond positively to advertising efforts (Akar, et al., 2011). Consequently, our consideration of the average time spent on each platform is substantiated by the belief that extended user engagement enhances the potential effectiveness of aZen Networks' advertising initiatives.

Research also indicates that individuals with higher incomes are more inclined to make online purchases (Li, et al., 1999). A "shop" feature on a social media platform which allows for direct purchases, makes online shopping more "convenient" and "rewarding" for users thereby having a positive effect on the platform's transactions (Saprikis and Avlogiaris, 2021). The final consideration of platform characteristics is the amount businesses spend advertising on a particular social media platform. Businesses must use engagement marketing principles to be successful following the growth of e-commerce (Bashar, et al., 2012). Where businesses spend their money is important as the nature of a platform affects the attitudes of people to online advertising. One study found that, of the companies they analyzed, more spent money marketing on Twitter rather than Facebook despite the larger user base because Twitter's more conversational format helped drive sales. Different platforms have

different effects on sales and companies have done a lot of research into which ones are the best for their strategies. Taking note of their marketing decisions should prove useful for the goal of platform ranking (Pradiptarini, 2011).

aZen Networks business model relies on smaller accounts recommending posts to other users. An open social media platform that allows for easy communication with new people is paramount for the success and growth of aZen Networks. However, as they do not follow the typical affiliate marketing model with only a few select influencers with large followings marketing products, there are several specific factors that are crucial only to aZen Networks. These include the amount of information needed to open an account, if a social media platform allows one user to open multiple accounts, the ratio of public to private accounts, and if the platform's algorithm segments are based on region. These considerations are not essential from a standard affiliate marketing approach but are included in this project because of the unique concept of aZen Network's marketing strategy. aZen Networks has a majority of their user base located in Africa and Southeast Asia where there are potentially more barriers to registering for a social media account. Therefore, the number of information fields required to open an account is considered in the platform ranking. The less information and, as a result, ease of access to a social media platform is considered positive towards a platform. The location of the aZen Networks users also means an algorithm that segments based on region is not an ideal feature. Some social media platforms are known to promote posts from the same general area as a user instead of promoting posts on an international basis. This would make it difficult for an aZen user from Indonesia for example to promote to a potential customer based in the United States.

The need for aZen users to increase their audience on their posts means that having multiple accounts is an important asset for them. More accounts give them a greater assortment of viewers and allow them to reach more areas of the platform. A platform with a higher ratio of private accounts will also hurt aZen user's ability to reach potential customers. Typically, aZen users rely on interacting with

posts in the form of likes and comments to supplement their smaller followings. It is difficult to do this with private accounts as they are often impossible to reach unless they are friended.

Whether or not users can be recommended posts by non-followers is similarly an important consideration. The vast majority of aZen users will not be following the people they are advertising products to. One method to overcome this segmentation of platforms is a “for you” page or an area of the platform where users are recommended posts an algorithm thinks they will like based on their previous activity. Research has found product recommendations are successful at increasing sales, making this a useful characteristic for platform comparison (Chen, et al., 2004). There are, however, some platforms that demote offsite links. Social media has been found to increase web traffic of promoted products, so if offsite links are often blocked on a platform that will hurt online sales (Dolega, et al., 2021).

The final major factor to determine the potential of success for aZen Networks on social media platforms is virality. A platform where it is much easier for a post to amass a large number of views, likes, comments, and shares will be exceedingly important for aZen Networks’ business model. To quantify this ease of virality, two factors will be considered- the metrics of public posts and the number of available engagement methods. The metrics of public posts is intended to quantify the likelihood of virality. If one platform’s “viral” posts seem to have a greater number of views, likes, comments, or shares compared to the “viral” posts of a different platform, that platform is likely a better fit for online marketing. In the social media marketing field, post metrics are considered a useful tool for determining the success of marketing campaigns; a greater number of positive post metrics indicates a greater viability of marketing success on the platform (Spiller, et al., 2015). Engaging with users is important to standard affiliate marketing as users feel more inclined to purchase products from an affiliate when they have a more trustworthy, personal connection with the influencer (Chattopadhyay, 2020). For aZen

Networks, being able to engage with users through likes and comments for example will help them connect with potential customers and potentially drive sales.

This IQP project aims to address an issue that has not seen significant research. One similar study evaluating social media marketing techniques through thematic analysis also acknowledges "research into social media strategy is limited." (Keegan, 2017). This paper has a similar format to ours with identification of performance indicators, in our case identification of relevant platform factors, followed by data collection and analysis to inform business decisions. They used thematic analysis as their information was more qualitative and text based which makes that an appropriate approach. In our case, the data was more quantitative and therefore called for different analysis methods and we found the most appropriate to be the Analytic Hierarchy Process (AHP), TOPSIS, and SMART.

3 Methodology

Social media platform recommendations in this study revolve around an evaluation of three distinct factor categories: Platform Characteristics, Openness, and Virality. To systematically assess and prioritize these factors, we employ three decision models that utilize discrete alternative multiple criteria evaluation: the Analytic Hierarchy Process (AHP), Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), and Simple Multiple Attribute Rating Technique (SMART). The decision-making process involves first establishing weights for criteria through surveys. Subsequently, these weights guide the scoring and ranking of platforms based on their performance across identified criteria. The AHP, TOPSIS, and SMART models facilitate nuanced and quantitative evaluation, offering insights into the strengths and weaknesses of each platform.

To evaluate the robustness of the results, sensitivity analysis becomes a critical component. By systematically varying the weights of individual criteria and observing the resultant changes in platform rankings, valuable insights into the stability and sensitivity of the decision models can be gained. This

analytical approach enhances the reliability of the platform recommendations, providing a well-rounded assessment of their performance and suitability for affiliate marketing.

3.1 Platform Characteristic Data Sources

Four of the five platform characteristics on the five social media platforms were obtained from Statista, which provided comprehensive reports encompassing various statistics and information points for each platform (Statista, 2023a-e). Platform characteristics, such as size, were quantified using the user share within the US, while income factors were determined by the percentage of users with a high-income level.

The average time spent on each social media platform was gauged using statistics from Statista (eMarketer, 2023). Since this source lacked information on Pinterest's average time, an alternative statistic from Broadband Searched was incorporated (Seitz, 2023).

To determine the percentage of advertisers utilizing influencer marketing, a Statista statistic was employed (Hootsuite, 2022). Given that the data spanned several years, the 2023 data was selected for relevance. Since it lacked information on Pinterest, supplemental data from another source, GRIN (2023), was incorporated.

For the evaluation of the number of shopping features a platform has, a direct observational approach was adopted. Accessing the platforms through new accounts, features related to shopping were identified and counted, providing a firsthand assessment of each platform's e-commerce capabilities.

3.2 Openness Data Sources

To assess the openness of each platform, most factors were quantified through direct platform observation. In particular, the ease of opening a new account was determined by counting the required

points of information during the account creation process. Common data points considered included emails, birthdays, and passwords, with the objective of evaluating the user-friendliness and accessibility of each platform's registration process.

To further examine the platform's openness, we investigated whether users were allowed to maintain multiple accounts. This evaluation involved a review of the terms and conditions for each platform. Additionally, we explored the functionality of their respective apps to ascertain if users had the capability to sign into multiple accounts simultaneously.

Then, focus was placed on the presence of a "for you" page, a feature commonly associated with algorithmic recommendations. This analysis entailed direct observation to identify the existence of such a recommendation page.

To further explore the functionality of the algorithmic recommendation page, attention was directed towards determining whether it recommended posts from individuals outside the user's friend group. Additionally, an investigation was conducted to assess whether the recommendation algorithm considered the user's region. This involved experimentation with VPN settings, observing if altering the VPN server’s location influenced recommendations towards more localized results.

Then, the evaluation extended to understanding whether the algorithm on each platform played a role in demoting links to external websites. This aspect of the assessment relied on user testimonials sourced from online forums. These testimonials provided real-world perspectives on whether the algorithm exhibited a tendency to reduce the visibility or prominence of links leading to other websites.

To ascertain the percentage of the user base with private accounts, various online sources, including user testimonials from forums and discussions, blogs, and direct observation, were employed. One such blog, written by Gaffney, discusses the composition of Instagram’s userbase including the number of private accounts (Gaffney, 2016). This method allowed us to leverage the strengths of each

source to fill gaps and provide a more nuanced understanding of user preferences and behaviors related to privacy on the platform.

3.3 Virality Data Sources

To assess the platform's dynamics related to content virality and audience reachability, two factors were considered. The first factor involved quantifying the number of engagement methods available on each platform. This assessment was conducted through direct observation. Common methods of engagement are commenting and liking.

The second factor delved into metrics associated with popular posts. Specifically, the evaluation centered on the "for you" page, where the number of likes and comments for the first 50 posts was recorded. This approach provided a snapshot of the engagement levels for content highlighted by the algorithm, offering valuable information on the platform's algorithmic promotion of content and the potential ease with which content creators could reach a wider audience. Table 3-1 summarizes all the factors and how the data is acquired. Additionally, detailed listings of the raw data collected for all the factors are listed in Appendix A.

Table 3-1. Summary of factors and their acquisition method.

Major Criteria	Sub Criteria	Acquisition Method
Platform Characteristics	Userbase size	Database
Platform Characteristics	Userbase income	Database
Platform Characteristics	Average time spent on platforms	Database
Platform Characteristics	Does it have a "shop" feature	Observation
Platform Characteristics	Percent advertisers using influencer marketing	Database
Openness	Ease of opening new accounts	Observation
Openness	Allows multiple accounts	Observation
Openness	Ratio of public/private accounts	User Testimonials
Openness	Has a recommendation page	Observation
Openness	Recommend posts from non-friends	Observation
Openness	demotes off-links on posts	User Testimonials
Openness	Does the algorithm recommendation depend on region	Observation
Virality	Number of engagement methods available	Observation
Virality	Metrics on public posts	Observation

3.4 Decision Models

To make an informed decision on which platform would be best for aZen's use we needed to use decision models for our data analysis. We chose to use three different models (AHP, TOPSIS, and SMART) because each has different features allowing a variety of perspectives on which platform performs the best.

3.4.1 The Analytic Hierarchy Process

AHP was developed by Thomas L. Saaty in 1980 to make educated and informed business decisions (Saaty, 2008). Saaty breaks AHP down into 4 steps:

1. Define a problem and decide which aspects need to be evaluated.
2. Structure the decision hierarchy from top to bottom, starting with the goal, then broad objectives, then specific objectives, and then the alternatives.

3. Construct a set of pairwise comparison matrices. Each element is compared in importance to each other in the same broad objective.
4. Use these matrices to determine the weight of each priority and repeat for each element to obtain each factor's global importance.

Saaty also describes how scoring on pairwise comparisons should be conducted, which is summarized in Figure 3-1. Each comparison should be scored between 9 and 1/9 depending on how much more or less important it is than the other objective as shown in this table (Saaty, 2008):

Intensity of Importance	*Definition*	*Explanation*
1	Equal Importance	Two activities contribute equally to the objective
2	Weak or slight	
3	Moderate importance	Experience and judgement slightly favour one activity over another
4	Moderate plus	
5	Strong importance	Experience and judgement strongly favour one activity over another
6	Strong plus	
7	Very strong or demonstrated importance	An activity is favoured very strongly over another; its dominance demonstrated in practice
8	Very, very strong	
9	Extreme importance	The evidence favouring one activity over another is of the highest possible order of affirmation
Reciprocals of above	If activity *i* has one of the above non-zero numbers assigned to it when compared with activity *j*, then *j* has the reciprocal value when compared with *i*	A reasonable assumption
1.1–1.9	If the activities are very close	May be difficult to assign the best value but when compared with other contrasting activities the size of the small numbers would not be too noticeable, yet they can still indicate the relative importance of the activities.

Figure 3-1 Saaty's Description of AHP Pairwise Comparison Scale

To perform AHP, we separated the process into a number of sub-steps, as can be seen in Appendix B. The steps are summarized as follows:

5. Like Saaty, the first step is choosing a goal. This is essentially the question you are trying to determine the best option for. For our project, the goal is to choose which online social media

platform is best for aZen to focus their marketing efforts on so that their company can be the most successful.

6. As described in the second half of Saaty's first step, the next step is breaking the goal into factors and subfactors which can be used to compare the alternatives. As discussed earlier in the paper, our main factors were Platform Characteristics, Virality, and Openness. These factors were divided into sub-factors. An image of this project's hierarchy can be seen in Appendix C.
7. One difference in this project, which isn't discussed in Saaty's description, is deciding on alternatives. We chose the alternatives (platforms) we did after conducting some background research on the general popularity of social media marketing on different platforms. In some cases, only a certain number of alternatives may be considered in the scope of other projects.
8. Next, the pairwise comparison resulted in relative importance weights for each major factor, and their sub-factors. Since we are not experts on social media marketing, we conducted a survey to gather the opinions of the employees at aZen Networks who have greater experience in the field.
9. Once the pairwise comparisons were collected, they were converted into a matrix so the relative importance of each factor could be calculated. Using the eigenvalue approach.
10. To calculate the local weights, we used a python library named AHPy (Griffith, 2023). We chose to use AHPy because it can calculate all of the necessary weights in AHP, but more importantly they can easily determine inconsistency values. This evaluation is useful in determining the validity and legitimacy of the survey results. If an inconsistency value is high, greater than 0.1, it may indicate the survey response isn't trustworthy or reliable. An example of the inconsistency checking along with our matrix calculations for one survey can be seen in Appendix D. Once local weights are calculated, each sub-factor's relative importance weight is multiplied by the relative importance weight of its parent factor in the hierarchy.

For example, if platform characteristics had a local relative importance weight of 0.3415, and userbase size (a sub-factor of platform characteristics) has a local relative importance weight of 0.3928, then userbase size's global weight would be (0.3928 * 0.3415) = 0.1341 which means that userbase size accounts for slightly more than 13% of the total relative importance from amongst all the sub-factors when evaluating each alternative's viability as a marketing platform.

11. After global relative importance weights are calculated, the relative performance of each social media platform is evaluated using pair-wise comparisons for each sub-factor. An example of the pairwise comparison matrix can be seen in Appendix E**.** These pairwise comparison values are then evaluated using the eigenvector valuation approach similar to factor weights using the python AHPy software. In the comparison table in Appendix E, as an example, you will see that Platform Userbase Size for Facebook is slightly better than Instagram and provided a value of "3".
12. After each platform has been evaluated and a relative performance score is given for a sub-factor, the platform's score is multiplied by the sub-factors' weight. For example, if userbase size has a value of 0.113 and Facebooks size rating is 0.533, then it's final score for that sub-factor would be (0.113 * 0.533) = 0.0602.
13. Step 8 is repeated for each platform, and then repeated again for each factor so each platform has a weighted score in each factor. The sum of these values is used to get the platform's final score.
14. These results can be further evaluated for robustness through the use of sensitivity analysis. For our project, sensitivity analysis consisted of changing the major factor weights from their values calculated from the survey to a 60/20/20 split. We varied the 60% weight from platform characteristics to virality and openness and observed how the results changed or stayed

consistent. We chose 60% for this project because although we wanted to have each category tested with more importance than the other two but still wanted those other categories to be represented so if it performed particularly well or poorly in those criteria, then that would still be factored into the platform's performance. If they stayed consistent, the result was considered to be robust. Another part of our sensitivity analysis was checking if our uncertain factors had a large effect on the outcome. This is important for our project due to the fact that some of our data came from other sources, and if those criteria had a large impact on the outcome, it could make our findings less robust.

15. The AHP results are then analyzed, and final platform rankings can be compared. This comparison is also made across the other techniques before an overall evaluation is completed.

3.4.2 TOPSIS

Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) (Hwang and Yoon, 1981) is another popular multi-criterion decision-making model technique. TOPSIS is a unique approach to decision-making models because it has the decision-maker choose what the ideal value for each factor would be before determining which of the alternatives is closest (Hwang and Yoon, 1981). Like AHP, the TOPSIS methodology had several steps. Steps 1-5 mirror steps 1-6 from the defined AHP process methodology section 3.4.1. These initial steps identical are because for this project the sub-factor weight values from AHP are used as the factor weights for TOPSIS. This approach is used, but it is not the only way to obtain the weight values, another way to calculate TOPSIS sub-factor weights is using the values from SMART analysis as discussed later in section 3.4.3. The graphical summary of the TOPSIS steps is summarized in Appendix F and are as detailed in the following steps:

1. TOPSIS differs from AHP because the ideal and nadir values for each sub-factor needs to be determined initially. In the *userbase size* sub-factor example, the ideal value would be the values from the data which is closest to 1 and the nadir would be that which is closest to 0. The larger

the userbase, the more suited it is for affiliate marketing since the platform potentially has a greater reach. An example where the ideal would be 0 and the nadir 1 would be the amount of info required to sign up for a platform. In this case, a lower score would be better because that means it takes less information to make an account which means it is easier and less time consuming; if hundreds of accounts are necessary it could be very impactful.

2. The next step is to normalize the data, which can be completed in numerous ways. This step is important because it allows data rescaling so each factor can have relatively appropriate and standardized scoring when considering the standardized importance weights.

   Two notes on this step. First, since the data is not on a 9-point scale there can be large disparities between some of the platforms even after normalization. Second, the type of normalization chosen can influence the final outcome of the model. For our TOPSIS model we chose to use L2 normalization because it is what is used in the python library preprocessing as seen in Appendix G (Cournapeau, 2023). To perform L2 normalization, you must first find $\left|\left|x\right|\right|_2$, which represents the magnitude of the vector. $\left|\left|x\right|\right|_2$ can be found using equation (1):

$$\left|\left|x\right|\right|_2 = \sqrt{x_1^2 + x_2^2 + \cdots + x_n^2} \tag{1}$$

   And then calculating the normalized value using equation (2).

$$W'_{ij} = \frac{x}{\left|\left|x\right|\right|_2} \tag{2}$$

   Here W'_{ij} represents the normalized value of the chosen platform-criteria pair, *i* represents the alternative, and *j* represents the factor for which its being evaluated.

3. Once normalized, we can find the ideal (Z_j^+) and nadir (Z_j^-) values from our data by checking which alternatives are closest and furthest from the ideal (1 or 0) value determined for that factor. Finding ideal (Z_j^+) and nadir (Z_j^-) is trivial and can simply be found by looking through the data. If, however, there are so many options that it cannot be found by eye, the maximum and

minimum values of any given factor can be found using an Excel function like =MAX(A1:A10). After we find these values, we can then determine each platform's Euclidean distance from the ideal (D_i^+) and nadir (D_i^-) values calculated using Equations (3) and (4), respectively.

$$D_i^+ = \sqrt{\sum_{j=1}^{m} \left(W'_{ij} - Z_j^+\right)^2} \tag{3}$$

$$D_i^- = \sqrt{\sum_{j=1}^{m} \left(W'_{ij} - Z_j^-\right)^2} \tag{4}$$

4. We then take the Euclidean distance calculations for an alternative *i* (platform *i*) and find the final best and worst performing alternatives based on their proximity to the ideal and distance from the nadir solutions denoted by C_i using equation (5).

$$C_i = \frac{D_i^-}{D_i^+ + D_i^-} \tag{5}$$

5. Next, similar to AHP a sensitivity analysis can be used to check the reliability and robustness of the initial results. The AHP sensitivity analysis process was relatively straightforward—the value of each factor to 0 and have the others rescale proportionally to determine any changes in the importance of each factor. Sensitivity analysis is important to determine if the best performing alternative changes as a factor changes. It may show that the alternatives are more suited for different tasks and not necessarily better or worse than one another overall.
6. These results can then be analyzed and recommendations on the best fit for the organizational goal can be decided.

3.4.3 SMART

SMART constitutes the third decision model in this research, employing a weighted linear additive model. The process of utilizing SMART involves three key steps:

1. Establishing Weights for Criteria: The initial step in SMART involves determining the weights for each factor. This can be accomplished through a survey where respondents typically provide input on the importance of each factor using a Likert scale or a 1-10 scale.
2. Scoring Alternatives on Criteria: Following the establishment of weights, the next step is to score the alternatives on each factor. This process relies on research-derived data to objectively assess how each platform performs across the identified criteria.
3. Calculating Overall Scores: For each alternative, the individual scores for each factor are multiplied by their respective weights, and the products are summed to obtain an overall score. This calculation provides an evaluation of each platform's performance, considering both the weighted importance of criteria and their actual scores.

In the scoring process, platforms are arranged based on their raw data, followed by the assignment of scores ranging from 1 to 5. The highest-performing platforms are assigned a score of 5 and so on potentially down to 1. When ties occur due to identical raw data points, platforms are assigned the same score. As an illustration, for the factor of the number of engagement methods, if platforms A through E exhibit engagement method counts of 5 methods, 3 methods, 3 methods, 2 methods, and 1 method respectively, scores would be assigned as follows: 5 for A, 4 for both B and C, 3 for D, and 2 for E.

To conduct sensitivity analysis for SMART, the variation of weights for each factor is essential to observe its impact on platform rankings. This process involves systematically setting the weight of each factor to 0, one by one, while recording the resultant changes in platform scores. By methodically altering the weights of individual criteria, we can assess the sensitivity of the SMART model. This process allows us to understand how each factor contributes to the overall platform rankings. The recorded data can then be utilized to create a sensitivity graph, with each platform represented as a series, offering a visual representation of the dynamic shifts in rankings as a response to changes in factor weights.

3.5 Surveys

To determine the weights assigned for each factor, surveys were administered to upper managers and employees closely involved with social media, such as social media managers. Three surveys were conducted in total to comprehensively capture perspectives.

The first survey compared the relative importance of each factor using pairwise comparisons amongst factors (see Appendix H). In the survey respondents were first asked about their role and level in the company. Subsequent questions followed a pairwise comparison format, asking respondents to rate the importance of Factor A compared to Factor B. The choices ranged from "much more" to "much less," with 36 questions in total covering all pairwise comparisons among major factors and subfactors. The format of these questions is commonly used in decision problems and can generate very accurate weights even when the participant is only using intuition (Bodin, 2003). Side-by-side English to Chinese translations were provided and proofread by HDU students. The complete survey is available in Appendix H.

Due to initial difficulties, an alternative format was offered to management decision makers for the first survey to garner pairwise comparison scores. Respondents were presented with pairwise comparison matrices directly. The diagonals were pre-filled with ones (because it is assumed that an alternative compared to itself is always equal), and the bottom half was shaded since they were just the reciprocal of the upper triangle of the matrix. An example of a blank matrix is shown in Table 3-2.

Table 3-2. Example pairwise comparision matrix for alternative survey.

General	Platform Characteristics	Openness	Virality
Platform Characteristics	1		
Openness		1	
Virality			1

Participants (respondents) were instructed to complete the matrices by indicating how many times one factor was deemed more important than the other using Saaty's ranges. Valid values ranged from 1/9 to 9, with 1 signifying equality and 2 representing twice the importance (see Figure 3-1). Both English and Chinese versions of this survey are included in Appendix I.

Responses obtained from both the first and second surveys will be standardized into four pairwise comparison matrices, one for the major criteria and one for each of the sub criteria. To facilitate this standardization, the options within each response from the first survey will be transformed into numerical values that represent their relative importance. The conversion process will utilize a key, the details of which are outlined in Table 3-3 and representative of Figure 3-1:

Table 3-3. Key for converting survey options (linguistic scales) to numerical values.

Option	Numerical Value
Much more	9
More	6
Slightly more	3
Equal	1
Slightly less	1/3
Less	1/6
Much less	1/9

3.5.1 SMART Survey

The survey in Appendix J is used to calculate the weights for the SMART model. Similar to the preceding surveys, initial questions gathered information about respondent roles and levels within their respective companies. Subsequent questions required respondents to rank each subfactor on a scale from 1 to 7, where 1 indicated "not important at all," and 7 signified "very important."

4 Findings and Results

The raw data for all the criteria, encompassing platform characteristics, openness, and virality, is listed in the Appendix A. Additionally, Table A-4 incorporates averages and ratios, calculated from the number of likes and comments for each platform.

Using the pairwise comparison matrices from the surveys, weights for each factor were calculated—which is used for both AHP and TOPSIS. For a detailed breakdown, the complete table containing the calculated weights from each survey, along with the average local weights and global weights, appear in Appendix K. Responses from survey 3 for the SMART inputs are listed in Appendix L in addition to the weights for each factor. These weights are used for the SMART model.

4.1 Results and Findings from Analytical Hierarchy Process Evaluation

Utilizing the calculated weights derived from the first survey, we conducted a ranking of platforms evaluation employing AHP. Figure 4-1 summarizes the average relative importance weights from the AHP calculations for each major factor. Notably, openness emerges with the highest weight (0.400), followed by platform characteristics (0.341) and virality (0.257).

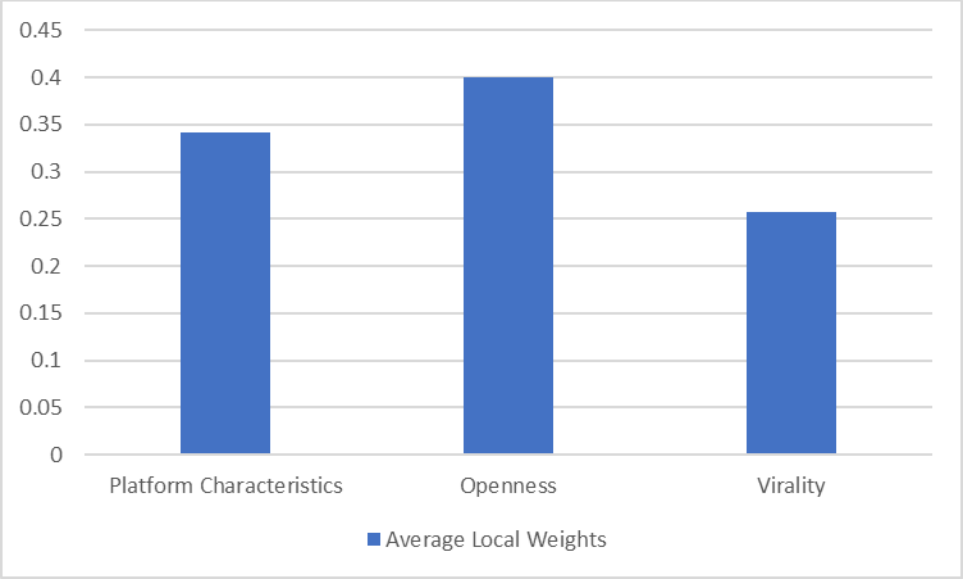

Figure 4-1. AHP relative importance weights for the major factors for evaluating the social media platforms.

Figure 4-2 delineates the global relative importance weights for each sub-factor. The top three sub-factors identified are the ease of virality (0.540), number of engagement methods (0.459), and userbase size (0.329). In contrast, the lowest-ranked factors include the ratio of public to private accounts (0.082), advertisement spending (0.112), and the presence of shopping features (0.126).

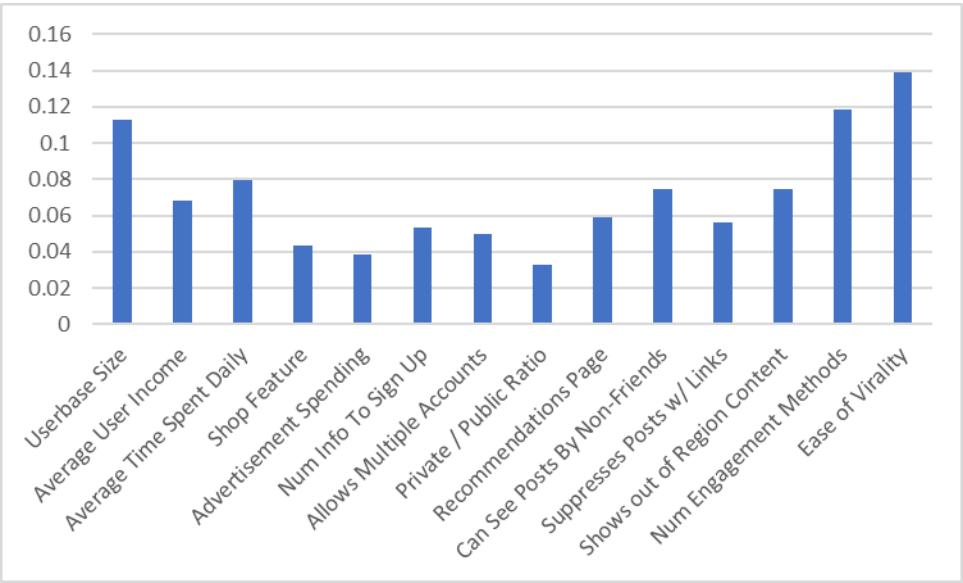

Figure 4-2. Global weights for each sub-factor.

To evaluate the relative importance based on AHP weights for each of the platform alternatives, we took information from the data tables in Table A-1, Table A-2, Table A-3, and Table A-4, and the relative performance of the sub-factors were calculated (see section 3.4.1 step 11 for more details about process). Then we multiped the relative performances with the respective global weights as detailed in section 3.4.1 step 12. Figure 4-3 showcases the viability scores of each of the five platforms. Instagram with a relative AHP rank score of 0.242, emerges as the highest-performing platform. The rest of the order for this initial result includes Facebook (0.219), TikTok (0.188), Pinterest (0,182), and Twitter (0.167).

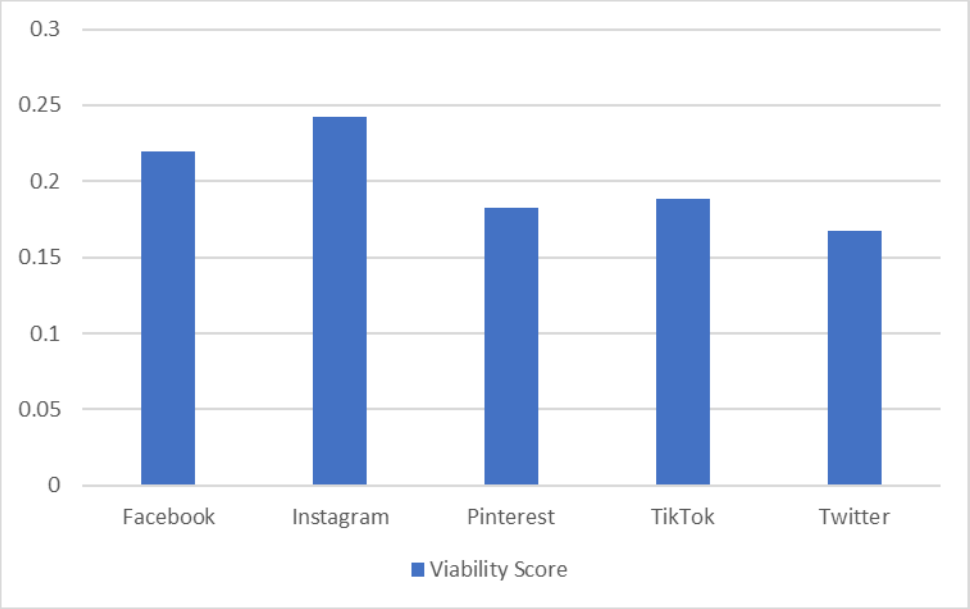

Figure 4-3. AHP relative importance weights of each social media platform using all information.

Figure 4-4 shows the AHP rankings with uncertain factors omitted. Specifically, these uncertain factors include average daily time spent on the platform, advertisement spending, and the ratio of private to public accounts. These were omitted by setting their weights to 0. After this adjustment, rankings mostly did not change other than that TikTok moving from third ranked to last.

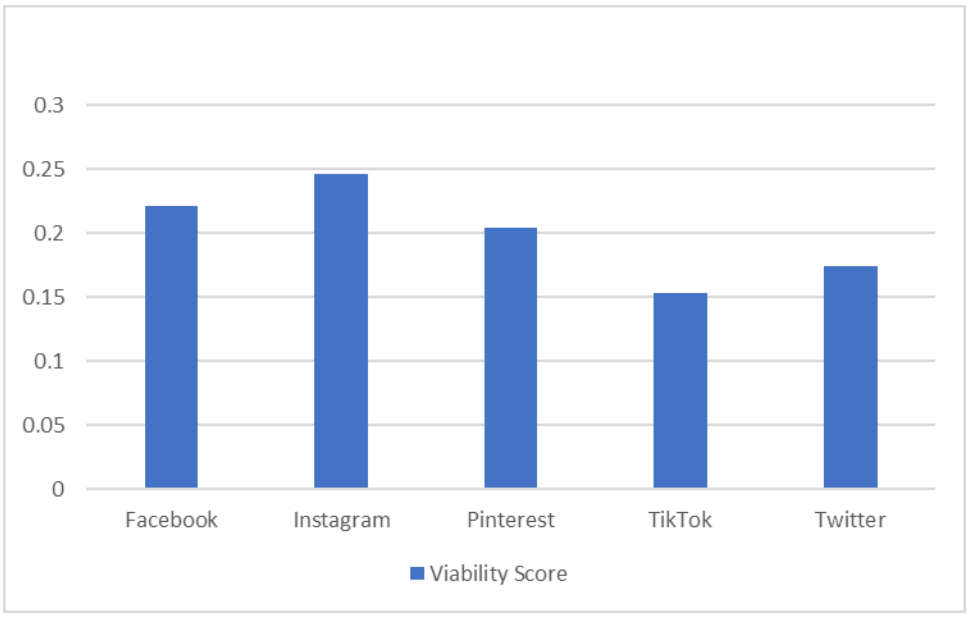

Figure 4-4. AHP rankings with uncertain sub-factors omitted by setting their relative importance weight to zero.

Sensitivity analysis for AHP was then conducted to determine how robust our rankings were as detailed in section 3.4.1 step 14. This sensitivity analysis involves adjusting the weights of the major factors. To complete this process, one major factor is assigned a weight of 0.6, while allocating weights of 0.2 to each of the other two major factors. The resulting adjustments in weights are then applied to reevaluate the rankings.

As illustrated in Figure 4-5, the graph displays the recalculated weights and rankings following the boost in the weight of the platform characteristics major factor. Interestingly, Facebook now closely surpasses Instagram, with both platforms leading the rankings. TikTok, Twitter, and Pinterest follow in descending order.

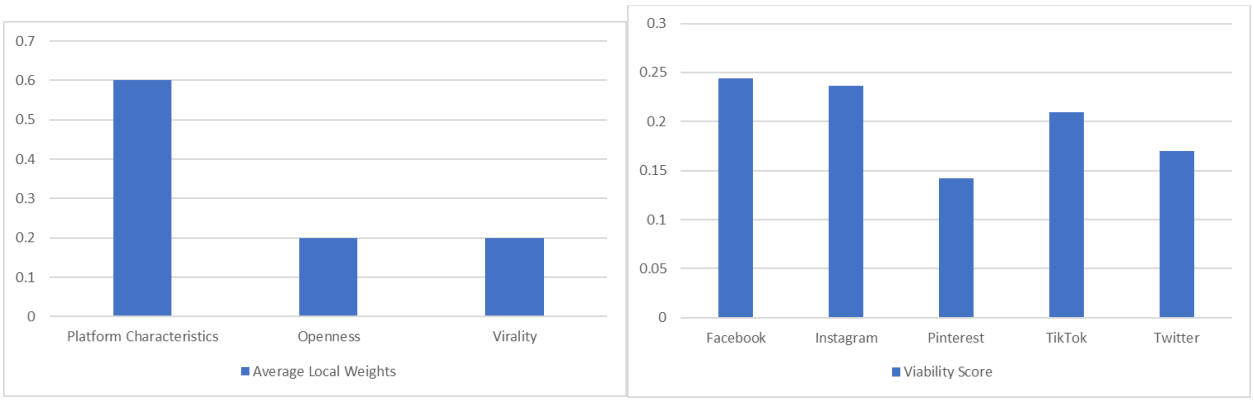

Figure 4-5. AHP rankings with platform characteristics assigned a higher weight of 0.6.

The rankings were recalculated following an increase in the openness factor relative importance weight (see Figure 4-6). Although the overall order of rankings remained consistent, the adjustment highlights that Instagram was even more preferred. This result suggests a strong performance by Instagram specifically in the openness factor.

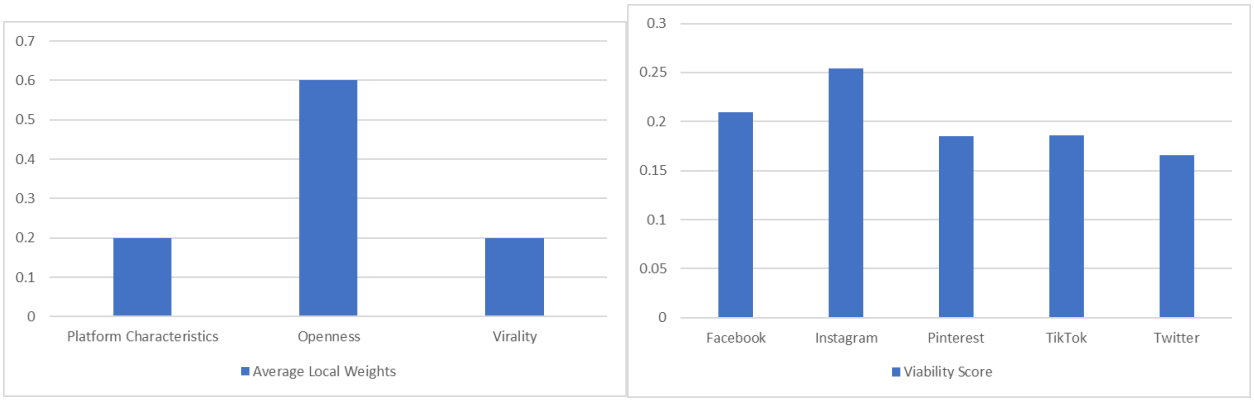

Figure 4-6. AHP Rankings with openness assigned a higher weight of 0.6.

The final sensitivity analysis for AHP, as presented in Figure 4-7, involved recalculating the platform rankings when the weight assigned to the virality major factor is changed to 0.6. Upon reevaluation, Pinterest emerges as the clear frontrunner, significantly ahead of the other platforms. The revised rankings position Instagram, Facebook, Twitter, and TikTok in descending order. This outcome suggests a notable strength for Pinterest specifically in the virality factor, while indicating comparatively weaker performance in the other two major factors—platform characteristics and openness.

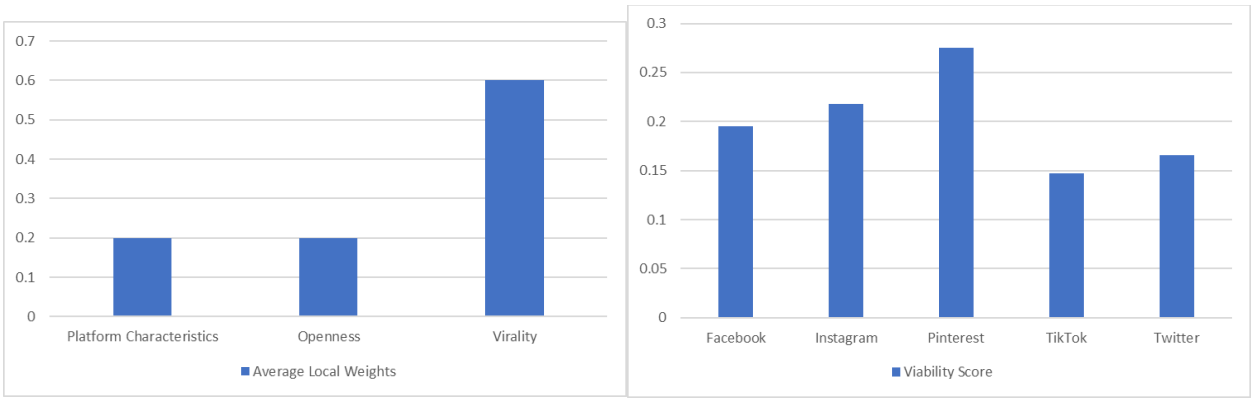

Figure 4-7. AHP Rankings with virality assigned a higher weight of 0.6.

4.2 Results and Findings from TOPSIS

Moving on to the results obtained through TOPSIS, as illustrated in Figure 4-8, platform rankings were determined using the same weights applied in AHP.

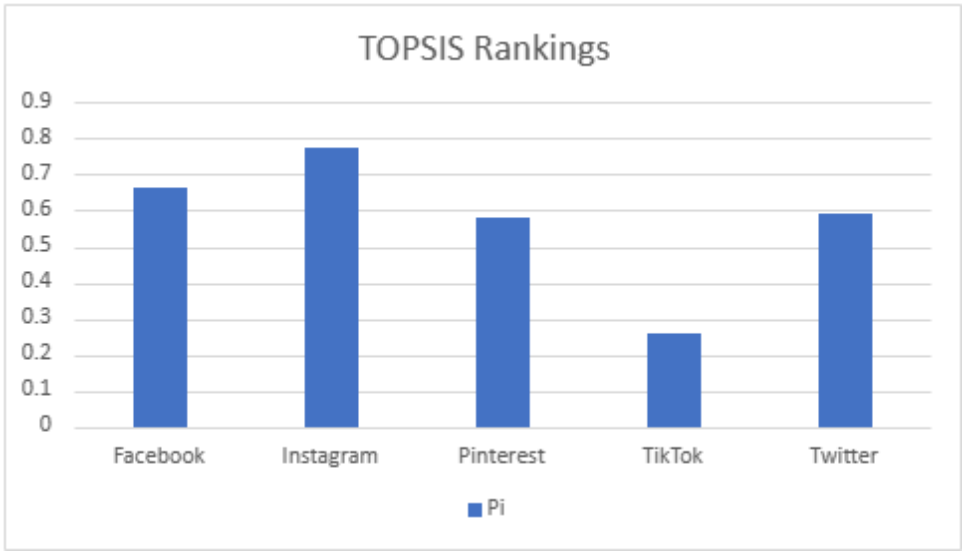

Figure 4-8. Platform rankings from the TOPSIS model.

The resulting order is as follows: Instagram, Facebook, Pinterest, Twitter, and TikTok. It's noteworthy that Instagram maintains its leading position, underscoring its consistent performance across both decision models. However, a notable change is observed as TikTok shifts from the third position to the last.

For the sensitivity analysis in TOPSIS, individual sub-factors were systematically assigned a weight of 0, while the weights for the remaining sub-factors were normalized. This approach allowed us to gauge the impact of specific sub-factors on the overall rankings.

Figure 4-9 is structured to visually represent the fluctuations in rankings resulting from changes in the weights. Upon comparison with the rankings under unchanged weights, it becomes evident that the most influential factors affecting the rankings are whether the recommendation algorithm is region-based and the post metrics. These two factors exert the most significant influence on altering the relative standings of the platforms.

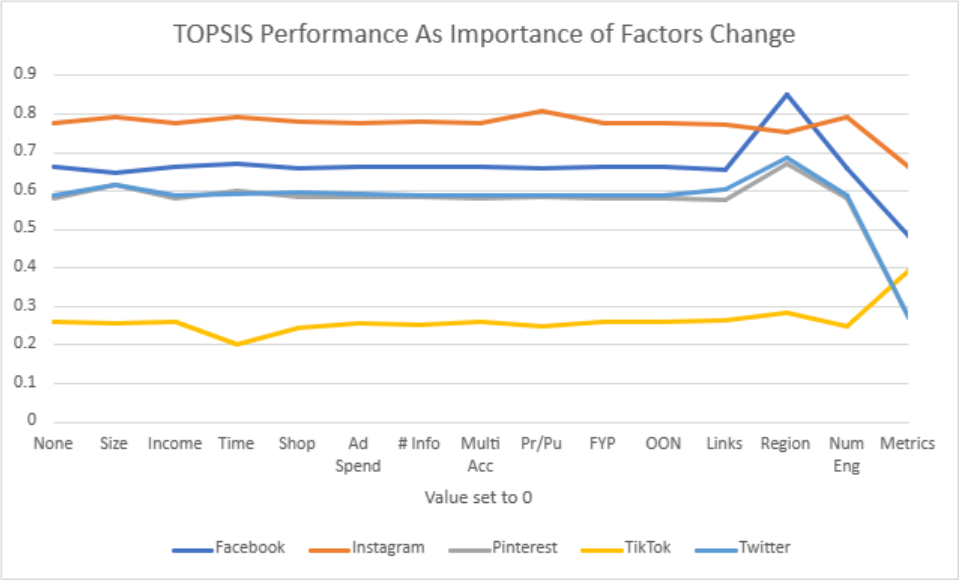

Figure 4-9. Sensitivity analysis for TOPSIS.

Instagram consistently demonstrates high performance across various weight scenarios, except for instances when the region factor is modified. Under such conditions, Facebook experiences a boost. This indicates that even if our weights were inaccurate, or the data for a select.

4.3 Results and Finding from SMART

The final decision model under consideration is SMART. As depicted in Figure 4-10, the platform rankings resulting from the SMART model are presented.

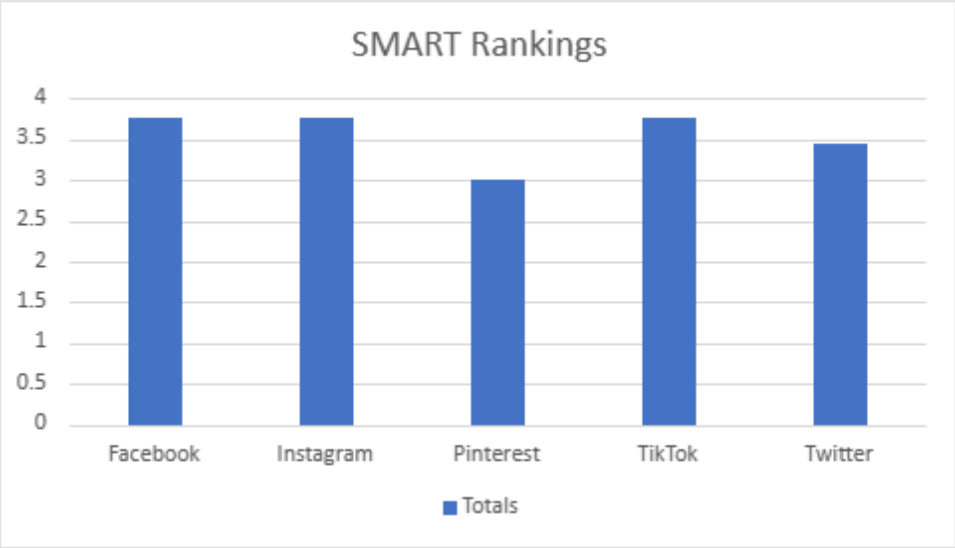

Figure 4-10. Platform rankings using the SMART model.

Most platforms exhibit similar levels of performance, except for Pinterest. The order of rankings is as follows: Facebook, Instagram, TikTok, Twitter, and Pinterest.

The sensitivity analysis for SMART is presented in Figure 4-11, mirroring the approach taken in the TOPSIS analysis. In this process, weights for the sub-factors were individually set to 0 one-by-one to assess their impact on platform rankings.

Notably, Pinterest consistently appears ranked lower than all other platforms throughout all weight scenarios. In contrast, the remaining platforms—Facebook, Instagram, TikTok, and Twitter—tend to cluster closely together. This clustering suggests a high sensitivity in the results derived from the SMART model.

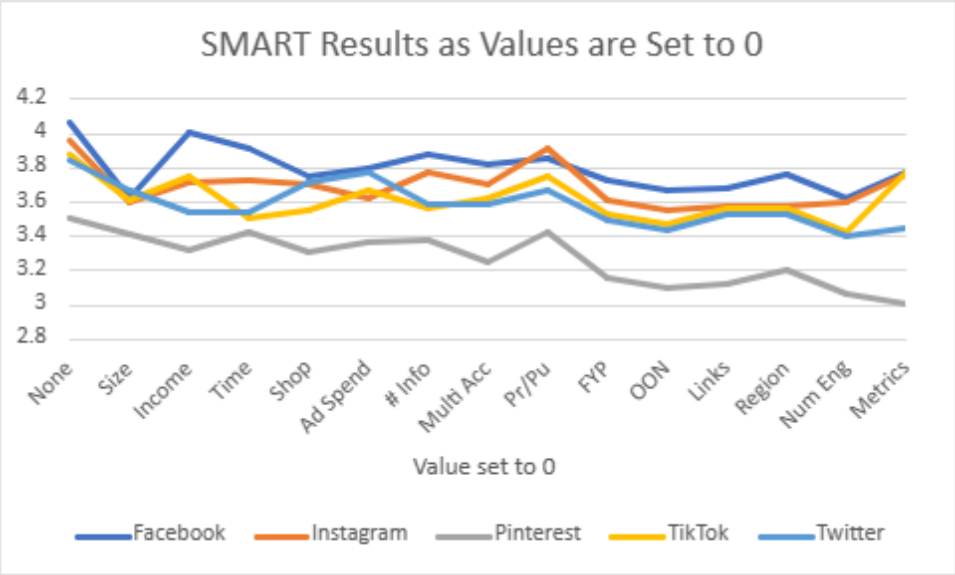

Figure 4-11. Sensitivity analysis for SMART.

4.4 Methodological Limitations and Caveats

Throughout the employment of this methodology, several limitations were encountered that may impact the interpretation and application of the findings. This approach relies heavily on secondary data; a number of information points were found on databases meaning we had limited control over the data collection process. Questions were not tailored to fit the specific context of this project. The factors "average time spent on platform," "percent of advertisers using influencer marketing," and "ratio of public to private accounts" had to be sourced from multiple databases as a single database did not have all the necessary information. This aggregation process could potentially lead to inconsistent results as the data collection methods may have been different across the sources.

The data for the virality factor observing the number of engagements on social media platforms was determined by making a new account on a platform and counting the number of likes, comments, shares, etc. on the recommended page. This process was completed with only one new account per platform. Having and using multiple accounts would have improved the accuracy of this factor. Due to technological difficulties and time constraints this multiple account process was not possible. For Twitter

specifically, a new account must follow one user as part of the sign-up process and when determining the engagement metrics. This action may have biased the posts that appeared on the recommended page. Factoring in information outside of social media features, such as business costs, would have improved our results and allowed us to provide aZen Networks with data more useful for informing business decisions.

The analysis methods, while very useful, had several potential drawbacks. AHP involves many pairwise comparisons which makes it difficult to weigh all of the factors because it involves many questions. It also only has nine discrete levels when evaluating the importance of factors which could remove some nuance from the comparison. TOPSIS does not have a consistency check meaning results may be less robust, the normalization method may affect results, and it does not consider relative importance. SMART analysis involves many assumptions and the weights and scores could be biased. For all of these, sensitivity analysis may help address some concerns.

The survey and respondent understanding may have been biased or replete with uncertainty by the respondents. The survey sent to the aZen Networks employees for AHP and SMART analysis weighting had a few constraints- the major one was a language barrier. The survey was written in English and computer translated into Chinese. We received feedback that some of the questions were difficult to understand and workshopped the survey with HDU students. Explanations were provided for the complicated questions while those deemed self-explanatory were not defined. However, there remained the risk that the intended meaning of questions was not accurately expressed. To make the survey as clear as possible, we made two versions. One version has the questions rated against each other with a drop-down menu and the other in a matrix format. Each of the surveys can be seen in Appendix H and Appendix I, respectively. Confusion concerning the wording of the questions was found at the end of the project when a final discussion occurred. The model and approach can be replicated by

the company after further discussion, unfortunately the project timeline did not allow for additional revisions to the data collection process.

We now recognize the ideal response collection method would have been to walk the employees through the tables in more of an open discussion format as opposed to the surveys used. We received 12 total AHP responses and 9 SMART responses, and while this is a majority of aZen Networks employees with relevant knowledge, a higher response rate would be preferable to improve the reliability of the results.

5 Conclusion

In the culmination of our analysis, we present conclusive recommendations for aZen Networks in their pursuit of finding the best social media platform for affiliate marketing. Following an in-depth exploration of Instagram, Facebook, TikTok, Twitter, and Pinterest, our evaluation spans three crucial factors—platform characteristics, openness, and virality. Leveraging methodologies such as AHP, TOPSIS, and SMART, we unravel insights that guide aZen Networks in making informed decisions for their affiliate marketing strategies. As we delve into the recommendations and limitations of our study, we highlight the potential for aZen Networks to refine their decision-making processes using these robust analytical methods.

5.1 Recommendations

After completion of data analysis, we can recommend Instagram as the best platform for aZen Networks to use for affiliate marketing. It was consistently ranked very highly across all three analytical methods and its position was consistent after sensitivity analysis.

Instagram had the highest AHP score and still had the highest AHP score when the uncertain factors, those that came from multiple sources, were omitted. During sensitivity analysis of AHP, when

openness was given a higher weight, Instagram was the highest scoring. When platform characteristics and virality were given higher weights, Instagram still had the second highest AHP score.

Instagram also received the highest TOPSIS score and retained its placement in thirteen out of fourteen sensitivity analysis scenarios.

In SMART analysis, Instagram received the third-place position, but the top three are separated by a small margin. It did receive the highest value on one of the sensitivity analysis scores.

The second-place spot goes to Facebook as it received the second highest score across AHP, TOPSIS, and SMART. For AHP, Facebook retained its second-place score regardless of the uncertain factors being omitted and was notably first place when platform characteristics were weighted heavily. For TOPSIS sensitivity analysis, Facebook was second for thirteen out of fourteen factors.

TikTok is the third most effective social media platform for affiliate marketing and has a wider variety of scores from the analytical methods. It received third place from AHP and for two thirds of the sensitivity analysis scenarios but was last with the uncertainty factors omitted. TikTok was last for TOPSIS and ranked first by SMART.

Twitter was ranked last by AHP though it was fourth without the uncertain factors and was fourth for two out of three sensitivity analysis scenarios. It was ranked third by TOPSIS and fourth by SMART.

Finally, Pinterest is the last on the platform ranking of aZen Networks. It received the fourth highest score from AHP, was third with uncertain factors omitted, was fourth when openness was prioritized, last when platform characteristics was prioritized, and surprisingly first when virality was prioritized. Pinterest was ranked fourth by TOPSIS and last by SMART and stayed last for all sensitivity analysis scenarios.

We recommend aZen Networks focus their affiliate marketing efforts on Instagram, though Facebook and TikTok are also strong options. It is important to note every platform has its strengths and weaknesses which are shown by sensitivity analysis. As mentioned before, Pinterest has a particularly high virality score, therefore if a specific marketing campaign needs to go viral, Pinterest may be the better option as opposed to our first-place platform, Instagram.

5.2 Challenges, Limitations and Additional Future Recommendations

This project did not consider the associated cost of operating on any of the platforms; this could be considered by adding more factors in addition to the three decision models. Potentially this addition of factors would change the platform suggested by any or all the models.

The most significant takeaway for aZen beyond our data-centric findings are that this process could be applied to many other decisions in the business world. AHP, TOPSIS, and SMART were all designed with business in mind and were created so that decision makers could make more informed action based on data from the industry and their company. There is value in this project for aZen Networks from gaining an understanding of the analysis methods used to rank the platforms. AHP, TOPSIS, and SMART are all useful ranking methodologies for making managerial and business decisions. These methods were unfamiliar to aZen Networks before the project but are established tools for comparing and ranking alternatives which will be beneficial for the company in the future.

For future work we recommend looking into more platforms than the five researched in this project as there are still many platforms with great potential for affiliate marketing. There are also several steps that could be taken to improve the robustness of results. One option would be to increase the sample size of various data points. For example, the factor exploring the metrics of viral posts on platforms was done using only one social media account. If this data had been collected from multiple accounts, it would have improved results. This difficulty is explained more in-depth in the limitations section. Increasing the number of responses to our survey sent to the aZen Networks employees to

weigh factors for AHP and SMART analysis would have improved the accuracy of those weights. However, getting more survey responses would have involved asking people outside of aZen Networks to respond to the survey, which was not possible due to time constraints.

5.3 Report Summary and Conclusion

This IQP project set out to provide aZen Networks, the sponsoring company, with an assessment of platforms on their efficacy for social media affiliate marketing. The goal was to equip aZen Networks with information allowing them to better allocate their time, effort, and resources into platforms that provide optimal returns.

aZen Networks presented five key social media platforms of interest for evaluation: Instagram, Facebook, TikTok, Twitter, and Pinterest. The assessment criteria involved three factors: platform characteristics, openness, and virality. Platform characteristics encompassed features and user demographics, while openness gauged the ease of user connectivity. Virality measured the potential for a post to garner significant engagement metrics.

These factors, comprised of several sub-factors, allowed for a comprehensive evaluation of fourteen key elements for each platform. Information was sourced from various channels including Statista's database and interaction with the platforms.

To evaluate and rank these platforms, three methodologies—Analytic Hierarchy Process (AHP), Technique for Order Preference by Similarity to Ideal Solution (TOPSIS), and Simple Multi-Attribute Rating Technique (SMART)—were employed. These methodologies utilized original data and inputs collected from survey responses from aZen team members.

The resulting platform ranking stands as follows: Instagram, Facebook, TikTok, Twitter, and Pinterest. Our recommendation leans towards aZen Networks considering their affiliate marketing strategies on Instagram, Facebook, and TikTok, given their performances based on the analysis results.

Beyond the platform rankings, this project holds value for aZen Networks because it introduces them to useful analytical methods. AHP, TOPSIS, and SMART are established tools for decision-making in business contexts. Utilizing these methodologies could substantially benefit aZen Networks in future endeavors.

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Appendix A– Raw Factor Data

Table A-1. Raw data for platform characteristics.

Platforms	% US pop market share	% Userbase is High Income	Average Time Spent on Platform (Minutes)	Has a "shop"	% advertisers using influencer marketing
Instagram	56	39	33.1	3.00	76.6
Pinterest	27	38	14.2	2.00	35
Facebook	77	34	30.9	5.00	58
Twitter	32	43	34.1	1.00	25.2
TikTok	44	35	53.8	5.00	49

Table A-2. Raw data for openness.

Platforms	Info to open accounts	Allows multiple accounts	Private accounts	has "for you" page	Recommends posts from non-friends	demotes off-links on posts	Shows out of Region Content
Instagram	email, name, username, password, birthday	TRUE	75%	TRUE	TRUE	FALSE	FALSE
Pinterest	email, password, birthday, gender, language, location	TRUE	50%	TRUE	TRUE	FALSE	TRUE
Facebook	Name, email, password, birthday, gender	TRUE	0%	TRUE	TRUE	FALSE	TRUE
Twitter	Name, email, birthday, password	TRUE	13%	TRUE	TRUE	TRUE	TRUE
TikTok	birthday, email, password	TRUE	20%	TRUE	TRUE	TRUE	TRUE

Table A-3. Raw data for number of engagement methods for the virality factor.

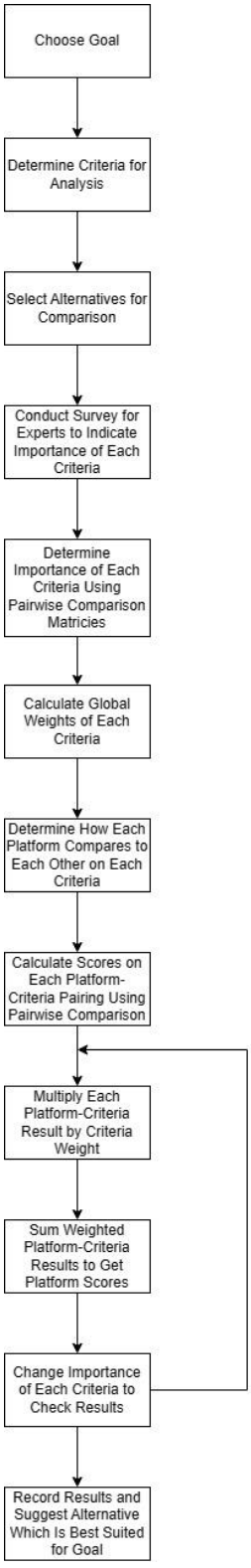
Platform	Number of engagement methods
Instagram	2
Pinterest	3
Facebook	3
Twitter	3
TikTok	3

Table A-4. Raw data for post metrics for the virality factor. Includes averages and ratios.

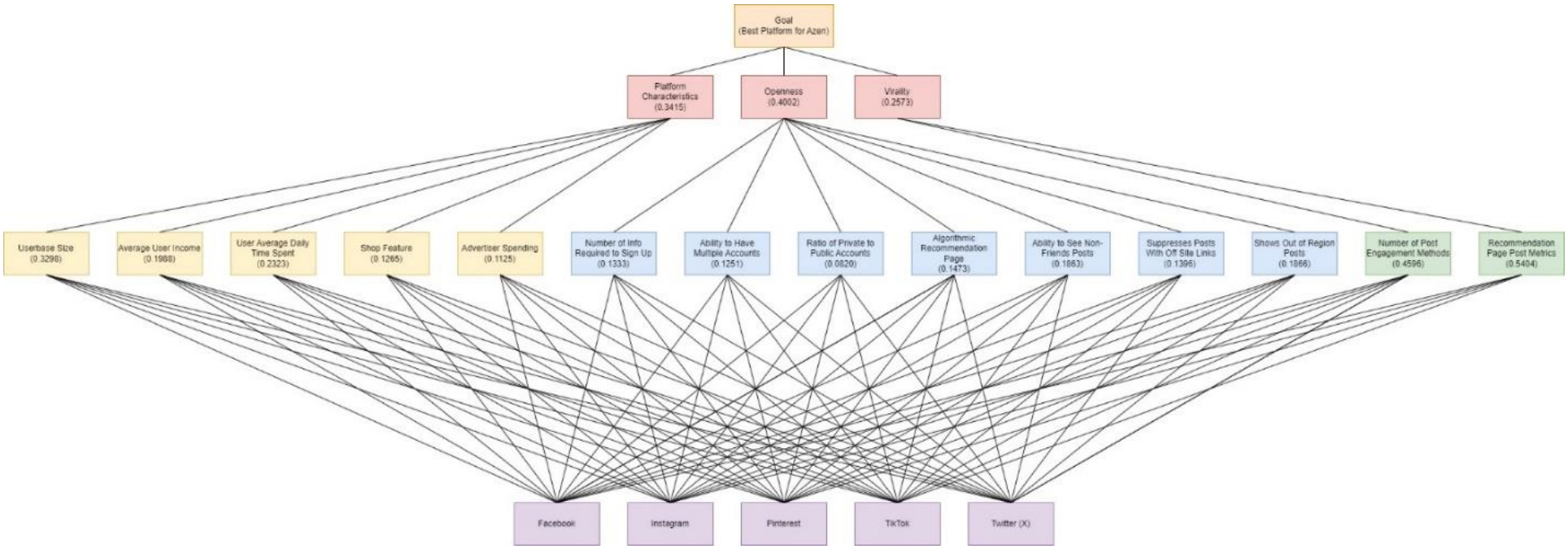
Platform	Instagram		Pinterest		Facebook		Twitter		TikTok	
	Likes	Comments	Likes	Comments	Likes	Comments	Likes	Comments	Likes	Comments
	6165	96	48	53	5.30E+04	4.00E+03	4.90E+04	4.10E+03	2.30E+06	4.10E+04
	0	70	70	1	277	5	1.10E+04	46	4256	43
	1.10E+06	1.59E+04	896	28	66	1	2.40E+04	106	3.00E+06	3.31E+04
	0	29	526	34	953	7	3.00E+04	285	4.20E+06	2.76E+04
	983	32	42	9	84	1	3.40E+04	507	6.40E+05	5.33E+04
	1.60E+06	4586	49	1	646	5	1.14E+05	982	3.00E+06	2.49E+04
	724	71	601	9	348	2	1.92E+05	1.00E+03	1.90E+06	3.10E+04
	8513	34	5	4	1.80E+03	37	1.00E+05	255	7.00E+06	2.66E+04
	223		7	0	6.10E+04	626	4.19E+02	9	5.50E+06	8.24E+03
	0	14	117	36	8.70E+04	1.00E+03	1.70E+04	2.00E+01	1.20E+06	2.94E+03
	1.26E+04	164	163	26	3.51E+02	12	2.80E+03	107	7.20E+06	1.35E+05
	1.65E+04	151	1.50E+03	0	8.40E+01	1	4.40E+04	87	5.50E+06	2.24E+04
	2.00E+06	6962	2	1	5.00E+04	1.80E+03	2.50E+04	8.10E+01	1.40E+06	5.22E+03
	1.30E+05	87	24	10	3.16E+05	6.60E+03	1.30E+04	3.30E+01	7.00E+06	2.24E+04
	4.91E+02	6	1.39E+05	439	4.60E+04	1.30E+03	7.80E+04	8.35E+02	9.75E+05	9.20E+03
	1.65E+05	1.00E+03	184	47	1.60E+04	5.97E+02	1.10E+04	5.00E+01	5.30E+06	1.84E+04
	9.27E+02	42	169	19	5.20E+03	6.36E+02	6.50E+04	3.20E+03	3.10E+06	9.82E+03
	1.61E+03	32	4	6	3.60E+03	1.40E+03	7.90E+04	1.90E+04	3.00E+06	1.99E+04
	1.05E+03	9	9.10E+03	1139	3.58E+02	1.20E+01	2.23E+05	7.71E+02	5.80E+06	1.48E+04
	3.82E+03	3	205	20	1.10E+04	1.10E+03	4.10E+04	3.30E+01	7.20E+06	2.12E+04

	2.52E+04	112	641	11	1.79E+05	3.80E+03	5.30E+04	1.40E+03	2.40E+06	6.87E+03
	0.00E+00	22	5	2	3.80E+03	1.50E+03	2.80E+03	4.60E+01	4.90E+06	1.44E+04
	5.51E+04		15	4	6.90E+03	2.75E+02	5.10E+03	2.90E+01	1.90E+06	3.88E+03
	6.47E+04	527	31	0	1.49E+05	7.00E+03	2.10E+04	1.82E+02	2.45E+04	2.27E+02
	1.19E+05	245	1.10E+03	72	2.50E+03	4.33E+02	1.40E+05	1.10E+03	4.90E+06	2.75E+04
	7.35E+05	3091	419	56	1.30E+04	1.55E+02	5.60E+04	1.40E+03	7.72E+05	1.05E+04
	1.44E+04	225	20	0	6.70E+04	2.10E+03	2.20E+03	3.40E+03	3.70E+06	2.27E+04
	8.77E+02	24	1.10E+03	103	7.90E+04	5.10E+03	2.20E+04	1.90E+03	4.80E+06	1.23E+04
	2.11E+05	192	162	34	4.90E+04	3.07E+02	1.71E+05	1.00E+03	2.40E+06	7.77E+03
	2.69E+04	42	3.90E+03	14	8.58E+02	1.22E+02	4.90E+04	2.37E+02	2.00E+06	1.95E+04
	0.00E+00	96	6	0	1.33E+05	1.40E+03	5.00E+03	4.10E+01	1.20E+07	1.19E+05
	3.82E+03	76	1.25E+02	35	1.80E+04	7.84E+02	1.03E+05	4.56E+02	1.50E+06	1.38E+04
	2.50E+05	8792	1.86E+04	105	8.50E+03	2.89E+02	1.60E+03	1.70E+01	1.01E+05	3.02E+02
	9.92E+02	85	1.60E+03	283	9.90E+03	1.30E+03	5.00E+04	6.93E+02	5.80E+06	2.11E+04
	1.59E+03	63	8.50E+01	3	6.80E+03	4.00E+01	1.80E+04	2.28E+02	1.25E+07	2.94E+04
	2.67E+05	313	3.00E+00	6	3.90E+04	5.19E+02	1.40E+04	5.20E+01	8.04E+05	2.86E+03
	1.92E+02	28	3.00E+00	0	1.20E+03	1.78E+02	4.50E+03	1.10E+03	2.00E+06	2.64E+04
	6.28E+04	111	5.80E+03	21	7.09E+05	1.80E+04	2.20E+04	3.23E+02	2.50E+06	7.99E+03
	1.02E+03	63	9.70E+01	14	1.90E+06	3.00E+04	1.73E+02	4.80E+01	1.50E+06	3.85E+04
	1.69E+03	37	2.90E+01	31	1.10E+04	1.00E+03	3.90E+04	2.70E+03	3.39E+03	5.80E+01
	1.41E+03	56	1.60E+01	0	2.30E+04	1.80E+03	1.30E+04	2.32E+02	1.20E+06	6.76E+03
	0.00E+00	1.67E+02	1.41E+04	1.26E+02	6.10E+04	2.50E+03	3.90E+03	3.89E+02	1.60E+07	6.69E+04
	1.90E+06	9950	8.50E+01	3	1.20E+04	2.97E+02	4.80E+04	2.30E+01	2.10E+06	5.70E+03
	4.26E+02	10	3.80E+01	7	7.48E+02	1.15E+02	4.00E+04	4.71E+02	7.80E+06	2.11E+04
	0.00E+00	62	6.00E+01	0	5.40E+04	3.77E+02	2.30E+03	1.00E+01	2.20E+06	1.08E+04
	2.82E+05	1511	5.84E+02	68	1.70E+04	4.71E+02	3.30E+03	1.86E+02	1.90E+06	8.04E+03
	6.93E+04	121	7.02E+02	33	1.20E+04	2.98E+02	2.13E+05	1.30E+03	1.20E+06	6.23E+04
	3.51E+03	51	1.00E+03	241	2.60E+04	6.15E+02	6.90E+03	3.60E+01	4.07E+07	2.39E+05
	4.65E+02	18	6.29E+02	69	3.80E+04	1.51E+02	6.24E+02	7.25E+02	4.40E+06	3.25E+04
	4.47E+03	26	1.23E+04	113	6.00E+04	5.11E+02	5.10E+03	4.33E+02	1.48E+07	1.19E+05
Averages:	1.83E+05	1.15E+03	4.31E+03	6.67E+01	8.69E+04	2.01E+03	4.54E+04	1.03E+03	4.68E+06	2.97E+04
Ratio (L/C)		1.59E+02		6.46E+01		4.32E+01		4.39E+01		1.58E+02

Appendix B – AHP Process Flow Chart



Appendix C – AHP Hierarchy



Appendix D – Example Code for AHP Calculations for Survey Response

```python
import ahpy
superCat_raw = {
    ('characteristics','openness'):2, ('characteristics','virality'):1,
    ('openness','virality'):.8
    }

characteristics_raw = {
    ('size','income'):5, ('size','time'):2, ('size','shop'):5, ('size','advert'):2,
    ('income','time'):.5, ('income','shop'):2, ('income','advert'):1,
    ('time','shop'):5, ('time','advert'):9,
    ('shop','advert'):.5
    }

openness_raw = {
    ('info','multi'):9, ('info','ratio'):9, ('info','rec'):5, ('info','outNet'):1, ('info','suppLinks'):1, ('info','regLock'):1,
    ('multi','ratio'):9, ('multi','rec'):5, ('multi','outNet'):2, ('multi','suppLinks'):2, ('multi','regLock'):.5,
    ('ratio','rec'):1, ('ratio','outNet'):.5, ('ratio','suppLinks'):.5, ('ratio','regLock'):.2,
    ('rec','outNet'):1, ('rec','suppLinks'):2, ('rec','regLock'):.5,
    ('outNet','suppLinks'):9, ('outNet','regLock'):1,
    ('suppLinks','regLock'):.2
}

virality_raw = {
    ('numMethods','viral'):.5
}

superCat = ahpy.Compare(name = 'category scores', comparisons = superCat_raw, precision = 3, random_index = 'saaty')
characteristics = ahpy.Compare(name = 'platform characteristics scores', comparisons = characteristics_raw, precision = 3, random_index = 'saaty')
openness = ahpy.Compare(name = 'openness scores', comparisons = openness_raw, precision = 3, random_index = 'saaty')
virality = ahpy.Compare(name = 'virality scores', comparisons = virality_raw, precision = 3, random_index = 'saaty')

print('Response 1 Results:')
print('Overall Categories:', superCat.target_weights , 'consistency:', superCat.consistency_ratio, '\nCharactersistics:', characteristics.target_weights, 'consistency:', characteristics.consistency_ratio, '\r
print('Average Inconsistency value:', (superCat.consistency_ratio + characteristics.consistency_ratio + openness.consistency_ratio + virality.consistency_ratio)/4, '\n')
```

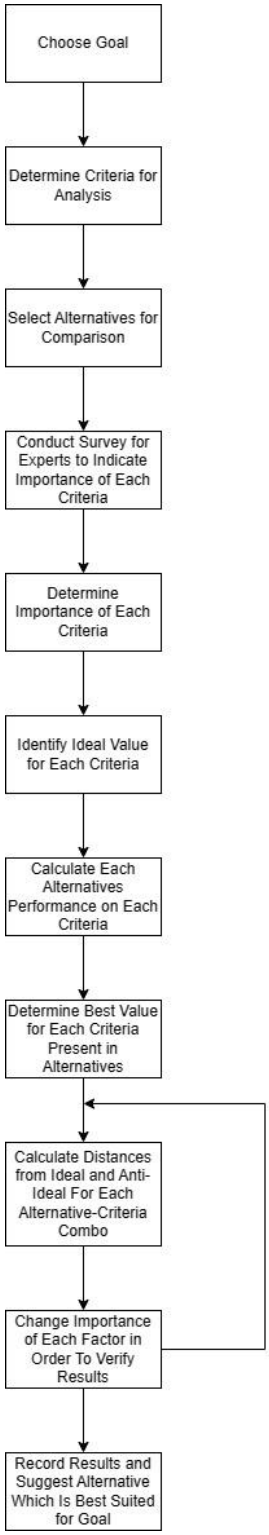
```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

Response 1 Results:
Charactersistics: {'size': 0.384, 'time': 0.355, 'income': 0.105, 'advert': 0.1, 'shop': 0.056} consistency: 0.105
Openness: {'info': 0.316, 'regLock': 0.184, 'outNet': 0.17, 'multi': 0.159, 'suppLinks': 0.07, 'rec': 0.067, 'ratio': 0.035} consistency: 0.237
Virality: {'viral': 0.667, 'numMethods': 0.333} consistency: 0.0
Average Inconsistency value: 0.0915

PS C:\Users\wpiadmin>
```

Appendix E – Pairwise Comparison Matrix for Platform Userbase Size and Raw Data

	Facebook	Instagram	Pinterest	TikTok	Twitter
Facebook	1	3	9	6	9
Instagram		1	7.5	3	7.5
Pinterest			1	1/5	1
TikTok				1	3
Twitter					1

Platform	% US pop. who use platform
Facebook	77
Instagram	56
Pinterest	27
TikTok	44
Twitter	32

Appendix F – TOPSIS Flow Chart



Appendix G – Preprocessing Code (L2 Normalization)

```
from sklearn import preprocessing
import numpy as np

# normalize defined as x / np.linalg.norm(x)
# where np.linalg.norm(x) = sqrt((sum_i_j(abs(x_i_j)))^2)

size = np.array([77, 56, 27, 44, 32])
income = np.array([34, 39, 38, 35, 43])
time = np.array([30.9, 33.1, 14.2, 53.8, 34.1])
shop = np.array([5, 3, 2, 5, 1])
adSpend = np.array([58, 76.6, 35, 49, 25.2])
numInfo = np.array([5, 5, 6, 3, 4])
multiAcc = np.array([1, 1, 1, 1, 1])
privateAcc = np.array([0, 75, 50, 20, 13])
fyp = np.array([1, 1, 1, 1, 1])
network = np.array([1, 1, 1, 1, 1])
demLinks = np.array([1, 1, 1, 0, 0])
region = np.array([0, 1, 0, 0, 0])
engMethods = np.array([3, 2, 3, 3, 3])
metrics = np.array([86900, 183000, 4310, 4680000, 45400])


print("Normalized Values:")
print("Size:", preprocessing.normalize([size]))
print("Income:", preprocessing.normalize([income]))
print("Time:", preprocessing.normalize([time]))
print("Shop:", preprocessing.normalize([shop]))
print("Advertisment Spending:", preprocessing.normalize([adSpend]))
print("Number of Info To Sign Up:", preprocessing.normalize([numInfo]))
print("Multiple Accounts:", preprocessing.normalize([multiAcc]))
print("Private Account Ratio", preprocessing.normalize([privateAcc]))
print("Has FYP?", preprocessing.normalize([fyp]))
print("Out of Network Recommendations:", preprocessing.normalize([network]))
print("Demotes links?:", preprocessing.normalize([demLinks]))
print("Region Locked?:", preprocessing.normalize([region]))
print("Num Engagement Methods:", preprocessing.normalize([engMethods]))
print("Post Metrics:", preprocessing.normalize([metrics]))
```

Appendix H – AHP Survey

aZen Network Factor Rankings.

Please fill out each survey field to make each question an accurate statement.

Identification

Information about yourself.

1. Role and level in company.

Options

- Much more
- more
- slightly more
- equally
- slightly less
- less
- much less

Major Factor Questions:

These questions pertain to the major factors used for comparing social media platforms. Platform characteristics contain user base demographics and platform features. Openness tries to judge how open a platform is and how easy it is to use for aZen networks to use. And virality tries to judge how easy it is for aZen network's posts to spread on the platform.

1. Platform characteristics are _____ important as openness.
2. Platform characteristics are _____ important as virality.
3. Openness is _____ important than virality.

Platform characteristics

A platform has a "shop" feature if purchases can be made directly on the app with no need for redirection to a third-party site.

1. Number of users are _____ important than user income.
2. Number of users are _____ important than average time spent on platform.
3. Number of users are _____ important than if a platform has a "shop" feature.

4. Number of users are _____ important than how much companies spend advertising on the platform.
5. User income is _____ important than average time spent on platform.
6. User income is _____ important than if a platform has a "shop" feature.
7. User income is _____ important than how much companies spend advertising on the platform.
8. Average time spent on a platform is _____ important than if a platform has a "shop" feature.
9. Average time spent on a platform is _____ important than how much companies spend advertising on the platform.
10. If a platform has a "shop" feature is _____ important than how much companies spend advertising on the platform.

Openness:

1. The amount of information it takes to make an account is _____ important than the ability to have multiple accounts for any given platform.
2. The amount of information it takes to make an account is _____ important than the ratio of public to private accounts on the platform.
3. The amount of information it takes to make an account is _____ important than if the platform has a recommended or popular page.
4. The amount of information it takes to make an account is _____ important than if the platform can show users posts from outside their network of friends.
5. The amount of information it takes to make an account is _____ important than if the platform suppresses posts with links in them.
6. The amount of information it takes to make an account is _____ important than if the platform allows users to see posts from other countries or regions.
7. The ability to have multiple accounts for any given platform is _____ important than the ratio of public to private accounts on the platform.
8. The ability to have multiple accounts for any given platform is _____ important than if the platform has a recommended or popular page.
9. The ability to have multiple accounts for any given platform is _____ important than if the platform can show users posts from outside their network of friends.
10. The ability to have multiple accounts for any given platform is _____ important than if the platform suppresses posts with links in them.
11. The ability to have multiple accounts for any given platform is _____ important than if the platform allows users to see posts from other countries or regions.
12. The ratio of public to private accounts on the platform is _____ important than if the platform has a recommended or popular page.
13. The ratio of public to private accounts on the platform is _____ important than if the platform can show users posts from outside their network of friends.
14. The ratio of public to private accounts on the platform is _____ important than if the platform suppresses posts with links in them.
15. The ratio of public to private accounts on the platform is _____ important than if the platform allows users to see posts from other countries or regions.

16. If the platform has a recommended or popular page is _____ important than if the platform can show users posts from outside their network of friends.
17. If the platform has a recommended or popular page is _____ important than if the platform suppresses posts with links in them.
18. If the platform has a recommended or popular page is _____ important than if the platform allows users to see posts from other countries or regions.
19. If the platform can show users posts from outside their network of friends is _____ important than if the platform suppresses posts with links in them.
20. If the platform can show users posts from outside their network of friends is _____ important than if the platform allows users to see posts from other countries or regions.
21. If the platform suppresses posts with links in them is _____ important than if the platform allows users to see posts from other countries or regions.

Virality

1. The number of engagement methods available to users is _____ important than how easy it is to go viral on a platform.

aZen 网络因素排名

请填写每个调查字段，以便准确表述每个问题。

识别

关于你自己的信息

1. 在公司的角色和级别

选项

- 很多
- 多
- 较多
- 一样多
- 较少
- 少
- 很少

主要因素

这些问题涉及用于比较社交媒体平台的主要因素。平台特征包括用户群人口统计和平台功能。开放性试图评判一个平台的开放程度，以及它对 aZen 网络使用的易用性。病毒性则试图判断一个 Zen 网络的帖子在平台上传播的难易程度。

1. 平台特性比开放性_____重要。
2. 平台特征比病毒性_____重要。
3. 开放性比病毒性_____重要。

平台特征

如果可以直接在应用程序上购买，而无需转到第三方网站，则该平台具有 ″商店 ″功能。

1. 用户群规模比用户收入 _____ 重要。
2. 用户群规模比在平台上花费的平均时间 _____ 重要。
3. 用户群规模比平台是否具有 ″商店 ″功能 _____ 重要。
4. 用户群规模比公司在平台上的广告投入 _____ 重要。
5. 用户收入比平台平均使用时间 _____ 重要。
6. 用户收入比平台是否有 ″商店 ″功能 _____ 重要。
7. 用户收入比公司在平台上的广告投入 _____ 重要。
8. 在平台上花费的平均时间比平台是否有 ″商店 ″功能 _____ 重要。
9. 在平台上花费的平均时间比公司在平台上的广告投入 _____ 重要。
10. 如果一个平台有 ″商店 ″功能比公司在平台上花多少广告费 _____ 重要。

开放性

1. 创建一个账户所需的信息量比在任何特定平台上拥有多个账户的能力 _____ 重要。
2. 创建账户所需的信息量比平台上公共账户与私人账户的比例 _____ 重要。
3. 创建账户所需的信息量比平台是否有推荐页面或热门页面 _____ 重要。
4. 创建账户所需的信息量比平台能否向用户显示其朋友圈以外的帖子更重要。
5. 创建一个账户所需的信息量比平台是否压制带有链接的帖子 _____ 重要。
6. 创建账户所需的信息量比平台是否允许用户查看其他国家或地区的帖子 _____ 重要。
7. 在任何特定平台上拥有多个账户的能力比平台上公共账户与私人账户的比例 _____ 重要 。
8. 能够为任何给定平台拥有多个帐户比该平台是否有推荐页面或热门页面 _____ 重要。
9. 在任何特定平台上拥有多个账户的能力比该平台能否向用户显示其朋友圈以外的帖子 _____重要。
10. 在任何特定平台上拥有多个账户的能力比平台是否压制带有链接的帖子 _____重要。
11. 在任何特定平台上拥有多个账户的能力比平台是否允许用户查看来自其他国家或地区的帖子 _____重要。

12. 平台上公共账户与私人账户的比例比平台是否有推荐或热门页面 _____重要。
13. 平台上公共账户与私人账户的比例比平台能否向用户显示其朋友圈以外的帖子 _____重要。
14. 平台上公共账户与私人账户的比例比平台是否压制带有链接的帖子 _____重要。
15. 平台上公共账户与私人账户的比例比平台是否允许用户查看来自其他国家或地区的帖子 _____重要。
16. 平台是否有推荐页面或热门页面比平台是否能显示用户朋友圈以外的帖子 _____重要。
17. 如果平台有推荐或热门页面比平台是否压制带有链接的帖子 _____重要。
18. 如果平台有推荐或热门页面比平台是否允许用户查看其他国家或地区的帖子 _____重要。
19. 如果平台可以向用户显示其朋友圈以外的帖子，那么 比平台是否压制带有链接的帖子 _____重要。
20. 如果平台可以向用户显示其朋友圈以外的帖子，那么 比平台是否允许用户查看其他国家或地区的帖子 _____重要。
21. 如果平台压制带有链接的帖子，那么比平台是否允许用户查看来自其他国家或地区的帖子 _____重要。

病毒性

1. 用户可使用的参与方式的数量比在一个平台上病毒传播的难易程度 _____重要。

Appendix I – AHP Survey Alternative

Hello,

We would like to analyze which platform would be the best for aZen network's affiliate marketing plan. To do this, we will be comparing 5 platforms (Twitter, Pinterest, TikTok, Facebook, Instagram) using multiple factors.

For each table, fill the top half with how important a factor is relative to each other. Write down how important the row factor is compared to the column factor.

You can write any number between 1/9 and 9, where 1 means that they are equally important. Suggested numbers are 1/9, 1/8, 1/7, …, 1, 2, 3, … 9.

The table below is an example comparing how cute dogs, cats, and birds are. If you think dogs (from the left) are less cute than cats (from the top) you would put a 1/3 in the box to show that they are only 1/3 as cute. If you think cats (from the left) are cuter than birds (from the top), you put a large number in the box such as 9, which means it is 9 times as cute. The row is "X" as cute as the column.

Example	Dog 狗	Cat 猫	Bird 鸟
Dog 狗	1	1/3	3
Cat 猫		1	9
Bird 鸟			1

Clarifications:

Platform characteristics contain user base demographics and platform features. Openness judges how open or interconnected a platform is and how easy it would be for aZen networks user to operate. And virality quantifies how easy it is for aZen network's posts to spread on the platform.

A platform has a "shop" feature if purchases can be made directly on the app with no need for redirection to a third-party site.

Please take this second survey after completing the tables below.

1. What is your role and level in the company?

General Ranking	Platform Characteristics	Openness	Virality
Platform Characteristics	1		
Openness		1	
Virality			1

Characteristics Ranking	Number of users	Average Income of users	Time people spend on platform	Platform has a “shop” feature	Amount businesses spend advertising on the platform
Number of users	1				
Average Income of users		1			
Time people spend on platform			1		
Platform has a “shop” feature				1	
Amount businesses spend advertising on the platform					1

Virality Ranking	Number of Engagement methods	How easy it is to go viral
Number of engagement methods	1	
How easy it is to go viral		1

Openness Ranking	Amount of information needed to open an account	Platform allows for multiple accounts	Ratio of private accounts to public accounts	Platform has a recommended post page	Platform recommends posts from new people	Platform suppresses off-site links	Platform segments content based on region
Amount of information needed to open an account	1						
Platform allows for multiple account		1					
Ratio of private accounts to public accounts			1				
Platform has a recommended post page				1			
Platform recommends posts from new people					1		
Platform suppresses off-site links						1	
Platform segments content based on region							1

您好、

我们想分析一下哪个平台最适合 aZen 网络的联盟营销计划。为此，我们将使用多种因素对 5 个平台（Twitter、Pinterest、TikTok、Facebook、Instagram）进行比较。

在每个表格的上半部分，填写各因素的相对重要性。写下与列因素相比，行因素的重要程度。

您可以写下 1/9 到 9 之间的任何数字，其中 1 表示它们同等重要。建议数字为 1/9, 1/8, 1/7, ..., 1, 2, 3, ..., 9。

下表是一个比较狗、猫和鸟的可爱程度的例子。如果您认为狗（从左边开始）没有猫（从上面开始）可爱，您就会在方框里填上 1/3，表示它们只有猫的 1/3 可爱。如果你认为猫（从左边开始）比鸟（从上面开始）可爱，你就会在方框里填一个大数字，比如 9，表示可爱程度是鸟的 9 倍。这一行的可爱程度是这一列的 "X"。

Example	Dog 狗	Cat 猫	Bird 鸟
Dog 狗	1	1/3	3
Cat 猫		1	9
Bird 鸟			1

说明:

平台特征包括用户群人口统计和平台功能。开放性判断平台的开放或互联程度，以及 Zen 网络用户操作平台的难易程度。而病毒性则量化了一个 Zen 网络的帖子在平台上传播的容易程度。

一个平台是否具有 "商店 "功能，取决于是否可以直接在应用程序上进行购买，而无需转到第三方网站。

1. 在公司的角色和级**别?**

_____

请在填写以下表格后进行第二次调查。

平台特性	用户数量	用户收入	用户在平台上花费的平均时间	平台有 "商店 "功能，允许用户直接购买产品	公司在平台上的广告投入
用户数量	1				
用户收入		1			
用户在平台上花费的平均时间			1		
平台有 "商店 "功能，允许用户直接购买产品				1	
公司在平台上的广告投入					1

病毒性	用户可使用的参与方式（点赞、评论）的数量	是否容易传播
用户可使用的参与方式（点赞、评论）的数量	1	
是否容易传播		1

开放性	建立账户的简便程度	能够创建多个账户	公共账户与私人账户的数量	平台有推荐页面	平台显示除了互关好友之外的帖子	平台允许插入外链	推荐更加全球化的帖子
建立账户的简便程度	1						
能够创建多个账户		1					
公共账户与私人账户的数量			1				
平台有推荐页面				1			
平台显示除了互关好友之外的帖子					1		
平台允许插入外链						1	
推荐更加全球化的帖子							1

一般	平台特性	开放性	病毒性
平台特性	1		
开放性		1	
病毒性			1

Appendix J – SMART Survey

aZen Networks Simple Factor Ranking, aZen 网络简单因子排名

This survey is to judge how important each factor is when comparing the social media platforms.

这项调查的目的是在比较社交媒体平台时，判断每个因素的重要性。

1. What is your role and level in the company? 您在公司的角色和级别是什么？
2. Please choose how important you think each factor is when comparing social media platforms, where 1 is not important at all and 7 is very important. 请选择您认为在比较社交媒体平台时每个因素的重要程度，1 表示完全不重要，7 表示非常重要。

- The number of users, 用户数量
- User income, 用户收入
- If a platform has a "shop" feature, which allows for users to directly buy products. 如果一个平台有 "商店 "功能，允许用户直接购买产品。
- How much money companies spend advertising on a platform. 公司在平台上的广告投入。
- Average time users spend on a platform. 用户在平台上花费的平均时间。
- The amount of information it takes to make an account. 建立账户所需的信息量。
- The ability to create multiple accounts. 能够创建多个账户。
- The number of public vs private accounts. 公共账户与私人账户的数量
- If the platform has a recommended page. 如果平台有推荐页面。
- If the platform shows posts outside of a user's network of friends. 如果平台显示的帖子超出了用户的朋友圈。
- If a platform suppresses posts with links. 如果平台压制带有链接的帖子。
- If the platform allows users to see posts from other countries. 如果平台允许用户查看来自其他国家的帖子。
- The number of engagement methods (liking, commenting) available to users. 用户可使用的参与方式（点赞、评论）的数量。
- How easy it is to go viral on a platform. 在一个平台上传播病毒是多么容易。

Appendix K – AHP and TOPSIS Weights

	Survey 1	Survey 2	Survey 3	Survey 4	Survey 5	Survey 6	Survey 7	Survey 8	Survey 9	Survey 10	Survey 11	Survey 12	Average Local Weights	
Platform Characteristics	0.41	0.433	0.596	0.808	0.333	0.5	0.123	0.217	0.333	0.115	0.105	0.125	0.3415	
Openness	0.24	0.387	0.308	0.062	0.333	0.437	0.673	0.717	0.333	0.166	0.396	0.75	0.4001666	
Virality	0.35	0.169	0.096	0.13	0.333	0.064	0.204	0.066	0.333	0.719	0.499	0.125	0.257333333	Global Weights
Userbase Size	0.384	0.135	0.306	0.639	0.362	0.336	0.439	0.328	0.17	0.424	0.339	0.096	0.329833333	0.112638
Average User Income	0.105	0.181	0.285	0.116	0.321	0.086	0.089	0.032	0.493	0.141	0.305	0.232	0.198833333	0.067902
Average Time Spent Daily	0.355	0.304	0.312	0.186	0.281	0.413	0.307	0.121	0.141	0.071	0.194	0.103	0.232333333	0.079342
Shop Feature	0.056	0.221	0.035	0.024	0.024	0.026	0.076	0.478	0.113	0.086	0.053	0.326	0.1265	0.0432
Advertisement Spending	0.1	0.158	0.062	0.035	0.012	0.139	0.09	0.043	0.082	0.277	0.109	0.243	0.1125	0.038419
Num Info to Sign Up	0.316	0.298	0.174	0.265	0.037	0.102	0.058	0.031	0.062	0.02	0.211	0.026	0.133333333	0.053356
Allows Multiple Accounts	0.159	0.099	0.092	0.371	0.052	0.018	0.05	0.131	0.086	0.122	0.247	0.074	0.125083333	0.050054
Private / Public Ratio	0.035	0.066	0.14	0.086	0.066	0.027	0.284	0.041	0.091	0.042	0.079	0.027	0.082	0.032814
Recommendations Page	0.067	0.058	0.069	0.173	0.229	0.362	0.076	0.077	0.279	0.164	0.181	0.033	0.147333333	0.058958
Can See Posts by Non-Friends	0.17	0.164	0.143	0.043	0.385	0.084	0.237	0.207	0.136	0.12	0.081	0.465	0.18625	0.074531
Suppresses Posts w/ Links	0.07	0.164	0.105	0.019	0.161	0.172	0.019	0.168	0.147	0.374	0.14	0.136	0.139583333	0.055857
Shows out of Region Content	0.184	0.151	0.278	0.044	0.07	0.235	0.276	0.344	0.198	0.159	0.061	0.239	0.186583333	0.074664
Num Engagement Methods	0.333	0.75	0.125	0.857	0.75	0.1	0.857	0.25	0.75	0.1	0.5	0.143	0.459583333	0.118266
Ease of Virality	0.667	0.25	0.875	0.143	0.25	0.9	0.143	0.75	0.25	0.9	0.5	0.857	0.540416667	0.139067

Appendix L– SMART Weights

	Size	Income	Shop Feature	Advertiser spending	Average Time Spent Daily	Num Info to Sign Up	Allows Multiple Accounts	Private / Public Ratio	Recommendations Page	Can See Posts by	Suppresses Posts w/ Links	Shows out of Region Content	Num Engagement Methods	Ease of Virality

										Non-Friends				
	3	1	1	2	3	3	3	3	3	3	3	3	3	3
	3	3	5	4	4	3	6	4	4	7	7	7	7	7
	7	3	6	6	7	2	1	4	5	7	7	7	5	7
	3	1	1	1	3	3	1	1	2	3	3	3	3	2
	7	3	7	5	4	5	5	3	6	5	7	5	7	7
	7	6	6	6	7	1	1	1	3	3	1	3	6	7
	5	7	2	3	1	4	2	1	3	5	2	1	5	7
	7	1	7	3	3	6	5	3	5	4	6	6	6	6
	2	5	2	2	1	4	1	1	3	3	2	3	2	3
Mean	4.888889	3.333333	4.111111	3.555556	3.666667	3.444444	2.777778	2.333333	3.777778	4.444444	4.222222	4.222222	4.888889	5.444444