



ROI and SNA Analysis in Testing the Effectiveness of New Student Admission Promotion: A Case Study at MAS Al Washliyah Gedung Johor

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Abstract– Globalization and intense competition in the education sector, especially among private high schools, require institutions such as MAS Al Washliyah Gedung Johor to continue optimizing their new student admission promotion strategies. Although the school has implemented multi-channel promotions that include social media (Instagram, TikTok), conventional methods (brochures), and financial incentives (alumni tuition fee discounts), there has been no in-depth analysis of the effectiveness of each variable. The problem of less than optimal promotion results due to inappropriate media selection often results in inefficient allocation of promotion costs with minimal student recruitment results. This study aims to analyze the effectiveness of various promotion variables used by MAS Al Washliyah Gedung Johor, in order to support a more appropriate and efficient allocation of funding sources. Data were collected through a questionnaire given to new students regarding their sources of promotional information. To achieve this goal, this study uses a two-method approach: Return on Investment (ROI) to measure financial efficiency and return on funds, and Social Network Analysis (SNA) to visualize interaction patterns, reach, and identify the most influential communities or promotions in the student exposure network. By combining ROI and SNA analysis, it is hoped that this study can provide clear information regarding promotion costs and the most efficient and effective types of promotion, as a basis for improving the school promotion system in the future.

Keywords: New student admissions; Promotion effectiveness; Return on Investment (ROI); Social Network Analysis (SNA); MAS Al Washliyah Gedung Johor

1. INTRODUCTION

In this increasingly advanced era of globalization, humans are required to be able to compete with other human resources to achieve a better life, one of which is through the existence of Senior High Schools (SMA).[1]. With the increase in private educational institutions, each school must prepare itself to face its competitors so as not to lose out in the competition to attract the hearts of consumers or the wider community.[2]. The ongoing competition in accepting new students is a major driving factor for the development of the education sector in Indonesia. From the results of research conducted by M Iqbal et al., it was stated that one way to improve Indonesia's human resources is by improving the quality of Indonesian education.[3]. The intense competition between educational institutions to attract new students adds to the urgency of using data analysis techniques.[4]. Increasing the quantity of new student admissions in a sustainable manner is a strategic goal for every educational institution. MAS Al Washliyah Gedung Johor, as one of the private Islamic educational institutions in Medan, faces challenges in optimizing promotional strategies to attract prospective new students. Although the school has used various promotional channels, there has been no in-depth analysis of the effectiveness of each promotional channel in attracting the interest of prospective new students. This causes inefficiency in the allocation of resources and promotional efforts that have been made. As explained by Fransiskus and Yoseph, the problem often experienced by the promotion team is the less than optimal results of the promotion due to the selection of media, this results in large promotional costs with few prospective student recruitment results.[5]. Without a clear understanding of the patterns of interaction and information dissemination across various promotional channels, schools have difficulty in determining targeted promotional strategies. Therefore, this study aims to help schools obtain clear data information from each promotional channel used by MAS Al Washliyah Gedung Johor. Data mining is the author's choice to help process data from the types of promotions previously conducted by the school. Data mining is a process that employs one or more computer learning techniques to analyze and extract knowledge automatically.[6]. With the right approach, data mining can provide the information needed to perform analysis.[7].

This study uses two methods, namely the ROI (Return on Investment) method and the SNA (Social Network Analysis) method. The Return On Investment (ROI) method is to measure the level of net income obtained from its total assets.[8][9]. With various promotions that have been made by MAS Al Washliyah Gedung Johor school before, the author hopes that the school will get clear and efficient information on expenses and income with the help of the ROI method. This SNA method and technique were chosen because this study requires a method that can provide a picture or visualization in the network according to the data that has been preprocessed, this SNA method can also be used to find nodes, communities, and informal hierarchies that have the greatest influence in the network[10]. The purpose of using the SNA method is usually to identify which groups or actors are influential on certain social media so that they can be used to facilitate the dissemination of information.[11]. So by using this SNA method, the author hopes that the school will get data on which promotion results have an impact on the school's new student promotion system. By using the ROI



and SNA methods, the researcher gets the results of the total promotional costs and types of promotions used are more efficient, which greatly influences the promotion system of the MAS Al Washliyah Gedung Johor school in the future.

2. RESEARCH METHODOLOGY

2.1 Research Stages

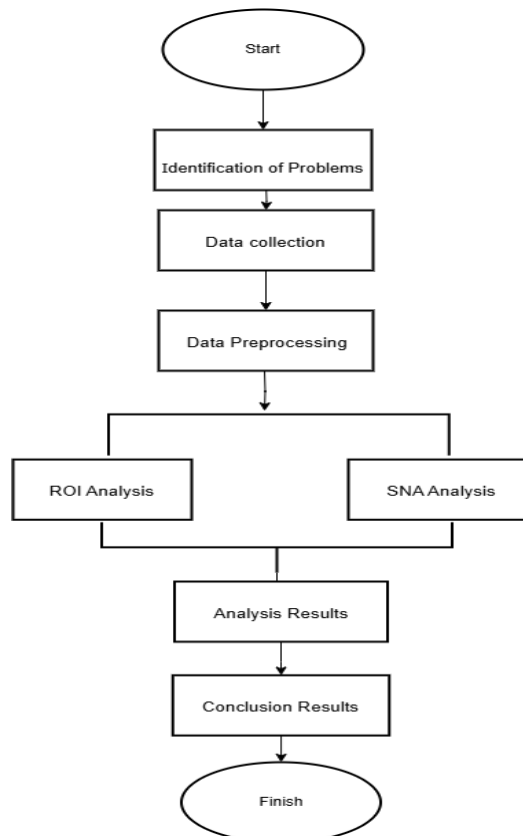


Figure 1.Research Stages

1. Identification of problems

Understanding the types of promotions used by MAS Al Washliyah Gedung Johor school and determining the appropriate type of method to use in line with the research objectives on the effectiveness of new student promotions at the school.

2. Data collection

The data collection process was carried out by interviewing the treasurer of MAS Al Washliyah Gedung Johor and making a questionnaire for all students.

3. Data Preprocessing

Cleaning the data obtained according to the needs of the next data analysis stage. As quoted by Muitsanjaya, et al., namely Preprocessing data is one of the important stages in conducting classification analysis which aims to clean data from unnecessary elements so as to speed up the classification process.[12].

4. ROI Analysis

Calculate the promotional costs to the income generated.

5. SNA Analysis

Mapping the relationship of students to the types of promotions they use when registering at MAS Al Washliyah Gedung Johor

6. Analysis Results

Obtain ROI and SNA Analysis Results and then compare the cost-effectiveness of promotional spending based on the various types of school promotions used.

7. Conclusion Results

To answer the research objectives and obtain effective promotional strategies used by MAS Al Washliyah Gedung Johor school.

2.2 Research Data



Table 1. Student Promotion Data 2022

No	Student Name	Origin_SMP	Promotion Information
1	THE HOLY ABSYAH OF UTARI	Junior High School 28 Medan	Social media
2	ACHYAR HAFIZD SIREGAR	MTs Al-Washliyah Gedung Johor	MTS Alumni Promotion
3	THE LINGGA	SMP N 1 Gunung Sitember	Social Media, Brochures
4	AIRIN SIAM AMANDA	Junior High School 28 Medan	Brochure
5	ANIS ICHSANI PRINCESS	MTs Al-Washliyah Gedung Johor	MTS Alumni Promotion
6	ANNISA SYAFIRA	MTs Al-Washliyah Gedung Johor	MTS Alumni Promotion, Brochure
7	ANTA MAULANA SIDDIK MANIK	Junior High School 3 Pegagan Hilir	Social media
8	ARDIAN SYAHPUTRA	Private Junior High School of Pembangunan	Social media
9	ARI WIJAYA	MTs Al-Washliyah Gedung Johor	MTS Alumni Promotion
10	AULIA AZIZAH	MTs Al-Washliyah Gedung Johor	MTS Alumni Promotion
...			
80	ROMY FERDIANSYAH	MTs Al-Washliyah Gedung Johor	MTS Alumni Promotion

Table 2. Student Promotion Data 2023

No	Name	Origin of Junior High School	Promotion Information
1	SERVANT OF YANSAH	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion
2	AGUS SYAHPUTRA	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion
3	ENGLISH	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion, Brochure
4	ALDI RAHMAN RANKUTI	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion
5	ALLIF JAIYA PRAMANA	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion
6	ALVIN MAULANA ZIKRI	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion, Social Media
7	ALZA TRI ANGGAR PURBA	MTs Al Ittihadiyah	Brochures, Social Media
8	ANANDA AGIL PRASTYA	MTs Al Ittihadiyah	Social Media, Brochure
9	ANANDA REYFANSYAH	MTs Al Ittihadiyah	Brochure
10	ARDIANSYAH	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion
...			
106	ZAHRA WULANDARI	MTsS Sidikalang	Social media

Table 3. Student Promotion Data 2024

No	Name	Origin of Junior High School	Origin of Promotion
1	SISTERS OF SRI WAHYUNI	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion
2	AGUNG SETYO	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion
3	AGUS PUTRA NST	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion
4	AGUS SYAHPUTRA	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion
5	THE REVELATION OF THE GOD OF RINALDI	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion
6	ALISCA RIMANINGSIH NAPITUPULU	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion
7	ALVIN SYAHPUTRA	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion
8	ANDINI	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion
9	ANDIRA	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion
10	ANISA PRINCESS AULIA	MTs Al Washliyah Gedung Johor	MTS Alumni Promotion





11	ANWAR	State Junior High School 8 Medan	Brochure, Social Media
...			
109	ZASKIA DWI SAFIRA	Harapan 3 Private Middle School	Social media

2.3 Return on Investment (ROI)

One of the most commonly used profitability ratio components is ROI, which aims to assess a company's ability to generate profits by considering the total funds available in the company's assets.[13]The purpose of the ROI method used in this study is so that schools...MAS Al Washliyah Gedung Johor can measure the level of income from the total costs incurred in conducting promotions for new student admissions. The formula for calculating ROI is;

$$ROI = \frac{\text{Gain from Investment} - \text{Cost of Investment}}{\text{Cost of Investment}} \times 100\% \quad (1)$$

2.4 Social Network Analysis (SNA)

Social Network Analysis (SNA) is a method used to analyze and describe the structure of a social network.[14].By using the SNA method, you can display a node graph to find out how much interaction occurs.[15].

3. RESULTS AND DISCUSSION

3.1 Data Selection

The data underlying the analysis in this study were obtained through the distribution of questionnaires to active students of MAS Al Washliyah Gedung Johor, which served as a primary source of information regarding their exposure patterns to various types of new student admission promotions used by the school.

3.2 Return on Investment (ROI) Analysis Results

3.2.1 ROI Results 2022

Based on the data of new student admissions for the 2022 intake totaling 80 students, it is known that the majority of students obtained school information through the promotion of tuition discounts from the Alumni of MTS Al Washliyah Gedung Johor, which is 49 students. Meanwhile, 16 students were connected from social media promotions, and 15 students obtained information through brochure promotions. The following are the results of the investment ratio obtained using the ROI formula;

Tuition fee discount promotion from MTS Alwashliyah Gedung Johor alumni, 2022-2023 student admissions

$$ROI = \frac{\text{Gain from Investment} - \text{Cost of Investment}}{\text{Cost of Investment}} \times 100\%$$

$$ROI = \frac{(49 \text{ student} \times 1.800.000) - (Rp25.000 \times 12 \text{ bulan} \times 49 \text{ student})}{(Rp25.000 \times 12 \text{ bulan} \times 49 \text{ student})} \times 100\%$$

$$ROI = \frac{Rp88.200.000 - Rp14.700.000}{Rp14.700.000} \times 100\%$$

$$ROI = 500\%$$

Promotion with social media for student admissions 2022-2023

$$ROI = \frac{\text{Gain from Investment} - \text{Cost of Investment}}{\text{Cost of Investment}} \times 100\%$$

$$ROI = \frac{(16 \text{ student} \times Rp1.800.000) - Rp2.500.000}{Rp2.500.000} \times 100\%$$

$$ROI = \frac{Rp28.800.000 - Rp2.500.000}{Rp2.500.000} \times 100\%$$

$$ROI = 1052\%$$

Promotion with brochures on student admissions 2022-2023

$$ROI = \frac{\text{Gain from Investment} - \text{Cost of Investment}}{\text{Cost of Investment}} \times 100\%$$





$$ROI = \frac{(15 \text{ student} \times 1.800.000) - Rp1.800.000}{Rp1.800.000} \times 100\%$$

$$ROI = \frac{Rp27.000.000 - Rp1.800.000}{Rp1.800.000} \times 100\%$$

$$ROI = 1400\%$$

3.2.2 ROI Results 2023

In the 2023 promotion, there was a new innovation in the type of social media promotion, using drone documentation which increased the promotion cost from the previous promotion cost, from a total of 106 new students, 40 students received information about the school through the promotion of tuition discounts from the Alumni of MTS Al Washliyah Gedung Johor. Furthermore, social media promotion managed to reach 34 students and 32 students obtained information from brochure promotions. In the promotion carried out in 2023, there was an innovation that increased the promotion cost in the social media promotion system. The following are the results of the investment ratio obtained using the ROI formula;

Tuition fee discount promotion from MTS Alwashliyah Gedung Johor alumni, 2023-2024 student admissions

$$ROI = \frac{\text{Gain from Investmen} - \text{Cost of Investment}}{\text{Cost of Investment}} \times 100\%$$

$$ROI = \frac{(40 \text{ student} \times 1.800.000) - (Rp25.000 \times 12 \text{ bulan} \times 40 \text{ student})}{(Rp25.000 \times 12 \text{ bulan} \times 40 \text{ siswa})} \times 100\%$$

$$ROI = \frac{(Rp72.000.000 - Rp12.000.000)}{Rp12.000.000} \times 100\%$$

$$ROI = 500\%$$

Promotion with social media for student admissions 2023-2024

$$ROI = \frac{\text{Gain from Investmen} - \text{Cost of Investment}}{\text{Cost of Investment}} \times 100\%$$

$$ROI = \frac{(34 \text{ student} \times Rp1.800.000) - Rp3.500.000}{Rp3.500.000} \times 100\%$$

$$ROI = \frac{Rp61.200.000 - Rp3.500.000}{Rp3.500.000} \times 100\%$$

$$ROI = 1648\%$$

Promotion with brochures on student admissions 2023-2024

$$ROI = \frac{\text{Gain from Investmen} - \text{Cost of Investment}}{\text{Cost of Investment}} \times 100\%$$

$$ROI = \frac{(32 \text{ student} \times 1.800.000) - Rp1.800.000}{Rp1.800.000} \times 100\%$$

$$ROI = \frac{Rp57.600.000 - Rp1.800.000}{Rp1.800.000} \times 100\%$$

$$ROI = 3100\%$$

3.2.3 ROI Results for 2024

In the 2024 intake, out of a total of 109 new students, 45 students received information about the school through the promotion of tuition discounts from the Alumni of MTS Al Washliyah Gedung Johor. Furthermore, social media promotions managed to reach 37 students, and 27 students obtained information from brochure promotions. The following are the results of the investment ratio obtained using the ROI formula;

Tuition fee discount promotion from alumni of MTS Alwashliyah Gedung Johor for 2024-2025 student admissions



$$ROI = \frac{\text{Gain from Investment} - \text{Cost of Investment}}{\text{Cost of Investment}} \times 100\%$$

$$ROI = \frac{(45 \text{ student} \times 1.800.000) - (Rp25.000 \times 12 \text{ bulan} \times 45 \text{ student})}{(Rp25.000 \times 12 \text{ bulan} \times 45 \text{ student})} \times 100\%$$

$$ROI = \frac{Rp81.000.000 - Rp13.500.000}{Rp13.500.000} \times 100\%$$

$$ROI = 500\%$$

Promotion with social media for student admissions 2024-2025

$$ROI = \frac{\text{Gain from Investment} - \text{Cost of Investment}}{\text{Cost of Investment}} \times 100\%$$

$$ROI = \frac{(37 \text{ student} \times Rp1.800.000) - Rp3.500.000}{Rp3.500.000} \times 100\%$$

$$ROI = \frac{Rp66.600.000 - Rp3.500.000}{Rp3.500.000} \times 100\%$$

$$ROI = 1802\%$$

Promotion with brochures on student admissions 2024-2025

$$ROI = \frac{\text{Gain from Investment} - \text{Cost of Investment}}{\text{Cost of Investment}} \times 100\%$$

$$ROI = \frac{(27 \text{ student} \times 1.800.000) - Rp1.800.000}{Rp1.800.000} \times 100\%$$

$$ROI = \frac{Rp48.600.000 - Rp1.800.000}{Rp1.800.000} \times 100\%$$

$$ROI = 2600\%$$

3.3 Social Network Analysis (SNA) Results

In this section, the author presents the results of social network analysis (SNA) to map and evaluate the interaction patterns and reach of new student admission promotions at MAS Al Washliyah Gedung Johor. SNA analysis provides insight into the structure of connectivity between students and the types of promotions that are their sources of information.

3.3.1 Visualization and Metrics of SNA promotion of new student admissions for 2022-2023

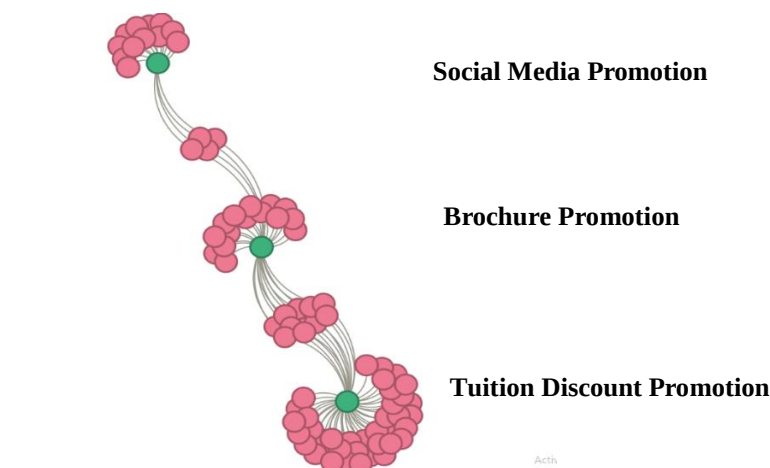


Figure 2.Visual SNA Promotion of New Student Admissions in 2022

Figure 1 presents a visualization of the relationship network between new students and sources of information on new student admission promotions at MAS Al Washliyah Gedung Johor in 2022, which was generated through social network

analysis (SNA) using Gephi software. In this graph, the green nodes represent the types of promotions (Social Media, Brochures, Tuition Discounts), while the pink nodes represent new students. In the visualization results above, the author obtained information that there were several students who received information from 2 types of promotions, namely tuition discount promotions and brochure promotions, and also between social media promotions and brochure promotions. In the 2022 promotion, there were no prospective students who were connected between the three types of promotions used by the MAS Alwashliyah Gedung Johor school.

Table 4.Degree Promotion for New Student Admissions in 2022

No	Label	Degree
1	Tuition Discount Promotion	49
2	Social Media Promotion	16
3	Promotion Brochure	30

The following table presents the degree values of each promotion in social network analysis (SNA). The degree value indicates the number of direct connections each actor has in the network. The higher the degree value, the more connections the actor has, indicating a more central role or influence in the network. Conversely, a low degree value indicates that the actor has few direct connections, so his role in the network tends to be more limited. In the degrees value above from the promotion of new student admissions in 2022, the discount promotion for alumni of MTS Alwashliyah Gedung Johor has the highest degrees value, namely 49, which means it has 49 direct connections with prospective students, the degrees value of social media promotion is 16, and the degrees value of brochure promotion is 30

3.3.2 Visualization and Metrics of SNA promotion of new student admissions for 2023-2024

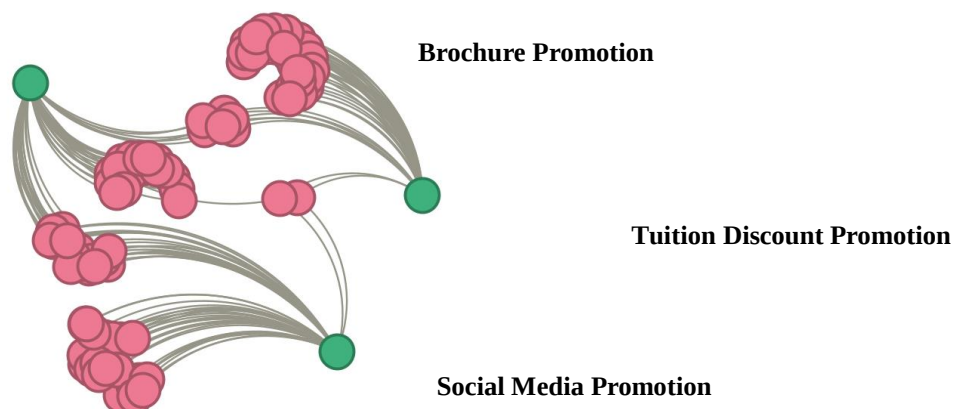


Figure 3.Visual SNA Promotion of New Student Admissions in 2023

Figure 2 presents a visualization of the relationship network between new students and sources of information on new student admissions promotion of MAS Al Washliyah Gedung Johor in 2023, which was generated through social network analysis (SNA) using Gephi software. In this graph, the green nodes represent the types of promotion (Social Media, Brochures, Tuition Discounts), while the pink nodes represent new students. In the visualization results above, the author obtained information on new student admissions in 2023 that there were several students who had connections to the three types of promotions used by the MAS Alwashliyah Gedung Johor school.

Table 5.Degree Promotion for New Student Admissions in 2023

No	Label	Degree
1	Tuition Discount Promotion	40
2	Social Media Promotion	47
3	Promotion Brochure	46

In the table of degrees of promotion value for new student admissions in 2023 with social network analysis (SNA), with the number of students increasing from 80 to 106 students, the degrees value increases in each type of promotion. The degrees value of discount promotion for alumni of MTS Alwashliyah Gedung Johor has a degrees value of 40, which means it has 40 direct connections with prospective students, the degrees value of social media promotion is 47, this is a significant increase in the degrees value which previously only had 16 connections with prospective students, and the degrees value of brochure promotion is 46 which also increased from the previous year

3.3.3 Visualization and Metrics of SNA promotion of new student admissions for 2024-2025

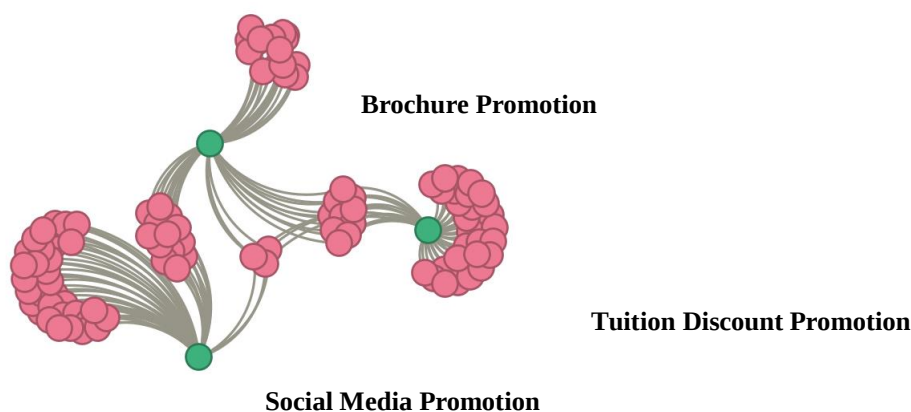


Figure 4. Visual SNA Promotion of New Student Admissions in 2024

Figure 3 presents a visualization of the relationship network between new students and sources of information on new student admission promotions for MAS Al Washliyah Gedung Johor in 2022, which was generated through social network analysis (SNA) using Gephi software. In this graph, the green nodes represent the types of promotions (Social Media, Brochures, Tuition Discounts), while the pink nodes represent new students. In the visualization results above, the author obtained information that a significant increase occurred in the type of social media promotion, this is a very meaningful visual for the school by obtaining visual results that are clear enough to see the difference in the number of connections that occur between promotions and connected students.

Table 6. Degree Promotion for New Student Admissions in 2024

No	Label	Degree
1	Tuition Discount Promotion	45
2	Social Media Promotion	50
3	Promotion Brochure	43

In the table of promotion degree values for new student admissions in 2024 with social network analysis (SNA), with the number of students increasing from 106 to 109 students, the degree value increases in each type of promotion. The discount promotion degree value for alumni of MTS Alwashliyah Gedung Johor has a degree value of 45, this includes a stable degree value in the last 3 years in accepting new students, the social media promotion degree value is 50 connections, and the brochure promotion degree value is 43 connections.

4. CONCLUSION

This study aims to examine the effectiveness of new student admission promotion at MAS Al Washliyah Gedung Johor through Return on Investment (ROI) and Social Network Analysis (SNA) analysis over a three-year period (2022, 2023, and 2024). The results of the analysis show that the promotion system implemented by the school as a whole is effective in supporting the growth of the number of new students, with an increase in applicants from 80 students in 2022 to 109 students in 2024. A comprehensive analysis of the effectiveness of new student admission promotion, which integrates financial (ROI) and network structure (SNA) perspectives, reveals key findings from the school's multi-promotion strategy. Social media proved to be the most financially effective channel, with ROI consistently increasing from 1,052% in 2022 to 1,802% in 2024. Although brochure promotions showed a significant spike in ROI (reaching 3,100% in 2023), they tended to be unstable, while tuition discount promotions showed stable financial effectiveness but did not grow at 500%. The results of the SNA analysis support this finding, showing the relative stability of all types of promotions in the past three years, but specifically highlighting the spike in Degree values for social media and brochures in the past two years. This increase in Degree indicates that both media are not only cost-efficient (indicated by high ROI), but also increasingly strategic in building connections and expanding the reach of information in the promotional communication network, emphasizing its important role in shaping interactions and influences. By obtaining the analysis results from the two methods used, namely ROI and SNA, the author concludes that the new student admission promotion system at MAS Al Washliyah Gedung Johor is very effective. This is evidenced by the growth in the number of new students and the very high ROI level as well as the wide network reach of the three types of promotions.

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