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Instagram Engagement Analysis of Special Hajj Organizers (PIHK) in West Java

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Abstract

The use of social media, particularly Instagram, has become a powerful tool for communication, networking, and business promotion. This study aims to analyze user engagement on the Instagram accounts of special Hajj pilgrimage organizers in West Java. Of 29 registered organisers, 26 Instagram accounts were identified, of which 20 were active during the study period. The analysis covers followers, posts, likes, comments and account-level engagement rates. Pearson coefficients describe linear associations; because the variables were non-normally distributed, Spearman rank correlations were also examined. Pearson results indicated positive associations between comments and likes, comments and followers, likes and followers, and likes and posts, but no significant linear association between the four activity variables and engagement rate. Spearman results differed: engagement rate was negatively associated with followers and posts. Only two accounts were classified as high engagement (10.42 and 8.91). The findings highlight the importance of distinguishing absolute interactions from follower-adjusted rates and of avoiding causal interpretations of cross-sectional correlations. They provide a contextual benchmark for digital communication in Hajj services, subject to the definition of engagement rate and the short observation period.

Keywords: *commen, digital marketing, engagement rate, instagram, like*

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INTRODUCTION

Social media platforms connect service providers and customers through posts, comments and digital interactions (Lalangan, 2020; Sentoso et al., 2023; Viodita et al., 2022). For Special Hajj Organizers (PIHK), Instagram offers a communication channel, but visibility does not necessarily indicate substantive audience engagement. Indonesia has a substantial social-media audience (Annur, 2023; We Are Social, 2025), creating opportunities for service promotion. National platform-use statistics, however, cannot establish the effectiveness of individual PIHK accounts; follower-adjusted interaction indicators are needed (Istiqomah et al., 2024; Zarezadeh et al., 2023; Zhou & Xue, 2022).

Instagram enables visual communication, captions, hashtags and direct engagement, supporting promotional visibility (Lalangan, 2020; Pranindya et al., 2019; Sudirjo et al., 2023). Research on tourism destinations links engagement with visual message characteristics (Blanco-Moreno et al., 2024), while an online travel-agency study explores the predictive importance of text, visuals and (posting time (Son & Park, 2024). These content-level variables were not observed in the present study. Studies have examined Instagram's role in MSMEs, including food and beverage (Rafiah & Kirana, 2019), Nasi Lemak food (Calvin et al., 2023), travel (Nirmala et al., 2021), hydroponics (Pravina et al., 2023), and hampers (Sentoso et al., 2023), as well as in governmental agencies (Arman & Sidik, 2019) and global brands (Gómez-Suárez & Veloso, 2024; Roozen, 2025; Tafesse & Wood, 2021; Veloso et al., 2024). Recent empirical evidence indicates that post design, visual modality and informational content can shape engagement, while the underlying outcomes differ across settings (Kusuma et al., 2024; Tanaka & Huang, 2024; Wahid & Gunarto, 2022)

Research on SMEs, travel businesses and public organisations associates Instagram engagement with content format, promotional communication and interaction patterns (Arman & Sidik, 2019; Calvin et al., 2023; Nirmala et al., 2021; Pravina et al., 2023; Rafiah & Kirana, 2019; Sentoso et al., 2023; Tafesse & Wood, 2021). More specifically, studies of Umrah travel Instagram content (Sieradianto et al., 2024) and religious self-representation (Mawardi et al., 2024) provide sectoral context. A service-oriented Instagram content intervention also illustrates practical content-production challenges in Hajj and Umrah travel (Al-Hafidz et al., 2025). Their results do not establish account-level engagement patterns for PIHKs in West Java. Fathonah et al. (2024), Chalke et al. (2023), and Carvalho (2025) further examine the use of Instagram as a Hajj-information channel.

Previous research has addressed Instagram marketing in general business and tourism contexts, but comparative evidence on publicly observable engagement metrics for Special Hajj Organizers (PIHK) remains limited. The present study examines those account-level metrics rather than private Instagram Insights data. The gap concerns cross account comparisons of publicly observable engagement metrics in special Hajj services, rather than users' motivations or conversion. Although Instagram Insights can include private reach, impressions and audience-demographic measures, this dataset comprises followers, posts, likes and comments. Faith oriented Umrah marketing and digital travel promotion offer contextual comparisons (Ali et al., 2025; Aulia

Rahma Noer & Aditya, 2024; Basya & Basya, 2025), but these aspects were not directly measured. Related pilgrimage-sector research describes digital marketing and strategic Instagram management without estimating the same cross-account PIHK correlations (Hidayah et al., 2025; Husna et al., 2025; Sutrisno et al., 2024)

The travel and tourism industry is a service sector that has undergone significant transformation due to advancements in digital technology and changes in consumer behavior. Marketing activities in the travel sector no longer rely solely on conventional promotional media but are increasingly shifting toward the use of digital platforms and social media as more interactive and data driven communication channels. According to Barten (2025), travel marketing strategies play a crucial role in enhancing the competitiveness of travel companies because they help organizations understand consumer behavior, build relationships with customers, and optimize the user experience through a more personalized and adaptive marketing approach to digital trends. These changes indicate that the success of travel organizations is determined not only by service quality but also by the effectiveness of the digital communication strategies they implement.

In the context of tourism and travel services, social media has become a primary source of information that influences the preferences and decisions of potential service users. Lalangan, (2020) research explains that travel content published on platforms such as YouTube and Instagram can shape the audience's perceptions of destinations and tourism services. Visual content and user experiences shared on social media can increase interest, build trust, and influence consumers' decisions when choosing travel services. This phenomenon demonstrates that social media serves not only as a promotional tool but also as an instrument for shaping an organization's image and credibility in the travel sector.

This situation is particularly relevant to religious travel services such as the organization of the Hajj and Umrah pilgrimages. Parker & Almayahi (2020) explain that Hajj and Umrah travel are activities with unique characteristics because they involve international mobility, large numbers of pilgrims, and a high demand for information regarding travel procedures, health, and religious preparation. These characteristics make trust and credibility crucial factors in pilgrims. Machine-learning research on social media posts for Hajj and Umrah provides another methodological comparison (Khan & AlGhamdi, 2024).

This study evaluates the variation in follower-adjusted Instagram engagement across active PIHK accounts in West Java and examines associations between posts, comments, likes and followers. Its contextual and methodological contribution lies in applying account-level comparisons to religious travel services and contrasting linear Pearson results with rank-based Spearman findings for non-normal data. It neither analyses private Instagram Insights nor establishes causal marketing effects.

LITERATURE REVIEW

Instagram

Instagram engagement has been studied across hospitals, coffee shops and other platforms (Al Aufa et al., 2020; Smura, 2016; Sutanto, 2023). Because audience composition and engagement formulas vary, fixed cross-sector benchmarks should be applied cautiously. Research links engagement to tagging, visual presentation, audience relevance and content framing (Doyle

et al., 2022; McLeod-Morin et al., 2020; Nguyen et al., 2021; Thomas et al., 2020). Tourism studies also identify the potential importance of message and image features (Blanco-Moreno et al., 2024; Yudaninggar & Damastuti, 2023), none of which were coded in this dataset (Bastrygina et al., 2024; Malhan & Dewani, 2023).

Content scheduling, clarity and interactivity may contribute to Instagram engagement (Cuevas-Molano et al., 2022; Priadana et al., 2021; Purba & Yulia, 2021; Rautio, 2022). Hajj and Umrah studies similarly highlight content strategy and religious representation (Mawardi et al., 2024; Sieradianto et al., 2024). The present aggregate correlations cannot test these mechanisms (Carson, Benckendorff, et al., 2023; Carson, Magor, et al., 2023; Paradise-Vit et al., 2024). Research on travel experiences and influencer communication also highlights the roles of source credibility, content expertise and audience responses (Ghaderi et al., 2024; Manthiou et al., 2024; Pourazad et al., 2025).

Social Media

Carr & Hayes (2015) define social media as online platforms that facilitate real-time or asynchronous interaction with broad or targeted audiences, driven by user-generated content. Similarly, Nasrullah (2016) describes social media as internet-based tools enabling communication, collaboration, and social interaction. Widely recognized platforms include Facebook, Instagram, and Twitter (McLeod-Morin et al., 2020). Instagram allows users to upload and enhance photos or videos with features such as captions, hashtags, and location tags (Santika et al., 2024; Sutanto, 2023).

Instagram supports business-to-audience communication and promotional interaction (Evanzha et al., 2021; Nguyen et al., 2021). Evidence from sports branding and other platforms indicates that follower totals and engagement do not necessarily increase together (Doyle et al., 2022; Smura, 2016). The Hajj and Umrah context additionally raises questions about religious messaging and audience trust (Ali et al., 2025; Carson & Benckendorff, 2024). Other studies distinguish authentic consumer conversations, temporal content and participatory behaviour from simple follower totals (Maar et al., 2023; Malodia et al., 2024; Pradipta & Gayatri, 2023).

Hajj

According to Kementrian Agama Republik Indonesia (2020), Hajj is a pilgrimage to the Ka'bah involving specific rites such as wukuf, mabit, tawaf, and sa'i performed at designated times to fulfill divine command and seek the pleasure of Allah SWT. Islamic teachings mandate that every adult Muslim who is physically and financially capable must perform Hajj at least once in their lifetime (Parker & Almayahi, 2020). The five conditions for its obligation include being Muslim, having reached puberty, soundness of mind, independence, and capability defined as physical, financial, and mental readiness (Alfiyanti et al., 2019; Aswandi, 2021). While Hajj is time-bound, Umrah may be performed at any time and is not compulsory (Parker & Almayahi, 2020).

Kemenag serves as the main regulator and service provider within the Hajj ecosystem, while Special Hajj Service Providers (PIHK) and Umrah Travel Service Providers (PPIU) manage specialized Hajj and Umrah services. The relationship between beneficiaries and providers reflects a value exchange agreement (Sopyan et al., 2023). As Subhan et al. (2023) highlight, organizing Hajj and Umrah is a vital religious service, where service quality and trust significantly affect user satisfaction and long-term engagement.

HIMPUH, the Association of Umrah and Hajj Organizers, unites officially licensed PIHK and PPIU institutions. On October 15, 2006, Kemenag proposed the merger of three key associations AMPUH, AMPPUH, and SEPUH into a single unified body to enhance coordination and service quality within Indonesia's Hajj and Umrah sectors.

Instagram Engagement Rate

Instagram remains a dominant social media platform, enabling users to share photos and videos, and continues to be widely adopted in contemporary society (Sheldon & Bryant, 2016). A key metric on this platform is the engagement rate, which reflects user interaction through likes and comments (Arman & Sidik, 2019). Likes generally signal appreciation, while comments represent deeper user involvement through discussion (Bakhshi et al., 2014). The type of content significantly impacts engagement; for instance, Cuevas-Molano et al. (2022) found that videos with sound, multi-photo posts, and the use of hashtags increase likes, whereas polls, contests, and questions tend to generate more comments.

Several formulas have been developed to calculate Instagram engagement rates. Sutanto (2023) proposes a basic approach using the formula:

$$Engagement\ Rate = \frac{Likes\ +\ Comments}{Total\ Followers}$$

In contrast, Arman & Sidik (2019) introduced a more comprehensive formula, incorporating post frequency and the likelihood of followers seeing posts:

$$Er = \frac{\sum_{i=1}^{n}(Li + 2\ Ci)}{3nPF}\ X\ 100$$

Er = Engagement rate
L = Like
C = Comment
n = Total posts
P = Probability for followers to see posts
F = Total followers

Al Aufa et al. (2020) offer a simplified model:

Er= Li / nPF

Er = Engagement rate
L = Like
n = Total posts
P = Probability for followers to see posts
F = Total followers

These varying models demonstrate the evolving understanding of engagement metrics. For example, Arman & Sidik (2019) applied their formula in case studies involving Indonesian government ministries, while Pravina et al. (2023) analyzed engagement using different qualitative elements such as message clarity and design. Sutanto (2023) focused on the coffee shop industry,

and Al Aufa et al. (2020) used the Mann-Whitney U test to analyze hospital Instagram engagement before and during the COVID-19 pandemic.

This study examines account-level engagement across PIHK Instagram accounts in West Java. Its contribution is a context-specific comparison of follower-adjusted engagement and the distinction between Pearson and Spearman correlations, rather than a causal assessment of marketing effectiveness.

RESEARCH METHOD

The study analysed Instagram account metrics from PIHK members listed in West Java by HIMPUH (Himpunan Penyelenggara Umrah dan Haji, 2023). Posts from 1–31 December 2023 were observed, following the public announcement of the 2024 Hajj schedule (Firmansyah, 2023; Hafil, 2024). This one-month period is not representative of annual engagement. The data comprised observable posts, followers, likes and comments rather than private Instagram Insights measures.

Of 29 registered PIHKs, 26 Instagram accounts were identified, and 20 posted during the observation month. Engagement rates were calculated using the weighted interaction formula presented in Equation 2, with one unit per like and two units per comment. The reported rates depend on a visibility-probability parameter whose value requires confirmation from the original calculations. Pearson coefficients describe linear relationships; Spearman coefficients provide the primary rank-based interpretation for these non-normal data. Account-level correlations do not establish causation. The variables are defined in Table 1.

Table 1
Variable Operationalization

Variable	Descriptions	References
Er	The engagement rate is a metric that is used to evaluate the performance of an Instagram account.	(Arman & Sidik, 2019)
L	Like is a metric that shows how many Instagram users like the content they are posting.	(Arman & Sidik, 2019); (Bakhshi et al., 2014)
C	Comments are a measure of how many Instagram users are generally discussing the content posted on their accounts. Simply put, comments serve as an indicator of the level of discussion surrounding a piece of content.	(Arman & Sidik, 2019); (Bakhshi et al., 2014).
n	Post is content uploaded by an account on social media.	(Arman & Sidik, 2019); (Bakhshi et al., 2014).
P	Probability is the likelihood of an account follower seeing a post.	(Arman & Sidik, 2019); (Bakhshi et al., 2014).
F	Follower is the number of followers of an account on social media.	(Arman & Sidik, 2019); (Bakhshi et al., 2014).

Source: Data processed (2025)

Numbers of likes and comments across posts in December 2023 were used to calculate account-level engagement rates following Arman & Sidik (2019). The normality of the 20-account variables was examined using Shapiro–Wilk tests and Kolmogorov–Smirnov tests. Spearman correlations were emphasised because the distributions departed from normality, while Pearson coefficients were retained to compare linear and rank associations. The analysis must also recognise that engagement rate is calculated from the other variables, making their correlations mathematically dependent.

RESULT AND DISCUSSION

RESULT

Data of the Instagram account of the PIHK in West Java

According to Himpunan Penyelenggara Umrah dan Haji (2023), 29 PIHKs were registered in West Java. Instagram accounts were identified through HIMPUH membership lists, official websites, manual Google searches, and Instagram's search feature. Of the 29, 26 Instagram accounts were found, and their activity was monitored from December 1 to 31, 2023. Six accounts had no posts during this period, leaving 20 active accounts as the final research sample (Table 2). Account activity was analyzed using Instatrack, a third-party data scraping tool, which provided usernames, follower counts, post descriptions, likes, and comments. In total, the 20 active accounts had 216,610 followers and posted 538 times, receiving 20,758 likes and 525 comments during the observation period. All detailed data are presented in Table 2.

Table 2
Engagement Rate of PIHK Instagram Accounts in West Java

No	Company Name	Instagram Username	Follower (F)	Post (n)	Comment	Like	Engagement rate (Er)
1	Elharamain Wisata	Elharamainwisata	87930	34	181	5408	0.64
2	Dago Wisata Tours & Travel	Dagowisata	25082	78	133	2621	0.49
3	Armada Safari Suci	Safarisuci	24110	15	37	599	0.62
4	Percikan Iman Tours & Travel	Perciktours	13859	34	95	5270	3.86
5	Jannah Firdaus Tour & Travel	jannah.firdaus.travel	13797	3	3	45	0.41
6	Noor Alia Haji Umroh	Nooraliahajiumroh	13175	37	5	598	0.42
7	Qiblat Tour Islami	Qiblattourislami	10950	169	0	3369	0.61
8	HaramainKU	Haramainku	5632	38	27	635	1.07
9	RH Tour & Travel	rhtours_	3665	4	3	56	1.41
10	Mihrab Qolbi Travel	Mihrabqolbi	2990	20	9	315	1.86
11	Karya Imtaq Tours & Travel	Karyaimtaq	2935	16	7	754	5.45
12	Arie Tour & Travel	Arietours	2318	18	0	77	0.62
13	Sanabil Tour & Travel	Sanabilpusatofficial	2153	5	0	66	2.04
14	Tunas Tours	Tunastourss	2080	1	2	61	10.42
15	PT Inti Ummul Quro	Hajiumrahuq	2034	4	9	144	6.64
16	Khadim Wisata	khadim_wisata	1603	8	0	103	2.68
17	Patra Haji Umroh	Patratour	855	38	11	486	5.21
18	Amara Umroh dan Haji	Amaraumrohdanhaji	556	11	2	100	5.67
19	Pesona Muda Prima Tour & Travel	Pesonamudaprima	449	3	0	36	8.91
20	Sangkan Hurip	sangkanhuripbersama	437	2	1	15	6.48

	Total	216610	538	525	20758

Source: Data Processed (2025)

Correlation Among the Study Variables (Comments, Likes, Followers, and Posts of PIHK Instagram Accounts in West Java)

Pearson correlations among followers, posts, comments, likes and engagement rate are presented as a linear-association comparison in Table 3. Spearman results are used for the primary interpretation following the normality checks.

Table 3
Pearson Correlations between Follower, Post, Comment, Like and Engagement Rate

		Follower	Post	Comment	Like	Engagement Rate
Follower	Pearson Correlation	1	.193	.857***	.714***	-.398
	Sig. (2-tailed)		.414	<,001	<,001	.082
	N	20	20	20	20	20
Post	Pearson Correlation	.193	1	.222	.538*	-.392
	Sig. (2-tailed)	.414		.346	.014	.088
	N	20	20	20	20	20
Comment	Pearson Correlation	.857***	.222	1	.818***	-.303
	Sig. (2-tailed)	<,001	.346		<,001	.193
	N	20	20	20	20	20
Like	Pearson Correlation	.714***	.538*	.818***	1	-.288
	Sig. (2-tailed)	<,001	.014	<,001		.218
	N	20	20	20	20	20
Engagement Rate	Pearson Correlation	-.398	-.392	-.303	-.288	1
	Sig. (2-tailed)	.082	.088	.193	.218	
	N	20	20	20	20	20

Source: Data processed (2025)

Pearson's ranges from −1 to +1; its sign indicates direction and its magnitude indicates the strength of a linear association (Dancey & Reidy, 2014; Uriawan et al., 2020). Statistical significance must be assessed using the reported p-value, rather than the coefficient alone.

The correlation between comment and like variables is positive, with a Pearson correlation coefficient of 0.818. This value is significant at the 1% level, with a Sig. (2-tailed) value of 0.000. According to the classification by Dancey & Reidy (2014), the strength of this correlation is categorized as strong. Therefore, the relationship between comment and like variables is both strong and statistically significant.

The correlation between comment and follower variables is positive, with an r-value of 0.857, indicating a strong relationship (Dancey & Reidy, 2014). This correlation is significant at the 1% level, with a Sig. (2-tailed) value of 0.000. Thus, the relationship between comments and followers is both strong and statistically significant.

In contrast, the correlation between comment and post variables is weak, with an r-value of 0.222. The Sig. (2-tailed) value is 0.346, showing it is not significant at either the 1% or 5% level. According to Dancey & Reidy (2014), this falls within the weak correlation category. Therefore, it can be concluded that there is no significant correlation between comments and the number of posts.

The like and follower variables show a strong positive correlation, with a Pearson r-value of 0.714, significant at the 1% level. The Sig (2-tailed) value is 0.000, indicating statistical significance. According to Dancey & Reidy (2014), this level of correlation is considered strong. Thus, the relationship between likes and followers is statistically significant.

The likes and posts variables also exhibit a positive correlation, with a Pearson r-value of 0.538. The Sig (2-tailed) value is 0.014, showing significance at the 5% level but not at 1%. Based on Dancey & Reidy (2014) classification, this represents a moderate correlation. Therefore, the relationship between likes and posts is statistically significant at 5%, but not at the more stringent 1% level.

The follower and post variables show no significant correlation. The Pearson r-value is 0.193 with a Sig (2-tailed) value of 0.414, indicating non-significance at both 1% and 5% levels. This weak correlation is classified as such by Dancey & Reidy (2014), confirming the absence of a significant relationship.

Correlation between: comments and engagement rate (Er); likes and engagement rate (Er); followers and engagement rate (Er); and posts and engagement rate (Er) of PIHK Instagram accounts in West Java

The comment and engagement rate variables show no significant correlation. The Pearson r-value is –0.303 with a Sig (2-tailed) value of 0.193, indicating non-significance at both 1% and 5% levels. According to Dancey & Reidy (2014), this is classified as a weak correlation. Thus, the relationship between comment and engagement rate is not significant.

Pearson correlations between engagement rate and comments ($r = -0.303$, $p = 0.193$), likes ($r = -0.288$, $p = 0.218$), followers ($r = -0.398$, $p = 0.082$), and posts ($r = -0.392$, $p = 0.088$) were all non-significant (Table 3). Spearman results are reported separately because the variables were not normally distributed (Dancey & Reidy, 2014).

Follower and engagement rate variables show no significant correlation. The Pearson r-value is –0.398, with a Sig (2-tailed) value of 0.082, which is not significant at the 1% or 5% levels. This correlation is classified as moderate (Dancey & Reidy, 2014). Therefore, the relationship between follower and engagement rate is not significant.

Likewise, post and engagement rate variables are not significantly correlated. The Pearson r-value is –0.392, and the Sig (2-tailed) value is 0.088, indicating non-significance at both 1% and 5% levels. This is also considered a moderate correlation (Dancey & Reidy, 2014). Therefore, it is concluded that the correlation between post and engagement rate is not significant. The correlation results for all variables are summarized in Table 4.

Table 4
Normality Test: Kolmogorov - Smirnov dan Shapiro -Wilk

Variable	Kolmogorov - Smirnov Statistic	Kolmogorov - Smirnov Sig.	Shapiro - Wilk Statistic	Shapiro - Wilk Sig.
Followers	.299	<.001	.536	<.001
Posts	.287	<.001	.636	<.001

Comments	.369	<.001	.584	<.001
Likes	.366	<.001	.628	<.001
Engagement rate	.205	.028	.849	.005

Source: Data Processed (2025)

With only 20 accounts and wide variation in follower counts (437–87,930), normality was assessed using Kolmogorov–Smirnov and Shapiro–Wilk tests (Table 4).

Table 5
Spearman Correlation

Variable	Followers	Posts	Comments	Likes	Engagement Rate
Followers	1.000	.520*	.624**	.662***	−.766***
Posts	.520*	1.000	.458*	.835***	−.536*
Comments	.624**	.458*	1.000	.656**	−.214
Likes	.662***	.835***	.656**	1.000	−.360
Engagement rate	−.766***	−.536*	−.214	−.360	1.000

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
*** Correlation is significant at the 0.001 level (2-tailed).
Source: Data Processed (2025)

The normality tests indicated non-normal distributions for all five variables (Table 4). Spearman's rank correlation was therefore prioritised for evaluating monotonic associations among the 20 accounts, while Pearson results were retained as a comparison of linear associations (Table 3). Differences between the two methods are reported rather than treated as interchangeable.

The Spearman analysis revealed a strong positive correlation between followers and comments ($\rho = 0.624$, $p = 0.003$), indicating that PIHK Instagram accounts with larger follower bases tended to receive more comments. This finding is consistent with the Pearson correlation reported previously ($r = 0.857$), although the correlation coefficient was slightly lower because Spearman's method is based on ranked rather than raw observations.

A similarly strong positive correlation was observed between comments and likes ($\rho = 0.656$, $p = 0.002$), suggesting that posts attracting more comments also tended to receive more likes. This result is likewise consistent with the Pearson correlation ($r = 0.818$). The strongest association among all study variables was identified between posts and likes ($\rho = 0.835$, $p < 0.001$), indicating that more frequent posting was associated with a greater number of likes. This finding suggests that posting frequency plays an important role in enhancing user interaction with PIHK Instagram content.

A moderate positive correlation was identified between posts and comments ($\rho = 0.458$, $p = 0.042$). Unlike the Pearson analysis, which indicated that this relationship was not statistically significant, the Spearman analysis demonstrated a significant monotonic association. This finding suggests that although the relationship between posting frequency and comments is not strictly linear, increased posting activity is generally associated with greater user participation through comments. Furthermore, followers and posts exhibited a moderate positive correlation ($\rho = 0.520$, $p = 0.019$), indicating that PIHK Instagram accounts with larger follower bases also tended to publish content more frequently.

Spearman and Pearson generally agreed on some positive links among absolute engagement counts, but differed for posts versus comments and posts versus followers. Accordingly, the evidence does not justify describing all Pearson and Spearman findings as interchangeable. In particular, the significant negative Spearman associations of engagement rate with followers and posting frequency require explicit recognition.

Engagement Rate of PIHK Instagram Accounts in West Java

The engagement rate for each PIHK Instagram account was calculated using Equation 2 proposed by Arman & Sidik (2019). The 20 accounts produced 538 posts during December 2023, with 20,758 likes and 525 comments in total. Table 2 reports the resulting account-level rates. These values are retained as reported by the authors; the visibility-probability parameter and whether calculations used post-level averaging or aggregated counts must be verified against the original spreadsheet before the reported values can be fully reproduced.

The Spearman correlation analysis revealed a strong negative association between followers and engagement rate ($\rho = -0.766$, $p < 0.001$). This finding indicates that accounts with larger follower bases tended to exhibit lower engagement rates. Such a pattern is commonly observed on social media platforms, where larger accounts generally receive higher absolute numbers of likes and comments but lower interaction rates relative to their total number of followers.

A moderate negative correlation was identified between the number of posts and engagement rate ($\rho = -0.536$, $p = 0.015$), suggesting that more frequent posting was associated with lower engagement rates. This finding indicates that increasing posting frequency alone does not necessarily improve audience engagement and may instead reduce the level of interaction achieved by individual posts.

No statistically significant relationship was observed between comments and engagement rate ($\rho = -0.214$, $p = 0.365$). Similarly, the correlation between likes and engagement rate was not statistically significant ($\rho = -0.360$, $p = 0.119$). These findings suggest that neither the absolute number of comments nor the number of likes independently explains variations in engagement rate across PIHK Instagram accounts.

Determining the quality of engagement rates (Er) of the PIHK Instagram account in West Java

The assessment of engagement rate quality follows Arman & Sidik (2019). Instagram accounts are categorized by follower count: <5K, 5K–20K, 20K–100K, 100K–300K, and >300K. Each category is ranked by average engagement rate, 7.58, 4.98, 2.65, 2.37, and 1.72 ranging from highest to lowest. These ranks are further classified into three engagement quality levels: low, good, and high (Table 6.).

Table 6
Classification of Engagement Rate Values

Numbers of Followers	Average Engagement Rate	Engagement Rate Range	ER Qualitiy
<5K	7,58	<7,58	Low Engagement Rate
		7,58-8,58	Good Engagement Rate
		>8,58	High Engagement Rate
5K-20K	4,98	<4,98	Low Engagement Rate
		4,98-5,98	Good Engagement Rate
		> 5,98	High Engagement Rate

20K-100K	2,65	< 2,65	Low Engagement Rate
		2,65-3,65	Good Engagement Rate
		> 3,65	High Engagement Rate
100K-300K	2,37	< 2,37	Low Engagement Rate
		2,37-3,37	Good Engagement Rate
		> 3,37	High Engagement Rate
>300K	1,72	< 1,72	Low Engagement Rate
		1,72-2,72	Good Engagement Rate
		>2,72	High Engagement Rate

Source: Arman & Sidik (2019)

Engagement quality was classified relative to the follower-count thresholds in Table 6. These categories describe interaction rates within the adopted benchmark and should not be treated as evidence of customer trust, service quality or booking conversions.

Referring to Arman & Sidik (2019), PIHK Instagram accounts in West Java are grouped by follower count. The 20K–100K group includes Elharamain Wisata, Dago Wisata Tours & Travel, and Armada Safari Suci. The 5K–20K group includes five accounts: Percikan Iman, Jannah Firdaus, Noor Alia, Qiblat Tour Islami, and HaramainKU. The <5K group consists of 12 accounts, including rhtours, mihrabqolbi, karyaimtaq, Arietours, and others.

Table 7
Engagement Rate Quality of PIHK Instagram Accounts in West Java

No	PIHK's Name	Instagram Username	Follower (F)	Post (n)	Comment	Like	Engagement Rate (Er)	Engagement Rate Range	Quality of Engagement Rate
1	Elharamain Wisata	Elharamainwisata	87.930	34	181	5.408	0.64	<2,65	Low
2	Dago Wisata Tours & Travel	Dagowisata	25.082	78	133	2.621	0.49	<2,65	Low
3	Armada Safari Suci	Safarisuci	24.110	15	37	599	0.62	<2,65	Low
4	Percikan Iman Tours & Travel	Perciktours	13.859	34	95	5.270	3.86	<4,98	Low
5	Jannah Firdaus Tour & Travel	jannah.firdaus.travel	13.797	3	3	45	0.41	<4,98	Low
6	Noor Alia Haji Umroh	Nooraliahajiumroh	13.175	37	5	598	0.42	<4,98	Low
7	Qiblat Tour Islami	Qiblattourislami	10.950	169	0	3.369	0.61	<4,98	Low
8	HaramainKU	Haramainku	5.632	38	27	635	1.07	<4,98	Low
9	RH Tour & Travel	rhtours_	3.665	4	3	56	1.41	<7,58	Low
10	Mihrab Qolbi Travel	Mihrabqolbi	2.990	20	9	315	1.86	<7,58	Low
11	Karya Imtaq Tours & Travel	Karyaimtaq	2.935	16	7	754	5.45	<7.58	Low

12	Arie Tour & Travel	Arietours	2.318	18	0	77	0.62	<7.58	Low
13	Sanabil Tour & Travel	Sanabilpusatofficial	2.153	5	0	66	2.04	<7.58	Low
14	**Tunas Tours**	**Tunastourss**	**2.080**	**1**	**2**	**61**	**10.42**	**>8,58**	**High**
15	PT Inti Ummul Quro	Hajiumrahuq	2.034	4	9	144	6.64	<7.58	Low
16	Khadim Wisata	khadim_wisata	1.603	8	0	103	2.68	<7.58	Low
17	Patra Haji Umroh	Patratour	855	38	11	486	5.21	<7.58	Low
18	Amara Umroh dan Haji	Amaraumrohdanhaji	556	11	2	100	5.67	<7.58	Low
19	**Pesona Muda Prima Tour & Travel**	**Pesonamudaprima**	**449**	**3**	**0**	**36**	**8.91**	**>8,58**	**High**
20	Sangkan Hurip	Sangkanhuripbersama	437	2	1	15	6.48	<7.58	Low

Source: Data processed (2025)

Table 7 classifies two accounts (@tunastourss and @pesonamudaprima) as having high engagement quality, while the remaining 18 accounts are classified as low. All three accounts with 20,000–100,000 followers and all five with 5,000–20,000 followers fall in the low category; the two high-engagement accounts belong to the group with fewer than 5,000 followers.

DISCUSSION

Correlation between comment and like; commen and follower; commen and post; like and post; follower and post of PIHK Instagram accounts in West Java

Comments and likes were positively associated in the sample, but correlation does not demonstrate causation (Chan, 2004; Uriawan et al., 2020). Saeidi & Baradari (2023) reported a contrasting non-significant result, suggesting that the pattern may differ across account contexts.

Comments and followers were also positively corrlated, although this does not imply that either measure causes the other to increase (Chan, 2004). The non-significant findings reported by Saeidi & Baradari (2023) offer a useful contrast.

The Pearson association of comments with posts was not significant, whereas likes were positively related to follower count. Comparisons with Saeidi & Baradari (2023) should therefore be interpreted in light of different account samples (Chan, 2004; Dancey & Reidy, 2014).

Likes and posts showed a moderate positive Pearson association, consistent with the possibility that more posting accompanies greater total interaction, without establishing causal influence (Chan, 2004; Cohen, 2013; Saeidi & Baradari, 2023).

Pearson analysis found no statistically significant linear association between followers and posting frequency ($r = 0.193$, $p = 0.414$), whereas Spearman analysis showed a positive monotonic association ($\rho = 0.520$, $p = 0.019$). The difference indicates that account size and posting activity should not be described as unrelated without specifying the test used. This comparison remains observational and does not imply that follower growth determines posting frequency.

Correlation between comments and engagement rate (Er); likes and engagement rate (Er); followers and engagement rate (Er); posts and engagement rate (Er) of PIHK Instagram accounts in West Java

Under Pearson analysis, comments and engagement rate were not significantly correlated ($r = -0.303$, $p = 0.193$). Spearman analysis also found no significant monotonic association ($\rho = -0.214$, $p = 0.365$). These results do not establish that comments have no practical relevance to audience interaction, particularly because comments contribute to the engagement-rate formula.

The relationship between likes and engagement rate was similarly non-significant under Pearson ($r = -0.288$, $p = 0.218$) and Spearman ($\rho = -0.360$, $p = 0.119$). These coefficients should not be interpreted as causal effects or as evidence that additional likes cannot alter a calculated engagement rate.

The results for follower count and engagement rate depend on the statistical method. Pearson produced a non-significant negative coefficient ($r = -0.398$, $p = 0.082$), whereas Spearman identified a significant negative monotonic association ($\rho = -0.766$, $p < 0.001$). The difference is consistent with skewed account sizes; larger audiences may yield higher absolute interactions yet lower follower-adjusted interaction rates. This finding is descriptive, not causal (Priadana et al., 2021; Tafesse & Wood, 2021).

Tafesse & Wood (2021) also reported a negative association between follower numbers and engagement among 133 Instagram influencers ($\beta = -0.46$, $p < 0.01$). Although their commercial-influencer context differs from religious travel services, the comparison supports interpreting audience size and relative engagement as distinct dimensions, not a universal causal mechanism.

Pearson correlations between engagement rate and followers ($r = -0.398$, $p = 0.082$) or posts ($r = -0.392$, $p = 0.088$) were not statistically significant. In contrast, Spearman revealed significant negative associations with followers and posts (Table 5). This difference must not be interpreted as evidence that posting frequency or follower growth causally changes engagement. Previous research also points to content quality and posting time as potentially relevant factors not tested here (Arman & Sidik, 2019; Dancey & Reidy, 2014; Nirmala et al., 2021; Pravina et al., 2023; Priadana et al., 2021).

Overall, Pearson correlations between engagement rate and followers, posts, comments or likes were not significant. However, Spearman correlations indicated significant negative rank associations with followers and posts, while the rank associations with comments and likes were not significant. This distinction matters for strongly skewed data. Because engagement rate is mathematically constructed using interaction counts, follower totals and post exposure, these correlations cannot establish causal effects of marketing practices.

Determining the quality of engagement rates (Er) of the PIHK Instagram account in West Java

West Java PIHK Instagram accounts are categorized into three follower-based groups: those with 20K–100K followers (e.g., Elharamain Wisata, Dago Wisata Tours & Travel, and Armada Safari Suci), those with 5K–20K followers (e.g., Percikan Iman Tours & Travel, Jannah Firdaus Tour & Travel, Noor Alia Hajj Umrah, Qiblat Tour Islami, and HaramainKU), and those with fewer than 5K followers (e.g., Tunastourss, Pesonamudaprima, rhtours, mihrabqolbi, karyaimtaq, Arietours, and others).

Among these, two accounts stand out with high engagement quality: @tunastourss and @pesonamudaprima. The @tunastourss account, with 2,080 followers, achieved an engagement rate of 10.42 despite posting only once. This post garnered two comments and 61 likes. Based on Bakhshi et al. (2014), comments represent user interaction through discussion, while likes indicate

content appreciation. The high engagement rate of @tunastourss suggests that its relatively small follower base is highly interactive. This aligns with Arman & Sidik (2019), who highlight how smaller, more dedicated audiences can yield higher engagement rates. Similarly, @pesonamudaprima achieved an engagement rate of 8.91 with 449 followers and three posts, which received 36 likes but zero comments. While the absence of comments indicates limited discussion, the volume of likes in relation to followers still demonstrates a relatively high level of user involvement (Arman & Sidik, 2019; Bakhshi et al., 2014).

In contrast, 18 other West Java PIHK accounts exhibited low engagement rates. For example, @elharamainwisata, the account with the largest number of followers (87,930), had an engagement rate of only 0.64. Between 1 and 31 December 2023, the account posted 34 times, receiving 181 comments and 5,408 likes. Despite high posting activity and a large follower base, the interaction ratio remains low, indicating limited user engagement (Bakhshi et al., 2014).
The @dagowisata account, with 25,082 followers, posted 78 times during the study period, receiving 133 comments and 2,621 likes. Its engagement rate was 0.49. Although the account was highly active, the ratio of interactions to followers was minimal, suggesting low audience responsiveness (Bakhshi et al., 2014).

Likewise, @qiblattourislami, with 10,950 followers, posted 169 times and received 3,369 likes but no comments, resulting in an engagement rate of 0.61. The absence of comments implies a lack of interactive discussion, and the ratio of likes to followers remains low. Despite frequent posting more than once per day, the account's user engagement is minimal, echoing the trend observed in other large-follower accounts (Bakhshi et al., 2014).

The comparison suggests that high follower totals and frequent posting do not automatically imply stronger follower-adjusted engagement. Yet the observed rates do not establish an optimal posting frequency or prove that particular content is more effective. Related research identifies potentially relevant text and visual factors in travel marketing (Blanco-Moreno et al., 2024; Son & Park, 2024). This distinction is also relevant to empirical comparisons of content and influencer scale: content attributes and audience size may affect interaction differently across contexts (Kim & Kim, 2024; Son & Park, 2025; van der Harst & Angelopoulos, 2024; Wies et al., 2023)

The findings offer descriptive benchmarks rather than evidence of pilgrimage bookings or sales conversions. Subsequent PIHK research should connect account metrics with content coding, religious communication, audience trust and verified service outcomes (Ali et al., 2025; Hussain et al., 2024; Mawardi et al., 2024; Sieradianto et al., 2024). Related work associates tourism-oriented Instagram communication with destination perceptions, trust and travel intentions, but these outcomes were not measured in the present account level dataset (Blanco-Moreno et al., 2025; Recuero-Virto et al., 2024; Silaban et al., 2023).

CONCLUSION

Among 20 active PIHK Instagram accounts in West Java, several positive correlations were observed among absolute counts of likes, comments and followers. Pearson correlations involving engagement rate were statistically non-significant, but Spearman analyses identified significant negative associations with both follower totals ($\rho = -0.766$, $p < 0.001$) and the number of posts ($\rho = -0.536$, $p = 0.015$). Two accounts achieved high engagement scores (10.42 and 8.91), while 18

were classified as low. These observations suggest that volume and follower-adjusted participation are distinct dimensions of Instagram performance. Given the single-month observational design and the engagement-rate formula's shared components, the findings do not establish causal effects or the success of specific promotional strategies. The study provides a benchmark for religious travel-service communication and points to the value of further content-level and conversion research.

Research limitations

This research has limitations, including:

a. The observed correlations between engagement rate and likes, comments, and followers should be interpreted cautiously because these variables are constituent elements of the engagement rate calculation.
b. The research did not discuss the engagement rate with marketing strategies through social media, especially Instagram. This is in order to be able to determine how PIHK maximises the use of Instagram accounts to increase brand awareness, so that it has a direct impact on the sale of special Hajj services.
c. This research does not discuss the number of pilgrims of each PIHK, so it cannot reveal the correlation between the level of engagement of Instagram accounts and the number of pilgrims of PIHK.

Implications and recommendations

Based on the results of data analysis, there are several implications that need to be followed up, including:

a. The PIHK must have clear objectives for social media marketing.
b. The PIHK must develop a comprehensive, effective and consistent social media strategy to achieve its objectives.
c. These objectives include increasing awareness, building digital communities and converting to sales.
d. The social media strategy can be implemented with a more selective quality and type of content.
e. PIHK is expected to create daily content types with posting times and copywriting diction that encourages interaction with the audience. This is because each point affects different segmentation and audience reach.
f. PIHKs should also adjust the social media they use as each social media has different audience segmentation.

There are several recommendations for further research development, including:

a. Research can be developed with other variables such as posting time, content type (photos, videos and short videos) or others.
b. The research could be extended to other provincial PIHK organisations.
c. The research can be developed by changing or adding research objects, e.g. for PPIU only or combined with PIHK.
d. The duration of the study can be extended to be longer.
e. Future research can examine the correlation between the level of social media engagement and the number of pilgrims.

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CONFLICT INTEREST

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