Jurnal Manajemen
e-JM
E-ISSN: 2549-8797
ISSN: 1410-3583

The Comparison Of Product Placement Effectiveness Between Human Influencers and Virtual Influencers

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Submitted *14-09-2024* ***Reviewed*** *06-11-2024* ***Revised*** *12-11-2024* ***Accepted*** *18-11-2024* ***Published*** *19-02-2025*

Abstract: This study aims to analyze the influence of attitudes toward human and virtual influencers on attitudes toward product placement and brands. The study employs a post-test experimental design without a control group, involving 287 participants: 136 participants are human, and 151 participants are virtual influencers. Data were collected through questionnaires and analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM) and Partial Least Squares Multigroup Analysis (PLS-MGA). The treatment in this study involved Instagram content from a human influencer and a virtual influencer. The results show that attitudes toward both human and virtual influencers positively influence attitudes toward the brand. However, attitudes toward influencers only positively influence attitudes toward product placement in the case of virtual influencers. While there is no difference in effectiveness between humans and virtual influencers in influencing attitudes toward the brand, virtual influencers are more effective in influencing attitudes toward product placement.
Keywords: Human Influencer; Virtual Influencer; Attitude Toward Influencer; Attitude Toward Product Placement; Attitude Toward Brand.

Abstrak: Penelitian ini bertujuan untuk menganalisis pengaruh sikap kepada human influencer dan virtual influencer terhadap sikap kepada penempatan produk dan merek. Penelitian ini menggunakan desain eksperimen pasca-tes tanpa grup kontrol dengan melibatkan 287 partisipan, terdiri dari 136 partisipan dalam kelompok pemengaruh manusia dan 151 partisipan dalam kelompok pemengaruh virtual. Data dikumpulkan melalui kuesioner dan dianalisis menggunakan Partial Least Squares Structural Equation Modelling (PLS-SEM) dan Partial Least Squares Multigroup Analysis (PLS-MGA). Perlakuan dalam penelitian ini berupa konten Instagram dari seorang pemengaruh manusia dan seorang pemengaruh virtual. Hasil penelitian menunjukkan bahwa sikap kepada pemengaruh manusia dan pemengaruh virtual berpengaruh positif terhadap sikap kepada merek. Namun, sikap kepada pemengaruh berpengaruh positif terhadap sikap kepada penempatan produk pada pemengaruh virtual. Meskipun tidak terdapat perbedaan efektivitas antara pemengaruh manusia dan pemengaruh virtual dalam mempengaruhi sikap kepada merek, pemengaruh virtual lebih efektif dalam mempengaruhi sikap kepada penempatan produk.
Kata kunci: Pemengaruh Manusia; Pemengaruh Virtual; Sikap Kepada Pemengaruh; Sikap Kepada Penempatan Produk; Sikap Kepada Merek.

INTRODUCTION

In today's digital era, technology and the internet have transformed how companies interact with their consumers. Social media as a marketing tool has become an essential strategy in modern business. With the rapid growth of internet and social media usage, platforms such as Facebook, Instagram, Twitter, and LinkedIn have become effective channels for companies to engage with consumers, build brand awareness, and boost sales. Social media allows companies to reach a broader audience, measure marketing campaign performance in real-time, and foster more personal relationships with consumers.

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e-JM
E-ISSN: 2549-8797
ISSN: 1410-3583

Instagram, in particular, has emerged as a popular and effective social media platform for marketing purposes. With its unique visual features and many active users, Instagram provides an ideal avenue for companies to promote their products and services to a broader audience (Blanche et al., 2019). The rise of social media platforms like Instagram has ushered in a new era of marketing, where influencers play an important role in shaping consumer attitudes and behaviours. Traditionally, influencers were individuals with large online followers (Kadekova & Holienciova, 2018), becoming key drivers in brand promotion. However, the emergence of virtual influencer characters created through computer-generated imagery (CGI) or artificial intelligence (AI) with carefully crafted personalities has introduced a new dynamic to the influencer landscape (Conti et al., 2022).

Marketers face the challenge of selecting the most appropriate influencers to meet their marketing objectives. Human influencers are valued for authenticity and genuine connections with their followers, while virtual influencers offer meticulously designed personas and narratives. Both influencers build engagement with their followers through sharing daily experiences and direct interaction (Lim & Lee, 2023). Human influencers are viewed as real individuals who share personal experiences, whereas virtual influencers captivate audiences with their fantastical and fictional nature, offering a unique perspective. Studies suggest virtual influencers are uniquely positioned to build parasocial relationships despite their artificial persona (Stein et al., 2022). Consumers tend to trust human influencers due to perceived authenticity and shared values (Kuzminov, 2023), while virtual influencers may appeal more to audiences seeking escapism or entertainment (Lee & Eastin, 2021).

Research shows that human and virtual influencers have different impacts on consumers, each with strengths and weaknesses. Human influencers are more effective in creating genuine parasocial interactions with their followers due to their authenticity and the personal connections they establish (Stein, Breves, & Anders, 2022). Moreover, human influencers consistently score higher in trustworthiness, social presence, and humanity than virtual influencers (Hofeditz et al., 2022). On the other hand, although virtual influencers tend to have fewer followers, they are more interactive on social media and often receive positive feedback regarding their visual appeal (Arsenyan & Mirowska, 2021). Virtual influencers also have significant potential in promoting luxury products and attracting younger generations, and they can compete with human influencers when using rational messaging (Rodgers, 2021; Thomas & Fowler, 2021; Jhawar et al., 2023; Ozdemir et al., 2023).

While previous research has mainly focused on comparing user reactions and interactions with influencers (Arsenyan & Mirowska, 2021; Stein et al., 2022), this study aims to empirically test three forms of attitudes toward human and virtual influencers and compare the influence of these attitudes on both types of influencers. No studies have addressed this issue, particularly in product placement in developing countries, including Indonesia, which still faces methodological limitations (Guo et al., 2019; Cokki et al., 2023). The findings from this research are expected to provide new insights for academics and practitioners to design more effective product placement strategies in the digital era.

THEORETICAL REVIEW

Human influencers actively use social media accounts to engage in specific topics and convey new information (Kim & Kim, 2022). They often promote products that align

with their lifestyle, sharing reviews through social media platforms. Human influencers can provide up-to-date information, positively evaluate products, and influence consumer attitudes and behaviours (Liu et al., 2015; Munukka et al., 2016). They also serve as third parties recommending and describing products through social media content, which can shape consumer opinions, behaviours, and attitudes toward a product (Joshi et al., 2023). Consumers seeking product information often consider influencers as trustworthy sources (Wang et al., 2021).

Virtual influencers are personas created through artificial intelligence (AI) or computer-generated imagery (CGI), resembling real humans in traits, characteristics, and personalities (Evangelos et al., 2020; Lou et al., 2022). Though fictional, virtual influencers can be perceived as characters who share content on social media and interact to achieve influential status among consumers (Mouritzen et al., 2023). They serve as entertainment and have a strategic purpose in influencing consumer opinions and behaviour. With a large follower base on social media, virtual influencers develop diverse identities, lifestyles, and mindsets (Molin & Nordgren, 2019). Additionally, they maintain parasocial relationships with their followers, creating a virtual bond between the audience and the celebrity.

Product placement involves the paid integration of branded products into mass media content through audiovisual methods (Balasubramanian et al., 2019). This practice blurs the line between advertising and entertainment and has the potential to influence behaviour, including reducing risky activities and promoting healthier lifestyles (Russell, 2019). Traditionally, products are placed in entertainment media, such as movies, television programs, and video games, in exchange for payment from marketing companies (Guo et al., 2019). When systematically executed, product placement can enhance brand awareness, drive sales, and contribute to company profitability (Homer, 2009). In this study, product placement is conducted by influencers who promote specific brands on their Instagram accounts.

Attitude toward influencers is shaped by beliefs, experiences, and emotions that influence how individuals interact with them (Wadhwa & Chaihanchanchai, 2021). This attitude includes consumer perceptions, evaluations, beliefs, and opinions, all of which affect purchasing behaviour and brand attitudes (Liu & Zheng, 2024). Factors such as the influencers' attractiveness, expertise, and shared interests with their audience significantly impact consumer attitudes toward influencers and the brands they endorse (Masuda et al., 2022). However, connection and trust can sometimes be more influential than attractiveness, even for beauty influencers (Sokolova & Kefi, 2020). Influencers are often seen as more credible than traditional celebrities due to their closer alignment with followers' interests, shaping their attitudes and responses (Blanche et al., 2021). A positive attitude toward influencers fosters trust and engagement, ultimately influencing purchase intentions (Chopra et al., 2020). This study defines attitude toward influencers as an individual's evaluation of both human and virtual influencers on Instagram.

Attitude toward product placement is an individual’s evaluation of product placements in films, television shows, video games, and other media content (Gregorio & Sung, 2008; Homer, 2009). In films, this attitude reflects the evaluation of segments promoting specific brands. Consumers may have a positive attitude when product placements are subtle, making them feel more connected to their favourite brands (Hashem et al., 2022). They may also respond positively if the placements add realism (Kaur et al., 2021). Conversely, adverse reactions may occur if product placements are perceived as intrusive, manipulative, or forced (Hashem et al., 2022). This study defines attitude toward

Jurnal Manajemen
e-JM
E-ISSN: 2549-8797
ISSN: 1410-3583

product placement as an individual's evaluation of Instagram content featuring such placements.

Attitude toward a brand is influenced by the emotional connection consumers have with it, shaped by their experiences and values (Najmi et al., 2012). Affective components of attitude significantly influence purchase intentions for global brands (Naseem & Yaprak, 2022). Sensory, intellectual, behavioural, and affective experiences also shape consumer attitudes toward luxury brands (Jhamb et al., 2020). Positive attitudes increase the likelihood of purchases, while negative attitudes can deter them. This study defines attitude toward the brand as an individual's evaluation of brands presented in Instagram content.

Relationship Between Attitude Toward Influencers and Attitude Toward Brand. Research (Ha & Lam, 2017) demonstrates that celebrities as endorsers positively affect brand attitudes, with consumers forming favourable or unfavourable views of brands based on their perceptions of the endorsers. Perceived congruence between an influencer and a product enhances the influencer's credibility and likability, leading to more favourable attitudes toward both, especially with highly sincere influencers endorsing utilitarian products (Blanche et al., 2021; Lee et al., 2020). However, a mismatch, particularly with luxury goods, can negatively impact purchase intentions and word-of-mouth communications (Qian & Park, 2021). This principle extends to product placements on platforms like Instagram, where credible and trustworthy influencers can significantly impact positive consumer attitudes toward promoted brands.

The Relationship Between Attitude Toward Influencers and Attitude Toward Product Placement. Consumer behaviour and attitudes toward product placement are influenced by opinions from peers, personal experiences, and perceptions of product placement relevance (Gregorio & Sung, 2010). These attitudes affect consumers' views of the product and determine their engagement with it or their decision to purchase. Additionally, consumers' cultural background plays a significant role in shaping their attitudes. Research by (Karrh et al., 2001) shows that cultural differences between Singapore and the United States can influence audience attitudes towards brand placement. This research emphasizes the importance of understanding cultural contexts in determining the effectiveness of brand placement strategies across different markets.

In the context of product placement by influencers on Instagram, an individual's liking or disliking of the influencer can be a decisive factor in accepting or rejecting the product placement made by the influencer. Just as cultural differences affect audience attitudes towards brand placement, individual views of an influencer also play an important role in how they respond to product placement. If the audience has a positive view of the influencer, he or she is more likely to accept and engage more actively with the promoted product. Conversely, if the audience dislikes the influencer, product placement may be rejected or deemed irrelevant, even if the product holds value.

The Relationship Between Attitude Toward Product Placement and Attitude Toward the Brand. Trust in an influencer aligned with the endorsed product enhances positive attitudes and purchase intentions toward the influencer and the brand, while a mismatch leads to negative attitudes (Park & Lin, 2020). (Ulker-Demirel & Yildiz, 2020) consumers' attitudes toward film actors and characters affect their attitudes toward product placement and the brand. Similarly, product placement in television programs positively influences brand attitudes, though this effect weakens over time (Boerman et al., 2021). Research consistently shows that product placement has a positive impact on consumers'

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E-ISSN: 2549-8797
ISSN: 1410-3583

perceptions of a brand, boosting brand awareness, attitudes, and purchase intentions, mainly when there is a strong brand-plot connection (Babin et al., 2021)

The literature consistently shows that product placement in films or TV series shapes consumers' attitudes toward the brand. A positive attitude toward product placement typically produces a more favourable brand perception. This principle also applies to product placement by influencers on Instagram. When consumers positively view product placement by influencers, they are more likely to have a positive attitude toward the promoted brand.

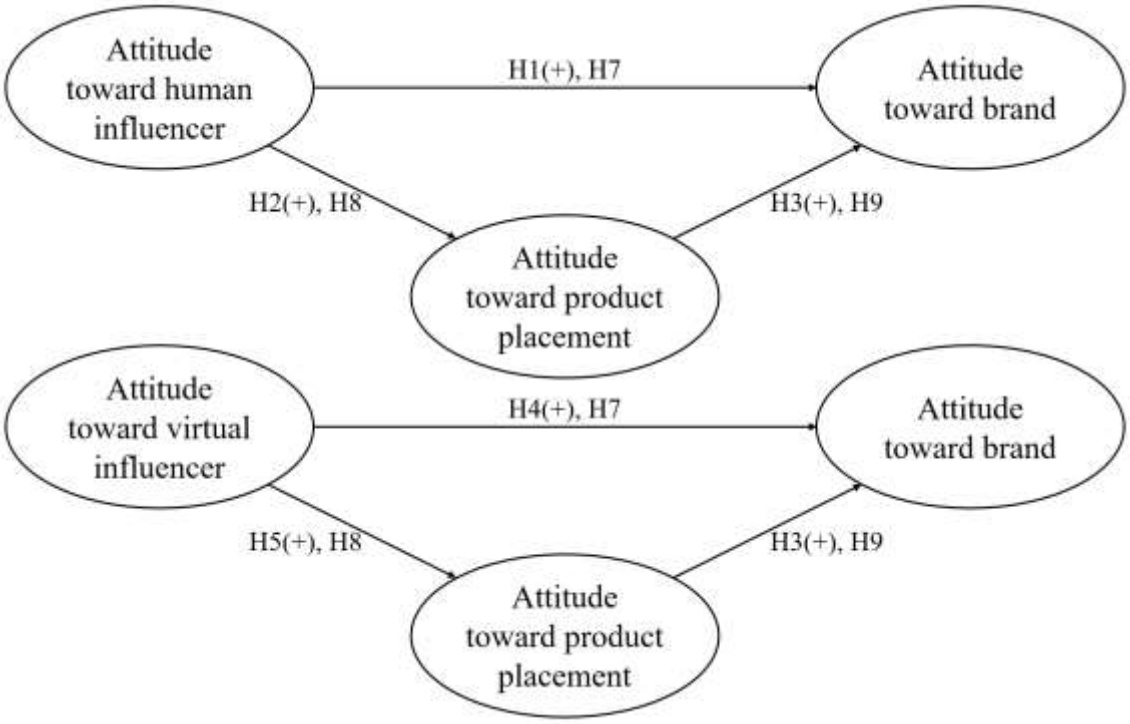

Figure 1. Research Model
Source: Developed by the author.

This study formulates the following hypotheses:

H1: Attitude toward human influencers positively affects attitude toward the brand.
H2: Attitude toward human influencers positively affects attitude toward product placement.
H3: Attitude toward product placement by human influencers positively affects attitude toward the brand.
H4: Attitude toward virtual influencers positively affects attitude toward the brand.
H5: Attitude toward virtual influencers positively affects attitude toward product placement.
H6: Attitude toward product placement by virtual influencers positively affects attitude toward the brand.
H7: There is a difference in attitude toward influencers and attitude toward brands between human and virtual influencers.
H8: There is a difference in the attitude of influencers toward product placement between human and virtual influencers.

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E-ISSN: 2549-8797
ISSN: 1410-3583

H9: There is a difference in attitude toward product placement and attitude toward brand between human influencers and virtual influencers.

METHODS

This study employed a post-test experimental design without a control group. The treatment in the experiment consisted of Instagram posts from a human influencer named Taeri (Instagram: @taeri__taeri) (**Figure 2**) and a virtual influencer named Lucy (Instagram: @here.me.lucy) (**Figure 3**). Nine Instagram posts were selected from both influencers, three featuring Taeri and Lucy wearing Nike products. When selecting the influencers, the researchers evaluated several well-known influencers from South Korea and chose the top three. The selection criteria for the human influencer included similarity in content and appearance to the virtual influencer or an "unreal" aesthetic. Additionally, the researchers considered that the chosen virtual influencer was from Korea and had many followers.

Figure 2. Their Instagram content featuring product placement
Source: @taeri__taeri, Instagram post

Figure 3. Lucy's Instagram content featuring product placement
Source: @here.me.lucy, Instagram post

The experimental procedure began with participants providing their personal information, followed by screening questions to determine whether they were already familiar with the influencers. Afterwards, participants were exposed to Instagram content as the treatment, followed by a manipulation check. The manipulation check consisted of two questions: the influencer's name and the brand featured in the Instagram content. Participants were then asked to answer questions regarding their attitude toward the influencer, attitude toward product placement, and attitude toward the brand. The procedure concluded once all questions were answered.

The population of this study comprised Instagram social media users in the Greater Jakarta area (Jabodetabek), with participants recruited using convenience sampling. A total of 400 participants were recruited, with 200 participants viewing Instagram content from a human influencer and 200 viewing content from a virtual influencer. Of the 200 participants who viewed content from the human influencer, 44 failed the screening test, and 19 failed

the manipulation check. Meanwhile, of the 200 participants who viewed content from the virtual influencer, 36 failed the screening test, and 13 failed the manipulation check. As a result, the final usable data included 136 participants for the human influencer group and 151 for the virtual influencer group, yielding 287 participants for analysis.

Data collection for the study was done through questionnaires distributed via social media and in person using Google Forms. Attitudes toward the influencer were measured using five indicators (**Table 1**), attitudes toward product placement were measured using seven indicators (**Table 2**), and attitudes toward the brand were measured using six indicators (**Table 3**). A Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used. The data analysis technique applied for testing hypotheses 1 to 6 was Partial Least Squares Structural Equation Modeling (PLS-SEM), while hypotheses 7 to 9 were tested using Partial Least Squares Multigroup Analysis (PLS-MGA). The data analysis was conducted using SmartPLS version 4.

This section outlines the indicators used to measure participants' attitudes toward influencers, specifically Taeri and Lucy (see **Table 1**). These indicators assess perceptions of the influencers' attractiveness, likability, and overall appeal, as well as the quality of their Instagram content. The measurements are adapted from the work of (Silvera & Austad, 2004) and (Casaló et al., 2020), emphasizing factors such as visual appeal and content engagement.

Table 1. Measurement of Attitude Toward Influencer

Variable	Indicator
Attitude Toward Influencer	I find Taeri/Lucy attractive, pleasant to look at, easy to like, and enjoyable. I have a favourable view of Taeri/Lucy's Instagram content.

Source: Adapted from (Silvera & Austad, 2004) and (Casaló et al., 2020).

The indicators used to gauge participants' attitudes toward product placement by influencers are presented in this section (see **Table 2**). Participants were asked about their ethical concerns, objections, and reactions to seeing Nike products in posts by Taeri or Lucy. The items reflect participants' discomfort with influencers being paid for product placement and their perceptions of the realism of using branded products like Nike. These measures are adapted from (Gupta & Gould, 1997), focusing on ethical considerations and the acceptance of product placement.

Table 2. Measurement of Attitude Toward Product Placement

Variable	Indicator
Attitude Toward Product Placement	I object to Taeri/Lucy receiving money for including Nike products in their posts; Taeri/Lucy should use fictional products instead of real ones like Nike; I object to seeing the Nike brand in Taeri/Lucy's posts; it is unethical for Taeri/Lucy to use Nike in their posts, The government should regulate the use of Nike brands in Taeri/Lucy's posts, Using the Nike brand in Taeri/Lucy's posts makes it seem unrealistic, I do not want to buy Nike products after seeing Taeri/Lucy's post featuring the brand.

Source: Adapted from (Gupta & Gould, 1997).

This section presents participants' perceptions of the Nike brand after seeing it featured in posts by Taeri or Lucy (see **Table 3**). The indicators measure participants' opinions on the brand's quality, attractiveness, and personal satisfaction due to its

association with the influencer. The scale is adapted from (Ha & Lam, 2017), assessing how the influencers' use of Nike products influences brand perception.

Table 3. Measurement of Attitude Toward the Brand

Variable	Indicator
Attitude Toward Brand	The Nike brand worn by Taeri/Lucy is a good choice. I find it attractive, and I like it because Taeri/Lucy wears it. The Nike brand worn by Taeri/Lucy is of good quality. I am satisfied with the Nike brand worn by Taeri/Lucy. I feel confident wearing Nike shoes because of Taeri/Lucy.

Source: Adapted from (Ha & Lam, 2017).

RESULTS

This study analyzes data from 287 participants who are Instagram social media users in the Greater Jakarta area (Jabodetabek). The majority of participants were female, with 82 individuals (60.500 per cent) and 54 males (39.500 per cent) among the total 136 human influencer participants, 93 females (61.500 per cent) and 58 males (38.500 per cent) among the 151 virtual influencer participants. Most participants were aged 17 to 25, covering both human and virtual influencers. Most participants resided in Jakarta and did not know the human or virtual influencers personally.

Convergent validity occurs when scores from different instruments used to measure the same construct have a high correlation. The convergent validity test results indicate that all human and virtual influencer variables passed the test, with AVE values greater than 0.500 (see **Table 4**; Hair et al., 2019).

Table 4. Convergent Validity Test

Variable	AVE (Human Influencer)	AVE (Virtual Influencer)
ATI	0.747	0.741
ATPPL	0.755	0.785
ATB	0.660	0.635

ATI: Attitude toward influencer; ATPPL: Attitude toward product placement; ATB: Attitude toward brand.

Discriminant validity occurs when instruments measuring different constructs do not correlate highly. The Heterotrait-Monotrait Ratio (HTMT) was used to assess discriminant validity, with a good HTMT value being below 0.850 and acceptable if below 0.900 (Hair et al., 2019). All variables met the discriminant validity requirements as they had HTMT values below 0.850 (see **Tables 5** and **6**).

Table 5. Discriminant Validity for Human Influencer

Construct	ATHI	ATPPL	ATB
ATHI			
ATTP	0.212		
ATB	0.730	0.180	

ATHI: Attitude toward human influencer; ATPPL: Attitude toward product placement; ATB: Attitude toward brand.

Jurnal Manajemen
e-JM
E-ISSN: 2549-8797
ISSN: 1410-3583

Table 5 shows the discriminant validity results for the constructs in the human influencer group. Discriminant validity assesses the extent to which constructs such as Attitude Toward Human Influencer (ATHI), Attitude Toward Product Placement (ATPPL), and Attitude Toward Brand (ATB) are distinct from each other. The values in the table indicate how much each construct differs from the others, with the higher off-diagonal values suggesting more substantial differentiation between the constructs.

Table 6. Discriminant Validity for Virtual Influencers

Construct	ATVI	ATPPL	ATB
ATVI			
ATTP	0.250		
ATB	0.708	0.207	

ATVI: Attitude toward virtual influencer; ATPPL: Attitude toward product placement; ATB: Attitude toward brand.

Table 6 shows the discriminant validity for the virtual influencer group, similar to the human influencer group in **Table 5**. The constructs measured are Attitude Toward Virtual Influencer (ATVI), Attitude Toward Product Placement (ATPPL), and Attitude Toward Brand (ATB). The values help verify whether each construct in the virtual influencer group is distinct, with off-diagonal values again indicating the level of differentiation.

Reliability tests for indicators are based on the loading factor value for each indicator measuring a construct, where each indicator must have a loading factor value of more than 0.700 (Hair et al., 2019). Based on **Table 7**, all indicators met the reliability requirements as they had loading factor values above 0.700. Thus, all indicators were deemed reliable for measuring their respective constructs.

Table 7. Indicator Reliability Test for Human Influencer

Variable	Indicator	Loading Factor
Attitude toward Influencer (Human)	ATI1	0.851
	ATI2	0.903
	ATI3	0.851
	ATI4	0.872
	ATI5	0.841
Attitude toward Product placement (Human)	ATP1	0.816
	ATP2	0.847
	ATP3	0.851
	ATP4	0.880
	ATP5	0.900
	ATP6	0.893
	ATP7	0.893
Attitude toward the brand (Human)	ATB1	0.843
	ATB2	0.870
	ATB3	0.754
	ATB4	0.867
	ATB5	0.834
	ATB6	0.893

Table 7 shows the reliability test results for indicators related to human influencers. The reliability of each indicator is evaluated using the Loading Factor (LF), where values

closer to 1 indicate more substantial reliability. The table includes three constructs: Attitude Toward Human Influencer (ATHI), Attitude Toward Product Placement (ATPPL), and Attitude Toward Brand (ATB). The indicators demonstrate high reliability for all the constructs, with most LF values above 0.800, indicating a strong relationship between the items and their corresponding constructs.

Table 8. Indicator Reliability Test for Virtual Influencer

Variable	Indicator	Loading Factor
Attitude toward Influencer (Virtual)	ATI1	0.844
	ATI2	0.886
	ATI3	0.854
	ATI4	0.883
	ATI5	0.834
Attitude toward Product placement (Virtual)	ATP1	0.826
	ATP2	0.870
	ATP3	0.896
	ATP4	0.908
	ATP5	0.921
	ATP6	0.872
	ATP7	0.906
Attitude toward brand (Virtual)	ATB1	0.843
	ATB2	0.870
	ATB3	0.754
	ATB4	0.867
	ATB5	0.834
	ATB6	0.700

Table 8 shows the reliability test results for indicators related to virtual influencers. Like the human influencer group, the reliability is measured by Loading Factors (LF), which show the strength of the relationship between the indicator and its construct. The constructs analyzed are Attitude Toward Virtual Influencer (ATVI), Attitude Toward Product Placement (ATPPL), and Attitude Toward Brand (ATB). Most of the LF values exceed 0.800, indicating high indicator reliability, except for ATB6, which has a lower reliability of 0.700.

The internal consistency reliability analysis aims to ensure that the questionnaire produces consistent data if used on the same sample. Composite Reliability (rho A) was used as an appropriate measure of construct reliability, positioned between Cronbach's Alpha and Composite Reliability (Hair et al., 2019). The test results showed that all variables, both for Human influencers (**Table 10**) and Virtual influencers (**Table 9**), had good internal consistency with Composite Reliability (rho A) values above 0.700.

The internal consistency reliability results for human influencers, measured using composite reliability (rho A), demonstrate strong reliability (see **Table 9**). Composite reliability assesses how consistently the indicators measure the construct, with values closer to 1 indicating higher reliability. For the human influencer group, the reliability of all construct's Attitude Toward Human Influencer, Attitude Toward Product Placement, and Attitude Toward Brand exceeds 0.900, signifying excellent internal consistency for each variable.

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E-ISSN: 2549-8797
ISSN: 1410-3583

Table 9. Internal Consistency Reliability for Human influencer

Variable	Composite Reliability (rho A)
Attitude toward human influencers	0.917
Attitude toward product placement	0.955
Attitude toward brand	0.918

The internal consistency reliability results for the virtual influencers, measured using composite reliability (rho A), also indicate high reliability (see **Table 10**). Composite reliability evaluates the consistency with which the indicators measure the construct, with values closer to 1 indicating higher reliability. For the virtual influencer group, all constructs, such as Attitude Toward Virtual Influencer, Attitude Toward Product Placement, and Attitude Toward Brand, show values near or above 0.900. Notably, the reliability for Attitude Toward Product Placement is slightly higher in the virtual influencer group than in the human influencer group, indicating firmer measurement consistency.

Table 10. Internal Consistency Reliability Test for Virtual Influencer

Variable	Composite Reliability (rho A)
Attitude toward human influencers	0.916
Attitude toward product placement	0.965
Attitude toward brand	0.898

After the outer model analysis was deemed valid and reliable, the next step was to conduct inner model data analysis, which includes tests of multicollinearity, determination coefficients, predictive power, path coefficients, and hypothesis testing, which shows that all variables have VIF values below 5, indicating the absence of multicollinearity among the variables tested (Hair et al., 2019).

The multicollinearity test results for human influencers, as measured by the variance inflation factor (VIF), assess whether the independent variables are highly correlated, potentially leading to redundancy. The VIF values for attitude toward human influencer (ATHI) and attitude toward product placement by human influencer (ATPPLHI) are both 1.042, indicating no multicollinearity, as these values are well below the commonly accepted threshold of 5 (see **Table 11**).

Table 11. Multicollinearity Test for Human Influencer

Variable (Human)	VIF	Description
ATB = f(ATHI, ATPPLHI)		
ATHI	1.042	No multicollinearity
ATPPLHI	1.042	No multicollinearity

ATB: Attitude toward brand; ATHI: Attitude toward human influencer; ATTPLHI: Attitude toward product placement by human influencer.

The multicollinearity test results for virtual influencers, as shown in **Table 12,** reveal that the VIF values for Attitude Toward Virtual Influencer (ATVI) and Attitude Toward Product Placement by Virtual Influencer (ATPPLVI) are both 1.059. Similar to the results for human influencers, these values indicate no multicollinearity among the variables tested.

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E-ISSN: 2549-8797
ISSN: 1410-3583

Table 12. Multicollinearity Test for Virtual Influencers

Variable	VIF	Description
ATB = f (ATVI, ATPPLVI)		
ATHI	1.059	No multicollinearity
ATPPLVI	1.059	No multicollinearity

ATB: Attitude toward brand; ATHI: Attitude toward virtual influencer; ATTPLHI: Attitude toward product placement by virtual influencer.

The coefficient of determination (R^2) indicates how well the independent variables explain the variance in the dependent variables. For human influencers, the R^2 for attitude toward product placement is 0.040, suggesting a very low explanatory power. On the other hand, attitude toward the brand has an R^2 of 0.471, indicating a low but more substantial predictive power (see **Table 13**).

Table 13. Coefficient of Determination for Human Influencer

Variable	R^2	Description
Attitude toward product placement	0.040	Very low
Attitude toward brand	0.471	Low

For virtual influencers, the R^2 values are similar to those for human influencers. The R^2 for Attitude Toward Product Placement is 0.056, indicating very low explanatory power, while the R^2 for Attitude Toward Brand is 0.424, showing slightly lower predictive power compared to human influencers but still within the low category (see **Table 14**).

Table 14. Coefficient of Determination for virtual influencer

Variable	R^2	Description
Attitude toward product placement	0.056	Very low
Attitude toward brand	0.424	Low

Table 15 shows the predictive power of the PLS model compared to the LM model for human influencers. The Q^2 Predict values for Attitude Toward Brand (ATB) indicators are positive, indicating good predictive power for these variables. However, Attitude Toward Product Placement (ATPPL) indicators generally have negative Q^2 Predict values, suggesting less accurate predictions. The RMSE and MAE values demonstrate that the PLS model performs slightly better in predicting these variables than the LM model.

Table 15. Predictive Power for Human Influencer

Variable Indicators	Q^2 Predict	PLS Model		LM Model	
		RMSE	MAE	RMSE	MAE
ATB1	0.422	0.678	0.501	0.696	0.513
ATB2	0.401	0.706	0.557	0.730	0.571
ATB3	0.199	0.948	0.742	0.939	0.763
ATB4	0.371	0.783	0.615	0.795	0.608
ATB5	0.160	1.058	0.774	1.072	0.812
ATB6	0.139	1.065	0.830	1.082	0.854

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ATPPL1	-0.012	1.096	0.820	1.127	0.844
ATPPL2	-0.012	1.094	0.823	1.127	0.855
ATPPL3	-0.016	1.029	0.742	1.048	0.780
ATPPL4	-0.004	1.079	0.797	1.102	0.828
ATPPL5	0.003	1.152	0.862	1.174	0.883
ATPPL6	0.003	1.125	0.842	1.146	0.871
ATPPL7	0.005	1.130	0.844	1.139	0.857

Similar results for human influencers are shown in **Table 16**, where the PLS model demonstrates better predictive power than the LM model for virtual influencers. Positive Q^2 Predict values for Attitude Toward Brand (ATB) indicators reflect substantial predictive accuracy, while some Attitude Toward Product Placement (ATPPL) indicators exhibit lower predictive accuracy with negative Q^2 Predict values. Overall, the PLS model provides slightly better predictions.

Table 16. Predictive Power for Virtual Influencers

Variable Indicators	Q^2 Predict	PLS Model		LM Model	
		RMSE	MAE	RMSE	MAE
ATB1	0.361	0.772	0.539	0.769	0.555
ATB2	0.304	0.835	0.610	0.849	0.628
ATB3	0.213	1.077	0.847	1.093	0.873
ATB4	0.338	0.816	0.625	0.811	0.633
ATB5	0.172	1.045	0.783	1.018	0.785
ATB6	0.154	1.152	0.900	1.165	0.909
ATPPL1	0.021	1.245	1.064	1.279	1.075
ATPPL2	0.048	1.214	1.048	1.250	1.058
ATPPL3	0.038	1.251	1.043	1.280	1.068
ATPPL4	0.036	1.206	1.030	1.227	1.046
ATPPL5	0.032	1.301	1.124	1.320	1.121
ATPPL6	0.024	1.326	1.131	1.344	1.123
ATPPL7	0.054	1.277	1.088	1.296	1.102

The results of hypothesis testing for the six proposed relationships in this study are presented (see **Table 17**). Attitude toward human influencers has a positive and significant effect on attitude toward the brand with a large effect (Path coefficient: 0.679; p-value: 0.000; f^2: 0.837). In contrast, the attitude toward human influencers negatively, but not significantly, affects the attitude toward product placement with a small effect (Path coefficient: -0.200; p-value: 0.142; f^2: 0.042). Attitude toward product placement for human influencers does not significantly affect attitude toward the brand (Path coefficient: -0.029; p-value: 0.717; f^2: 0.002). For the virtual influencers, attitude toward the influencer positively and significantly affects attitude toward the brand with a significant effect (Path coefficient: 0.650; p-value: 0.000; f^2: 0.693), and also an attitude toward product placement with a small effect (Path coefficient: 0.236; p-value: 0.000; f^2: 0.059). However, attitude toward product placement does not significantly affect attitude toward the brand for virtual influencers with meaningful effect (Path coefficient: 0.006; p-value: 0.946; f^2: 0.000).

Table 17. Hypothesis Testing 1 to 6

Hypothesis	PC	*p-value*	f^2	Description
H1: ATHI → ATB	0.679	0.000	0.837	Positive, significant, large effect

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H2: ATHI → ATPPL	-0.200	0.142	0.042	Negative, not significant, small effect
H3: ATPPLHI → ATB	-0.029	0.717	0.002	Negative, not significant, small effect
H4: ATVI → ATB	0.650	0.000	0.693	Positive, significant, large effect
H5: ATVI → ATPPL	0.236	0.000	0.059	Positive, significant, small effect
H6: ATPPLVI → ATB	0.006	0.946	0.000	Positive, not significant, not meaningful

ATHI: Attitude toward human influencer; ATB: Attitude toward brand; ATPPLHI: Attitude toward product placement by a human influencer; ATVI: Attitude toward virtual influencer; ATPPLVI: Attitude toward product placement by a virtual influencer; PC: Path coefficient; f^2: *Effect size*.

Hypotheses 7 to 9 using the PLS-MGA procedure were used to examine the differences in the effects of variables on human and virtual influencers. The MICOM (Measurement Invariance of Composite Models) test results show that in step one, the model has consistent configurations in both groups, and step two shows no significant differences (p-value higher than 0.050) in the composition of the tested variables between the groups being compared.

Table 18. Compositional Invariance Tet (MICOM Step 2)

Variable	*Correlation Permutation*	*Permutation p-value*
Attitude toward influencer	0.999	0.096
Attitude toward product placement	0.999	0.995
Attitude toward brand	1.000	0.788

The third stage involves evaluating scalar invariance. This stage assesses the differences in means and variances across groups. The evaluation follows the criteria that the mean original difference should be 2.500 per cent lower than the mean original difference lower than 97.500 per cent, and the permutation p-value of the mean original difference should be greater than 0.050. If these criteria are met, PLS-MGA analysis does not need to be performed (Cheah et al., 2023).

Based on **Tables 18** and **19**, PLS-MGA analysis is still required for attitude toward influencers and attitude toward product placement, as some p-values do not meet the threshold of higher than 0.050. However, PLS-MGA analysis is unnecessary for attitude toward the brand since it meets the second and third stage criteria. The results of the scalar invariance test for mean differences (MICOM Step 3a) between human and virtual influencers are shown (see **Table 19**).

Table 19. Scalar Invariance Test for Mean Differences (MICOM Step 3a)

	Mean Original Diff. (Human – Virtual)	Lower Bound 2.500 per cent	Upper Bound 97.500 percent	*Permutation p-value*
ATI	-0.263	-0.237	0.245	0.033
ATPPL	-0.343	-0.226	0.222	0.002
ATB	0.168	-0.225	0.247	0.148

ATI: Attitude toward influencer; ATPPL: Attitude toward product placement; ATB: Attitude toward brand.

The next step examines the variance differences between human and virtual influencers. The results of the scalar invariance test for variance differences (MICOM Step 3b) are presented (**Table 20**).

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Table 20. Scalar Invariance Test for Variance Differences (MICOM Step 3b)

	Mean Original Diff. (Human – Virtual)	Lower Bound 2.500 per cent	Upper Bound 97.500 percent	*Permutation p-value*
ATI	-0.123	-0.598	0.623	0.686
ATPPL	-0.361	-0.327	0.331	0.029
ATB	-0.095	-0.505	0.520	0.693

ATI: Attitude toward influencer; ATPPL: Attitude toward product placement; ATB: Attitude toward brand.

The results of hypotheses 7 to 9 demonstrate whether there are differences in the impact of variables between human influencers and virtual influencers (see **Table 21**). The seventh hypothesis test shows that attitude toward the influencer and attitude toward the brand is more significant for human influencers (Path coefficient: 0.679) compared to virtual influencers (Path coefficient: 0.650). However, the difference is not significant (p-value: 0.762). This means there is no meaningful difference between human influencers and a positive attitude toward the brand; both are equally effective. Next, the eighth hypothesis test indicates that the influence of attitude toward the influencer on attitude toward product placement is more significant (p-value: 0.006) for virtual influencers (Path coefficient: 0.236) compared to human influencers (Path coefficient: -0.200). This suggests that product placements by virtual influencers are more acceptable to the audience than those by human influencers. Finally, the ninth hypothesis test shows that the influence of attitude toward product placement on attitude toward the brand is more significant for human influencers (Path coefficient: -0.029) compared to virtual influencers (Path coefficient: 0.006). However, the difference is also not significant (p-value: 0.751). This indicates that product placement, whether done by a human or virtual influencer, is equally ineffective in influencing the audience's attitude toward the brand. These results align with the findings from the scalar invariance test on brand attitude, which did not pass the test (see **Tables 18** and **19**).

Table 21. Hypothesis Testing 7, 8, and 9

Hypothesis	PC Human	PC Virtual	PC Difference (Human -Virtual)	*p-value*	Description
H7: ATI → ATB	0.679	0.650	0.029	0.762	Human is greater than virtual; Not significant
H8: ATI → ATPPL	-0.200	0.236	-0.436	0.006	Virtual is greater than human; Significant
H9: ATPPL → ATB	-0.029	0.006	-0.035	0.751	Human is greater than virtual; Not significant

PC: Path coefficient; ATI: Attitude toward influencer; ATTP: Attitude toward product placement; ATB: Attitude toward brand.

DISCUSSION

Product Placement by Human influencer. Based on the first hypothesis test results, attitude toward human influencers positively affects attitude toward the brand. This finding

aligns with (Ha & Lam's, 2017) research, which suggests that consumers tend to form perceptions of a brand based on their perception of its endorser. This effect is more substantial when the influencer is perceived as highly sincere (Blanche et al., 2021; Lee et al., 2020). In this context, participants' positive or negative views of Taeri as a human influencer affect their liking or disliking of the Nike brand worn by Taeri. In this study, the highest-contributing indicator of attitudes toward human influencers is "pleasant to look at" (Loading factor: 0.903), indicating that participants' liking for Taeri is more influenced by the visual appeal of Taeri's appearance on Instagram. This highlights the importance of influencers and marketers considering the visual appeal of their Instagram posts.

Conversely, the second hypothesis test results indicate that attitude toward human influencers does not positively affect attitude toward product placement. This may be due to the audience's perception that product placements by human influencers feel less natural or overly commercial. Research by (Sokolova & Kefi, 2020) also found that audiences need to feel connected and trust with influencers to endorse products effectively. The negative path coefficient suggests that participants tend to have an unfavourable attitude toward product placements by human influencers. However, this attitude is not universally applicable, as indicated by the insignificant p-value. From a managerial perspective, influencers must focus on building genuine relationships and fostering trust with their audience to enhance the effectiveness of product placements. Marketers should also pay close attention to the alignment between the product and the influencer, ensuring that the product is relevant and appropriate for the influencer's persona and audience to avoid the perception of being overly commercialized.

Next, the third hypothesis test results show that attitude toward product placement by human influencers does not positively affect attitude toward the brand, aligning with a previous study which found that increased consumer awareness of influencer marketing reduces its effectiveness (Vrontis et al., 2021). A mismatch between the influencer and the product may contribute to negative perceptions, as trust in an aligned influencer enhances brand attitudes (Park & Lin, 2020). Research by (Ulker-Demirel & Yildiz, 2020) also shows that consumer attitudes toward actors influence product placement perceptions. Therefore, brands should consider working with micro-influencers or using story-driven content to build authenticity and improve brand perceptions. Consistent findings in product placement literature (Babin et al., 2021; Boerman et al., 2021) suggest that aligning influencers with the brand can positively influence brand attitudes and purchase intentions.

Product Placement by Virtual influencer. The fourth hypothesis test results indicate that attitude toward virtual influencers positively affects attitude toward the brand. This finding suggests that although Lucy, as a virtual influencer, is not a real person, she can still be perceived as trustworthy by her followers. This may be due to the brand's complete control over the messages conveyed, allowing for consistency and reliability in communication. Research by (Bhatt & Jayswal, 2013) showed that influencers' visual appeal and credibility positively correlate with brand attitudes. Virtual influencers can be designed with optimal visual appeal and have tightly controlled narratives to enhance credibility. Therefore, brands can leverage virtual influencers to deliver messages aligned with the brand image or create virtual influencers that embody the brand's persona and values. Like human influencers, the indicator 'pleasant to look at' is also the highest-contributing factor for virtual influencers (Factor loading: 0.883). Visual stimuli are still important in creating virtual influencers as aesthetic quality shapes audience perceptions in Instagram posts.

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The fifth hypothesis test results indicate that attitude toward virtual influencers positively affects attitude toward product placement. This suggests that consumers tend to have a positive attitude toward product placement done by virtual influencers. This finding aligns with previous research, indicating that product placements' relevance and uniqueness can enhance positive perceptions (Gregorio & Sung, 2010). Product placement using virtual influencers can be strategically planned and tailored for the target audience, making it appear more natural and less commercial. The positive path coefficient for virtual influencers contrasts the negative coefficient for human influencers. The seventh hypothesis will further test the differing acceptance of human and virtual influencers.

Meanwhile, the sixth hypothesis test results show that attitude toward the virtual influencer's product placement does not positively affect attitude toward the brand. Although product placement by virtual influencers is well-received, it is not strong enough to alter overall brand perceptions. This may be due to consumers recognizing that product placement is part of a larger marketing strategy and does not always reflect the brand's quality or value. Research by (Park & Lin, 2020) emphasizes that trust in the influencer plays a key role in shaping attitudes. Similarly, (Ulker-Demirel & Yildiz, 2020) found that consumer attitudes toward actors in films influence their perceptions of product placement. Therefore, brands must ensure that product placements in virtual influencer content align with the brand's values and image to maintain authenticity and foster stronger emotional connections with the audience.

Comparison of Product Placement by Human influencer vs. Virtual influencer. The PLS-MGA test results for the **seventh hypothesis** reveal no difference in the effect of attitude toward influencer on attitude toward brand between human and virtual influencers. This means that both influencers are equally effective in creating positive brand attitudes among consumers. This indicates that the type of influencer used does not affect the effectiveness of building positive brand attitudes, giving brands flexibility in choosing between human and virtual influencers based on their strategy and budget. In the future, human influencers will excel in engagement through direct interaction with their followers. On the other hand, virtual influencers can be created with diverse identities, lifestyles, and mindsets to better align with the brand image (Molin & Nordgren, 2019).

The PLS-MGA test results for the **eighth hypothesis** indicate a difference in the effect of attitude toward influencer on attitude toward product placement between human influencer and virtual influencer. Attitudes toward product placement by virtual influencers have a more significant impact than human influencers, suggesting that product placement by virtual influencers is more acceptable to consumers. However, this result contrasts with the findings of (Hofeditz et al., 2022), which showed that human influencers excel in building trust, social presence, and humanity. This difference may be due to virtual influencers' ability to consistently deliver messages that align with the brand's values and image. At the same time, consumers demand a higher level of honesty and authenticity from human influencers.

Finally, the PLS-MGA test results for the **ninth hypothesis** show no difference in the effect of attitude toward product placement on attitude toward brand between human influencer and virtual influencer. This result suggests that product placement by influencers, whether human or virtual, does not directly affect consumers' attitudes toward the brand. This indicates that other factors, such as product quality, user experience, and brand perception, maybe more critical in shaping consumer attitudes toward the brand.

CONCLUSION

This study explores the effectiveness of human and virtual influencer product placement in shaping audience attitudes toward brands. The findings indicate that attitude toward human influencers positively affects attitude toward the brand but does not positively affect attitude toward product placement, as product placement by human influencers is often perceived as less natural or overly commercial. In contrast, virtual influencers positively impact brand and product placement attitudes due to their ability to consistently convey messages aligned with the brand's values and image. However, the attitude toward product placement by both human and virtual influencers does not positively affect the attitude toward the brand.

There is no significant difference in the effect of influencer attitudes on brand attitudes between humans and virtual influencers, suggesting that both are effective in generating positive attitudes toward brands. However, virtual influencers are more effective in product placement. Product placement by influencers, whether human or virtual, does not directly influence consumer attitudes toward the brand, indicating that other factors, such as product quality and user experience, play a more significant role.

Future research should confirm whether product placement by virtual influencers is superior to that of human influencers and explore specific factors influencing the effectiveness of product placement, such as product type, audience demographics, and content format. Further studies should also investigate the long-term impact of product placement in Instagram posts on consumer attitudes and brand loyalty. Additionally, it is suggested to examine how the interaction between authentic and commercial content affects consumer perceptions and attitudes.

Companies may benefit from combining human and virtual influencers to expand their reach and diversify marketing content. Human influencers can create positive brand impressions with more natural product placement, while virtual influencers can be leveraged for more innovative product placement. Given the more substantial impact of product placement by virtual influencers, companies may focus more on this strategy. Marketers should ensure that the content created by both influencers is authentic and engaging to reduce potential negative perceptions from consumers.

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ACKNOWLEDGEMENTS

This research was funded by the Directorate General of Higher Education, Research, and Technology – Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia through the Master's Thesis Research scheme (Number: 829/LL3/AL.04/2024).