

THE IMPACT OF AI-DRIVEN PERSONALIZATION ON USER RETENTION IN SPOTIFY: THE MEDIATING ROLE OF EMOTIONAL ATTACHMENT

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Abstract

The increasing use of artificial intelligence (AI) in digital platforms has transformed how personalized user experiences are delivered, particularly in music streaming services. This study examines the effect of AI-driven personalization on user retention, with emotional attachment as a mediating variable, within the context of Spotify users in Palembang city, Indonesia. Using a quantitative approach, data were collected through a survey of 110 Spotify users in Palembang city and analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS). The results indicate that AI-driven personalization has a strong and significant effect on emotional attachment, while emotional attachment significantly influences user retention. Although AI-driven personalization also has a direct effect on user retention, the effect is relatively weaker. Furthermore, emotional attachment is found to partially mediate the relationship between AI-driven personalization and user retention. These findings confirm that emotional attachment plays a central role in translating AI-driven personalized experiences into sustained user behavior. This study contributes to the literature by extending the Stimulus–Organism–Response framework in the context of AI-based digital services and offers practical insights for streaming platforms to enhance user retention through emotionally driven personalization strategies.

Keywords: *AI-driven personalization; emotional attachment; user retention; S-O-R framework*

1. INTRODUCTION

The development of digital technology has driven a major transformation in the global music industry where previously the conventional way of consuming music has changed to *online* platforms via *streaming*. With the presence of artificial intelligence technology (AI), which is a music service that is able to adjust to the preferences of each user, it causes fundamental changes in finding, choosing, and enjoying songs. Streaming music platforms now not only provide an extensive catalog of songs but also provide a personalized song listening experience through AI algorithms. One of the most aggressive and successful platforms to integrate AI-driven personalization technology is Spotify, which later became a pioneer and leader of the modern digital music ecosystem.

In Indonesia, the development of digital music platforms is getting stronger, according to a report from We Are Social and Kepois In 2024, it was recorded that more than 78% of active internet users access music streaming services both for free and with a subscription. Based on the Populix survey (2023), Spotify is used by 66% of music streaming service users in Indonesia, far outperforming YouTube Music with 38% achievements, Joox by 17% and Apple Music by 6%. Spotify's dominance lies not only from the music catalog offered but also in its ability to deliver a personalized listening experience through AI technology. This approach makes Spotify not only an entertainment service provider, but also a listener partner which is able to understand the emotions and character of its users through personalized and relevant music recommendations, namely features such as *Discover Weekly*, *Daily Mix*, *Release Radar* and *Playlist Made for You* which are specifically designed with each user's unique preferences in mind so that they are able to touch the psychological side of the user. Not only that, at the end of each year, Spotify also presents an annual summary with the *Spotify Wrapped* feature that compiles music listening data into a personalized music journey view that makes users feel recognized, appreciated, and emotionally connected to the platform. The combination of AI algorithms in recommendations and behavioral analysis allows Spotify to create a music listening experience that is similar but not uniform so that it feels exclusive to each individual (Gomathy, 2022).

Music listening activities are often related to mood, personal preferences, self-identity and social experiences. When digital platforms are able to present songs that suit individual psychological conditions and tastes, the relationship created is no longer transactional but emotional. A consistent personalization experience makes some users feel "recognized" and "understood" by the platform, resulting in an *emotional attachment* to the services they use (Agil Anderson & Malik Mutoffar, 2024). This attachment is one of the factors that has the potential to strengthen user loyalty and the tendency to stick to one particular platform in the long term (Bansal & Pruthi, 2021).

Although the Spotify platform has managed to attract millions of users in Indonesia, most of them are still classified as non-premium users who enjoy the service for free with ads as the main source of income. This situation poses its own challenges for Spotify in keeping users active and encouraging them to switch to paid services. A report from *We Are Social* (2024) notes that around 82% of internet users in Indonesia have multi-platform *behaviour* where users use more than one music streaming application at the same time which increases the risk of users moving to competing platforms when they feel that music recommendations, listening experiences, or emotional value obtained are no longer satisfactory so that it will affect sustainability platform business in the long run.

In that context, AI personalization research is seen as an important factor that can create a more relevant listening experience and improve user convenience (Holtz et al., 2020; Sepnandito & Suharyati, 2024). However, the personalization effect on customer retention doesn't always happen immediately without a strong emotional connection between the user and the platform. Emotional attachment acts as a psychological element that is able to strengthen the relationship (Grönroos, 1996). When users feel emotionally connected to the platform because of personalization that suits their personality, they are more likely to stick around and stay loyal to the service (Darmayasa & Yasa, 2021).

2. THEORETICAL FOUNDATION

Stimulus–Organism–Response (S-O-R) Theory

The *Stimulus–Organism–Response* (S-O-R) model proposed by Mehrabian and Russell (1974) explains that environmental stimuli can affect the internal conditions of individuals (*organisms*) which further determine behavioral responses. In the context of digital services, artificial intelligence-based music personalization acts as a stimulus that creates a personalized experience for users. The experience gives rise to emotional attachment as an internal affective response, which ultimately drives Spotify user retention behavior (Hajcak & Foti, 2020).

Customer Retention Theory

Retention is a consequence of customer loyalty that develops gradually through cognitive, affective, conative, and behavioral processes. In this context, user retention arises when users have a positive attitude and emotional attachment to a brand or platform, thus encouraging the intention to continue using the service despite the availability of other alternatives (Oliver L, 1980). User retention is reflected in behaviors such as intent to repeat use, willingness to stay subscribed, and resistance to moving to competitor services (Parasuraman et al., 1994). In digital-based services, retention is an important indicator of the success of the platform because the cost of retaining users tends to be lower than acquiring new users (Salem, 2021).

In the perspective of *Stimulus–Organism–Response* (S-O-R) put forward by Mehrabian and Russell (1974), user retention is positioned as a response, which is a behavioral response that arises as a result of the user's internal reaction to a certain stimulus. The personalization of AI-based services as a stimulus affects the user's affective state (organism), such as emotional attachment, which ultimately drives the user's decision to continue using the Spotify service on an ongoing basis.

Hypothesis

- H1 There is a positive and significant influence of AI Personalization on the Emotional Attachment of Spotify users in Palembang city.
- H2 There is a positive and significant influence of Personalisai AI on Spotify User Retention in Palembang city.
- H3 There is a positive and significant influence of Emotional Attachment on Spotify User Retention in Palembang city
- H4 There is a positive and significant influence of AI Personalization on Spotify User Retention in Palembang city through Emotional Attachment as a mediation variable.

3. RESULTS AND DISCUSSION

Respondent Profile

The respondent profile which is presented in this study is to find out the basic characteristics of the research participants, so that they can provide an overview of the results obtained. The results of the respondent profiles showed that most of the respondents were female (57.7%), and the male respondents were 42.3%. Based on age, respondents were dominated by the age group of 20–30 years (43.6%), followed by the age group under 20 years old (31.8%) and the age over 30 years old (24.6%). In terms of employment, the majority of respondents were workers (62.7%), while students were 37.3%. In addition, most respondents use the Spotify application for more than an hour per day (61.9%), indicating a relatively high intensity of use among respondents.

Data Analysis

Uji Outer Model

Convergent Validity Test

To test the validity of the convergence, the *outeir loading* value is used. An indicator is declared to meet the convergence validity if *the outer loading* value > 0.708 (Hair, 2022)

Table 2. Outer Loading Test Results

Variabel		Indicator	Statement Items	Outer Loading
AI Driven Personalization (X)	PA1	Relevance	Suitable music recommendation	0,789
	PA2	Ease of Exploration	Ease of finding music you like	0,775
	PA3	Preference Accuracy	Understanding the user's music genre	0,782
	PA4	System Adaptability	Ability to adapt to the changing of music preferences	0,705
Emotional Attachment (Z)	KE1	Emotional Comfort	Feel comfortable when listening to music on Spotify	0,714
	KE2	Emotional Closeness	Feeling familiar with music in Spotify	0,786
	KE3	Emotional Meaning	Feeling nostalgic when listening song on spotify	0,778
	KE4	Feeling Understood	Spotify understanding the changing of user's feelings	0,697
User Retention (Y)	RP1	Intention to Continue Using	Intend to stay on Spotify	0,853
	RP2	Consistency of Using	High intensity using Spotify	0,844
	RP3	Replacement Resistance	Reluctant to move to another app	0,792

Source: SmartPLS data processing, 2025

Based on Table 2 the values *outer loading* of each indicator has a value of > 0.7 so that the eleven indicators studied in the study are valid.

Table 3. Average Variance Extracted (AVE) Test Results

Average Variance Extracted (AVE)	
AI Driven Personalization (X)	0.583
User Retention (Y)	0.554
Emotional Attachment (Z)	0.689

Source: SmartPLS data processing, 2025

Based on Table 3, all research variables have a value *average variance extracted* (AVE) of > 0.50 . Thus, all indicators in this study are able to explain the latent variables well and are suitable for use at the next stage of analysis.

Composite Reliability Test

The variable is declared reliable if the CR value > 0.70 . The higher the CR value, the better the consistency of the indicator in measuring the variable in question (Hair, 2022). The results of the CR test for each variable in this study can be seen as follows:

Table 4. Composite Reliability Test Results

	Composite Reliability
AI Driven Personalization (X)	0.848
User Retention (Y)	0.832
Emotional Attachment (Z)	0.869

Source: SmartPLS data processing, 2025

Based on Table 4, it can be seen that all variables in the study have a CR value of > 0.7 . Thus all variables are declared reliable. With the fulfillment of the criteria for the validity and reliability of the research instrument, the model can be continued at the structural testing stage (*inner model*). The configuration of the relationship between variables in this study is shown in the diagram of the algorithm path schema as follows:

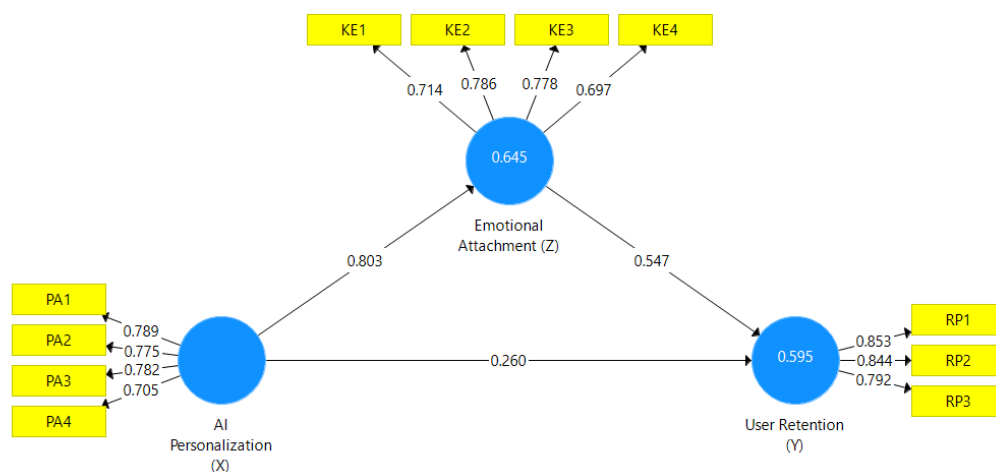


Figure 2 SmartPLS Algorithm Test Results

Source: SmartPLS data processing, 2025

Uji Inner Model

Collinearity Test (VIF)

If the VIF value is 5 or high then it indicates a critical collinearity problem among the indicators of the formatively measured variables. Ideally, the VIF value is close to 3 or lower (Hair, 2022).

Table 5. Results of the Collinearity Test (VIF)

	VIF
PA1	1,576
PA2	1,604
PA3	1,689
PA4	1,288
KE1	1,612
KE2	1,766
KE3	1,473
KE4	1,356
RP1	1,652

RP2	1,663
RP3	1,497

Source: SmartPLS data processing, 2025

Based on the table of 5 indicators, all the variables in this study have a VIF value of < 5 , so it can be concluded that there is no multicollinearity between indicators in each variable so that all indicators can be used in the study.

Determinant Coefficient Test (R²)

The *Determinant Coefficient* (R²) is tested to see how well the independent variable is able to explain the dependent variable. The results of the R² test can be seen in the following table:

Table 6. R² Test Results

	R Square	R Square Adjusted
Emotional Attachment(Z)	0.645	0.641
User Retention (Y)	0.595	0.587

Source: SmartPLS data processing, 2025

Based on Table 6. The R-square value shows that the AI driven personalization variable is able to explain 64.5% of the variation in emotional attachment ($R^2 = 0.645$). which indicates the model has strong explanatory abilities. Meanwhile, the variables of AI driven personalization and emotional attachment simultaneously accounted for a 59.5% variation in user retention ($R^2 = 0.595$).

Uji Effect Size (F²)

Effect Size (F²) testing was performed to see how much influence each predictor variable had on endogenous variables. The results of the F² test can be seen in the following table:

Table 7. F² Test Results

	Emotional Attachment (Z)	User Retention (Y)
AI Driven Personalization (X)	1,814	0.059
User Retention (Y)		
Emotional Attachment (Z)		0.262

Source: SmartPLS data processing, 2025

Based on table 7. The effect size value (f^2) indicates that AI driven personalization has a very strong influence on emotional attachment ($f^2 = 1,814$), indicating that AI driven personalization is a major determinant in the formation of emotional attachment of Spotify users. In contrast, the direct effect of AI driven personalization on user retention was relatively weak ($f^2 = 0.059$), suggesting that AI driven personalization did not predominantly affect retention without intermediary psychological mechanisms. Meanwhile, emotional attachment had a moderate effect on user retention ($f^2 = 0.262$), which confirms the important role of emotional attachment as a key factor in driving the sustainability of Spotify use, while also strengthening its position as a mediating variable in the research model.

Relevance Test (Q²)

The Q-Square (*Predictive Relevance*) test is used to find out if the model has good predictive ability against endogenous variables. If $Q^2 > 0$ indicates that the model has predictive relevance. The results of the Q² test can be seen in the following table:

Table 8. Q² Test Results

	SSO	SSE	Q ² (=1-SSE/SSO)
AI Driven Personalization (X)	61.036	61.036	
Emotional Attachment (Z)	64.065	39.193	0.388
User Retention (Y)	45.708	25.096	0.451

Source: SmartPLS data processing, 2025

Based on Table 8. The *predictive relevance* value (Q²) indicates that the model has good predictive capabilities. The emotional attachment variable has a Q² value of 0.388, which indicates that the model is

able to predict emotional attachment constructs with an adequate level of accuracy. Meanwhile, the user retention variable showed a Q^2 value of 0.451, which signifies strong predictive ability in explaining the retention behavior of Spotify users.

Significance and Influence Test

A relationship is declared significant if the T-Statistic > 1.96 or the P-Value < 0.05 at a 95% confidence level. The results of the significance test on direct relationships are shown as follows.

Table 9. Results of the Direct Relationship Significance Test Results

	Original Sample (O)	T Statistics (O/STDEV)	P Values
AI Driven Personalization (X) -> Emotional Attachment (Z)	0.803	26.229	0.000
AI Driven Personalization (X) -> User Retention (Y)	0.260	2.408	0.016
Emotional Attachment (Z) -> User Retention (Y)	0.547	5.463	0.000

Source: SmartPLS3 data processing, 2025

Based on Table 9 the results of the structural pathway test showed that AI driven personalization had a positive and significant effect on emotional attachment ($\beta = 0.803$; $t = 26.229$; $p < 0.001$), indicating that AI driven personalization is a major determinant in the formation of emotional attachment of Spotify users. In addition, AI driven personalization also had a positive and significant effect on user retention ($\beta = 0.260$; $t = 2.408$; $p = 0.016$), albeit with a relatively weaker power of influence. Meanwhile, emotional attachment had a positive and significant effect on user retention ($\beta = 0.547$; $t = 5.463$; $p < 0.001$), which confirms the important role of emotional attachment in driving sustainable use of Spotify.

Table 10. Indirect Relationship Significance Test Results

	Original Sample (O)	T Statistics (O/STDEV)	P Values
AI Driven Personalization (X) -> Emotional Attachment (Z)			
AI Driven Personalization (X) -> User Retention (Y)	0.439	5.271	0.000
Emotional Attachment (Z) -> User Retention (Y)			

Source: SmartPLS3 data processing, 2025

Based on Table 10 the results of direct and indirect pathway testing, emotional attachment is categorized as *partial mediation*. This is demonstrated by the direct effect of AI driven personalization on user retention that remains significant ($\beta = 0.260$; $p = 0.016$), as well as an indirect effect through emotional attachment that is also significant ($\beta = 0.439$; $p < 0.001$). These findings indicate that AI driven personalization affects user retention both directly and through emotional attachment, so emotional attachment acts as a partial mediator in the relationship between AI driven personalization and Spotify user retention.

Test Model Fit

The *Model Fit* test is used to assess how well the model is generated at matching existing data. The assessment of model suitability in this study was using the value indices from the *Standardized Residual Root Mean Square* (SRMR). The test results of the fit model are as follows:

Table 11. Model Fit Test Results

	Saturated Model	Estimated Model
SRMR	0.095	0.095

Source: SmartPLS3 data processing, 2025

Based on Table 11 the SRMR value of 0.095 at saturated model or estimated model which is below the threshold of 0.08 indicates that the model has a good level of compatibility.

Discussion

The Effect of AI Driven Personalization on Emotional Attachment

The results of the study show that AI driven personalization has a positive and significant effect on the emotional attachment of Spotify users. This finding is evidenced by the path coefficient value of $\beta = 0.803$ with a t-statistical value of 26.229 and a p-value of < 0.001 , which indicates that the higher the level of AI driven personalization that users feel, the stronger the emotional attachment formed to the Spotify application. The magnitude of the R-square value in the emotional attachment construct ($R^2 = 0.645$) also suggests that AI driven personalization has a strong ability to explain the variation in users' emotional attachments (Agil Anderson & Malik Mutoffar, 2024).

The Effect of AI Driven Personalization on User Retention

The results show that AI driven personalization has a positive and significant effect on Spotify user retention. This is evidenced by the path coefficient value of $\beta = 0.260$ with a t-statistical value of 2.408 and p-value = 0.016, which indicates that the improvement in the quality of AI driven personalization directly drives the tendency of users to continue using the Spotify app. These findings confirm that AI driven personalization has an important role in shaping continuous usage behavior on music streaming services (Ramadhani & Salisah, 2024).

The Effect of Emotional Attachment on User Retention

The results of the study show that emotional attachment has a positive and significant effect on Spotify user retention. This is shown by the path coefficient value of $\beta = 0.547$ with a t-statistical value of 5.463 and a p-value of < 0.001 , which indicates that the stronger the user's emotional attachment to Spotify, the higher their tendency to continue using the app. These findings confirm that affective factors have an important role in driving continuous usage behavior on music streaming services (Zhang et al., 2025).

The Effect of AI Driven Personalization on User Retention through Emotional Attachment

The results show that AI driven personalization has a positive and significant effect on user retention through emotional attachment. This is evidenced by an indirect influence value of $\beta = 0.439$ with a t-statistical value of 5.271 and a p-value of < 0.001 , which indicates that emotional attachment plays an important role in explaining the relationship between AI driven personalization and Spotify user retention. These findings suggest that AI driven personalization not only affects retention directly, but also indirectly through the formation of users' emotional attachment to the platform.

Furthermore, the test results showed that the direct effect of AI driven personalization on user retention remained significant ($\beta = 0.260$; $p = 0.016$) even though emotional attachment was included in the model. This condition indicates that emotional attachment acts as a partial mediator, where AI driven personalization affects user retention both through direct and affective channels. These findings confirm that the technical aspects of personalization and the emotional aspects work simultaneously in driving sustainable use behavior (Albérico & Joaquim A, 2023; Eboseremen et al., 2022; Panya et al., 2025; Widjaja, 2023).

4. CONCLUSION

The results of this study support the application of the *Stimulus–Organism–Response* (S-O-R) model in the context of AI-based digital services, especially on music streaming platforms. AI personalization as a stimulus is able to influence the affective state of users and encourage behavioral responses in the form of user retention, thus reinforcing the importance of integration between technology and emotional aspects in managing long-term user relationships.

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