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Millennials Intention to Use Health Smartwatches: Influence of Usefulness, Ease, Social Factors, and Awareness

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ABSTRACT

Purpose – This study aims to identify the factors influencing the intention to use health-based smartwatches among millennials in the Jabodetabek area. The main focus is on the effects of perceived usefulness, perceived ease of use, and social influence, with sustainable health awareness as a mediating variable.
Methodology/approach – This research employs a quantitative approach using an online survey distributed via Google Form to millennials who use health-based smartwatches in Indonesia, especially the Jabodetabek region. The data were analyzed using SmartPLS software version 4.1.1.2 to test the research model and hypotheses.
Findings – The results show that perceived usefulness and sustainable health awareness have a significant influence on the intention to use health-based smartwatches. Furthermore, perceived usefulness, perceived ease of use, and social influence positively affect sustainable health awareness. Sustainable health awareness also serves as a partial mediator in the relationship between perceived usefulness and the intention to use health-based smartwatches.
Novelty/value – This study contributes to the development of the Technology Acceptance Model (TAM) by incorporating sustainable health awareness as a mediating variable. The findings also offer practical insights for developers and marketers of wearable technology to enhance user adoption among millennials through beneficial, easy-to-use technology supported by positive social influence.

INTRODUCTION

The lifestyle of Indonesia's millennial generation is currently considered unhealthy due to poor dietary habits, excessive stress, lack of physical activity, and a sedentary way of life. The 2018 Basic Health Research (Riskesdas) data show that the productive age group, including millennials, is increasingly vulnerable to chronic diseases such as hypertension, diabetes mellitus, and cardiovascular disorders. Rosmiati et al. (2023) stated that the consumption of high-calorie, low-fiber fast food contributes to obesity and other chronic illnesses. A study by Burhan et al. (2023) highlighted the growing habit of prolonged sitting as a trigger for metabolic disorders. Ridwani (2024) pointed out that high workloads and social pressure also increase stress levels and internal disorders among urban working millennials. The COVID-19 pandemic further worsened this situation due to limited access to

direct healthcare services and a growing need for self-monitoring of health. One increasingly popular solution is the use of health-based smartwatches, which offer features such as heart rate monitoring, stress management, sleep tracking, and even early symptom detection. However, despite the growing number of smartwatch users, not all of them are oriented toward usage based on perceived benefits and sustainable health awareness.

This study aims to analyze the influence of perceived usefulness, perceived ease of use, and social influence on the intention to use health-based smartwatches among millennials, with sustainable health awareness as a mediating variable. Several previous studies (Al-Maroof et al., 2021; Chuah et al., 2016; Siepmann & Kowalczuk, 2021) have shown that perceived usefulness and perceived ease of use have a positive and significant effect on behavioral intention in adopting technology. However, other studies have found non-significant results (Bölen, 2019; Gupta et al., 2020; Cheung et al., 2020), particularly in the context of wearable technology. Based on a preliminary survey of 30 smartwatch users in the Greater Jakarta area, the majority of respondents stated that they considered health benefits and ease of use when choosing a health-based smartwatch and were also influenced by their social environment, such as communities and social media. Therefore, this study offers empirical and contextual contributions by analyzing how technological perceptions and social factors can drive the intention to use smartwatches through the enhancement of sustainable health awareness, particularly among millennials in the Jabodetabek area.

This study is based on the Technology Acceptance Model (TAM) developed by Davis (1989), which emphasizes perceived usefulness and perceived ease of use as two key components. TAM has been widely applied in various studies to explain technology adoption behavior, including the adoption of wearable technology. In this study, the TAM model is extended by incorporating sustainable health awareness as a mediating variable, considering the growing importance of personal health consciousness in the use of digital technologies (Siepmann & Kowalczuk, 2021). In addition, this research adopts elements from the Theory of Planned Behavior (Ajzen, 1991) by including social influence as a social factor that may affect behavioral intention. Social influence reflects pressure or support from the social environment, such as peers, family, or communities. The integration of TAM and these social aspects is expected to provide a more comprehensive understanding of the factors influencing the sustainable adoption of health-based smartwatches.

LITERATURE REVIEW

Perceived Usefulness (PU)

Perceived usefulness (PU) reflects the degree to which individuals believe that smartwatches provide health benefits and improve lifestyle efficiency (Davis, 1989; Cheung et al., 2020). Prior studies show PU significantly drives technology adoption because users perceive wearable devices as valuable for monitoring health and fitness (Siepmann & Kowalczuk, 2021; Misra et al., 2023). In health-based contexts, PU enhances behavioral intention by linking perceived benefits with health management goals.

H1: Perceived usefulness has a positive effect on the intention to use health-based smartwatches.
H4: Perceived usefulness has a positive effect on sustainable health awareness.

Perceived Ease of Use (PEOU)

Perceived ease of use (PEOU) refers to the extent to which users find a system effortless to learn and operate (Davis, 1989). In the smartwatch context, ease of use reduces cognitive barriers and increases satisfaction, thereby fostering adoption intention (Al-Maroof et al., 2021; Hokroh et al., 2020). PEOU also indirectly enhances sustainable health awareness by making health monitoring features more accessible and usable.

H2: Perceived ease of use has a positive effect on the intention to use health-based smartwatches.
H5: Perceived ease of use has a positive effect on sustainable health awareness.

Social Influence (SI)

Social influence (SI) describes the effect of peers, family, and communities on an individual's adoption of new technologies (Venkatesh et al., 2003; Niknejad et al., 2020). Millennials, who are highly responsive to digital communities, are more likely to use health-based smartwatches when encouraged by social norms and peer recommendations (Gupta et al., 2020; Hewitt et al., 2022). SI also fosters sustainable health awareness through community engagement and social comparison.

H3: Social influence has a positive effect on the intention to use health-based smartwatches.
H6: Social influence has a positive effect on sustainable health awareness.

Sustainable Health Awareness (SHA)

Sustainable health awareness (SHA) refers to individuals' conscious recognition of maintaining long-term health through sustainable practices (Ferguson et al., 2022; Au et al., 2024). SHA directly enhances behavioral intention by encouraging consistent smartwatch use as part of a healthy lifestyle. Moreover, SHA mediates the influence of PU, PEOU, and SI on intention, serving as the mechanism that translates technology perceptions into sustainable behaviors.

H7: Sustainable health awareness has a positive effect on the intention to use health-based smartwatches.
H8: Sustainable health awareness mediates the relationship between perceived usefulness and behavioral intention.
H9: Sustainable health awareness mediates the relationship between perceived ease of use and behavioral intention.
H10: Sustainable health awareness mediates the relationship between social influence and behavioral intention

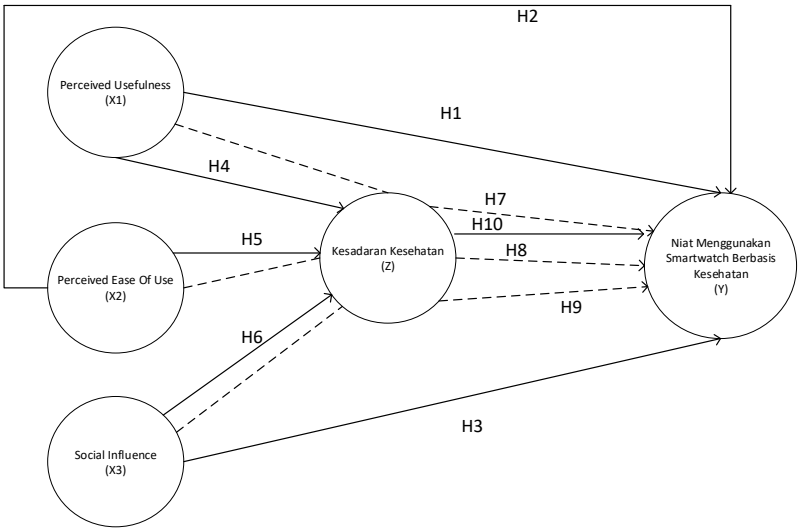

Figure 1. Conceptual Framework

METHOD

This study used a quantitative approach and a causal research design to look at how perceived usefulness, perceived ease of use, and social influence affect the intention to use health-based smartwatches, with sustainable health awareness as a mediating variable. We used Google Form for online survey to millennials (those born between 1981 and 1996) who live in the Jabodetabek who actively use smartwatches in their daily activities. There were 154 people that took part in the study.

The five primary variables were measured on a Likert scale from 1 to 5, where 1 meant strongly disagree and 5 meant strongly agree. There were five main variables in the questionnaire, namely perceived usefulness, perceived ease of use, social influence, sustainable health awareness, and behavioral intention. We used theories and prior research to turn each variable into numerous indications. We used SmartPLS version 4.1.1.2 to look at the data. The analytical procedure involved

looking at the outer model, the inner model, and the direct and mediating hypothesis tests to see how the constructs in the proposed research model were related to each other.

RESULT AND DISCUSSION

154 young people from the Jabodetabek region participated in this study, with the majority coming from Jakarta (51percent), Depok (16 percent), Bekasi (14 percent), Bogor (11 percent), and Tangerang (8 percent). The majority of respondents (63 percent) the ages of 35-44 years old, while 37 percent were the ages of 29-35 years old. Based on gender, 48 percent of respondents are women, while 52 percent are men. According to the educational, the majority of respondents were Banchelor Degree (62 percent), Master Degree S2 (16 percent), and the rest had a Diploma Three (equivalent to an Associate Degree) and senior high school education. According to the income per month category, approximately 18 percent of respondents had a monthly income of more than Rp 25 Mn, 21 percent had an income between Rp 15 Mn – Rp 25 Mn, and 23 percent had an income between Rp 10 Mn – Rp 15 Mn, with the majority falling below Rp 10 Mn. Every respondent is an active user of smartwatch based on health that is used in daily activities.

Convergent Validity

Based on the results of data processing using SmartPLS 4.1.1.2, the outer model results are as follows:

Table 1. Outer Model Evaluation

Construct/ Indicators	Item	Loading Factor	Cronbach's Alpha	CR	AVE
Perceived Usefulness (X1)			0.952	0.960	0.750
Increase productivity	PU1	0.890			
Useful for organize	PU2	0.887			
Health monitoring	PU3	0.891			
Fitness Tracking	PU4	0.895			
Enhance Uniqueness	PU5	0.835			
Reflect personality	PU6	0.749			
Battery Life	PU7	0.903			
Damage protection	PU8	0.868			
Perceived Ease Of Use (X2)			0.957	0.965	0.823
Attractive design and comfortable to use	PE1	0.912			
Easy of navigation and interaction with the device	PE2	0.895			
Ease of finding features and information	PE3	0.920			
Responsive and user-friendly interaction	PE4	0.916			
The presentation of health information is easy to understand	PE5	0.911			
The information displayed is real-time	PE6	0.889			
Social Influence (X3)			0.947	0.957	0.790

Social support from family or friends	SI1	0.903			
Recommendations from trusted people	SI2	0.893			
The influence of social groups using similar devices	SI3	0.900			
There is a desire to join a certain community, for example a running community	SI4	0.881			
Information received from the community	SI5	0.889			
Receive advice from influential people in a community	SI6	0.866			
Intention to use health-based smartwatches (N)			0.875	0.941	0.888
Continuity in the use of smartwatches in the future	N1	0.947			
Recommended use	N2	0.938			
Sustainable Health Awareness (Z)			0.952	0.961	0.805
Number of daily steps	Z1	0.918			
Duration of physical exercise	Z2	0.891			
Changes in heart rate during physical activity	Z3	0.900			
Rata-rata detak jantung dalam keadaan normal	Z4	0.890			
Duration of sleep each night	Z5	0.906			
Sleep quality and sleep patterns (do you often sleep late or do you often wake up at night)	Z6	0.878			

Source : Results Using SmartPLS (2025)

The findings of validity and reliability testing for the study's five primary constructs, namely Perceived Usefulness (X1), Perceived Ease of Use (X2), Social Influence (X3), Intention to Use (N), and Sustainable Health Awareness (Z) are shown in the table 1. The loading factor values of all indicators are more than 0.7, suggesting that each item accurately reflects the corresponding construct. Excellent internal consistency is demonstrated by the Composite Reliability (CR) and Cronbach's Alpha scores, which are both over 0.7. Strong convergent validity is also confirmed by the fact that all constructs have AVE (Average Variance Extracted) values greater than 0. 5. The fact that Perceived Ease of Use has the highest AVE indicates that the concept is well represented by its indicators. There are only two indicators in the Intention to Use construct, however they both show excellent measurement capabilities. All things considered, these findings validate the validity and reliability of the research tool, allowing for additional investigation.

Table 1 shows the results of validity and reliability testing for the study's five main constructs: Perceived Usefulness (X1), Perceived Ease of Use (X2), Social Influence (X3), Intention to Use (N), and Sustainable Health Awareness (Z). All of the loading factor values are more than 0.7, which means that each item accurately reflects the construct it is supposed to. The Composite Reliability (CR) and Cronbach's Alpha ratings, which are both above 0.7, show that the internal consistency is quite good. All constructs had AVE (Average Variance Extracted) values more than 0.5, which is another sign of strong convergent validity. The fact that Perceived Ease of Use has the highest AVE means that its indicators do a good job of representing the idea. The Intention to Use construct only has two indicators,

but both of them are quite good at measuring. In the end, these results show that the research tool is legitimate and reliable, which means that more study may be done.

Discriminat Validity
Using HTMT with the following results:

Table 2. Discriminant Validity

	Sustainable Health Awareness (Z)	Intention to use health-based smartwatches (N)	Perceived Ease Of Use (X2)	Perceived Usefulness (X1)	Social Influence (X3)
Sustainable Health Awareness					
Intention to use health-based smartwatches (N)	0.737				
Perceived Ease Of Use (X2)	0.678	0.584			
Perceived Usefulness	0.839	0.715	0.676		
Social Influence	0.686	0.573	0.599	0.713	

Source : Results Using SmartPLS (2025)

The expected value for the HTMT test is < 0.85. From Table 2 above, the HTMT values are < 0.85, ranging from 0.573 to 0.839. These values indicate that all construct pairs in the model have good discriminant validity. This demonstrates that constructs are empirically distinct and do not overlap conceptually. For example, the highest HTMT value (PU–SHA = 0.839) remains acceptable, indicating related but distinct constructs. This supports discriminant validity, consistent with Henseler et al. (2015). Thus, the constructs are unique and reliable for hypothesis testing.

Coefficient of Determination (R^2) Test
Coefficient of Determination (R^2) Test to determine how well exogenous factors can explain endogenous variables as shown in table 3 below:

Table 3. Coefficient of Determination (R^2) Test

	R-square	R-square adjusted
Sustainable Health Awareness (Z)	0.682	0.676
Intention to use health-based smartwatches (N)	0.498	0.485

Source : Results Using SmartPLS (2025)

Based on table 3 above, the coefficient of determination (R^2) for sustainable health awareness is 0.682, indicating that the exogenous variables are able to explain 68.2% of this construct, while the remaining variance is attributed to other factors not included in the research model. Likewise, the R^2 value for the intention to use a smartwatch is 0.498, showing that 49.8% of this construct can be explained by the predictors in the model, while the rest is influenced by external factors. These results suggest that Perceived Usefulness, Perceived Ease of Use, and Social Influence together have substantial explanatory power for Sustainable Health Awareness and moderate explanatory power for Intention to Use. In line with Chin (1998), these values highlight that the predictors play an important role in shaping awareness, which in turn moderately predicts smartwatch adoption intention among millennials.

F-Squared Test (f^2)

The F-Squared Test (f^2) to understand the significant effects of one eksogen variable on endogenous variables in research as shown in table 4 below:

Table 4. F-Squared Test (f^2)

	Sustainable Health Awareness (Z)	Intention to use health-based smartwatches (N)	Perceived Ease Of Use (X2)	Perceived Usefulness (X1)	Social Influence (X3)
Sustainable Health Awareness (Z)		0.085			
Intention to use health-based smartwatches (N)					
Perceived Ease Of Use (X2)	0.061	0.010			
Perceived Usefulness (X1)	0.453	0.044			

Social Influence (X3)	0.042	0.002

Source : Results Using SmartPLS (2025)

Effect sizes or F-Squared Test (f^2) in Table 4 reveal that *PU → SHA* has a large effect (0.453), making it the strongest driver of health awareness. SHA → N (0.085), PEOU → SHA (0.061), and SI → SHA (0.042) show medium effects, meaning they meaningfully contribute to health awareness and intention. In contrast, PEOU → N (0.010) and SI → N (0.002) exhibit small effects, reinforcing their non-significance in intention. These results highlight that usefulness dominates, consistent with previous technology adoption studies.

Q-Squared Test (Q^2)

The Q-Squared Test (Q^2) to measure how well the structural model is able to predict the indicators of endogenous variables as shown in table 5 below:

Table 5. Q-Squared Test (Q^2)

	Q^2predict	RMSE	MAE
Intention to use health-based smartwatches (N)	0.425	0.769	0.477
Sustainable Health Awareness (Z)	0.656	0.594	0.354

Source : Results Using SmartPLS (2025)

The predictive relevance values are $Q^2 = 0.425$ for Intention to Use and $Q^2 = 0.656$ for Sustainable Health Awareness, both above zero. This indicates that the model has strong predictive relevance, with higher predictive power for SHA. Hair et al. (2021) state that positive Q^2 values confirm that the model is capable of predicting observed data, supporting the robustness of the model in this study.

Hypotesis Testing Result

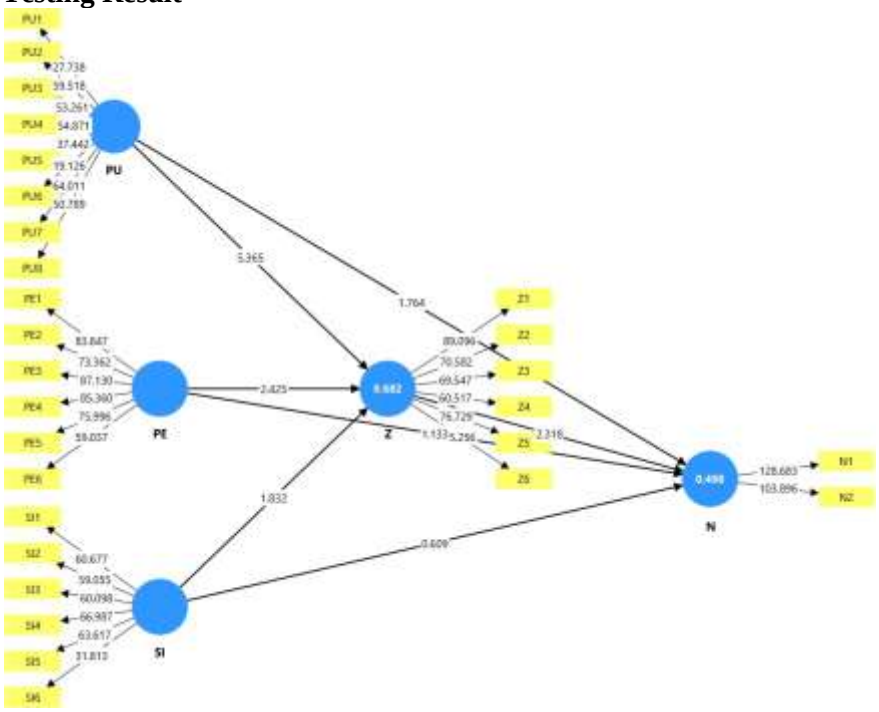

Figure 2. Hypotesis Testing Result

Table 6. Hyphotesis Testing Result

Relationship	Original sample (β)	T statistics (|O/STDEV|)	P values	Hyphotesis	Conclusion	Result
Perceived Usefulness -> Intention to use health-based smartwatches	0.268	1,764	0.039	H1	Positive-Significant	Accepted
Perceived Ease Of Use -> Intention to use health-based smartwatches	0.098	1,133	0.129	H2	Positive-Insignificant	Rejected
Social Influence -> Intention to use health-based smartwatches	0.046	0.609	0.271	H3	Positive-Insignificant	Rejected
Perceived Usefulness -> Sustainable Health Awareness	0.569	5,365	0.000	H4	Positive-Significant	Accepted
Perceived Ease Of Use -> Sustainable Health Awareness	0.188	2,425	0.008	H5	Positive-Significant	Accepted

Social Influence -> Sustainable Health Awareness	0.161	1,832	0.034	H6	Positive-Significant	Accepted
Sustainable Health Awareness -> Intention to use health-based smartwatches	0.367	2,318	0.01	H10	Positive-Significant	Accepted
Perceived Usefulness -> Sustainable Health Awareness -> Intention to use health-based smartwatches	0.209	2,099	0.018	H7	Positive-Significant	Accepted
Perceived Ease Of Use -> Sustainable Health Awareness -> Intention to use health-based smartwatches	0.069	1,628	0.052	H8	Positive-Insignificant	Rejected
Social Influence -> Sustainable Health Awareness -> Intention to use health-based smartwatches	0.059	1,444	0.074	H9	Positive-Insignificant	Rejected

According to Table 6, Hypothesis H1 is supported, as Perceived Usefulness significantly influences Intention to Use (β = 0.268; p = 0.039). This suggests that greater perceived usefulness leads to stronger adoption intention. The finding supports the *Technology Acceptance Model* (Davis, 1989) and Chuah et al. (2016), who demonstrated that usefulness is a key determinant of smartwatch adoption.

Table 6 shows that Hypothesis H2 is not supported, since Perceived Ease of Use is not significant for Intention to Use (β = 0.098; p = 0.129). This indicates that ease of use is considered a baseline expectation among millennials, making usefulness more influential. This aligns with Bölen (2020) and Cheung et al. (2020), who found that PEOU is a weaker determinant compared to usefulness in wearable adoption.

For Table 6, Hypothesis H3 is not supported, as Social Influence does not significantly affect Intention to Use (β = 0.046; p = 0.271). Despite the *Theory of Planned Behavior* (Ajzen, 1991) highlighting subjective norms, adoption here is more personally motivated. Gupta et al. (2020) emphasized the importance of social influence in some contexts, but this study shows that personal benefit is stronger than external pressure.

The results of Table 6 confirm Hypothesis H4, as Perceived Usefulness strongly influences Sustainable Health Awareness (β = 0.569; p < 0.001). This means that perceiving smartwatch benefits

such as health and sleep monitoring increases long-term health awareness. This is consistent with Ferguson (2022), who highlighted the role of usefulness in building health-related awareness.

As presented in Table 6, Hypothesis H5 is supported, with Perceived Ease of Use significantly affecting Sustainable Health Awareness (β = 0.188; p = 0.008). User-friendly features promote internalization of healthy habits. Cheung et al. (2020) also confirmed that usability enhances comprehension and adoption in health technology.

According to Table 6, Hypothesis H6 is supported, as Social Influence significantly drives Sustainable Health Awareness (β = 0.161; p = 0.034). Peer and community support can strengthen awareness, though not necessarily intention. Gupta et al. (2020) similarly found that social interactions enhance health consciousness.

Mediation results in Table 6 support Hypothesis H7, as SHA partially mediates PU's effect on intention (β = 0.209; p = 0.018). This indicates that PU influences intention both directly and indirectly through health awareness. The result is consistent with Davis (1989) and Ferguson (2022), who stressed the joint effect of usefulness and awareness.

Table 6 shows that Hypothesis H8 is not supported, since SHA does not significantly mediate PEOU's effect on intention (β = 0.069; p = 0.052). While PEOU enhances awareness (H5), its influence is not strong enough to drive intention via mediation. This aligns with Bölen (2020), who found that PEOU is not a major predictor in familiar technology contexts.

The mediation analysis in Table 6 indicates Hypothesis H9 is not supported, as SHA does not significantly mediate SI's effect on intention (β = 0.059; p = 0.074). While social influence raises awareness (H6), it is insufficient to transform into intention without strong perceived usefulness. This reflects Ajzen's (1991) TPB but highlights the primacy of personal benefits.

Finally, Table 6 supports Hypothesis H10, as Sustainable Health Awareness significantly affects Intention to Use (β = 0.367; p = 0.010). The more health-conscious users are, the stronger their intention to adopt smartwatches. This finding aligns with Ferguson (2022) and Au (2024), who identified health awareness as a critical factor in health technology adoption.

CONCLUSION

Based on the analysis results, several important findings were identified regarding the factors influencing the use of health-based smartwatches among millennials. Perceived usefulness has a significant effect on the intention to use smartwatches and on sustainable health awareness. The higher the perceived benefits, the stronger the intention to use and the awareness to maintain long-term health. Perceived ease of use does not significantly affect intention, as technological ease is considered normal by millennials. However, it still positively influences sustainable health awareness. Social influence does not significantly affect intention but does contribute to increased health awareness. Sustainable health awareness significantly mediates the relationship between perceived usefulness and the intention to use smartwatches, but it does not mediate the effects of perceived ease of use or social influence. This awareness also directly influences the intention to use smartwatches, as individuals who are conscious of their health tend to use smartwatch features as tools to regularly monitor their physical condition and support a healthier lifestyle.

Based on the conclusions that have been outlined, the recommendation for future research is as follows Future research is recommended to include variables such as hedonic motivation and brand trust, and to expand the target respondents to Generation Z, Generation X, and sports communities. The research area should also cover regions beyond Jabodetabek, such as Batam, West Java, Yogyakarta, and others, to obtain more generalizable results.

Suggestions for the Company

Companies should focus on smartwatch features that provide real health benefits, such as heart rate monitoring, daily step tracking, and active movement notifications. Integration with digital health apps, ergonomic design, and a variety of models are also important. Marketing efforts should involve influencers, health communities, and educational content on social media. Build a digital community and offer rewards and referral codes to increase user engagement and intention to use.

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