Intention to Use the Wearable Technology and Factors Influencing the Adoption

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Abstract:
Wearable devices have been a fad in recent times. They are used to keep a track on health and fitness. Wide application of the device is seen ranging from patient health tracking to sports person's schedule. Technology acceptance model has been used to assess the relationship and the effect of independent variables perceived usefulness, perceived ease of use and attitude towards use on the dependent variable intention to use. Correlation and regression analysis was conducted for the analysis of the data to achieve the predefined objectives. It was found out that the consumers tend to use the product if they find the technology useful to them. Ease of use of the technology had an effect on the intention to use the technology.
Keywords: Wearable devices, TAM, intention to use, behavior, usefulness

INTRODUCTION

Latest advancements in technology have enticed the consumers to use them to keep a check on their health and fitness. This monitoring is possible now on any device anytime. Among the technologies to track the health and fitness is an activity tracker. This device can be worn by the user and go on doing day-to-day activities. Tracking would include the collection of data to monitor the fitness. In 2019, the wearable technology market across the globe was valued at USD 32.63 billion (Research, 2020) and is expected to expand with 20.1% compound annual growth rate (CAGR) from 2019 to 2025 (Market Data Forecast, 2020) as products like activity trackers, smart watches, and smart clothing have seen a largely successful among the consumers.

Obesity and chronic diseases been major reasons for the acceptance of wearable technology such as body monitors and activity trackers. There devices provide information about the overall health of the person who wears them. Calorie intake, cholesterol levels, pulse rate, oxygen level, sleeping pattern and the quality of sleep, blood pressure are some of the information one can access using these wearable devices (Wu & Luo, 2019).

Research regard the wearable fitness trackers (WFT) is still in its nascent stage and largely focuses on data collection and its reliability(Drehlich et al., 2020; Lunney et al., 2016; Shih et al., 2015, 2015). Hence, this study concentrates on what influences that users to have the intention to use the wearable fitness trackers. To have an insight of what influenced the current users of WFTs, Technology Acceptance Model is tested. Further, the research examines the difference in perception of intention to use WFT among various users depending on various demographic factors.

LITERATURE REVIEW

Adoption of fitness trackers -Various studies have been conducted to access the adoption of the fitness trackers. A study done on students examined that the students find ICT more useful and easy to use in comparison with course work and other leisure activities. It was seen that large section of students was using ICT as a result of perceived usefulness of the technology (Edmunds et al., 2012). The motivation to adopt the wearable fitness trackers are price, personal innovativeness, interactivity, and the control the device provides. The perceived usefulness had a major role to play while deciding both user attitude and the intention to use. It was seen that interactivity, and the control the device provides had higher effect in adoption of the device in comparison with the other two mentioned. The cost did not have significant influence on usage intention of the device (Park et al., 2016). Young students told that activity tracker was helpful as it inspired them to be active and gave feedback regarding their physical activity levels. However, they found it little challenging to use the device which influenced their perceived ease of use. It is found that a wearable activity tracker has the potential to impact adolescents' physical activity levels. The study further identifies that the efforts needed to use the technology, and the issues related to concerning risks, compatibility would have influenced the engagement and the technology acceptance (Drehlich et al., 2020).

Usage pattern changes from person to person depending on the motivating factor. It was identified that the individuals in this study wanted regular notifications and feedback information about the fitness. The aesthetic design of the device had an influence in using the device. The device has to be ergonomically designed as the consumers would be wearing them for very long period. Data accuracy was an influencing factor to wear and use the fitness activity tracker. A gender difference was seen in this study with respective the use and adoption of fitness trackers. Aesthetics was given more importance by the female participants of the study. It mattered to them how the device looked like and they were not ready to wear a bulky and unattractive device. Sharing the data on social media also was a major influencer to adopt the technology. Individuals prefer to share their activities on the social media, however, this study showed that participants wanted to know more about their practices rather than just sharing and matching the information about the people they knew (Shih et al., 2015)

Not just the internal motivation, an external motivation and a regular monitoring in some cases would help the adoption of the technology. The study was conducted on elderly residents from four different nursing homes. Physical activity (PA) behaviour was analysed in this study. It was found out that the application of activity tracker was well suitable to examine and enhance the PA behaviour over a longer period of time. The institutional framework would have been a conducive environment for the study as a continuous support of the nursing staff was necessary to conduct the study. As a result of moderate usage, customized devices like wristbands could be considered. The study further puts light on low physical activity level and the potential application of activity trackers for the nursing home residents and suggests that such devices should be put in use extensively in the area of nursing home residents (Auerswald et al., 2020). A study was conducted to examine the influence on trust a consumer has over the technology. This study was undertaken to assess the influence of trustworthiness on technology acceptance. Here, the study was done for two indicators, and they are count of steps walked by the respondents and the calories they burned while working out. Overall, it was determined that trustworthiness has a large correlation with technology acceptance (Trommler et al., 2018).

Consumers prefer some fun associated with the device. The study found out that the usefulness of the activity trackers is highly correlated with the fun part attached with it while using it. It also has strong correlation with gamification. It could be evaluated from the study that higher perceived ease of use the service, higher fun it would be use the device as well would tell others about the effect of the device. A Positive change is observed in the behaviour due to the activity tracker and this changes influences them to tell about this device to family and friends. These activity trackers help the consumers who didn't have a regular schedule to keep themselves fit. Gamification is an effective factor to keep the device user motivated to use the device on regular basis (Ilhan& Henkel, 2018).

Technological Acceptance Model (TAM)

Technological Acceptance Model (Davis, 1989) has been one of the most recognized model to check the technology adoption among the users, with two principal determinants perceived ease of use and perceived usefulness influencing a person's intention to use a novel technology. Elderly persons who would find the technology not really easy to use would not accept the technology but if motivated by others and kept a check on it for a regular basis, that would be adopted(Auerswald et al., 2020).

 Research conducted by Farivar et. at., (2020) found that by enhancing the perception of usefulness of the technology and highlighting the importance of the technology, there is a larger scope of the technology getting accepted by the consumers (Canhoto& Arp, 2017). Similarly, Suki and Suki (2011) found out a positive correlation between behavioural intention to adopt the technology and perceived usefulness of the same.

This research believes that users would have a positive attitude towards the wearable fitness trackers which eventually influence WFT use,

Thus we hypothesize:

H1a. Perceived usefulness of wearable fitness tracker will be related to intention to use the wearable fitness tracker.

H1b. Perceived usefulness of wearable fitness tracker will be related to attitude towards wearable fitness tracker.

Perceived ease of use

The second factor which is part of TAM is perceived ese of use. As defined by Davis (1989) perceived ease of use is the degree to which a person believes that using a particular system would be free of efforts. Here the 'ease' was referred to the freedom from great struggle of difficulty. In this research perceived ease of use is how effortless it is to use the wearable fitness tracker by the users. If the technology is not easy to use, the intention for having that technology doesn't matter much (Morgan, 2012). Various research have found that perceived ease of use influences the intention to use (Canhoto& Arp, 2017; Hamid et al., 2016; Pobiruchin et al., 2017; Reyes-Mercado, 2018; Suki & Suki, 2011; Wu & Luo, 2019). Along with intention to use, ease of use influence the attitude towards the technology (Davis, 1989). This upkeeps with research telling a positive relation between perceived ease of use and attitude (Auerswald et al., 2020; Edmunds et al., 2012; Gao et al., 2015).
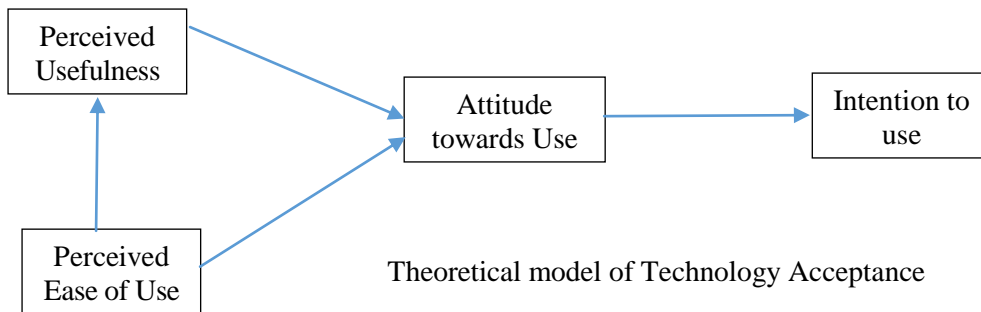
Thus we hypothesize

H2a. Perceived ease of use of wearable fitness tracker will be related to intention to use the wearable fitness

tracker.

H2b. Perceived ease of use of wearable fitness tracker will be related to attitude towards wearable fitness tracker.

Similarly, in this case, we prepare a conceptual model based in TAM

Theoretical model of Technology Acceptance

The objective of this model is to investigate if the independent variables Perceived Usefulness, Perceived Ease of Use, and Attitude Towards Use, have statistically significant relationship with Intention to Use. Further, it will be examined to see which independent variable has higher influence on the intention to use

RESEARCH METHODOLOGY

This research is an empirical study. Primary data is collected for the data analysis. The researcher used random sampling technique to collect the data. The questionnaire was sent to 400 samples. However, 240 respondents replied. Among them, 21 samples did have complete data, hence 219 was the data used for analysis. 54.7% was the response rate of the data collection. To assess the relationships within the independent variables and between independent variables and dependent variables, Pearson correlation is used. To investigate the influence of each independent variable on the dependent variable, linear regression analysis is conducted. The device users were to rate about their perception regarding the device. Their perception and attitude towards the device was captured using a 5 point Likert scale which ranged from Strongly agree to Strongly disagree. These were used further to measure the perception about usefulness, ease of use, attitude towards the use of the device and the intention to use the device.

ANALYSIS AND INTERPRETATION

To examine the relationship between the variables the correlation is conducted.

Correlations

		PU	PEU	IU	ATU
PU	Pearson Correlation	1	.548**	.506**	.625**
	Sig. (2-tailed)		.000	.000	.000
	N	219	219	219	219
PEU	Pearson Correlation	.548**	1	.621**	.531**
	Sig. (2-tailed)	.000		.000	.000
	N	219	219	219	219
IU	Pearson Correlation	.506**	.621**	1	.441**
	Sig. (2-tailed)	.000	.000		.000
	N	219	219	219	219
ATU	Pearson Correlation	.625**	.531**	.441**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	219	219	219	219

**. Correlation is significant at the 0.01 level (2-tailed).

It can be seen from the table above that the perceived usefulness has moderate positive correlation with bothvariables intention to use (0.506) and attitude towards usage of the device (0.625). Further it can be seen that the Perceive ease of use has moderate positive correlation with intention to use (0.612)as well as with attitude towards usage (0.531) of the device.There exists a positive moderate correlation between Perceive ease of us and perceived usefulness. The p value in all the cases has been less than 0.000.

To assess the influence of each independent variable on intention to use linear regression analysis is conducted.

Co-efficient

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.278	.239		5.355	.000
	PU	.552	.656	.510	3.003	.000
	PEU	.657	.554	.675	7.365	.000
	ATU	.357	.469	.357	4.831	.007

a. Dependent Variable: IU

This table contains the coefficients for the regression equation and tests of significance. The 'B' column in the co-efficient table, gives the values of the gradient and intercept terms for the regression line.

In the above chart only one independent value has less than 0.05 which means that only perceived ease of use variable is the predictor of dependent variable intension to use.

The model is:

Intension To Use (y) = 0.656 (Perceived Usefulness) + 0.554 (Perceived Ease of Use)
+ 0.469 (Attitude Towards Use)

From this we can infer that Perceived ease of use independent variable has a high influence on Intension to use. Attitude towards using has the second highest influence on intension to use and perceived usefulness have no influence on intension to use activitytracker.

As the perceived usefulnessincreases by a value on 1 unit, a 0.552 unitincrease will be seen in the Intention To Use. As the Perceived Ease of Use increases by 1 unit, 0.657 unit increases in the Intention ToUse and for every 1 unit increase in Attitude Towards Use, a 0.357 unit increase in Intention To Use isseen.

It can be seen that all the independent variables i.e., Perceived Usefulness, Perceived Ease of Use, and Attitude Towards Use, have statistically significant relationship with Intention to Use the p value of all the relationships are less than 0.05.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.653[a]	.426	.418	.48025

a. Predictors: (Constant), ATU, PEU, PU
b. Dependent Variable: IU

From the table above, R^2 value is 0.426. This shows that 42.6% of the variation in dependent variable is explained by the independent variables. 42.6% of the variation in intention to use activity tracker can beexplained by themodel containing theindependent variables are Perceived Usefulness, Perceived Ease of Use and Attitude Towards Using the device. These predictions from the regression equation are objectively reliable. It also means that the remaining 57.4% of the variation is still unexplained so adding otherindependent variables could improve the fit of themodel.

CONCLUSION

The research result shows that the Technology Acceptance Model holds good in the case of wearable devices. All the independent variables perceived usefulness, perceived ease of use and attitude towards using have a positive influence on the intention to use. Among all the 3 independent variables, perceived ease of use had the highest influence on intention to use followed by the perceived usefulness of the device. The least influencing factor was attitude towards using the technology under study. The manufacturers of these wearable devices should look at comfort the users would have while using the device. Firms should also work towards building the confidence of the consumers to identify the usefulness of the wearable devices.

REFERENCE

Auerswald, T., Meyer, J., von Holdt, K., &Voelcker-Rehage, C. (2020). Application of Activity Trackers among Nursing Home Residents—A Pilot and Feasibility Study on Physical Activity Behavior, Usage Behavior, Acceptance, Usability and Motivational Impact. International Journal of Environmental Research and Public Health, 17(18), 6683. https://doi.org/10.3390/ijerph17186683

Canhoto, A. I., & Arp, S. (2017). Exploring the factors that support adoption and sustained use of health and fitness wearables. Journal of Marketing Management, 33(1–2), 32–60.

https://doi.org/10.1080/0267257X.2016.1234505

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. MIS Quarterly, 13(3), 319–340. JSTOR. https://doi.org/10.2307/249008

Drehlich, M., Naraine, M., Rowe, K., Lai, S. K., Salmon, J., Brown, H., Koorts, H., Macfarlane, S., &Ridgers, N. D. (2020). Using the Technology Acceptance Model to Explore Adolescents' Perspectives on Combining Technologies for Physical Activity Promotion Within an Intervention: Usability Study. Journal of Medical Internet Research, 22(3), e15552. https://doi.org/10.2196/15552

Edmunds, R., Thorpe, M., &Conole, G. (2012). Student attitudes towards and use of ICT in course study, work and social activity: A technology acceptance model approach. British Journal of Educational Technology, 43(1), 71–84. https://doi.org/10.1111/j.1467-8535.2010.01142.x

Farivar, S., Abouzahra, M., &Ghasemaghaei, M. (2020). Wearable device adoption among older adults: A mixed-methods study. International Journal of Information Management, 55, 102209. https://doi.org/10.1016/j.ijinfomgt.2020.102209

Gao, Y., Li, H., & Luo, Y. (2015). An empirical study of wearable technology acceptance in healthcare. Industrial Management & Data Systems, 115(9), 1704–1723. https://doi.org/10.1108/IMDS-03-2015-0087

Hamid, A. Abd., Razak, F. Z. A., Bakar, A. A., & Abdullah, W. S. W. (2016). The Effects of Perceived Usefulness and Perceived Ease of Use on Continuance Intention to Use E-Government. Procedia Economics and Finance, 35, 644–649. https://doi.org/10.1016/S2212-5671(16)00079-4

Ilhan, A., & Henkel, M. (2018, January 3). 10,000 Steps a Day for Health? User-based Evaluation of Wearable Activity Trackers. https://doi.org/10.24251/HICSS.2018.428

Lunney, A., Cunningham, N. R., &Eastin, M. S. (2016). Wearable fitness technology: A structural investigation into acceptance and perceived fitness outcomes. Computers in Human Behavior, 65, 114–120. https://doi.org/10.1016/j.chb.2016.08.007

Market Data Forecast. (2020). Fitness Trackers Market Share, Size & Growth | 2019 to 2025. Market Data Forecast. http://www.marketdataforecast.com/

Morgan, L. (2012). Generation Y, learner autonomy and the potential of Web 2.0 tools for language learning and teaching. Campus-Wide Information Systems, 29, 166–176. https://doi.org/10.1108/10650741211243184

Park, E., Kim, K. J., & Kwon, S. J. (2016). Understanding the emergence of wearable devices as next-generation tools for health communication. Information Technology & People, 29(4), 717–732. https://doi.org/10.1108/ITP-04-2015-0096

Pobiruchin, M., Suleder, J., Zowalla, R., &Wiesner, M. (2017). Accuracy and Adoption of Wearable Technology Used by Active Citizens: A Marathon Event Field Study. JMIR MHealth and UHealth, 5(2), e24. https://doi.org/10.2196/mhealth.6395

Research, A. (2020). Wearable Fitness Technology Market Size, Growth, Trend and Forecast to 2022 | MarketsandMarkets. https://www.marketsandmarkets.com/Market-Reports/wearable-fitness-technology-market-139869705.html

Reyes-Mercado, P. (2018). Adoption of fitness wearables: Insights from partial least squares and qualitative comparative analysis. Journal of Systems and Information Technology, 20(1), 103–127. https://doi.org/10.1108/JSIT-04-2017-0025

Shih, P. C., Han, K., Poole, E. S., Rosson, M. B., & Carroll, J. M. (2015). Use and Adoption Challenges of

Wearable Activity Trackers. 12.

Suki, N. M., & Suki, N. M. (2011). Exploring the relationship between perceived usefulness, perceived ease of use, perceived enjoyment, attitude and subscribers' intention towards using 3g mobile services. 1, 7.

Trommler, D., Attig, C., & Franke, T. (2018). Trust in activity tracker measurement and its link to user acceptance. https://doi.org/10.18420/muc2018-mci-0361

Wu, M., & Luo, J. (2019, November 25). Wearable Technology Applications in Healthcare: A Literature Review. https://www.himss.org/resources/wearable-technology-applications-healthcare-literature-review