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Understanding the Antecedents to Smart Watch User's Continuance Intention

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ABSTRACT

The objective of this study was to determine the antecedents of continuance intention to use smart watch by integrating Technology Acceptance Model constructs with satisfaction and social influence. The data was collected from 159 respondents through the snowball sampling technique and was analyzed using Structural Equation Modeling. The results confirmed a significant impact of the following four factors: a) social influence, attitude towards smart watches and satisfaction on continuance intention; b) perceived usefulness and perceived ease of use on attitude; c) perceived usefulness on satisfaction; and d) perceived ease of use on perceived usefulness. The model is found to be having a moderate R^2 value, wherein, continuance intention to use smart watch has a 57.6% variance, attitude has a 61.5% variance, and satisfaction has a variance of 47.9%. The model also found the significant indirect effect of perceived ease of use on continuance intention, satisfaction, attitude; and perceived usefulness on continuance intention.

JFL Classifications: G20, M15, M31, L86

Keywords: wearable device; smart watch; continuance intention; attitude; satisfaction; perceived usefulness; perceived ease of use

I. INTRODUCTION

Technological advancements have brought about a tremendous change in almost all the sectors of economy, and have paved the way for wearable devices. Numerous technologies introduced in wearable device sector serve different purposes and different segments of the market. The wearable technology finds its applications in healthcare, fitness, consumer electronics, industrial enterprise applications and defense ("Wearable technology market 2019", 2019). One recent study found that the wearable technology has transformed to be more portable, light weighted and fashionable today (Wright and Keith, 2014). This has led to a rise in the number of users who happen to be early adopters of this technology. Smart watches are in the top segment, and the shipment estimate for the year 2019 is 74 million smart watches (Draper, 2018), followed by ear-worn devices that are expected to surpass the shipment of smart watches by the year 2022 (Gartner, 2018).

One of the major factors that determine the continuance intention (CI) of these devices is the performance. If it is not addressed properly, the enthusiasm among the users will be short-lived, and will lead to less market for wearable devices. In this paper, we intend to study CI of smart watches due to their benefits and being in the top segment of demand. The CI to use a technology has been empirically tested in earlier studies that are typically based on a different version of the Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), and Expectation-Confirmation Model (ECM). For smart watches to sustain in the market, it is important that the users of smart watches continue its usage. This kind of study will be of interest not only to academicians but also to the manufacturers and marketers of smart watches, or any other wearable device. Though a large number of studies in the past have been aimed at understanding the CI to use a rising technology, only a few of them focus on wearable technology and on smart watches in particular. This study attempts to integrate the TAM variables with two other factors i.e., satisfaction and social influence, to understand the CI to use smart watches leading to the following research questions:

1. What are the antecedents of the users' continuance intention to use smart watches?
2. What are the direct and the indirect effects of independent variables on continuance intention to use smart watches?

The following sections elucidate the literature review, methodology, and a detailed discussion on the results and findings of this study, followed by the conclusion.

II. LITERATURE REVIEW

A. Wearable Technology

The wearable technology integrates electronics and computers into a device, which can be worn by the user. Due to its sensory and scanning features such as biofeedback and tracking of physiological functions, the wearable technology is considered to be more sophisticated than other hand-held technologies (Mehdi and Alharby, 2018). The wearable technology can be classified as wrist wear, headwear, eyewear, neckwear, smart clothing, wearable cameras and implants ("Wearable technology market 2019", 2019).

Nugroho (2010) defined the shaping factors to evaluate and understand the role of design in wearable technology, such as, size/dimension, power source, heat, device position, durability/resistance, usability, functionality, social connectivity etc.

As major brands like Adidas, Xiaomi, Apple, Google, Fitfit, Samsung, Sony, Nike, Motorola etc., are involved in wearable technology, researchers have investigated the intention of consumers towards wearable devices in the recent studies. Krey et al. (2019) examined the influence of functional and emotional advertising strategy on consumer evaluation and the adoption of smart watches. Nunes and Arruda (2018) analyzed the consumer behavior (through Netnographic study) towards the Google glass. Chang et al. (2016) studied the usage behavior of wearable devices by integrating TAM and task-technology fit model by combining it with user and device characteristics, and its subjective norm. The model explained 50.3% of variance in the behavior intention. Kim and Chiu (2019) used Technology Readiness and Acceptance Model to understand the CI to use sports and fitness wearable devices. Technology readiness was found to have a positive correlation with perceived ease of use (PEOU) and perceived usefulness (PU), and the model explained 56.7% variance in intention. Choi and Kim's (2016) model explained 64.3% of variance, which integrated TAM with perceived enjoyment and perceived self-expressiveness. Pal et al. (2018) studied the CI by having 312 participants use smart watches through a research model based on ECM. The model explained 64.8% of variance in CI to smart watches. Chuah et al. (2016) studied the role of usefulness and visibility in adoption of smart watches, and found both to be significant indicators of adoption intention.

B. Continuance Intention

According to Bhattacherjee (2001), CI is the user's intention to continue using the system. It is appropriate to study the usage intention when the respondents are new to a given technology. However, CI is more favorable for the studies where the respondents are already the users of a given technology. Further, from the marketers' point of view, it is important for the product to sustain in the market. Earlier studies on CI were in the area of social media (Praveena and Thomas, 2014; Ofori et al., 2016); learning systems (Ho, 2010; Hsu and Chang, 2013; Wu and Chen, 2017); self-service technologies (Chen et al., 2009); AR applications (Kim et al., 2016); on Mobile commerce (Chong, 2013); Internet banking (Hong et al., 2006; Bhattacherjee, 2001); and wearable devices (Krey et al., 2019; Pal et al., 2018; Chuah et al., 2016); Google glass by Nunes and Arruda 2018, and sports and fitness wearable devices by Kim and Chiu (2019). In this study, we explore CI of users towards smart watches.

C. Technology Acceptance Model (TAM)

TAM is found to be the most popular among the technology adoption models to study the adoption intention or CI to use a technology. The model is presented by (Davis, 1989), which had perceived usefulness (PU) and perceived ease of use (PEOU) as the antecedents of attitude toward behavior and intention.

1. Perceived ease of use and perceived usefulness

PEOU is defined as, "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989). TAM has hypothesized the direct positive impact of PEOU on attitude and the indirect positive impact on attitude through PU. Further, TAM has hypothesized a positive direct impact of PU on attitude and intention to use. PU is defined as, "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989).

2. Attitude toward behavior

Attitude towards behavior is defined as "an individual's positive or negative feelings about performing the target behavior" (Fishbein and Ajzen, 1975; Davis, 1989). TAM has theorized the positive impact of attitude on intention to use.

3. Empirical studies on continuance intention using TAM

Several studies have applied TAM by integrating it with new antecedents to understand CI to use a given technology. The significant positive impact of PEOU and PU on attitude is confirmed by several recent studies having CI as the dependent variable. A study on CI to use Facebook by Praveena and Thomas (2014) was based on TAM with an additional construct i.e., perceived enjoyment that they found to be the strongest indicator of attitude, with 36% of the variance in CI. Hsu and Chang (2013) added perceived convenience (with PU and PEOU) as one of the determinant of attitude toward use of Moodle and found all three variables to be the significant indicators of attitude, explaining 67% of variance; and attitude in turn had a significant impact on CI, explaining 48% of the variance. In addition, a model proposed by Roca and Gangne (2008), based on Self-Determination Theory (SDT) and TAM, confirmed the positive and significant impact of PU and PEOU on CI. Wu and Chen (2017) integrated TAM, Task-technology Fit (TTF), MOOCs features and social motivation to examine the CI to use MOOCs, and the proposed model had attitude and PU, explaining 95.7% of variance in CI. The positive significant impact of PEOU on PU (defined by TAM) is confirmed from the above studies.

Based on TAM and the above literature, the following hypotheses are stated:

Hypothesis 1: Perceived usefulness (PU) has a significant impact on attitude towards smart watches (ATT).
Hypothesis 2: Perceived ease of use (PEOU) has a significant impact on attitude towards smart watches (ATT).
Hypothesis 3: Perceived ease of use (PEOU) has a significant impact on perceived usefulness (PU).
Hypothesis 6: Attitude towards smart watches (ATT) has a significant impact on continuance intention (CI).

D. Satisfaction

According to Oliver (1981), in consumption, context satisfaction was defined as, "the summary psychological state resulting when the emotion surrounding disconfirmed expectations is coupled with consumers' prior feelings about the consumption experience". Numerous research works have explored the impact of satisfaction on CI, which are combined with other technology adoption models. Ofori et al. (2016) attempted to examine the role of privacy concern in the CI to use mobile social media. They explored the impact of PE, PEOU, Perceived risk and Perceived enjoyment on satisfaction and found the factors that explained 29.3% of variance in satisfaction; and the impact of perceived risk, privacy concern and satisfaction explained 39.2% of variance in continuance use. Chen et al. (2009) integrated TAM, Theory of Planned Behavior (TPB) and Technology Readiness (TR) in order to predict the CI of the user towards self-service technologies whose findings, PU, PEOU, optimism, and innovation were seen to be significant indicators of satisfaction, explaining 49% of the variance; CI had a variance of 69% explained by satisfaction, optimism, subject norm, and perceived behavioral control. Kim et al. (2016) studied the CI of users of augmented reality application. They found the PU and perceived enjoyment to be 44.1% of variance in satisfaction; and PU and satisfaction explaining 60.4% of variance in CI.

E. Expectation-Confirmation Model (ECM)

ECT proposed by Oliver (1980) is a popular theory in consumer behavior studies in understanding satisfaction or post-purchase behavior of consumers. The theory explains expectation, perceived performance and disconfirmation of beliefs as the antecedents of satisfaction. Chong (2013) added PEOU, perceived cost and perceived enjoyment to ECM to examine the CI of mobile commerce users. Hong et al. (2006) compared three models (ECM-IT, TAM and extended ECM-IT, which is a hybrid model integrating ECM-IT and TAM) in the context of mobile banking, and found the extended ECM-IT to be having the highest explanatory power compared to the other two models. Ho (2010) integrated four models (ECM, TAM, SDM and cognitive model) in an attempt to measure the CI of a user of an e-learning platform. The integrated model found confirmation and PU explaining satisfaction to the extent of 63%; satisfaction, PU and PEOU explaining 66% of variance in attitude; and satisfaction, PU and attitude explaining 69% of variance in CI of users. Yoon and Rolland's (2015) research model was based on the IS continuance model. The model demonstrated 66% of variance in CI explained by subjective norm (SN), PU, satisfaction and perceived enjoyment; and 59.5% of variance in satisfaction is explained by PU, confirmation and perceived enjoyment. Bhattacherjee (2001) found PU and confirmation explaining 33% of variance in satisfaction, while PU and satisfaction together explained 41% of variance in CI. Hence, studies have confirmed that the consumer's repurchase or CI depends on satisfaction obtained from prior use.
Based on Section D and E, the following hypotheses are formulated:

Hypothesis 4: Perceived usefulness (PU) has a significant impact on satisfaction (SAT).
Hypothesis 5: Satisfaction (SAT) has a significant impact on continuance intention (CI).

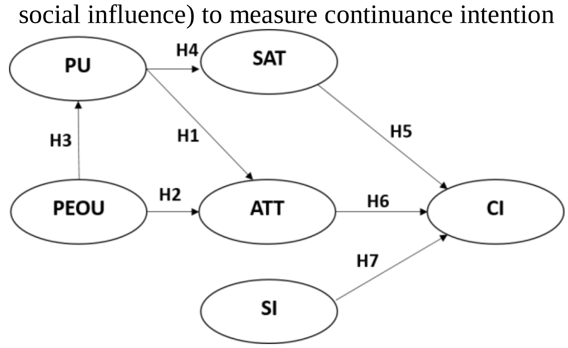
F. Subjective Norm/Social Influence

Social influence (SI) is defined as "the degree to which an individual perceives that important others believe he or she should use the new system" (Venkatesh et. al., 2003). SI is represented as subjective norm (SN) in other theories like Theory of Reasoned

Action (TRA), Theory of Planned Behavior (TPB), and C-TAM-TPB (combined TAM and TPB). The direct positive impact of SI on behavior or usage intention is established in the above theories (TRA, TPB, C-TAM-TPB, Unified Theory of Acceptance and Use of Technology (UTAUT)). However, the current study focuses on CI rather than usage intention. Yoon and Rolland (2015) found a direct positive impact of SN on CI.
Based on the above, the following hypothesis is stated:

Hypothesis 7: Subjective norm (SN)/social influence (SI) has a significant impact on continuation intention (CI).

Figure 1
Proposed research model: Comprehensive model (integrating TAM, satisfaction and social influence) to measure continuance intention



III. MATERIALS AND METHOD

A. Sampling

In order to answer the research questions and prove the hypothesized conceptual model, a survey was carried out during the period of February to March 2019, and the responses were collected regarding variables covered in a conceptual model with respect to smart watches. Both online and offline methods were used to collect the responses. Most of the respondents were in the age group of 18 to 30, and were users of smart watches. The responses were collected from 159 respondents using the snowball sampling technique from different states of south India. The sample included college students and working individuals with approximately 52% student respondents and 48% working respondents. Out of these, maximum respondents (approximately 43%) were in the age group of 21-24 and the number of male respondents were approximately 65%. The demographic profile of respondents is given in Table 1.

B. Measures of Constructs

The seven core constructs of the proposed conceptual framework were measured through 21 agreeableness statements. The responses were based on five point Likert scale ranging from 1 to 5, where 5 is strongly agree, 4 is agree, 3 is neutral, 2 is disagree and 1 is strongly disagree. The items of PU, PEOU, and SI were adopted from Venkatesh et al.

(2012), items measuring CI and satisfaction from Bhattacherjee (2001), and items measuring attitude from Davis et al. (1989). The statements were adapted to fitness and wellness services of smart watches, and the data was analyzed using partial lest square (PLS) - structural equation modelling (SEM) approach using the SmartPLS software.

Table 1
Demographic profile of the respondents

Characteristics	Frequency (N=159)	Percentage
Gender		
Female	56	35.22
Male	103	64.78
Age (in years)		
17-20	20	12.58
21-24	68	42.77
25-28	33	20.75
29-32	9	0.06
>33	29	18.24
Occupation		
Student	82	51.57
Employed/Working	77	48.43

IV. RESULTS AND DISCUSSION

A. Evaluating the Reflective Measurement Model

The reliability and validity of the constructs were measured in the following three steps: (1) internal consistency reliability, (2) convergent validity, and (3) discriminant validity. The internal consistency reliability was examined through composite reliability (CR) (see Table 2). The CR in the range of 0.7 to 0.9 is desirable (Hair et al., 2016) and all the constructs are in the given range except PU. However, as the CR was below 0.95, and the measured items were of different dimensions of the constructs, none of the two items (PU2 and PU3) were considered for elimination. The convergent validity was established through outer loading (factor loading) for indicator reliability and Average Variance Extracted (AVE) for construct validity. Items with an outer loading of greater than 0.7 were retained (Hair et al., 2016) in the construct for further analysis. The retained items in Table 2 had outer loading of greater than 0.7 except CI3, which was retained due to content validity of the item. As recommended by Hair et al. (2016), items in range of 0.4 to 0.7 may be retained if the deletion of items does not increase the CR/AVE or on the basis of content validity. The AVE was above the threshold value of 0.5, thereby confirming the construct validity. The discriminant validity was established through Heterotrait-Monotrait Ratio (HTMT). The HTMT values above 0.90 indicated a lack of discriminant validity (Hair et al., 2016). It can be seen in Table 2 that all the HTMT value of the proposed model are below the threshold value of 0.9.

Table 2
Internal consistency reliability, convergent validity, and discriminant validity

Construct	Items	Factor Loading	CR	AVE	Heterotrait-Monotrait Ratio (HTMT)	ATT	CI	PEOU	PE	SAT
ATT	ATT1 ATT2	0.889 0.919	0.900	0.818	**ATT**					
CI	CI1 CI2 CI3	0.900 0.918 0.592	0.850	0.668	**CI**	0.819				
PEOU	PEOU1 PEOU2	0.902 0.909	0.900	0.820	**PEOU**	0.811	0.587			
PU	PU2 PU3	0.948 0.953	0.940	0.904	**PU**	0.861	0.850	0.623		
SAT	SAT1 SAT5	0.919 0.882	0.890	0.811	**SAT**	0.856	0.845	0.568	0.833	
SI	SI1 SI2	0.912 0.891	0.890	0.813	**SI**	0.722	0.791	0.550	0.793	0.802

B. Evaluating the Structural Model

The structural model was assessed for: (1) collinearity issue, (2) significance of path coefficients, (3) R^2 or the explanatory power of the model, (4) effect size, and (5) predictive relevance.

The independent variables were assessed for the presence of multicollinearity issue. The variance inflation factor (VIF) value of greater than 4.0 (Hair et al., 2010) indicated the presence of multicollinearity problem. The results of VIF output as shown in Table 3 confirms that the model is free from multicollinearity problem as all the VIF values are lesser than 4.0.

The f^2 (effect size) value was examined to evaluate the change in R^2 value when a construct is omitted from the research model. The f^2 of 0.02, 0.15 and 0.35 is considered small, medium and high effect size, respectively (Cohen 1988). It can be referred in Table 3 that effect size of omitting ATT, SAT and SI on CI is small; the effect size of omitting PEOU on ATT is moderate; and the effect size of omitting PEOU on PU, PU on ATT and PE on SAT is very high.

Table 3
Collinearity statistics and effect size of independent variables

Collinearity Statistics				Effect Size – f^2				
ATT	**CI**	**PU**	**SAT**		**ATT**	**CI**	**PU**	**SAT**
	1.923			**ATT**		0.088		
1.372		1.000		**PEOU**	**0.237**		**0.372**	
1.372			1.000	**PU**	**0.549**			**0.919**
	2.153			**SAT**		0.124		
	1.735			**SI**		0.102		

The significance of path coefficient was obtained from PLS (Partial Least Square) algorithm and results from bootstrapping on smart PLS 3.0. The *t*-statistics and significance value (p value) in Table 4 confirm that all the defined paths in the proposed research model are found to have a significant relationship with 1% significant level. The structural model's explanatory power was assessed through the R^2 value. As shown in Table 4, the explanatory power of CI is 57.6%, indicating that ATT, SAT and SI together explain the CI to the extent of 57.6%. PEOU and PU together explain 61.5% variance in ATT; PEOU explains 27.1% of variance in PU; and 61.5% of variance in SAT is explained by PU. R^2 values of CI of 0.75, 0.5 and 0.25 were described as high, moderate and weak, respectively (Henseler, Ringle, and Sinkovics, 2009). For this the current model demonstrates moderate explanatory power in terms of CI, SAT and ATT.

Table 4

Path analysis- results from hypothesis testing

Hypothesis		Path coefficient	T Statistics	P Values	Conclusion
H1	PU → ATT	0.539	7.287	0.000	Supported
H2	PEOU → ATT	0.354	4.011	0.000	Supported
H3	PEOU → PU	0.521	7.524	0.000	Supported
H4	PU → SAT	0.692	13.481	0.000	Supported
H5	SAT → CI	0.336	3.287	0.001	Supported
H6	ATT → CI	0.267	3.064	0.002	Supported
H7	SI → CI	0.274	3.326	0.001	Supported
R^2_{CI} = 57.6%; R^2_{ATT} = 61.5%; R^2_{SAT} = 47.9%; R^2_{PU} = 27.1%					

Note: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$

Sample predictive relevance of the model was assessed through Q^2 value (Geisser, 1974; Stone, 1974). The Q^2 values were obtained using the blindfolding procedure on smart PLS. The Q^2 value, which is greater than zero, indicates the predictive relevance of the construct, and the value below indicates a lack of predictive relevance (Hair et al., 2016). The Q^2 value for all dependent constructs are above the value zero (see Table 5) indicating predictive relevance of the model. The consolidated result of the significance of path coefficients, *t*-statistics and effect size along with each hypothesis is presented in Figure 2 below.

C. Direct, Indirect and Total Effect

Indirect and specific indirect effect on the dependent variables in the research model were tested, and the results in Table 6 confirm the presence of indirect effect of PEOU on CI, PU on CI, PEOU on ATT and PEOU on SAT. The indirect impact of PEOU on CI is mediated through ATT (β=0.095, t= 2.503), through PE and SAT (β=0.121, t= 2.595), and through PU and ATT (β=0.075, t= 2.507), accounting for a total indirect effect of 0.291. Even PU is found to have an indirect effect on CI, which is mediated through ATT (β=0.144, t= 2.663) and SAT (β=0.233, t= 2.875), accounting for a total indirect effect of 0.377. PEOU is also found to have an indirect impact on ATT and SAT. The indirect effect of PEOU on ATT is mediated through PU (β=0.281, t= 6.208); and the indirect effect of PEOU on SAT is mediated through PE (β=0.360, t= 5.896). The specific indirect effect results obtained from complete bootstrap results confirm the significance of specific indirect effect on the dependent variables. This confirms that the R^2 of dependent variables is explained not only by the direct impact of dependent variables but also by other variables in the research model. The R^2 in CI is explained by PEOU and PU along with the dependent variables; and the variance in ATT and SAT is explained by PEOU along with their respective dependent variables defined in the model.

Table 5

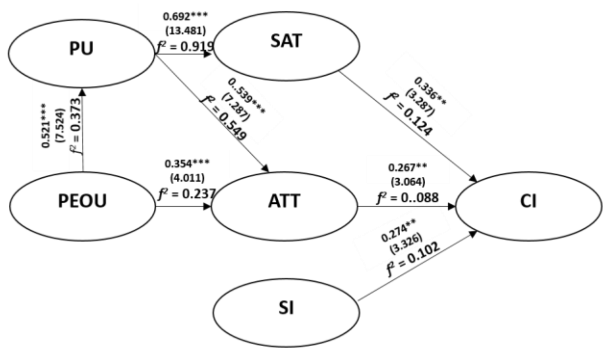
Q^2 values to measure the predictive relevance

	SSO	SSE	Q^2 (=1-SSE/SSO)
ATT	318.000	167.958	0.472
CI	477.000	310.742	0.349
PU	318.000	244.875	0.230
SAT	318.000	200.815	0.369

Note: SSE: squared prediction error; SSO: squared observations

Figure 2

Results of structural model



Notes: N=159. Standardized path coefficients (*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$*), in parentheses are *t*-statistics; f^2 of 0.02, 0.15 and 0.35 respectively is considered small, medium and high effect size (Cohen, 1988).

Table 6

Results of direct, indirect, specific indirect and total effect

Path	Direct effect	Indirect effect	Specific Indirect effect		Total Effect
			Path	β	
PEOU → CI	-	0.291^{***}	PEOU → PU → ATT → CI PEOU → ATT → CI PEOU → PU → SAT → CI	0.075^{*} 0.095^{*} 0.121^{**}	0.291^{***}
PU → CI	-	0.377^{***}	PU → ATT → CI PU → SAT → CI	0.144^{**} 0.233^{**}	0.377^{***}
SAT → CI	0.336^{**}	-	-	-	0.336^{**}
ATT → CI	0.267^{**}	-	-	-	0.267^{**}
SI → CI	0.274^{**}	-	-	-	0.274^{**}
PEOU → ATT	0.354^{***}	0.281^{***}	PEOU → PU → ATT	0.281^{***}	0.635^{***}
PU → ATT	0.539^{***}	-	-	-	0.539^{***}
PEOU → SAT	-	0.360^{***}	PEOU → PU → SAT	0.360^{***}	0.360^{***}
PU → SAT	0.692	-	-	-	0.692^{***}
PEOU → PU	0.521^{***}	-	-	-	0.521^{***}

Note: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$

D. Student Respondents vs. Working Respondents: Testing for Path Coefficient Difference

SmartPLS was used for multi-group analysis to examine if there was a significant difference between student and working respondent's path coefficients. Partial Least Square Multi-group analysis (PLS-MGA), a non-parametric test was used to identify the significant difference between the two groups. The result is said to be statistically significant if the p-value is lesser than 0.5 or greater than 0.95 (Sarstedt, Henseler, and Ringle, 2011). It was found that only two paths were statistically significant i.e., SI on CI and PU on SAT (see Table. 7) leading to a conclusion that there is a significant moderating effect of respondent type between SI to CI and PU to SAT.

Table 7
Student respondents vs. working respondents: testing for path coefficient difference

Path	Path Coefficients-diff (GROUP 1 - GROUP 2)	*p*-Value (GROUP 1 vs GROUP 2)
PU → ATT	0.010	0.455
PEOU → ATT	0.089	0.691
PEOU → PU	0.207	0.918
PU → SAT	**0.209**	**0.965**
SAT → CI	0.310	0.928
ATT → CI	0.129	0.747
SI → CI	**0.409**	**0.017**

Note: GROUP 1: Student respondent group; GROUP 2: Working Respondent group

Further, upon analyzing the bootstrapping results of both the groups, it was seen that path coefficient of SI on CI is significant and the strongest indicator of CI ($t = 3.652$) was in the student respondent group. In addition, path coefficient of SI on CI is insignificant in the working respondent group, and the strongest indicator of CI was SAT ($t = 2.849$). This implies that SI plays a major role in CI to use smartwatches for student respondents who are below the age 24. However, SAT obtained from smartwatches leads to CI among the working respondents who are mostly above the age 24.

V. DISCUSSION

Wearable devices like fitness trackers and smart watches are gaining popularity among the younger generations, who are health conscious. The rapid growth in the number of users of fitness device has paved the way for this research. The main aim of the proposed work was to find determinants of CI by integrating the TAM constructs with satisfaction and social influence. The research model had seven paths indicating seven hypotheses. The model explains the explanatory power of four dependent variables: (1) impact of SAT, ATT and SI on CI, (2) impact of PU on SAT, (3) impact of PU and PEOU on ATT, and (4) impact of PEOU on PU. The results confirm the significant impact of all defined paths in the research model, thereby leading to acceptance of all the seven hypotheses. The antecedents of CI explain 57.6% variance, while PU and PEOU together explain 61.5% variance in ATT, whereas PU explains 47.9% variance in satisfaction, and PEOU explains 27.1% variance in PU. The results are in line with the findings of the previous studies, stating that PU has a significant impact on SAT. The impact of PEOU on PU is significant, which was confirmed by the TAM model and several past studies. PU and PEOU have a significant impact on ATT, which was also confirmed by Hsu and Chang (2013). All the three antecedents (SAT, ATT and SI) were found to have a significant impact on CI. The significant impact of SAT on CI is confirmed by Ofori et al. (2016), Chen et al. (2009), Kim et al. (2016), Ho (2010), Yoon and Rolland (2015), and Bhattacherjee (2001). The significant relationship between ATT and CI is confirmed by Hsu and Chang (2013), Wu and Chen (2017), and Ho (2010). It can be inferred from the results that higher the belief of the user regarding the usefulness of the smart watch, higher will be the satisfaction. The usefulness and ease of use of smart watches lead to a positive attitude of the user towards smart watches, with a positive attitude towards the device, satisfied with its performance, along with positive influence of people around them, they will continue to use the device.

The model also found the significant indirect effect of PEOU (mediated through ATT, PU and ATT, PU and SAT) on CI; PU (mediated through attitude) on CI, PEOU (mediated through PU) on ATT, and PEOU (mediated through PU) on SAT. The findings of an indirect effect of PEOU on ATT, mediated through PU is in line with results of TAM, Praveena and Thomas (2014), Wu and Chen (2017) and many other researchers. This indicates that the user considers usefulness of the device in forming an attitude towards smart watches. The findings of an indirect effect of PEOU on SAT, mediated through PU is confirmed by Ofori et al. (2016). However, the direct effect of PU (β=0.692) on SAT is more profound than the indirect effect of PEOU (β=0.360) on SAT, indicating that usefulness or performance of the device plays a major role in user satisfaction. Wang et al. (2016) and Al-Maghrabi (2011) found the indirect effect of PE on CI. Lee (2010) confirmed the indirect effect of PE on CI through ATT and SAT. The current study also found ATT and SAT mediating the impact of PU on CI. However, the indirect effect of PU on CI is more profound through SAT (β =0.233) than with ATT (β =0.144). Wangpipatwong et al. (2008) confirmed the indirect effect of PEOU on CI through PU. The current study also found the indirect effect of PEOU on CI mediated through PU & ATT; and PU & SAT. The indirect effect of PEOU on CI through PU and SAT (β=0.121) is more profound than the indirect effect of PEOU on CI through PU and ATT (β=0.075). However, both the paths, indicating the indirect effect of PEOU on CI, have PE in common, indicating that marketing a device that requires less effort to use will enhance the performance of the device, thereby increasing the probability of CI to use the device.

In order for smart watches to sustain in the market, users are required to continue using the device. Therefore, the current research model takes into account the CI instead of adoption. The results imply that the manufacturers/marketers of smart watches have to make the device convenient for the users to meet their requirements and demonstrate it to the prospective buyers in order to ensure they purchase and continue to use it over a long period.

VI. CONCLUSION

The findings of the proposed research model are in line with the original TAM, PU and PEOU, which were found to be significant indicators of ATT, and ATT in turn was seen to be significantly influencing CI of smart watch users. The past research findings confirm the significant impact of PU on SAT and that CI is significantly predicted by

SAT, ATT and SI. The results also confirmed the significant indirect effect of PEOU and PU on CI, PEOU on SAT and on ATT. Based on the empirical findings, it may be concluded that the CI to use smart watches is directly determined by SAT, ATT and SI. ATT is directly explained by PU and PEOU; and SAT is directly explained by PU. The moderate or the above average explanatory power of the model confirms the application of the proposed model to understand the determinants of CI to use smart watches.

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