



# Use of ‘Habit’ Is not a Habit in Understanding Individual Technology Adoption: A Review of UTAUT2 Based Empirical Studies

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**Abstract.** ‘Habit’ was the most important theoretical addition into UTAUT2 to challenge the role of behavioural intention as a lone predictor of technology use. However, systematic review and meta-analysis of Price value the other UTAUT2 additional construct revealed major inconsistency of the model with just 41% UTAUT2 based studies including the construct in their research. Thus, the aim of this research is to understand the appropriateness of ‘habit’ construct usage among UTAUT2 based empirical studies and their reason for omission or inclusion. The findings from 66 empirical studies revealed only 23 studies a meagre (35%) utilised ‘habit’ construct and the remaining massive 43 studies (65%) excluded the construct from their research model. The major reason for studies not including “habit” construct was they were examining users of new technology at early stage of adoption where sufficient time hasn’t elapsed for users to form habit. Moreover this study caution the use of experience as an alternative for habit. Since experience can be gained under mandatory settings which is not sufficient enough to form habit that occurs more naturally under voluntary settings. This study also provided number of recommendations for theory and practice based on the findings.

**Keywords:** Meta-analysis · Habit · UTAUT2

## 1 Introduction

Understanding why individuals accept or reject information technology (IT) is a mature stream in the contemporary information systems (IS) arena and constantly examined for two reasons: new technologies are rapidly evolving and finding their place both in organisations and society; and the IS failure rate continued to be high [1]. Unified theory of acceptance and use of technology (UTAUT) developed in the organisational context emphasising on the utilitarian value (extrinsic motivation) through exhaustive review, mapping and integration of constructs from eight dominant technology adoption models is the most comprehensive model in explaining individual technology acceptance and use [see 2 for review]. The latest extended version of UTAUT popularly referred to as UTAUT2 comprises of three new constructs such as hedonic motivation, price value and habit focused on consumer context emphasising on hedonic

value (intrinsic motivation) of technology users to be more relevant to emerging consumer technologies. However, in the UTAUT2, voluntariness of use was dropped as a moderator since consumers have no organisational mandate and in many situations, consumer behaviour is voluntary [see 3 for review]. The predictive ability of UTAUT2 theory was much higher explaining about 74 percent of the variance in consumers' behavioural intention to use a technology and 52 percent of the variance in consumers' technology use [4].

The UTAUT2 model has already garnered more than 2500 citations despite its recent introduction in the year 2012, spanning from IS field and beyond emphasising on its predictive ability. However, systematic review of 650 UTAUT2 citations revealed 77% of the studies cited UTAUT2 for generic purpose without employing its constructs whereas the remaining 23% of studies, even if they utilised UTATU2, did so in combination with external theories omitting some of its original constructs with rare inclusion of moderators [see 5 for review]. Moreover, extant literature review on UTAUT2 additional constructs such as Price value have revealed major inconsistency on its usage with just 41% studies including the construct in their research model [see 6 for review]. 'Habit' was the most important new theoretical construct added into UTAUT2 model as a key predictor of technology use to challenge the role of behavioural intention as a lone predictor of technology use. To that extent habit as an key alternative mechanism in predicting consumer behaviour is lauded in the Journal of the Association for Information Systems (JAIS) special issue on the technology acceptance model (TAM) [3]. Thus, integrating 'habit' into the UTAUT2 will act as overarching mechanism and complement the focus of theory on intention as key driver of use behaviour. 'Habit' is function of both behavioural intention (BI) and use behaviour (UB) in the UTAUT2 model.  $HA \rightarrow UB$  path was based on Habit/automaticity perspective (HAP) [7], which states use behaviour occur automatically as a result of past habits without formation of evaluation and intention. Whereas,  $HA \rightarrow BI$  path was based on the instant activation perspective (IAP) [8] where use behaviour is considered as accelerated form of conscious use and perceived as function of behavioural intention such that past use habit will not weaken evaluation  $\rightarrow$  intention  $\rightarrow$  usage relationship.

Given the preceding discussion on centrality of habit construct as a key predictor of technology use and inconsistency among usage of UTAUT2 model on its entirety. This study is intend to evaluate appropriateness of habit construct usage among UTAUT2 based studies and aims to provide guidelines to future researchers on suitability of various context to operationalize 'habit' construct in their research. This study intends to achieve this through fulfilment of the following objectives:

- Identify studies that used UTAUT2 model as their underpinning theory and omitted 'habit' in their research model and reason for omission.
- Identify various antecedents/dependant variables of 'habit' and their significance.
- To conduct meta-analysis of the empirical studies to understand the convergence and divergence of various 'habit' path relationships and their performance.

The next section of this paper i.e. Section 2 describes the research method employed in this study; Sect. 3 will present the findings of meta-analysis and narrative review from empirical studies that utilized 'habit' construct. This will be followed by discussion in Sect. 4 and conclusion in Sect. 5.

## 2 Research Method

This study employed combination of “narrative review”, “citation reference search” and “meta-analysis” approach to synthesize the existing research findings that operationalized ‘habit’ from the UTAUT2 model in understanding individual technology adoption [4, 9, 10]. Meta-analysis enables to establish true effect size of various relationships of population through accumulation of effect sizes from individual studies facilitated by statistical techniques [10–13]. It allows to discover new knowledge that is undetectable otherwise in the isolated parcels of data scattered amongst individual “primary” studies [14]. Cited reference search for Venkatesh, Thong [3] article in Scopus and Web of Science database from March 2012 to March 2017 resulted in 1,320 papers (823 from Scopus; 497 from Web of Science). On further scrutiny, it was identified that 452 citations were common in both databases resulting in 868 unique citations for UTAUT2. Out of 868 articles, 650 were fully downloadable and 147 utilized at least one UTAUT2 construct whereas the remaining 503 articles just cited UTAUT2 for generic reason [see 5 for review]. Out of 147 studies, only 66 studies were empirical in nature to perform meta-analysis and hence the remaining studies were discarded from the scope of this research since they were neither empirical in nature nor did they report relevant data for meta-analysis. This leads us to the next stage of this study to screen 66 UTAUT2 based empirical studies to identify operationalization of ‘habit’ construct and appropriateness of its usage.

## 3 Findings

This section presents narrative review and meta-analysis findings of the 66 UTAUT2 based empirical studies based on the usage of habit construct. The findings resulted in classification of 66 studies broadly into two categories: (1) studies not utilizing habit—43 studies; and (2) Studies utilizing habit – 23 studies.

### 3.1 Review of Studies not Using ‘Habit’

Majority of the 66 UTAUT2 based empirical studies (i.e. 43) did not operationalize ‘habit’ in their research. Out of 43 studies that did not use ‘habit’ in their research model only 10 studies employed use behaviour (UB) [e.g. 15, 16] as their outcome variable with all of them utilizing behavioural intention (BI) as their immediate antecedent. Whereas BI was the most operated outcome variable with 31 studies hypothesizing BI [e.g. 17, 18] as their final outcome variable. Finally, there were couple of studies that employed radically new outcome variables apart from BI and UB such as: (1) Location disclosure on location based social networking applications [19] and (2) Disclosure of information about others in social network sites [20].

Table 1 presents findings of in-depth examination of these 43 studies across various contexts such as respondent types and system/technology examined to ascertain their convergence and divergence. This resulted in advent of eight broader categories based on the system/technology examined with 20 studies mobile technologies emerged as the topmost category. Social networking sites emerged as the second most studied

category with five examinations. Whereas, five categories such as (1) Education, (2) Internet banking, (3) Music as a service, (4) Smart home devices and (5) Wearables jointly occupied the third category spot with two examinations each. Finally, the ‘others category’ involved eight studies that were not able to be classified readily under any of the above seven categories as seen from Table 1.

In terms of respondents, the researchers examined six different types of technological users across 43 studies. Consumers emerged as the most researched user type with as large as 25 examinations. Students were the second most examined respondent’s type with 14 studies involving them to validate their research model on range of technology use. For instance, students were used as respondents to evaluate people willingness to pay for music as services [21] and information disclosure about others in social network sites to mention a few [19, 20] see Table 1 for exhaustive list. Finally, the remaining four respondents’ types were examined on one instance each: (1) “Tourists” responses to mobile augmented reality travel guide [22]; (2) “Citizens” adoption of e-government [23]; (3) “Teachers and Students” difference in podcasting acceptance on campus [24]; and (4) “Software developers” adoption intention to use existing software products [25].

### 3.2 Reason for Studies not Using ‘Habit’

This section explains the reason behind 43 studies that adapted UTAUT2 as underpinning theory for their research and excluded one of its core constructs ‘habit’ from their final research model. Five major categories emerged as reason for studies not using ‘habit’ construct as seen from Table 2. The basis for classification of these five categories are explained in detail along with instances of quotes from actual studies in italics.

#### 3.2.1 New Technology at Early Stage of Adoption

Twelve studies fell under this category as they did not use ‘habit’ since they were examining new technologies in introduction stage of the product life cycle with usage only among early adopters. Consumers tend to generate habit for particular technology or product after prolonged use especially during growth stages of product life cycle. For that reason few researchers examining early adopters recommended usage of “habit” construct in future (three such studies [21, 29, 39]) after sufficient time has lapsed from product launch and users developed habit for technology under investigation. For instance, Oliveira et al. [28] study on understanding consumer intention towards mobile payment in Portugal excluded ‘habit’ for the following reason:

*“The habit construct was not included in the research model since mobile payment is a relatively new technology that has not yet gained sufficiently widespread use among consumers to generate a habit”*

Whereas Ramantoko et al. [48] study on exploring consumers behavioural intention to use home digital services in Indonesia omitted ‘habit’ stating the following reason:

*“...the authors seek to understand characteristics in the early stage of adoption, where factor Habit was not taken into consideration. The authors’ prejudice considers that Habit did not exist among the respondents during the time of study”*

**Table 1.** Classification of studies not using habit construct

S N	Themes/Technology examined (with frequency)	Respondents type (with frequency)	Citations
1	Mobile technologies (20)		
	Mobile payments (7)	Consumers (6)	Jia et al. [26]; Koenig-Lewis et al. [27]; Oliveira et al. [28]; Qasim and Abu-Shanab [29]; Shaw [30]; Slade et al. [17]
		Students (1)	Teo et al. [31]
	Smart phone adoption (3)	Consumers(3)	Choudrie et al. [32]; Gao et al. [33]; Gao et al. [34]
	Mobile learning (2)	Students (1)	Bere [35]
		Consumers (1)	Wong et al. [36]
	Mobile banking (2)	Consumers (2)	Alalwan et al. [15]; Mahfuz et al. [37]
	Interactive mobile technologies (IMT) in hotels (1)	Students (1)	Wendy Zhu and Morosan [38]
	Mobile advertising (1)	Students (1)	Wong et al. [18]
	Mobile applications (1)	Consumers (1)	Lu et al. (2017)
	Mobile Augmented Reality (1)	Tourists (1)	Kourouthanassis et al. [22]
	Telebanking (1)	Consumers (1)	Alalwan et al. [16]
	Usage of Mobile devices in private clubs (1)	Consumers (1)	Morosan and DeFranco [39]
2	Social Networking sites (5)		
	Information sharing in SNS (1)	Students (1)	Hajli and Lin [40]
	Location disclosure on LB-SNAs (1)	Students (1)	Koohikamali et al. [19]
	Information disclosure in SNS (1)	Students (1)	Koohikamali et al. [20]
	Facebook usage (1)	Students (1)	Lallmahomed et al. [41]
	Purchase intention in Social networking sites (1)	Students (1)	Sharifi fard et al. [42]
3	Education (2)		
	Informal learning context (1)	Students (1)	Lai et al. [43]
	Podcasting in higher education (1)	Teacher and Students (1)	Lin et al. [24]
4	Internet banking (2)	Consumers (2)	Chaouali et al. [44]; Salim et al. [45]
5	Music as a service (2)	Consumers (1)	Wagner et al. [46]
		Students (1)	Wagner and Hess [21]

*(continued)*

**Table 1.** (continued)

S N	Themes/Technology examined (with frequency)	Respondents type (with frequency)	Citations
6	Smart home devices (2)		
	Household Technology acceptance (1)	Consumers (1)	Ahn et al. [47]
	Home Digital Services (1)	Consumers (1)	Ramantoko et al. [48]
7	Wearables (2)		
	Wearable healthcare technology	Consumers (1)	Gao et al. [49]
	Pervasive Information Systems (Google glass)	Consumers(1)	Segura and Thiesse [50]
8	Others (8)		
	Online shopping intention for agricultural products (1)	Students (1)	An et al. [51]
	Crime prevention using IS (1)	Consumers (1)	Cvijikj et al. [52]
	Purchase intention of electric vehicles (1)	Consumers (1)	Degirmenci and Breitner [53]
	E-government adoption (1)	Citizens (1)	Lallmahomed et al. [23]
	Biometric e-gates in airports (1)	Consumers (1)	Morosan [54]
	Broadband Technology Use (1)	Students (1)	Muraina et al. [55]
	Software reuse adoption individual perspective (1)	Software developers (1)	Stefi [25]
	E-books (1)	Students (1)	Yoo and Roh [56]

The study of Wagner and Hess [21] on freemium usage of Music as a Services of students in Germany was one of the three instance when ‘habit’ was recommended to be used in future studies stating the following reason:

*“... results indicate that separating free and premium products can increase people’s intention to use the premium version. However, lock-in effects resulting from the free version may also have a positive effect on users’ willingness to pay. Future studies should therefore focus on habit and the resulting lock-in effect in detail”*

**Table 2.** Reason for studies not using habit construct

Category type	Frequency	Description	Example citations
1. New technology at early stage of adoption	12	Studies in this category examined users at nascent stages technology adoption to with some of them recommending usage of habit in future.	Alalwan et al. [15], Alalwan et al. [16], Oliveira et al. [28], Ramantoko et al. [48]; Wagner and Hess [21]
2. Alternative construct	1	This study used construct similar to habit.	Lin et al. [24]
3. Extensive usage of habit	1	Habit construct extensively studied in this research context.	Ahn et al. [47]
4. Out of Scope	1	This category perceived habit construct as an inappropriate context for technology under investigation.	Mahfuz et al. [37]
5. No reason	28	These studies did not provide any reason for not including habit in their structural model	Bere [35], Hajli and Lin [40], Salim et al. [45], Slade et al. [17]

### 3.2.2 Alternative Construct

Lin et al. [24] only study in this category examined difference in perspective of "Teachers and Students" podcasting acceptance on campus in Germany included prior experience a construct similar to habit stating the below reason:

*".....as an individual learns by doing, prior experiences with a technology is likely to impact perceptions of the amount of effort required to subsequently use the technology."*

### 3.2.3 Extensive Usage of Habit

Ahn et al. [47] lonely study in this category examined consumers sustainable household technology acceptance in the USA and found 'habit' among extensively studied construct to justify their exclusion from their research model. Their reason for exclusion is as follows:

*".....household energy saving has been studied by environmental psychologists with the topics of motivations, behaviours, habits and interventions"*

### 3.2.4 Out of Scope

Mahfuz et al. [37] is the last of single study category that omitted habit along with hedonic motion since they perceived both these constructs were out of scope of mobile banking adoption in their research of cultural dimensions and website quality influence on Consumers Mobile banking services in Bangladesh. Their reason for exclusion is as follows:

*“.....author omitted hedonic motivation and habit from the conceptual mode due not directly related to the mobile banking adoption...”*

### 3.2.5 No Reason

Majority of the studies (i.e. 28) fell under category 5. Studies under this category although utilized UTAUT2 as their underpinning theory and developed their model without ‘habit’, they did not provide any reason for omitting the construct from their research model. Such instances include but not limited to understanding determinants of students mobile learning technology acceptance and use in South Africa [35] and factors affecting consumers Internet banking implementation in Sudan [45].

## 3.3 Review of Studies Using ‘Habit’

Unlike UTAUT2 based empirical studies that did not utilize ‘habit’, more than half of the studies that utilized ‘habit’ (i.e. 13 out of 23 studies) employed use behaviour as their outcome variable. All these 13 studies mapped ‘habit’ as an antecedent of both behavioural intention and Use behaviour in similar lines of UTAUT2 to research technologies in growth/mature stages of product life cycle rather than nascent stage since users develop habit over a period of time after product utilization. Such instances include examining actual adopters habitual behaviour towards Internet banking adoption in Jordan [57] and examination of students habitual use of learning management system in Malaysia that received limited attention [58]. Whereas, habit was mapped only to BI in seven studies that operated BI as outcome variable with instances ranging from understanding consumers’ Omni channel purchase intention behaviour in Spain [59] to students usage of Facebook as learning tool in Spain [60]. Apart from BI and UB, three studies employed completely new outcome variables such as: (1) Job offer success [61]; (2) Consumerization [62]; and (3) Job seeker unemployment duration [63]. Table 3 summarizes the various path relationships of ‘habit’ against various dependant variables, independent variables and moderators with their significance across 23 studies. Apart from being an antecedent on most instances, ‘habit’ also has few antecedents acting as a dependant variable.

### 3.3.1 Habit as an Antecedent

‘Habit’ served as an antecedent of six dependant variables across the span of 23 studies where it was used. It most often served as an antecedent of Behavioural Intention (BI) with 18 studies employing HA → BI path relationship in examining a range of technology adoption. Out of 18 studies, 15 studies found the path relationship HA → BI to be significant [e.g. 57, 64, 65] whereas the remaining three studies [58, 59, 66] reported insignificant values for this path. Use Behaviour is the second most examined



**Table 3.** Summary of habit path relationships

S N	I.V.	D. V. (Mod)	Total	Sig	Citations (Sig)	In. Sig	Citations (In. Sig)
1	HA	BI	18	15	Alalwan et al. [57], Ali et al. [64], Baptista and Oliveira [65]	3	Ain et al. [58], Juaneda- Ayensa et al. [59], Raman and Don [66]
2	HA	UB	13	11	Järvinen et al. [68], Nair et al. [69], Chong [73]	2	Ain et al. [58], Raman and Don [66]
3	HA	BI (Gen)	3	0	None	3	Baptista et al. [74], Wong et al. [75], Ramírez-Correa et al. [76]
4	HA	BI (Age)	2	0	None	2	Baptista et al. [74], Ramírez-Correa et al. [76]
5	HA	BI (Exp)	1	0	None	1	Ramírez-Correa et al. [76]
6	HA	UB (Gen)	2	0	None	2	Baptista et al. [74], Ramírez-Correa et al. [76]
7	HA	UB (Age)	2	0	None	2	Baptista et al. [74], Ramírez-Correa et al. [76]
8	HA	UB(Exp)	1	0	None	1	Ramírez-Correa et al. [75]
9	HA	PE	1	1	Herrero and San Martín [70]	0	None
10	HA	CN	1	1	Dernbecher et al. [62]	0	None
11	HA	PR	1	1	Escobar-Rodríguez and Carvajal-Trujillo [77]	0	None
12	HA	CN(SI)	1	0	None	1	Dernbecher et al. [62]
13	HA	DCC	1	1	Morosan and DeFranco [71]	0	None
14	MSUH	BI	1	1	Jia et al. [72]	0	None
15	MPUH	BI	1	1	Jia et al. [72]	0	None
16	OSH	BI	1	0	None	1	Jia et al. [72]
17	CPUH	BI	1	0	None	1	Jia et al. [72]
18	OSH	MPUH	1	1	Jia et al. [72]	0	None
19	MSUH	MPUH	1	1	Jia et al. [72]	0	None

*(continued)*

**Table 3.** (continued)

S N	I.V.	D. V. (Mod)	Total	Sig	Citations (Sig)	In. Sig	Citations (In. Sig)
20	CPUH	MPUH	1	1	Jia et al. [72]	0	None
21	EE	HA	1	1	Herrero and San Martín [70]	0	None
22	SE	HA	1	1	Dernbecher et al. [62]	0	None
23	PI	HA	1	1	Dernbecher et al. [62]	0	None
24	NS	HA	1	1	Morosan and DeFranco [71]	0	None
25	HM	HA	1	1	Herrero and San Martín [70]	0	None

**[Legend:** BI: Behavioural Intention; CN: Consumerization; CPUH: Cellphone usage habit; D.V.: Dependant Variable; DCC: Degree of co-creation; EE: Effort expectancy; Exp: Experience; Gen: Gender; HA: Habit; HM: Hedonic motivation; I.V.: Independent Variable; In. Sig: Number of insignificant path values; Mod: Moderator; MPUH: Mobile payment usage habit; MSUH: Mobile service usage habit; NS: Novelty seeking; OSH: Online shopping habit; PE: Performance Expectancy; PI: Personal Innovativeness; PR: Perceived relevance; SE: Self-efficacy; Sig: Number of significant path values; SN: Serial Number; UB: Use Behaviour]

dependant variable with 13 studies utilizing ‘habit’ as its antecedent. The path relationship HA → UB reported significant results on 11 instances [67–69] and the remaining two studies [58, 66] reported insignificant path values.

‘Habit’ is used as an antecedent of four other constructs apart from BI and UB, such as: (1) Performance expectancy (PE) in understanding consumer’s intention to share user generated content in social network sites [70], (2) Consumerization (CN) of information technology among European university students [62], (3) Perceived relevance (PR) of Facebook as a social media learning platform [60], and (4) Degree of co-creation (DCC) in understating consumers co-creation of value in hotels using mobile devices [71]. The path relationship was significant on all the four instances and need more examination in future to improve the validity. Age, gender, experience and social influence (SI) moderated the path relationships among the path HA → BI, HA → UB and HA → CN on various combinations and found to be insignificant on all instance as seen from Table 3.

In the pursuit, to understand effect of consumers technology use habits on their continuous intention to use mobile payments the study of Jia et al. [72] employed four different forms of consumer habits: (1) Mobile service usage habit (MSUH), (2) Mobile payment usage habit (MPUH), (3) Online shopping habit (OSH), and (4) Cell phone usage habit (CPUH). These four constructs had various path relationships between themselves and BI as seen from Table 3. Out of seven different paths, five were significant except for two paths between OSH → BI and CPUH → BI that were found to be insignificant. Thus, consumers Online shopping habit and cell phone usage habit does not translate into their intention to use mobile payments that need further examination [72].

### 3.3.2 Antecedents of Habit

There were also five antecedents for habit such as: (1) Novelty seeking (NS) in consumer value co-creation in hotels through mobile devices [71], (2) Effort expectancy (EE), (3) Hedonic motivation (HM) in evaluating consumer's intention to share user generated content in social network sites [60] and (4) Self-Efficacy (SE), (5) Personal Innovativeness (PI) in examining consumerization of IT [62] across span of three studies. The results of three studies found all five relationships of 'habit' and their antecedents to be significant.

### 3.4 Meta-Analysis of Studies Using Habit Construct

Meta-analysis allows both significant and insignificant effects to be analysed through accumulation of various results taking the relative sample and effect size into consideration enabling more accurate and credible results due to the overarching span of the analysis [9]. This study conducted meta-analysis of various dependant, independent and moderating variables and their relationships with 'habit' explored in two or more times across 23 studies [e.g., 9, 12, 78]. Only six path relationships fulfilled this criterion and were eligible for meta-analysis. Table 4 presents summary on meta-analysis path coefficients ( $\beta$ ) results.

**Table 4.** Meta-analysis of 'Habit' path coefficients ( $\beta$ ) (Adapted from [9])

S N	I.V.	D.V.(Mod)	#	TSS	p(ES)	Meta( $\beta$ )	95% L( $\beta$ )	95% H( $\beta$ )
1	HA	BI	18	8501	0.000	0.276	0.186	0.362
2	HA	UB	13	6820	0.000	0.273	0.157	0.382
3	HA	BI(Gen)	3	1020	0.886	-0.005	-0.066	0.057
4	HA	BI(Age)	2	827	0.213	0.043	-0.025	0.111
5	HA	UB(Gen)	2	827	0.975	-0.001	-0.069	0.067
6	HA	UB(Age)	2	827	0.378	0.031	-0.038	0.099

**[Legend:** #: Number of studies; D.V.: Dependant variable; Gen: Gender; H ( $\beta$ ): Highest (beta); In. Sig( $\beta$ ): Number of insignificant path values; I.V.: Independent Variable; L( $\beta$ ): Lowest (Beta); Meta( $\beta$ ): Meta-analysis path coefficient; Mod: Moderator; p(ES): Estimated value of p; TSS: Total sample size]

The results revealed only two relationships using 'habit' as an antecedent, i.e. HA  $\rightarrow$  BI and HA  $\rightarrow$  UB emerged as significant relationships at  $p < 0.000$  level. Whereas all the remaining four habit based relationships with behavioural intention and use behaviour moderated by age and gender were insignificant. HA  $\rightarrow$  BI emerged as the strongest path with meta-analysis ( $\beta$ ) of 0.276 very closely followed by HA  $\rightarrow$  UB with meta-analysis ( $\beta$ ) of 0.273. The 95% confidence interval for HA  $\rightarrow$  BI was the narrowest with Low ( $\beta$ ) - 0.186 and High( $\beta$ ) - 0.362, revealing the range is narrow enough to provide at least one confidence in the extent of variance that could be explained. Whereas 95% confidence interval for HA  $\rightarrow$  UB was bit wider with Low ( $\beta$ ) - 0.157 and High ( $\beta$ ) - 0.382.

## 4 Discussion

The purpose of this study was to have deeper understanding on appropriateness of ‘habit’ construct usage among 66 empirical studies that used UTAUT2 as their underpinning theory in their research. The findings revealed 43 studies (65%) did not operationalize habit in their research model with 31 of the 43 studies (72%) employing BI as their outcome variable rather than UB. Habit is an outcome of consumers prolonged experience in using particular technology and strengthened as result of repeated behaviour [79]. Majority of the studies that did not utilize ‘habit’ were those that conducted their research on mobile technologies. The studies that omitted ‘habit’ dealt with technologies in introduction stage of product life cycle and felt consumers did not have enough experience to formulate habitual behaviour for technology under investigation. Thus, it was more appropriate for them to measure behavioural intention than use behaviour. However, consumers tend to form habit after using technology for prolonged period and ‘habit’ is a critical factor in predicting the use of technology rather than its initial acceptance [7, 79]. This was quite evident as 13 out of 23 studies (52%) that operationalized ‘habit’ in their research model employed use behaviour as their outcome variable against 10 out of 43 (23%) non-habit related studies.

No reason emerged as the top category among studies that did not utilize ‘habit’ with 28 out of 43 studies (65%) not providing any reason for exclusion. 12 out of the remaining 15 studies excluded ‘habit’ since they examined users of “new technology at early stage of adoption with three studies explicitly recommending use of habit construct in future studies. The reason for final three studies to exclude ‘habit’ were: (1) Alternative construct, (2) Extensive usage of habit and 3) Out of scope across various research context. Researchers should be cautious in using prior experience as a proxy to measure habit. Although experience in using technology is necessary to form habit, experience alone is not a sufficient condition for the formation of habit. Moreover, experience in using technology over passage of time can form differing level of habits among users depending upon user’s familiarity and degree of interaction with target technology [3].

In terms of studies that used ‘habit’, it mostly served as antecedent of BI (18 studies) and UB (13 studies). The path relationships  $HA \rightarrow BI$  and  $HA \rightarrow UB$  were together found insignificant only in three studies. Two of these insignificant studies were on mandatory settings rather than on voluntary settings such as: (1) Examination of student’s use of learning management system [58] and (2) Students’ acceptance of learning management software (Moodle) [66]. The plausible reason for insignificant relationships of ‘habit’ in such mandatory settings could be because students might have performed educational activities out of compulsion and social pressure [58], which is driven by extrinsic motivation rather than intrinsic motivation. This reveals mandatory settings can enable user to gain experience of operating technologies that not necessarily translate into habit which occurs more naturally in voluntary settings. Whereas, habit was used as an antecedent of four other dependant variables such as: (1) Performance expectancy (PE), (2) Consumerization (CN), (3) Perceived relevance (PR) and (4) Degree of co-creation (DCC) on one instance each and the relationship was found significant on all four variables.

Furthermore, meta-analysis results revealed only two 'habit' based relationships i.e.  $HA \rightarrow BI$  and  $HA \rightarrow UB$  to be significant at  $p < 0.000$  level. This underscores the dominance of BI and UB as predictors in understanding consumer technology acceptance and use. However, all the four moderator relationships of habit with BI and UB were found to be insignificant in meta-analysis. This is a significant departure from the original UTAUT2 model of Venkatesh, Thong [3] that had significant results for moderators' (i.e. age, gender, experience) influence on  $HA \rightarrow BI$  and  $HA \rightarrow UB$ . To that extent Venkatesh et al. [4] omitted the moderators' effects in their multi-level framework for measuring individual technology acceptance and use. They rather merged moderators into individual level contextual factors including user attributes and prescribed them to be used based on context [4]. Finally, 'habit' apart from being an antecedent to dependant variables also have antecedents of its own with all-significant effects. The antecedents of 'habit' need further examination so that practitioners can leverage them in order to build habit among technological users.

## 5 Conclusion

This study aimed to understand appropriateness of the construct 'habit' among the UTAUT2 based empirical studies. The findings revealed 43 out of 66 studies did not operationalize 'habit' in their study with all of them focusing on introduction stage of product life cycle having early adopters as their users. Hence, 'habit' is not an appropriate construct in examining new to market technologies where sufficient time has not elapsed for users to develop habitual behaviour. In addition, 'habit' is not an appropriate construct in mandatory settings such as student's use of learning management system where they are compelled to use technology driven by extrinsic motivation. Moreover, the meta-analysis results confirmed the effects of moderators to be completely insignificant on 'habit' based relationships with its dependant variables. Future studies should be cautious in operationalizing 'habit' and their moderators in the above-mentioned scenarios. Further, studies should refrain from using experience as proxy for measuring 'habit'. Since experience is a necessary but not a sufficient condition to form 'habit'. However, 'habit' emerged as a very strong predictor of BI and UB. 'Habit' is a valid construct for studies to examine products after introduction stages in the voluntary settings driven through consumer intrinsic motivation. This study found five antecedents of 'habit' all having significant impact, future research should focus on these antecedents to understand its impact as a key predictor of technology use. Finally, none of existing studies used longitudinal data collection method to measure the impact of habit construct in their structural model. Since habitual behaviour for a technology develops after prolonged usage future studies should focus on longitudinal data collection for measuring habit.

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