Human Technology
ISSN: 1795-6889
https://ht.csr-pub.eu
Volume 20(1), May 2024, 93-113

USING THE UTAUT2 COMPONENTS AND TRUST TO PREDICT CONSUMER ACCEPTANCE OF SMART HOME TECHNOLOGY: A SYSTEMATIC REVIEW

Nejc Plohl
University of Maribor
Slovenia
ORCID 0000-0001-9936-4039

Nenad Čuš Babič
University of Maribor
Slovenia
ORCID 0000-0002-3580-2068

Abstract: *While sales of smart home technology are increasing, some are still hesitant to use such products. These differences in smart home technology acceptance could potentially be explained with the extended Unified theory of acceptance and use of technology (UTAUT2). However, the explanatory power of UTAUT2 in this context is still relatively unclear, and additional extensions, such as the inclusion of trust, have been proposed recently. In this systematic review, we address this issue by synthetizing evidence from 32 articles dealing with the relationship between the UTAUT2 components, trust, and smart home technology acceptance. Our results reveal that the UTAUT2 components and trust are all consistently correlated with behavioral intentions. In contrast, multivariate results show that only performance expectancy, hedonic motivation, and price value are consistent predictors of technology acceptance. In the discussion, we outline possible explanations for such results and highlight the limitations of our review.*

Keywords: *smart home technology, acceptance, unified theory of acceptance and use of technology 2, trust, review.*

DOI: https://doi.org/10.14254/1795-6889.2024.20-1.5

INTRODUCTION

Many years have passed since the introduction of smart home technology (Harper, 2003), with each year bringing new and unprecedented technological advances. Nowadays, smart home technology encapsulates numerous smart home devices (e.g., smart thermostats, smart lighting, and domestic robots) that can serve many different functions and thus lead to various health-related (e.g., detection of life-threatening events), environmental (e.g., reduction of energy consumption), financial (e.g., reduction of costs) and psychosocial benefits (e.g., decreased feelings of isolation; Marikyan et al., 2019). While recent statistics show that sales of smart home devices are proliferating worldwide (Strategy Analytics, 2019), suggesting that individuals increasingly recognize the potential of smart home devices to contribute positively to their well-being, some are still reluctant to use the technology (Clutch, 2019). In fact, another relatively recent survey of more than 2,000 households suggests that most people are still not interested in buying smart home devices at all (PricewaterhouseCoopers, 2016).

Several variables and broader theories have been considered to explain the diverse reactions of the general public, with one of the most recent and comprehensive theories being the extended Unified theory of acceptance and use of technology (UTAUT2; Venkatesh et al., 2012). This theory includes seven predictors that could explain considerable variance in the acceptance of smart home technology – performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, and habit. However, it could potentially benefit from another extension. Considering that even owners of smart homes have security/privacy concerns (YouGov, 2018) and that only a minority of consumers perceive smart home technology as trustworthy and safe (Accenture, 2019), special attention may need to be paid to factors such as trust that could mitigate security/privacy concerns and thus explain variance above and beyond the UTAUT2 model.

While both - the UTAUT2 model and trust - are increasingly being studied in the context of smart home technology, the literature has so far not exceeded the level of individual studies. The objective of this review is hence to conduct a systematic search of the relevant literature and synthesize the available evidence on the relationship between these (potential) predictors and acceptance of smart home technology.

Smart Home Technology

There are various definitions of smart home technology that can be categorized into two groups – definitions that focus on the nature of smart homes and definitions that are more service/context-oriented (Marikyan et al., 2019). One of the earliest and most influential definitions covering the nature of smart homes is that of Aldrich (2003), who defined smart homes as residences equipped with computing and information technology that address the needs of the occupants by providing comfort, convenience, security, and entertainment through the management of technology within the home and connections to the outside world. On the other hand, service/context-oriented definitions tend to be less broad and emphasize the specific benefits and uses of smart home technology. One such example is the definition proposed by Reinisch and colleagues (2011), which focuses on energy consumption. According to these authors, intelligent houses are equipped with several cooperating devices that constitute a homogeneous system that monitors electronic appliances and promotes efficient energy management and sustainability.

A recent literature review (Marikyan et al., 2019) suggests that different definitions overlap. Specifically, they generally emphasize three characteristics of smart homes, namely: technology (i.e., hardware and software components, including sensors, that are interconnected, integrated into home appliances and can detect changes in human behavior and other stimuli), services (e.g., remote controlling of household appliances, managing energy use, supporting and assisting users in their daily routine, anticipating and responding to users' needs), and the ability to satisfy users' needs (e.g., cost-efficiency, comfort, emotional needs, security, healthcare needs, quality of life, sustainability). These common components of definitions can be integrated into a comprehensive definition, which will guide the present systematic review: "*The smart home represents smart devices and sensors that are integrated into an intelligent system, offering management, monitoring, support, and responsive services and embracing a range of economic, social, health-related, emotional, sustainability and security benefits*" (Marikyan et al., 2019, pp. 144). It is worth noting, however, that some authors still point to the presence of definitional confusion over what counts as smart home technology (Sovacool & Furszyfer Del Rio, 2020).

The Unified Theory of Acceptance and use of Technology-2

Numerous theoretical models have been developed to explain the acceptance and use of information technology, most notably the Technology acceptance model (TAM; Davis, 1989), the Unified theory of acceptance and use of technology (UTAUT; Venkatesh et al., 2003), and most recently, the extended Unified theory of acceptance and use of technology-2 (UTAUT2; Venkatesh et al., 2012). While all of these models apply to information technology in the broadest sense, they all have their place in the specific context of smart home technology as well.

First, the UTAUT2 incorporates all four UTAUT constructs (i.e., performance expectancy, effort expectancy, social influence, and facilitating conditions) that influence behavioral intentions to use technology and actual technology use. *Performance expectancy* refers to the degree to which using technology will provide benefits to consumers in performing certain activities; *effort expectancy* refers to the level of ease associated with consumers' use of technology; *social influence* refers to the extent to which consumers perceive that important others believe they should use a particular technology; and *facilitating conditions* refer to consumers' perceptions of the resources and support available to use technology (Brown & Venkatesh, 2005; Venkatesh et al., 2003, 2012). Per the UTAUT model, the first three constructs predict behavioral intentions to use technology, and the intentions, together with facilitating conditions, predict the use of technology (Venkatesh et al., 2012).

Second, the UTAUT2 extends the UTAUT model by transferring it from organizational contexts (where it first originated) to the context of consumer use and by adding three additional constructs (i.e., hedonic motivation, price value, and habit). *Hedonic motivation* refers to the fun or pleasure derived from using technology (Brown & Venkatesh, 2005; Venkatesh et al., 2012); *price value* refers to consumers' cognitive tradeoff between the perceived benefits of using technology and the monetary cost associated with technology use

(Dodds et al., 1991; Venkatesh et al., 2012); and *habit* refers to the extent to which an individual believes the technology use behavior to be automatic (Limayem et al., 2007; Venkatesh et al., 2012). The UTAUT2 model suggests that hedonic motivation and price value predict behavioral intentions, while habit predicts both behavioral intentions and technology use (Venkatesh et al., 2012).

The UTAUT2 offers a comprehensive and integrative approach (by incorporating the main explanatory variables of previous theoretical models on technology acceptance and use) and hence represents one of the dominant theoretical frameworks in this area of research (as shown by the sheer number of citations). Additionally, the model has proven to be valuable when examining the acceptance and use of technology in various contexts (Herrero et al., 2017; Tamilmani et al., 2020). For example, a recent meta-analysis incorporating the results of 60 studies has shown that the proposed UTAUT2 factors correlate with behavioral intentions and technology use in a hypothesized way, with the strongest zero-order correlates and predictors of behavioral intentions to use technology being habit (r = .64, β = .27), performance expectancy (r = .62, β = .25) and hedonic motivation (r = .58, β = .25; Tamilmani et al., 2020).

Trust as an Additional Predictor of Technology Acceptance

Although the UTAUT2 is already an extension of earlier models and theories of technology acceptance, researchers often extend the UTAUT2 model even further by including additional variables such as trust, perceived risk, self-efficacy, attitudes, and personal innovativeness. Among these variables, trust is the one that is most commonly added to the UTAUT2, with studies generally showing that it is a significant predictor of behavioral intentions to use technology and actual technology use (Tamilmani et al., 2020). Trust has also been proposed as an important extension of the UTAUT2 in the specific context of smart consumer products and smart homes, as the lack of consumer trust in such products likely hampers their use diffusion and potential benefits (Michler et al., 2019). For example, Shuhaiber and Mashal (2019) argue that trust (together with awareness and perceived enjoyment) is an important personal factor that needs to be considered when predicting intentions to use smart home technology.

In general, trust can be defined as the intention to accept potential vulnerability based on positive expectations about a person or an institution (Dirks & Ferrin, 2002) or as the belief that the other party will behave in a socially responsible manner and meet the expectations of the trusting party without exploiting their vulnerability (Gefen, 2000; Mayer et al., 1995). Similarly to other areas of research (e.g., consumers' acceptance of e-commerce; Pavlou, 2003), we argue that consumers' trust in smart home technology could thus be a key element in helping consumers overcome risk concerns and reduce the uncertainty facing the adoption of smart homes (Shuhaiber & Mashal, 2019).

Aims of the Review

In this paper, we present a systematic literature review that synthesizes the available evidence on the relationship between the UTAUT2 components (i.e., performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, habit) as well as trust on one hand and consumer acceptance of smart home technology (i.e., intentions to use smart home technology, use of smart home technology) on the other. The hypothesized relationships considered in the review are depicted with regular lines in Figure 1 below. The dashed lines indicate relationships initially searched for but not examined in this review due to the low number of research articles.

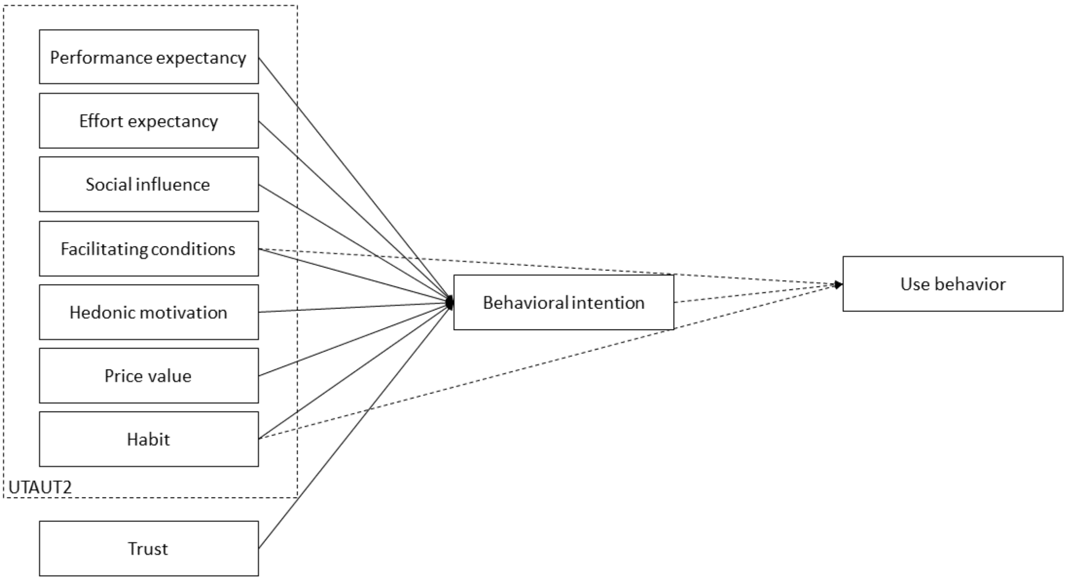

Figure 1. UTAUT2 factors and Trust as Predictors of Behavioral Intentions.

METHODS

This systematic literature review is guided by the Cochrane method, and the search method and findings are presented in accordance with the relevant sections of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Higgins & Green, 2008; Moher et al., 2009). The protocol used to conduct this review is described in detail in the following paragraphs.

Eligibility Criteria

In order to be considered for inclusion in the systematic literature review, the studies had to 1) be classified as articles or conference proceedings (as opposed to, for example, reviews), 2) be available in English, and 3) be fully published (i.e., preprints and other unpublished articles were not considered). Studies were then excluded from the present review if: 1) they were not empirical (i.e., no quantitative evidence obtained by collecting data on human subjects), 2) they did not address consumer acceptance but other forms of acceptance instead (e.g., in the organizational context), 3) the technology in focus did not fit our definition of smart homes, 4) they did not report on at least one relationship from Figure 1, and 5) we were unable to access the full text of the article. In cases where the entry was not a duplicate per se, but the authors reported identical results, only one version was included in the review. In a similar vein to other systematic reviews and meta-analyses that focused on UTAUT2 factors (Taiwo & Downe, 2013), the included studies had to involve empirical testing of UTAUT2 directly or indirectly using the same operationalized constructs as the original model (i.e., same name, a direct reference to UTAUT2 in the definition of the construct or use of previous UTAUT2 questionnaires).

Information Sources and Search Strategy

Two databases, which complement each other well, SCOPUS and Web of Science (Burnham, 2006), were used to identify the relevant articles. The main search was carried out on September 1st, 2022, using a search strategy that combined different *predictors of interest*, indicators of *acceptance*, and *smart home technology*. The terms later combined into a nested format and searched for in titles, abstracts, and keywords are shown in Table 1 below. In particular, terms within the same block were combined using the OR operator, and different blocks were combined using the AND operator. In order to identify potential additional articles, different combinations of search terms were also run in Google Scholar, as the use of Google Scholar can lead to the identification of additional unique entries (Martín-Martín et al., 2018). In Google Scholar, we also used the cited reference search for the article by Venkatesh and colleagues (Venkatesh et al., 2012) and were particularly focused on identifying articles specifically related to smart home technology.

Table 1. The Terms Derived From the Concepts

Predictors	Acceptance	Smart homes
"performance expectancy"	accept*	"smart home"
"effort expectancy"	adopt*	"smart house"
"social influence"	intention*	"home automation"
"facilitating condition"	"use behavior"	"smart building*"
utaut	use	
"hedonic motivation"		
"price value"		
habit		
utaut2		
utaut-2		
trust		

Study Selection

The search strategy described above was applied to both databases, and the identified records were downloaded and merged into a single Microsoft Excel spreadsheet. Duplicate articles (i.e., those identified by the search strategy in both databases) were eliminated. Additional articles (i.e., those not yet identified by the search strategy in Scopus and Web of Science) were also added to the same spreadsheet. In the next step, the titles and abstracts of the records were carefully screened. Those articles deemed ineligible (based on their title or abstract) were excluded, and the remaining articles, specifically those deemed eligible and those that did not contain enough information for a decision to be made, were again screened based on the full text of the article. Eligible articles were included in the final review. Ineligible articles were formally excluded (with reasons for exclusion noted).

Data Collection

A data extraction table was created to aid the synthesis of the eligible studies. The table included publication characteristics of the articles (authors, year, country), sample characteristics (number of participants, whether the participants belonged to any specific groups, age, gender, experience with smart home devices), the instruments used to measure the predictors and their internal consistency (Cronbach's α), the instruments used to measure indicators of technology acceptance and their internal consistency (Cronbach's α), whether the study referred to smart home technology in general or any specific category of smart home devices, the main findings of the studies (univariate and multivariate statistical results expressed by correlation coefficients and path/regression coefficients), and an extra column for notes.

RESULTS

Study Selection

The main and additional searches yielded a total of 226 unique articles. After the titles and abstracts were screened, 68 articles (30.1%) still fit the criteria. Of these, 32 articles (14.2%) met the inclusion criteria and were hence included in the final synthesis. As some articles include several studies, the final number of studies is higher (n = 36). The specifics of the search selection process are outlined in Figure 2 below.

Study Characteristics

As can be seen in Table 2, all included articles have been published since 2010, and a majority (84.4%) have been published in the last five years, indicating a sharp increase of research articles in this area. Most of the articles (93.8%) were published in JCR/Scopus-indexed journals and conference proceedings. Studies were conducted on participants with different cultural backgrounds; in particular, twelve studies (33.3%) were conducted in European countries, eleven studies (30.6%) in Asian countries, nine studies (25.0%) in the United States, two studies in Australia (5.6%), and one study in South America (2.8%). Moreover, one study (2.8%) combined samples from both Europe and Asia. The minimum sample size among the included studies was 53 and the maximum 1226, with the average study including 386.11 (SD = 304.25) participants. Most of the studies (69.4%) used general population samples, and the rest were performed on aging adults (22.2%) or student participants (8.3%). All studies that report data regarding gender used mixed-gender samples (88.9% of all included studies), and the studies differed substantially in whether the participants had any prior experience (although such data were often missing).

In most cases, the authors did not use the entire UTAUT2 model in their research but rather focused on a limited number of UTAUT2 factors while simultaneously adding other variables into the model. The most studied UTAUT2 factors are those appearing in the initial UTAUT model (Venkatesh et al., 2003) – performance expectancy with 28 studies, effort expectancy with 25 studies, social influence with 24 studies, and facilitating conditions with 18 studies. Among the variables that first appeared in the UTAUT2 model (Venkatesh et al., 2012), the most frequently examined variables are price value (14 studies) and hedonic motivation (13 studies), followed by habit (7 studies). The additional predictor included in this review, trust, was explored in 14 studies. As for the dependent variables, the studies focused almost exclusively on behavioral intentions (i.e., intentions to adopt/accept smart home technology). In fact, as only a few studies included in the synthesis also reported associations between predictors of interest and actual use behavior, such relationships are not considered in the present systematic review.

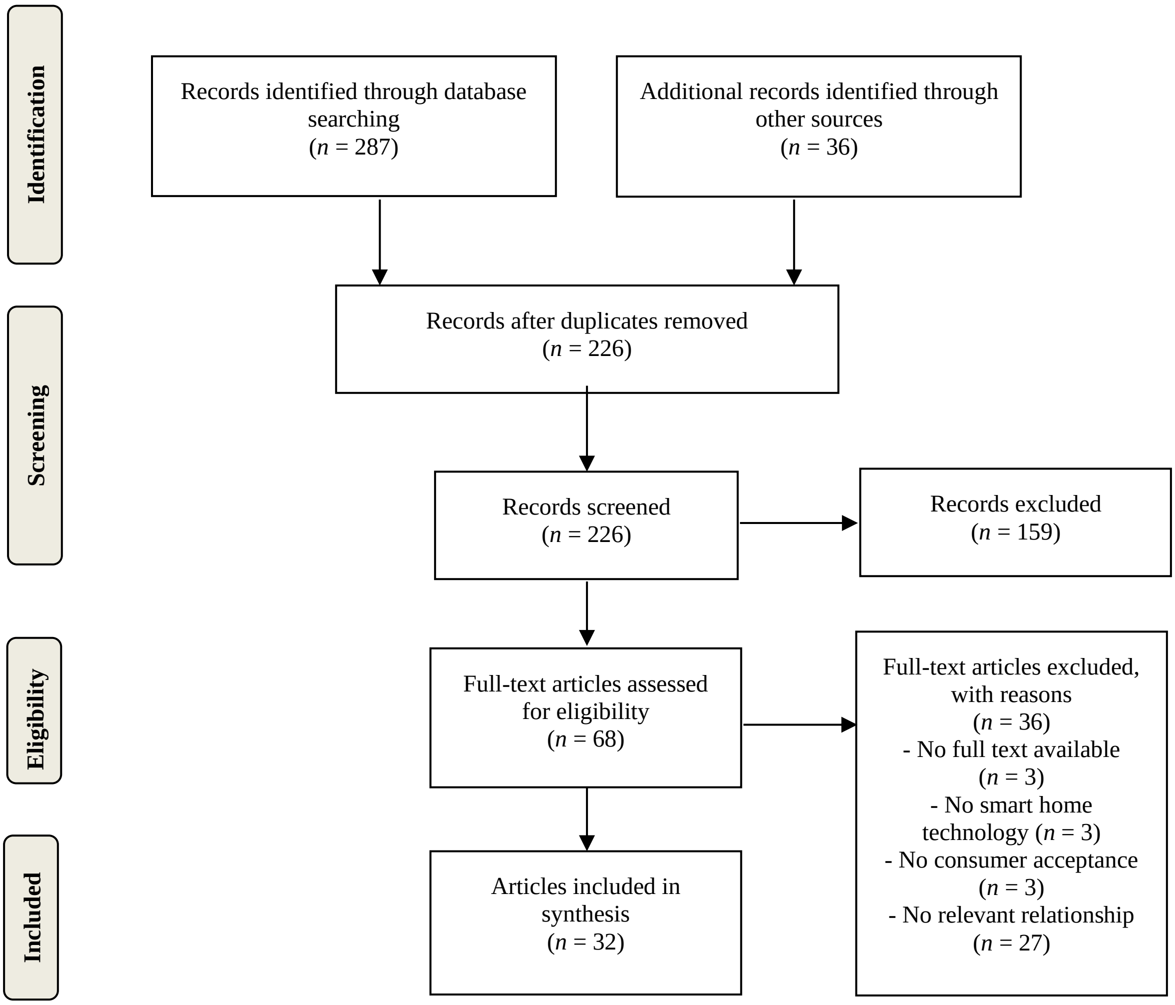

Figure 2. PRISMA Flowchart Depicting the Study Selection Process

In terms of the scales used, there seems to be no clear consensus; various scales - often self-construed or considerably adapted from previous scales, especially the one by Venkatesh and colleagues (2003, 2012) - were used to measure the constructs of interest. The internal reliability of the scales that were employed was, when reported, generally sufficient (Cronbach's $\alpha \geq .70$), except for the scales used to measure social influence in one of the included studies (Gumz et al., 2022) and facilitating conditions in two of the included studies (Baudier et al., 2020; Heerink et al., 2010). Lastly, considering the types of smart home devices included in the review, the largest share of studies (38.9%) investigated smart home devices in general, followed by studies focusing on energy management smart home devices (25.0%; e.g., smart thermostats, smart lighting, energy management services), health-related smart home devices (16.7%; e.g., smart healthcare, telehealth), and smart speakers and voice-based digital assistants (13.9%). The remaining studies (5.6%) examined assistive robots, screen agent technology, and smart interactive home textiles. A detailed table with study characteristics can be found in the Appendix.

Table 2. A List of All Included Articles.

#	Authors	Year	#	Authors	Year
1	Heerink et al.	2010	17	Chen et al.	2020
2	Kohnke et al.	2014	18	Mamonov & Koufaris	2020
3	Ahn et al.	2016	19	McCloskey & Bennet	2020
4	Cimperman et al.	2016	20	Wang et al.	2020
5	Moon & Hwang	2016	21	Alkawsi et al.	2021
6	Brauner et al.	2017	22	Andini & Adiwijaya	2021
7	Chen et al.	2017	23	Canziani & MacSween	2021
8	Aldossari & Sidorova	2018	24	Oyinlola Ayodimeji et al.	2021
9	Pal et al.	2018	25	Shanthana Lakshmi & Gupta	2021
10	Etemad-Sajadi & Gomes dos Santos	2019	26	Vimalkumar et al.	2021
11	Gu et al.	2019	27	Zaharia & Würfel	2021
12	Juric & Lindenmeier	2019	28	Grosse-Kreul	2022
13	Mashal & Shuhaiber	2019	29	Gumz et al.	2022
14	Nikou	2019	30	Maswadi et al.	2022
15	Shuhaiber & Mashal	2019	31	Meyer-Waarden et al.	2022
16	Baudier et al.	2020	32	Sorwar et al.	2022

Major Findings

Performance Expectancy

Twenty-eight studies explored the relationship between performance expectancy (PE) and the intention to accept smart home technology. Among these studies, seventeen report correlational data, with results clearly and consistently showing that PE is significantly correlated with behavioral intentions, regardless of the sample characteristics, the measure used, and the type of smart home devices. While the strength of the correlations varies to some extent, fourteen (82.4%) studies indicate a strong (and positive) correlation ($r \geq .50$).

PE was used as a direct predictor of behavioral intentions in twenty-three studies measuring these two variables. In a similar vein to correlational data, PE generally emerged as a significant predictor of behavioral intentions despite appearing in regression/structural models that included a wide array of additional predictors. Among the studies in our review, only three (13.0%) found that PE was not a significant predictor of the intention to use this technology. Two of these studies were conducted in the context of smart meters and one in the context of smart interactive home textiles. Overall, the regression/path coefficients varied considerably in the included studies, with most (43.5%) reporting strong β coefficients ($\geq .30$).

Effort Expectancy

Twenty-five studies investigated the relationship between effort expectancy (EE) and the intention to accept smart home technology, but only sixteen of these studies report correlational data. The results of these studies are highly consistent, with all studies but one showing that EE is significantly correlated with behavioral intentions. The one study that stands out in terms of its findings is the study by Kohnke and colleagues (2014), in which the acceptance of telehealth equipment was investigated on the sample of elderly patients, clinicians, and agency leadership personnel (it should be noted that group membership was not a significant predictor of behavioral intentions). Overall, the strength of the correlations varied substantially between the studies, with eight studies (50.0%) showing strong associations between the variables, four studies (25.0%) showing intermediate associations ($.30 < r < .50$) and four studies (25.0%) showing weak associations ($r \leq .30$).

Furthermore, eighteen studies examined the hypothesis that EE is a direct predictor of the intention to accept smart home technology. Slightly more than half of the studies (55.6%) found that EE is not a unique predictor of behavioral intentions when included in the regression/structural model together with other UTAUT2 factors and/or other variables. On the other hand, eight studies (44.4%) report that EE significantly predicts behavioral intentions, but only seven found a significant relationship in the expected direction (the study by Andini and Adiwijaya, 2021, surprisingly found that higher perceived effort needed to use technology increases behavioral intentions). Although the seven studies reporting significant findings in the expected direction are based on different sample sizes and participants from different countries, four were conducted on older participants (the remaining were conducted on general samples and students). Overall, studies reporting regression/path coefficients mostly show weak β coefficients ($\beta \leq .15$).

Social Influence

Twenty-four studies considered social influence (SI) as a correlate and/or predictor of the intention to adopt smart home technology. Sixteen of these studies provide correlational data. Their results consistently show that, regardless of different sample and study characteristics, SI is significantly correlated with the intention to accept smart home technology. While the strength of the correlations varies, the majority of correlation coefficients (62.5%) indicate a strong relationship ($r \geq .50$) between the variables.

Twenty studies also examined whether SI is a direct predictor of behavioral intentions in multivariate models. In the case of regression/structural equation modeling analyses, the results are somewhat mixed; eleven studies (55.0%) suggest that SI is a unique predictor of the intention to accept smart home technology, while nine (45.0%) studies suggest that SI is not a significant predictor of behavioral intentions when other variables are included in the regression/structural model. The studies that do not report significant regression/path coefficients differ in many aspects, but a relatively common denominator is that six out of nine studies used older samples. Overall, the majority (45.0%) of studies only found a weak predictive value of SI.

Facilitating Conditions

Eighteen studies explored the relationship between facilitating conditions (FC) and the acceptance of smart home devices. Within this array of research articles, thirteen studies reported correlational data. These studies almost unanimously show that FC are a significant correlate of intentions to accept smart home technology. The only exception is the study by

Kohnke and colleagues (2014), which investigated the acceptance of telehealth equipment on a sample of elderly patients, clinicians, and agency leadership personnel. Overall, six studies (46.2%) imply a strong relationship between FC and behavioral intentions, five studies (38.5%) imply an intermediate relationship, and two studies (15.4%) a weak relationship between these two variables.

FC were used as a direct predictor of behavioral intentions in twelve studies. The results of these studies predominantly show that facilitating conditions are not a significant predictor of intentions to accept smart home devices. In fact, only four studies (33.3%) found FC to be a significant predictor of smart home acceptance. Two of the studies (Ahn et al., 2016; Cimperman et al., 2016) that show significant results were carried out on samples consisting exclusively or predominantly of older participants, while the remaining two studies (Alkawsi et al., 2021; Vimalkumar et al., 2021) were conducted among the general population. Moreover, two of these studies investigated the acceptance of energy management smart home devices, while the remaining two studied health-related smart home technology and voice-based smart home technology. Additionally, in most studies (66.7%), the regression/path coefficients point to a weak association between the variables.

Hedonic Motivation

Thirteen studies investigated the relationship between hedonic motivation (HM) and behavioral intentions. Seven of them report correlational data, with the results consistently showing that HM correlates significantly with behavioral intentions related to the acceptance of smart home technology. Whereas correlation coefficients spanned from intermediate to strong, the majority of the studies (85.7%) showed values that can be described as strong.

Additionally, twelve studies tested whether HM directly predicts the intention to accept smart home technology. Most of these studies (75.0%) report significant regression/path coefficients, suggesting that HM is a unique predictor of behavioral intentions when other variables are entered into the model. It is worth noting that the three studies that did not find HM to be a significant predictor (Baudier et al., 2020; Grosse et al., 2022; McCloskey et al., 2020) were all conducted in western countries (France, United States, Germany), but tackled different smart home technologies (energy management, smart speakers, general). They also employed different samples (two were based on general samples and one on students). Overall, the regression/path coefficients varied in the included studies, but the largest share of studies (55.6%) reports a strong association between HM and smart home acceptance.

Price Value

Fourteen studies considered price value (PV) as a correlate and/or predictor of the intention to adopt smart home technology. Ten of these studies provide correlational data, and the results highly consistently (90.0%) show that PV correlates significantly with behavioral intentions. The only exception is the study by Nikou (2019), which was conducted in the context of general smart home technology. Overall, the power of correlation coefficients ranged from weak to strong, with the same percentage (40.0%) of studies suggesting a weak and intermediate association, while only 20.0% of studies yielded strong correlation coefficients between PV and behavioral intention.

Twelve studies additionally tested multivariate regression/structural models with PV included as a direct predictor of behavioral intentions. The results predominantly (75.0%) show that PV uniquely predicts the intention to accept smart home technology (in the expected direction). The remaining three studies, however, did not find PV to be a significant predictor of behavioral intentions when other variables are entered into the model. All studies (Baudier et al., 2020; Chen et al., 2017; Mamonov & Koufaris, 2020) that do not report significant results were conducted in western countries (USA, France) on participants who were, on average, relatively young and without any prior experience with smart home technology. In terms of the content, they were either concerned with smart meters/thermostats (Chen et al., 2017; Mamonov & Koufaris, 2020) or smart home objects in general (Baudier et al., 2020). As for the strength of path/regression coefficients, most studies (66.7%) report weak associations between variables of interest.

Habit

Seven studies examined the relationship between habit (HA) and behavioral intentions in the context of smart home technology acceptance. All seven studies report correlational data, with their results consistently showing that HA correlates significantly with intentions to accept smart home technology. However, the strength of the association varied considerably between the studies, with five studies (71.4%) showing a strong association and two studies (28.6%) showing a weak association.

All seven studies also report multivariate data, with the predominant conclusion being that HA is a significant predictor of smart home acceptance. The two non-significant results both stem from the study by Chen and colleagues (2020), which was conducted on two separate samples (American and Japanese participants with no prior experience) and investigated the role of different factors in predicting the adoption of home energy management systems. Overall, the β coefficients ranged from strong (57.1%) to weak (42.9%). It is worth noting that the conceptualization of HA differed between the studies. This is further discussed in the next section.

Trust

Fourteen studies investigated the relationship between trust (TR) and the intention to accept smart home technology. Twelve of them report correlational data that capture the association between the two variables. The results of these studies are very consistent, as they all concluded that TR and acceptance of smart home technology are significantly correlated. The strength of the correlation coefficients varied from weak to strong, with the largest share of studies (41.7%) concluding that trust is strongly associated with behavioral intentions.

Eleven studies have also investigated the possibility of TR being a unique predictor of behavioral intentions. Among these studies, more than half (54.3%) report that TR is indeed a significant predictor of intentions to accept smart home technology, but the relationship is negative in one case. The remaining five studies did not find TR to be a significant predictor of behavioral intentions. All studies that did not report a significant role of TR (Chen et al., 2020; Etemad-Sajadi & Gomes Dos Santos, 2019; Heerink et al., 2010; Sorwar et al., 2022) were conducted on samples that were exclusively or predominantly older. The included studies differed considerably in the way they defined and operationalized trust, which is discussed in the next section. Overall, most studies (63.6%) found that the strength of association between trust and intention to accept smart home technology is intermediate in strength.

Table 3. Quantitative Synthesis Based on All Studies Included in the Review.

Predictor	*N*	Univariate results (*r*)						Multivariate results (β)					
		n	Sig	Weak	Intermediate	Strong	Str. unclear	*n*	Sig	Weak	Intermediate	Strong	Str. unclear
PE	28	17	17	1	2	14	0	23	20	3	9	10	1
EE	25	16	15	4	4	8	0	18	8[a]	7	4[a]	3	4
SI	24	16	16	1	5	10	0	20	11	9	7	4	0
FC	18	13	12	2	5	6	0	12	4	8	2	2	0
HM	13	7	7	0	1	6	0	12	9	4	3	5	0
PV	14	10	9	4	4	2	0	12	9	8	1	1	2
HA	7	7	7	2	0	5	0	7	5	3	0	4	0
TR	14	12	12	3	4	5	0	11	6[a]	4	7[a]	0	0

Notes. Sig indicates the number of studies that showed significant results. Univariate results criteria: weak ($r \leq .30$), intermediate ($.30 < r < .50$), strong ($r \geq .50$). Multivariate results criteria: weak ($\beta \leq .15$), intermediate ($.15 < \beta < .30$), strong ($\beta \geq .30$). [a] One study showed results in an unexpected direction (different valence).

DISCUSSION

The present study aimed to systematically review the existing research articles that investigated the relationship between the UTAUT2 components and trust on the one hand and the acceptance of smart home technology on the other. The majority of studies found that all UTAUT2 components are significantly correlated with the acceptance of smart home technology. However, the strength of the associations differed considerably between the components, with performance expectancy, social influence, facilitating conditions, hedonic motivation, and habit standing out as the strongest correlates of smart home technology acceptance. These results are relatively in line with a broader meta-analysis of UTAUT2, which has also concluded that the components of UTAUT2 are generally significantly correlated with behavioral intentions, and identified habit, performance expectancy, and hedonic motivation as the strongest correlates of behavioral intentions (Tamilmani et al., 2020). However, there is some discrepancy regarding the role of social influence and facilitating conditions; these variables emerged as one of the strongest correlates of behavioral intentions in our review but were found to be one of the weakest UTAUT2 correlates of behavioral intentions in the meta-analysis conducted by Tamilmani and colleagues (2020). The observed difference could potentially be attributed to the fact that the smart home technology market is still at a relatively early stage, in which many potential users lack enough knowledge to rely solely on their own skills and make an independent decision about using it. As such, they might be particularly prone to basing their decisions on the opinions or suggestions of others and looking for other resources and support available (Yang et al., 2016).

Furthermore, the present review also reveals that trust is a consistently significant correlate of behavioral intentions. This finding is new; while previous reviews and meta-analyses have identified trust as one of the most common extensions of UTAUT2 (Tamilmani et al., 2020), to our knowledge, no review has explicitly addressed this relationship. Such results support the notion that consumers who trust smart home technology (or the utilities behind it) are also more likely to accept it. A closer examination, however, reveals considerable variance in the strength of the associations, which could be a result of different definitions of this construct. Weak associations were primarily found in studies that focused on trust in utility companies, which defined trust as, for example, "*the extent that home energy management system users believe utilities or energy providers are honest, dependable, and can reliably provide quality services*" (Chen et al., 2020, pp. 4). In contrast, strong associations were primarily found in studies that focused on trust in *technology* rather than the utilities behind the technology, with a common element of such definitions being the security aspect (e.g., Pal et al., 2018).

When it comes to the predictive role of UTAUT2 components and trust, the results are less uniform and clear; only performance expectancy stands out as a highly consistent predictor of behavioral intentions, followed by hedonic motivation and price value that emerged as significant predictors of smart home technology acceptance in 75% of the included studies. First, the proportion of significant multivariate results in our review is lower compared to the results of the recent general meta-analysis on UTAUT2 (Tamilmani et al., 2020); more precisely, Tamilmani and colleagues (2020) report that the UTAUT2 components were significant predictors of behavioral intentions in 72.8% of all relevant cases, while a comparable statistic is at 60.9% in our study. This could be interpreted in several ways. Some of the UTAUT2 components might be less important in this specific context, which would suggest omitting such components (and perhaps replacing them with other variables that could explain a unique portion of the variance). In contrast, it is also possible that the models in this specific context often contain overlapping variables as predictors, making some of the UTAUT2 components seem redundant. Second, the strength of the regression coefficients was generally weak to intermediate, which is largely in line with previous findings in other contexts (Tamilmani et al., 2020). However, despite relatively low regression weights, coefficients of determination (R^2) for the full models, when available, were generally relatively high (mostly above .50). Third, when comparing the importance of different predictors, the context of smart home technology again seems to deviate slightly from information technology in general (although there are also several similarities, e.g., the important predictive role of performance expectancy and hedonic motivation). Notably, price value was among the weakest predictors of behavioral intentions in the meta-analysis (Tamilmani et al., 2020) but is among the more consistent predictors in our review set in the specific context of smart home technology. The particularly important role of price value observed in our systematic review may be attributed to the specific characteristics of the supporting studies (e.g., age; research generally shows high importance of price value among older people; Chen & Chan, 2011). It should be noted, however, that while price value was a relatively consistent predictor of behavioral intentions, it was still a weak predictor in most instances. Finally, trust was a significant predictor of behavioral intentions (in the predicted way) in only five of the eleven studies that examined this relationship, and the regression coefficients were weak to intermediate. As such, it is difficult to determine its unique importance when studying smart home technology acceptance and even more troublesome to make conclusions regarding the incremental value of trust (as an added component to the UTAUT2), especially since none of the individual studies used all UTAUT2 components as well as trust as predictors of technology acceptance. The role of trust hence remains somewhat ambiguous.

Taken together, while correlational results strongly support the notion that the UTAUT2 components and trust are important correlates of smart home technology acceptance, multivariate data provide more limited evidence; the only consistently significant predictors of technology acceptance in multivariate models are performance expectancy, hedonic motivation, and price value, and the regression weights for all included variables were mainly weak to intermediate. While such findings still provide evidence-based justification for the use of the UTAUT2 model (and trust), they also point to the possibility that the UTAUT2 is still not comprehensive enough and/or that some of the components included in this review are redundant because they do not explain unique variance in behavioral intentions to a high enough degree. It is hence possible that the UTAUT2 may indeed need another extension in the smart home context, but it could perhaps also use some reduction in this context (e.g., by removing effort expectancy and facilitating conditions from the models), at least when answering certain research questions among certain population subgroups.

Although the present study did not focus on the role of moderators proposed by the UTAUT2 (i.e., age, gender, experience) or other potential moderators, such data were collected, revealing some associations that could be further explored in future studies. With the exception of performance expectancy, all variables considered in this review showed considerable variability between the studies, indicating the presence of moderators that determine the strength of the association between predictor variables and the acceptance of smart home technology. Based on our findings, one of the more prominent moderators in the context of smart home technology could be age; its potential importance surfaced in the case of effort expectancy (a significant predictor of behavioral intentions especially in samples consisting of older participants), social influence (not significant especially in samples consisting of older participants), facilitating conditions (significant especially in samples consisting of older participants), price value (not significant especially in samples consisting of younger participants), and trust (not significant especially in samples consisting of older participants). Other potential moderating variables (gender, previous experience, country) had a more minor role in reviewed articles; for example, our observations imply that the relationship between price value and smart home technology acceptance is less important in Western countries, but this needs to be explored further in future research.

In addition to the potential moderators, the strength of the associations between constructs also varied depending on how the authors defined them. Differences in conceptualizations were particularly prominent in the case of habit and trust (and, to a certain extent, facilitating conditions). Different definitions of trust have already been presented above, whilst the studies that investigated habit (similarly to other contexts, the inclusion of habit in the smart home context is relatively rare; Tamilmani et al., 2019) sometimes deviated considerably from its original conceptualization, especially when respondents had no prior experience with smart homes. For example, some authors define it in a way that is very similar to behavioral intentions (Baudier et al., 2020; example item: "*The use of smart home* *objects could become a habit for me*”), or refer to other similar habits, not necessarily habits related to the use of smart home technology in focus (Chen et al., 2020).

LIMITATIONS AND FUTURE DIRECTIONS

The results of the present systematic review are limited both by the shortcomings of the included studies as well as by the limitations of our review.

First, none of the individual studies included in our review entered all the variables of interest into the same multivariate model. Instead, the authors often focused on only a handful of UTAUT2 variables (and/or trust). Furthermore, they often included additional variables not considered in this review (e.g., personal innovativeness, perceived security, and techno-coolness). It is, therefore, difficult to compare regression coefficients, the strength of which, by definition, varies based on other predictors that appear in multivariate models. This also makes it difficult to draw a clear conclusion about the potential value of expanding UTAUT2 with trust. Second, our conclusions are somewhat limited due to the different conceptualizations and operationalizations of the studied constructs. In other words, the same predictor variables were defined and measured in very different ways. The differences in definitions were particularly prominent with facilitating conditions, habit, and trust, while other constructs (such as performance expectancy, effort expectancy, hedonic motivation, and price value) were defined more uniformly but were given different names (such as perceived usefulness, perceived ease of use, perceived enjoyment, and cost concerns derived from TAM and other models). As such, it was sometimes difficult to demarcate constructs and decide whether the studied construct meets our inclusion criteria. To some extent, the field seems to suffer from the so-called jingle-jangle fallacy, which refers to the false assumptions that two different things are the same because they bear the same name or that two almost identical things are different because they are labeled differently (Kelley, 1927). This problem is aggravated by the fact that authors mainly use self-construed scales that fit their definitions and research questions or adapt existing scales (sometimes without adequate justification) instead of using previously validated scales. While the reliability of self-construed scales was generally high enough when reported, the validity of such scales is not always self-evident. Third, while the included studies were mostly conducted on large samples (although this varies quite a lot between the studies), demographic data such as age (with a mean and standard deviation) and previous experience with smart home technology are often not reported thoroughly enough. While this does not necessarily affect our findings, it could be a critical limitation for future systematic theoretical reviews or meta-analyses focusing on the moderators of the relationship between UTAUT2 components, trust, and smart home technology acceptance. Finally, it is also noteworthy that some of the included variables (e.g., habit) have only been investigated in a few studies.

Moreover, the present systematic review is to some extent limited by our relatively dispersed focus; as we aimed to answer our research questions quite broadly, referring to smart home technology in general, our search strategy did not include any specific types of smart home technology or specific smart home technology products. Therefore, it is possible that some of the potentially relevant articles were overlooked. This could be addressed in the future by employing a more narrow and detailed focus. Furthermore, besides the already mentioned lack of systematic attention to moderators in the present review, studying mediators could also be useful to deepen our understanding of what drives the association between variables. In fact, it is possible that some of the variables considered in this review, in particular trust, may have a different role in models predicting the acceptance of smart home technology (e.g., trust as an indirect predictor instead of a direct one). This should be explored in the future. Finally, the present review lacks a proper quality assessment of the included studies. Such insights could help us further assess the validity of the findings obtained in individual studies and the validity of the derived synthesis.

CONCLUSIONS

This is the first systematic review that examined the relationship between the UTAUT2 components and their possible extension, trust, in the specific context of smart home technology. The evidence suggests that all included variables correlate with behavioral intentions to accept smart home technology. However, the multivariate results reveal that only performance expectancy, hedonic motivation, and price value are consistent, unique predictors of smart home technology acceptance across studies. Taken together, our findings thus illuminate the fact that the UTAUT2 and its' components should not be seen as the perfect and final recipe for explaining the different responses of the general public. Instead, it is likely that additional variables, such as more general psychological variables as opposed to variables specific to the technology at hand, will also need to be considered in the future. In a similar vein, it is likely that not all UTAUT2 components are needed to explain technology acceptance in the specific context of smart home technology. However, given the relatively small number of articles, their limitations, and other shortcomings of the review, this interpretation should be considered with caution.

REFERENCES

Accenture. (2019). *Consumer perceptions of smart home technology use worldwide as of 2019*. Statista. https://www-statista-com.ezproxy.lib.ukm.si/statistics/1075518/smart-home-technology-consumer-perception-worldwide/

Ahn, M., Kang, J., & Hustvedt, G. (2016). A model of sustainable household technology acceptance. *International Journal of Consumer Studies, 40*(1), 83–91. https://doi.org/10.1111/ijcs.12217

Aldossari, M. Q., & Sidorova, A. (2018). Consumer acceptance of internet of things (IoT): Smart home context. *Journal of Computer Information Systems*, 1–11. https://doi.org/10.1080/08874417.2018.1543000

Aldrich, F. (2003). Smart homes: Past, present and future. In R Harper (Ed.), *Inside the smart home* (pp. 17–39). Springer. https://doi.org/10.1007/1-85233-854-7

Alkawsi, G. A., Ali, N., Mustafa, A. S., Baashar, Y., Alhussian, H., Alkahtani, A., Tiong, S. K., & Ekanayake, J. (2021). A hybrid SEM-neural network method for identifying acceptance factors of the smart meters in Malaysia: Challenges perspective. *Alexandria Engineering Journal*, *60*(1), 227–240. https://doi.org/10.1016/j.aej.2020.07.002

Andini, N. D., & Adiwijaya, K. (2021). What factors do affect the adoption of internet of things (smart home) in Indonesia. *International Journal of Business and Technology Management, 3*(2), 84–97.

Baudier, P., Ammi, C., & Deboeuf-Rouchon, M. (2020). Smart home: Highly-educated students' acceptance. *Technological Forecasting and Social Change*, *153*, 119355. https://doi.org/10.1016/j.techfore.2018.06.043

Brauner, P., Van Heek, J., & Ziefle, M. (2017). Age, gender, and technology attitude as factors for acceptance of smart interactive textiles in home environments: Towards a smart textile technology acceptance model. In *ICT4AWE 2017 - Proceedings of the 3rd International Conference on Information and Communication Technologies for Ageing Well and e-Health*, (pp. 13–24). Springer Cham.

Brown, S. A., & Venkatesh, V. (2005). Model of adoption of technology in households: A baseline model test and extension incorporating household life cycle. *MIS Quarterly: Management Information Systems*, *29*(3), 399–426. https://doi.org/10.2307/25148690

Burnham, J. F. (2006). Scopus database: A review. *Biomedical Digital Libraries*, *3*, 1. https://doi.org/10.1186/1742-5581-3-1

Canziani, B., & MacSween, S. (2021). Consumer acceptance of voice-activated smart home devices for product information seeking and online ordering. *Computers in Human Behavior*, *119,* 106714. https://doi.org/10.1016/j.chb.2021.106714

Chen, C. F., Xu, X., Adams, J., Brannon, J., Li, F., & Walzem, A. (2020). When East meets West: Understanding residents' home energy management system adoption intention and willingness to pay in Japan and the United States. *Energy Research and Social Science*, *69,* 101616. https://doi.org/10.1016/j.erss.2020.101616

Chen, C. F., Xu, X., & Arpan, L. (2017). Between the technology acceptance model and sustainable energy technology acceptance model: Investigating smart meter acceptance in the United States. *Energy Research and Social Science*, *25*, 93–104. https://doi.org/10.1016/j.erss.2016.12.011

Chen, K., & Chan, A. H. S. (2011). A review of technology acceptance by older adults. *Gerontechnology*, *10*(1), 1–12. https://doi.org/10.4017/gt.2011.10.01.006.00

Cimperman, M., Makovec Brenčič, M., & Trkman, P. (2016). Analyzing older users' home telehealth services acceptance behavior-applying an Extended UTAUT model. *International Journal of Medical Informatics*, *90*, 22–31. https://doi.org/10.1016/j.ijmedinf.2016.03.002

Clutch. (2019). *33% of people plan to invest in a smart home device in the next 3 years, demonstrating the growth of IoT in the home*. https://www.prnewswire.com/news-releases/33-of-people-plan-to-invest-in-a-smart-home-device-in-the-next-3-years-demonstrating-the-growth-of-iot-in-the-home-300858930.html

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems*, *13*(3), 319–339. https://doi.org/10.2307/249008

Dirks, K. T., & Ferrin, D. L. (2002). Trust in leadership: Meta-analytic findings and implications for research and practice. *Journal of Applied Psychology*, *87*(4), 611–628. https://doi.org/10.1037/0021-9010.87.4.611

Dodds, W. B., Monroe, K. B., & Grewal, D. (1991). Effects of price, brand, and store information on buyers' product evaluations. *Journal of Marketing Research*, *28*(3), 307–319. https://doi.org/10.2307/3172866

Etemad-Sajadi, R., & Gomes Dos Santos, G. (2019). Senior citizens' acceptance of connected health technologies in their homes. *International Journal of Health Care Quality Assurance*, *32*(8), 1162–1174. https://doi.org/10.1108/IJHCQA-10-2018-0240

Gefen, D. (2000). The role of familiarity and trust. *Omega: The International Journal of Management Science*, *28*(6), 725–737. https://doi.org/10.1016/S0305-0483(00)00021-9

Große-Kreul, F. (2022). What will drive household adoption of smart energy? Insights from a consumer acceptance study in Germany. *Utilities Policy*, *75*. https://doi.org/10.1016/j.jup.2021.101333

Gu, W., Bao, P., Hao, W., & Kim, J. (2019). Empirical examination of intention to continue to use smart home services. *Sustainability*, *11*(19), 1–12. https://doi.org/10.3390/su11195213

Gumz, J., Fettermann, D. C., Sant'Anna, Â. M. O., & Tortorella, G. L. (2022). Social influence as a major factor in smart meters' acceptance: Findings from Brazil. *Results in Engineering, 15*. https://doi.org/10.1016/j.rineng.2022.100510

Harper, R. (2003). Inside the smart home: Ideas, possibilities and methods. In *Inside the Smart Home* (pp. 1–13). Springer. https://doi.org/10.1007/b97527

Heerink, M., Kröse, B., Evers, V., & Wielinga, B. (2010). Assessing acceptance of assistive social agent technology by older adults: The Almere model. *International Journal of Social Robotics*, *2*(4), 361–375. https://doi.org/10.1007/s12369-010-0068-5

Herrero, Á., San Martín, H., & Garcia-De los Salmones, M. (2017). Explaining the adoption of social networks sites for sharing user-generated content: A revision of the UTAUT2. *Computers in Human Behavior*, *71*, 209–217. https://doi.org/10.1016/j.chb.2017.02.007

Higgins, J. P., & Green, S. (2008). *Cochrane handbook for systematic reviews of interventions: Cochrane book series*. John Wiley and Sons. https://doi.org/10.1002/9780470712184

Juric, J., & Lindenmeier, J. (2019). An empirical analysis of consumer resistance to smart-lighting products. *Lighting Research and Technology*, *51*(4), 489–512. https://doi.org/10.1177/1477153518774080

Kelley, T. L. (1927). *Interpretation of educational measurements*. World Book Inc.

Kohnke, A., Cole, M. L., & Bush, R. (2014). Incorporating UTAUT predictors for understanding home care patients' and clinicians' acceptance of healthcare telemedicine equipment. *Journal of Technology Management and Innovation*, *9*(2), 29–41. https://doi.org/10.4067/S0718-27242014000200003

Limayem, M., Hirt, S. G., & Cheung, C. M. K. (2007). How habit limits the predictive power of intention: The case of information systems continuance. *MIS Quarterly: Management Information Systems*, *31*(4), 705–737. https://doi.org/10.2307/25148817

Mamonov, S., & Koufaris, M. (2020). Fulfillment of higher-order psychological needs through technology: The case of smart thermostats. *International Journal of Information Management*, *52*, 102091. https://doi.org/10.1016/j.ijinfomgt.2020.102091

Marikyan, D., Papagiannidis, S., & Alamanos, E. (2019). A systematic review of the smart home literature: A user perspective. *Technological Forecasting and Social Change*, *138*, 139–154. https://doi.org/10.1016/j.techfore.2018.08.015

Martín-Martín, A., Orduna-Malea, E., Thelwall, M., & Delgado López-Cózar, E. (2018). Google Scholar, Web of Science, and Scopus: A systematic comparison of citations in 252 subject categories. *Journal of Informetrics*, *12*(4), 1160–1177. https://doi.org/10.1016/j.joi.2018.09.002

Mashal, I., & Shuhaiber, A. (2019). What makes Jordanian residents buy smart home devices? A factorial investigation using PLS-SEM. *Kybernetes*, *48*(8), 1681–1698. https://doi.org/10.1108/K-01-2018-0008

Maswadi, K., Ghani, N. A., & Hamid, S. (2022). Factors influencing the elderly's behavioural intention to use smart home technologies in Saudi Arabia. *PLoS ONE*, *17*, 1–30. https://doi.org/10.1371/journal.pone.0272525

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of Management Review*, *20*(3), 709–734. https://doi.org/10.2307/258792

McCloskey, D., & Bennett, G. (2020). Examining artificial intelligence acceptance: Exploring smart speaker adoption with the unified theory of acceptance and use of technology (UTAUT2). *Pennsylvania Economic Review*, *27*(2), 44–56.

Meyer-Waarden, L., Cloarec, J., Adams, C., Aliman, D. N., & Wirth, V. (2022). Home, sweet home: How well-being shapes the adoption of artificial intelligence-powered apartments in smart cities. *Systemes d'Information et Management, 26*(4), 55–88. https://doi.org/10.3917/sim.214.0055

Michler, O., Decker, R., & Stummer, C. (2019). To trust or not to trust smart consumer products: A literature review of trust-building factors. *Management Review Quarterly*, *70*, 391–420. https://doi.org/10.1007/s11301-019-00171-8

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., Altman, D., Antes, G., Atkins, D., Barbour, V., Barrowman, N., Berlin, J. A., Clark, J., Clarke, M., Cook, D., D'Amico, R., Deeks, J. J., Devereaux, P. J., Dickersin, K., Egger, M., Ernst, E., … Tugwell, P. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine, 6*(7), e1000097. https://doi.org/10.1371/journal.pmed.1000097

Moon, Y. J., & Hwang, Y. H. (2016). A study of effects of UTAUT-based factors on acceptance of smart health care services. *Lecture Notes in Electrical Engineering*, *354*, 495–501. https://doi.org/10.1007/978-3-662-47895-0

Nikou, S. (2019). Factors driving the adoption of smart home technology: An empirical assessment. *Telematics and Informatics*, *45*, 101283. https://doi.org/10.1016/j.tele.2019.101283

Oyinlola Ayodimeji, Z., Janardhanan, M., Marinelli, M., & Patel, I. (2021). Adoption of smart homes in the UK: Customers' perspective. *Lecture Notes in Mechanical Engineering*, 19–30. https://doi.org/10.1007/978-981-15-9956-9_5

Pal, D., Funilkul, S., Charoenkitkarn, N., & Kanthamanon, P. (2018). Internet-of-things and smart homes for elderly healthcare: An end user perspective. *IEEE Access*, *6*, 10483–10496. https://doi.org/10.1109/ACCESS.2018.2808472

Pavlou, P. A. (2003). Consumer acceptance of electronic commerce: Integrating trust and risk with the technology acceptance model. *International Journal of Electronic Commerce*, *7*(3), 101–134. https://doi.org/10.1080/10864415.2003.11044275

PricewaterhouseCoopers. (2016). *Smart home technology - internet of things or indifference to things?* https://pwc.blogs.com/press_room/2016/05/smart-home-technology-internet-of-things-or-indifference-to-things-pwc-survey.html

Reinisch, C., Kofler, M. J., Iglesias, F., & Kastner, W. (2011). Thinkhome energy efficiency in future smart homes. *Eurasip Journal on Embedded Systems*, 104617. https://doi.org/10.1155/2011/104617

Shanthana Lakshmi, S., & Gupta, D. (2021). The smart set: A study on the factors that affect the adoption of smart home technology. *Machine Learning for Predictive Analysis*, 443–450.

Shuhaiber, A., & Mashal, I. (2019). Understanding users' acceptance of smart homes. *Technology in Society*, *58*, 101110. https://doi.org/10.1016/j.techsoc.2019.01.003

Sorwar, G., Aggar, C., Penman, O., Seton, C., & Ward, A. (2022). Factors that predict the acceptance and adoption of smart home technology by seniors in Australia: a structural equation model with longitudinal data. *Informatics for Health and Social Care*, 1–15. https://doi.org/10.1080/17538157.2022.2069028

Sovacool, B. K., & Furszyfer Del Rio, D. D. (2020). Smart home technologies in Europe: A critical review of concepts, benefits, risks and policies. *Renewable and Sustainable Energy Reviews*, *120*, 109663. https://doi.org/10.1016/j.rser.2019.109663

Strategy Analytics. (2019). *Consumer spending on smart home systems worldwide from 2014 to 2023 (in billion U.S. dollars)*. Statista. https://www-statista-com.ezproxy.lib.ukm.si/statistics/693303/smart-home-consumer-spending-worldwide/

Taiwo, A. A., & Downe, A. G. (2013). The theory of user acceptance and use of technology (UTAUT): A meta-analytic review of empirical findings. *Journal of Theoretical and Applied Information Technology*, *49*(1), 48–58. https://doi.org/10.12691/ajis-3-2-3

Tamilmani, K., Rana, N. P., & Dwivedi, Y. K. (2019). Use of 'Habit' is not a habit in understanding individual technology adoption: A review of UTAUT2 based empirical studies. In *IFIP International Federation for Information Processing* (Vol. 533). Springer International Publishing. https://doi.org/10.1007/978-3-030-04315-5

Tamilmani, K., Rana, N. P., & Dwivedi, Y. K. (2020). Consumer acceptance and use of information technology: A meta-analytic evaluation of UTAUT2. *Information Systems Frontiers*. https://doi.org/10.1007/s10796-020-10007-6

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly: Management Information Systems*, *27*(3), 425–478. https://doi.org/10.2307/30036540

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly*, *36*(1), 157–178. https://doi.org/10.2307/41410412

Vimalkumar, M., Sharma, S. K., Singh, J. B., & Dwivedi, Y. K. (2021). 'Okay google, what about my privacy?': User's privacy perceptions and acceptance of voice based digital assistants. *Computers in Human Behavior*, *120*, 106763. https://doi.org/10.1016/j.chb.2021.106763

Wang, X., McGill, T. J., & Klobas, J. E. (2020). I want it anyway: Consumer perceptions of smart home devices. *Journal of Computer Information Systems*, *60*(5), 437–447. https://doi.org/10.1080/08874417.2018.1528486

Yang, H., Yu, J., Zo, H., & Choi, M. (2016). User acceptance of wearable devices: An extended perspective of perceived value. *Telematics and Informatics*, *33*(2), 256–269. https://doi.org/10.1016/j.tele.2015.08.007

YouGov. (2018). *In your opinion, what are the disadvantages of smart homes?* Statista. https://www-statista-com.ezproxy.lib.ukm.si/statistics/965019/opinion-on-home-automation-disadvantages-in-italy/

Zaharia, S., & Würfel, M. (2021). Voice commerce - Studying the acceptance of smart speakers. *International Conference on Human Interaction and Emerging Technologies*, 449–454.

Authors' Note

All correspondence should be addressed to
Nejc Plohl
Department of Psychology,
University of Maribor,
Koroska cesta 160, 2000 Maribor, Slovenia
Email: nejc.plohl1@um.si
Telephone: +386 2 229 3855

Human Technology
ISSN 1795-6889
https://ht.csr-pub.eu