



# Hofstede's cultural dimensions in technology acceptance models: a meta-analysis

Jeffy Jan<sup>1</sup> · Khaled A. Alshare<sup>2</sup> · Peggy L. Lane<sup>3</sup>

Accepted: 30 September 2022  
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## Abstract

This paper employs a quantitative meta-analysis to investigate the direct, moderating, and mediating role of cultural dimensions in technology acceptance models. A comprehensive literature review of hypothesized relationships of technology acceptance models with cultural dimensions as direct, moderating, and mediating factors found in articles published from 1989 to 2019 is included. Results of reviewed research studies are analyzed, and a parsimonious model is developed based on the 'best predictors' as identified by the meta-analysis approach.

**Keywords** Meta-analysis · TAM · Hofstede culture dimensions · Moderating

## 1 Introduction

Since technology has rapidly thrived, measuring user acceptance of a new product or innovation is imperative for successful implementation of any technology. Many studies have confirmed that examining users' intentions to adopt and accept technology is crucial for an effective technology implementation. Not only is the user's perception important, but also important are societal and various other factors such as culture dimensions, risk factors, system quality factors, and individual factors [57], Yang 70. Numerous information system theories such as technology acceptance model (TAM), unified theory of acceptance and use of technology (UTAUT), the theory of planned behavior (TPB), as well as their extensions explain how users accept and use technology. Based on the research that has been conducted

to date, it is clear that relationships do exist between national culture and the acceptance or adoption of technologies [66]. Every organization that is working in a specific environment is influenced by its social-cultural elements. These elements impact different aspects of an organization such as how technology is being used in the organization. Users' perception of technology adoption is possibly influenced by the individual differences and culture of the organization, by national culture, or even by the characteristics of the technology itself. However, effect of culture on technology acceptance models has not been sufficiently studied [9], 33, 34, 62, 64; therefore, exploring the cultural influence on technology acceptance will add value to the research.

Prior research studies reported inconsistent results when they employed TAM and its extensions in different cultural settings [5], Haung et al. [31, 57]. Additionally, these studies lacked grounded theories to justify the role of cultural dimensions in the TAM models. McCoy, Galleta, and King [50] concluded that TAM results are sensitive in cross-cultural contexts. For example, Straub et al., [63] compared the applicability of TAM in three countries (USA, Japan, and Switzerland) and found that TAM holds valid in both the USA and Switzerland, but not in Japan, indicating the need for examining the culture impact on technology acceptance. A more recent study conducted by Huang et al., [33] found that cultural dimensions (e.g., Hofstede's model) influence teachers' intentions to use technology in educational contexts in two countries representing different culture (Spain and China). Another study by Teo and

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✉ Khaled A. Alshare  
kalshare@qu.edu.qa

Jeffy Jan  
jeffyan@qatar.cmu.edu

Peggy L. Lane  
peggylane14@gmail.com

<sup>1</sup> Carnegie Mellon University, Qatar Campus, PO Box 24866, Doha, Qatar

<sup>2</sup> Qatar University, University Street, Doha, Qatar

<sup>3</sup> University of Louisiana Monroe, 700 University Avenue, Monroe, LA 71209, USA

Huang [67] reported that perceived ease of use, which is a primary factor in TAM, was not a significant factor in predicting Chinese university teachers' attitudes toward technology usage. The authors explained the findings due to the Chinese collectivism culture value in which Chinese people prefer to conform to group expectations instead of making decisions based on their own personal judgment. They conclude that culture impacts individual perception, and therefore, it should be considered in studies involving TAM. Another study by Srite [61] found that while for the Chinese sample, subjective norm was a significant factor in predicting behavioral intention, for the American sample, it was not significant. On the other hand, the relationships between perceived usefulness and behavioral intention and between perceived ease of use and behavioral intention were significant only for the American sample. In the same line of studies, Sun et al., [64] reported that long-term benefits would improve the impact of perceived ease of use and perceived usefulness. Additionally, they found that societies with culture of low masculinity, compared to culture with high masculinity, would be more willing to adopt new hotel-related technologies. In a meta-analysis study on the antecedents and consequences of trust in m-commerce conducted by Sarkar et al., [53], it was found that culture was a significant moderator in the hypothesized relationships.

The above examples of prior studies have led to the conclusion that there is a need for a meta-analysis to provide a rigorous method to provide a solid basis for understanding the impact of the culture on TAM studies and support the inclusion of these cultural dimensions. The primary goal of our study is to find the effect of culture and its relationship on technology acceptance models, thereby investigating the direct, moderating and mediating effect of Hofstede's cultural dimensions on the latter. Hofstede [32] identified differences in national cultures on six dimensions: power distance (PDI), individualism (IDV), uncertainty avoidance (UAI), masculinity (MAS), long-term orientation vs. short-term orientation (LTO) and indulgence vs. restraint (IND). Consequently, it is important to investigate the direct, moderating, and mediating effect of Hofstede's cultural dimensions on TAM studies. To do this, meta-analysis is carried out on previous studies since 1989 that reported such effect. Results are examined, and a parsimonious model is developed, which is according to Bagozzi [13] the model that is comprised of a comparatively better predictive power with lesser constructs. This paper is organized as follows: The beginning part is an exploration of available literature related to the domain of study: theories on technology acceptance and adoption models are explored and a review of Hofstede's cultural dimensions is summarized. Then, the methodology section is explained. Finally, a parsimonious model is developed based on the results. The paper ends

with a discussion of conclusion, implications, and directions for future research.

## 2 User acceptance—summary of relevant theories

This section provides a brief overview of the most popular theories/models related to technology acceptance models such as the theory of reasoned action (TRA), the theory of planned behavior (TPB), technology acceptance model (TAM), and the unified theory of acceptance and use of technology (UTAUT). The second part of this section provides an overview of the impact of culture on the use of technology in an organization.

### 2.1 Theory of reasoned action (TRA)

Developed by Fishbein and Ajzen [23], the theory of reasoned action (TRA) is a theory of social psychology that deals with the factors or determinants of conscious behavior of human individuals [59]. It has been included in various dimensions as this theory is frequently referenced when human behavior is highlighted in research [51].

A Meta-Analysis comprising of 86 TRA studies found that there was a significant correlation between the intentions and the actions of individuals [59]. Furthermore, attitude has more to do with sentiments of an individual in connection to the behavior being performed by them. Attitude projects a person's overall feelings of favorability toward a certain activity or object. When an individual creates a mindset or belief pertaining to a certain object or event, an attitude toward that phenomenon is developed at the same time. The behavioral intention (BI) moves parallel to the attitude, that is, the (BI) will be strong if a person's attitude regarding behavior is positive and vice versa [23].

### 2.2 Theory of planned behavior (TPB)

This theory is an addition to the previous theory (TRA), where it further provides an analysis of human behavior [8]. However, the difference between the two is that theory of planned behavior depicts three independent determinants that cause intentions. Of these three, two are included in the preceding theory which has already been explained. The third determinant is 'degree of perceived behavioral control.' The 'degree of perceived behavioral control' relates to the difficulty level of performing a behavior. When an act is being performed, it is influenced by past similar experiences. Furthermore, this theory has little connection with the level of control that is possessed by a person in a scenario; however, it will take into consideration those effects of perceived behavioral control that are seen when behavioral goals are

achieved [7]. Perceived behavioral control became a part of the theory to basically evaluate a person's belief in their capability to perform a specific type of behavior.

### 2.3 Technology acceptance model (TAM)

Over two decades, user acceptance of technology has gained wide attention from technology evangelists and has been an important field of study among researchers. There are many models which are proposed to describe and predict the use of a system or technology, but the technology acceptance model has been a key model which has captured the most attention of the information systems community. Therefore, it is essential for those interested in researching user acceptance of any technology to understand this model.

#### 2.3.1 The original model

The technology acceptance model (TAM), which was introduced by Davis [20], is a model used to forecast the use of an information system. The mutual concept that persists in the TAM, as well as in the previously described two models (TPB and TRA), is that it examines the intention of a person while he/she is or will be performing a behavior. It is the intention of the person that tells us how willing an individual is to perform a certain type of behavior. The TAM model introduced two new concepts to the previous models; the new concepts are 'Perceived Usefulness' (PU) and 'Perceived Ease of Use (PEOU).' TAM is an adaptation of the TRA and looks at the acceptance of a user of an information system. The purpose of TAM is to explain the determinants of IS that will be taken into consideration when an information system is being introduced to complete a task. There are several precedents where information system professionals have utilized TAM models [20]. The above-mentioned research significantly proved the element of technology acceptance. According to [20], the probability that an individual operating with an information system or innovation will bring a significant increase in their job performance in terms of the benchmarks set by an organization is known as Perceived Usefulness (PU). What matters here is that when the innovation is being considered, it mostly depends on the perception of the users relating to innovation. The final model of TAM came about after numerous changes to the original model of TAM. Later known as the TAM 2, the final model aimed to integrate the precursors to Perceived Usefulness. There were a number of concepts that affected Perceived Usefulness including output quality, job relevance, image, subjective norm and result demonstrability [69, 70].

#### 2.3.2 Unified theory of acceptance and the use of technology (UTAUT)

Ample research has been conducted on the field of acceptance of technology when first introduced to individuals or in organizations. The models mentioned above have all been used in past research. Eventually, the theories were merged and transformed into a theory called 'unified theory of acceptance and the use of technology' (UTAUT) (Venkatesh et. al., 2003). This theory identified four key factors and four moderators which were linked to the ability to predict behavioral intention for the use of technology as well as the actual use of technology in terms of the organization. The four key factors that were identified by the theory are performance expectancy, effort expectancy, social influence, and facilitating conditions. Similarly, the four moderators defined in the theory are age, gender, experience, and voluntariness. The theory of UTAUT has been used numerous times in practical environments of various organizations. This was done so in order to fill those gaps which were left untouched by the previous models [71]. The four main factors that have been provided in this theory are related to the factors provided in the previous theories.

#### 2.3.3 Unified theory of acceptance and the use of technology2 (UTAUT2)

UTAUT2 [72], an extension of UTAUT [71], has added additional concepts to the previous model to create a better and new framework of prediction. Although a number of variables have been added in the integrated model, it has been highlighted by Venkatesh et al., [72] that there needs to be salient and important predictor variables included so that the technology can be used in accordance with the demands of the user. This updated model is being utilized to look into a variety of problems such as self-service technology, smart phone service, and the implementation of software in the healthcare sector. The previous model (UTAUT) was used to delineate technology adoption behavior of the users in terms of an organization. The newer version, UTAUT2, laid its focus more on the use of the individual rather than the use of the organization in terms of technology use. The newer model was clearly a more improved one as it talked about using technology by individuals in various situations. UTAUT 2 has included three additional concepts into UTAUT, which include hedonic motivation, price value, and habit. Factors that are related to individuals like age, gender, and experience are usually considered to reduce or moderate the link between technological use and behavioral intention.

### 3 Hofstede's culture framework

Although there are several frameworks to understand cultural differences, one of the most powerful is Hofstede's model as Greet Hofstede was a pioneer who conducted intensive research in the field of cultural diversification and differences. Our study focused on Hofstede's cultural dimensions since, as it is cited in the literature, it is the most popular cultural theory used in the social sciences [5, 60] and [62].

According to Hofstede [30], individuals basically possess various paradigms from thinking to performing throughout the course of their life. This is an elongated process where individuals absorb various factors that are persistent in the tenure of life. Initially the cultural patterns are formed with personal encounters with members of the society typically beginning with parents, then schools, religious norms, and the media as well [43]. While working at IBM, Hofstede conducted a research study which identified the differences between people to a higher degree. While analyzing these variations, Hofstede came across four dimensions relevant to differences in culture and nation. These dimensions and two additional ones added later are as follows:

- **Uncertainty avoidance**—This shows the level of patience persisting among the individuals in relation to irregularities and insecurities. It reflects whether a person is a risk taker or risk avoider.
- **Power distance**—This basically relates to the level at which individuals are acquainted with the variability in power among various individuals as it shows the trends and mindset of the people toward power and authority. In general, people from society with high power distance tend to accept and expect unequal distribution of power.
- **Individualism-collectivism**—This is a depiction of the extent to which individuals connect to one another in a group. Individualism is defined as a situation where human beings cater for themselves and their close family members. Contrary to this, Collectivism is a scenario that is comprised of people belonging to a common group as they foster each other for loyalty and bondage. It basically shows how individuals behave when they are in a group.
- **Masculinity-femininity**—This concept shows the difference between the roles based on gender. Masculinity here highlights the hegemonic values in society. These values relate to authority, money, and dominance. However, femininity illustrates a situation relating to a proclivity for relationships, nurturing the feeble, and life quality. Additionally, people from masculine cultures tend to value achievement in their career. On the other hand, people from feminine cultures tend to focus on quality

of life. As these concepts are interchangeable, the term masculinity is used to highlight the gender roles.

- **Long-term orientation**—this dimension measures people's perspectives on how they deal with events by either focusing on future gains while compromising short-term gains, or the opposite.
- **Indulgence/restraint**—this dimension measures the fulfillment of enjoyment. A more indulgent society is concerned with having fun and enjoying life.

### 4 Research methodology

The primary goal of this study is to find the effect of espoused culture and its relationship with technology acceptance models, thereby investigating the direct and moderating variables. A meta-analysis investigation is performed on the previous studies to analyze and synthesize the impact of Hofstede's cultural dimensions on the hypothetical relationships formulated in the technology acceptance models literature. Thus, profiling review and meta-analysis methods are considered as most appropriate to use in combination [41, 44, 45]. The study will examine the direct and moderating impacts of Hofstede's cultural dimensions on technology acceptance models as reported by previous studies. This allows us to understand the relationships between independent and dependent variables across diverse cultures as well as similarities and dissimilarities of the results with respect to the countries. After examining all the relationships, we formulate a model, which is the result of the analysis.

The meta-analysis procedure applied in this study followed the process reported by Zolotov et al. [74]. As shown in Fig. 1, the meta-analysis framework starts with stating the selection criteria (general conditions), which include the period of time the study is covered, the sources for the studies, and the keywords used in the search. After determining the general conditions, the researcher then obtains the initial records. The screening process starts with eliminating irrelevant and duplicated titles. The second stage of screening is to exclude qualitative studies and any studies that do not report coefficient values. The final stage of screening is to include only studies that include cultural dimensions as either direct, moderating, or mediating factors in the technology acceptance models and their extensions. Once the final list of qualified studies has been identified, the coding and merging process starts by recording detailed information about each study and preparing a list of commonly used variables and the relationships among them. The weight analysis and forest plot methods were employed to develop the resulting models. The following paragraphs describe the application of the steps depicted in Fig. 1.

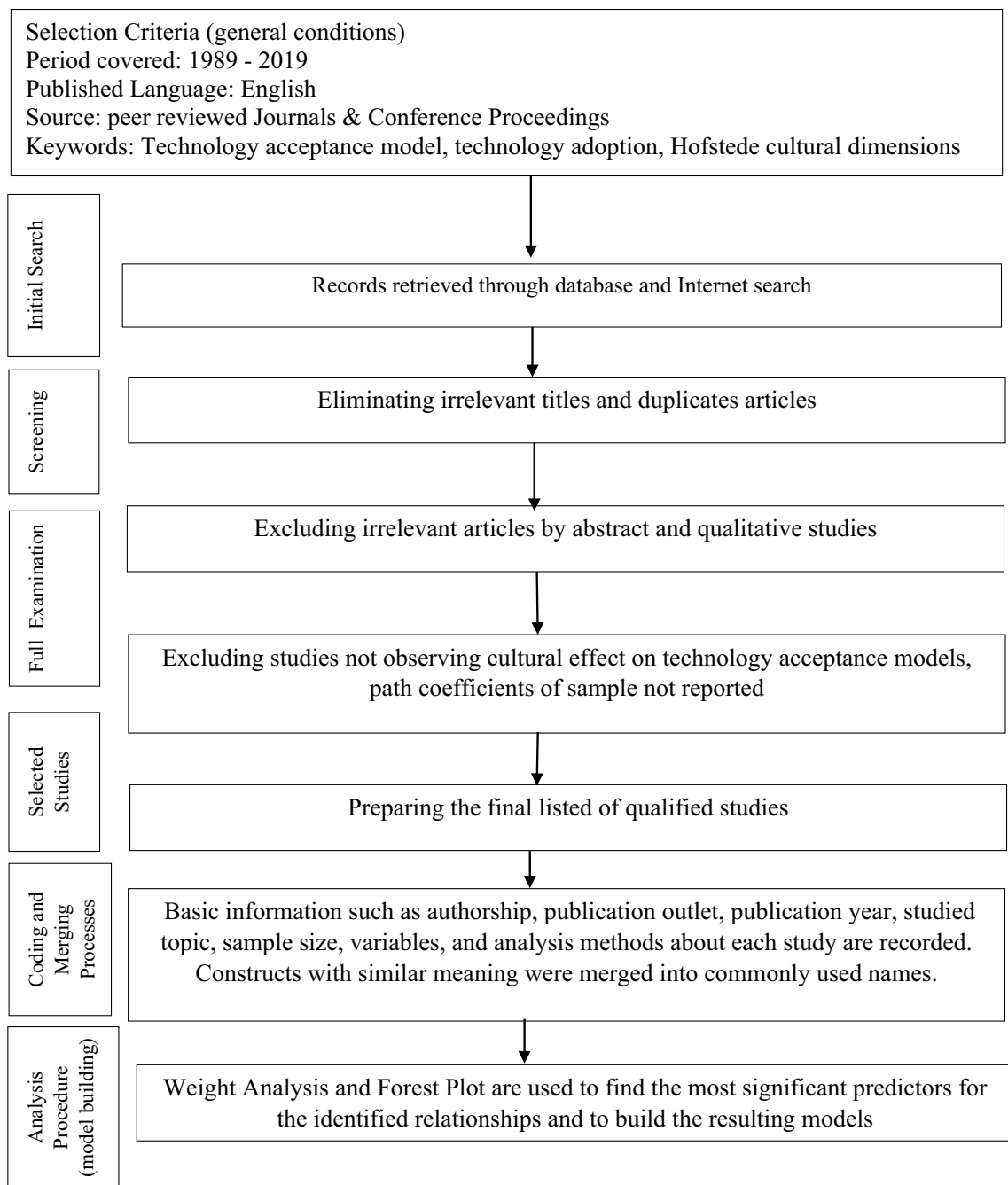


Fig. 1 Meta-Analysis Framework

### 4.1 Selection criteria of studies

The articles involved in this study are identified with an extensive search of different databases. All the available electronic databases (e.g., Scopus, Science Direct, ABI/Information Database, ProQuest Direct, Emerald, JSTOR, CiteSeerX, IEEE Xplore, Google scholar) relevant to the topic are explored. The search engines of databases provided options to query the relevant topic of interest. Keyword

search, title search using the logical operators (AND/OR) and giving a specific time frame helped to streamline the search results. Past research, papers published over a period of the last 30 years, that are relevant to the topic are identified. The criteria for selection of articles included using these keywords among others for query—‘Technology Acceptance’, ‘Technology Adoption’, ‘TAM’, ‘UTAUT’, ‘UTAUT2’, ‘Hofstede’, ‘Culture’, ‘National culture’, ‘Moderating’, ‘Mediating’ ‘Power Distance’, ‘Uncertainty

Avoidance', 'Individualism', 'Collectivism', 'Masculinity', 'Long term orientation.' Peer-reviewed articles were given higher importance, and the articles published from the years 1989 to 2019 in the English language are explored. However, the focus was on the studies that include cultural dimensions as independent variable, as moderator or mediating factor. The initial search retrieved more than 300 publications. Many articles used a qualitative approach and around 200 articles were eliminated from this study as they lacked empirical evidence. Besides keyword searches, references of related articles were reviewed to obtain the most relevant ones. Thus, out of the 100 relevant articles retrieved, each was carefully reviewed and judged to be included or not in the study. Some articles were dropped.

as they did not report path coefficients (standardized) but only whether variables were significant or not. Finally, 22 studies were found most fitting and meet the criteria to be included in the meta-analysis. Although 22 studies may appear as relatively few in counts to conduct a meta-analysis, it is satisfactory in number. In their study, Legris et al. [44] used 22 studies for meta-analysis and, while observing correlation coefficients between the components, they ended up using only three studies as the coefficient correlation matrices were not available in the other studies.

## 4.2 Coding procedure

To collect required information from the final 22 relevant prior research papers used for analysis, coding of the basic information about the paper (e.g. Author, Publication, Year), research objective (e-banking adoption, ERP acceptance, etc.), sample size, independent variables, dependent variables, moderator factors, path coefficient, theoretical model used, country of study, and target population details (university students, public, etc.) are recorded in an Excel spreadsheet used to log all this information.

## 4.3 Dataset analysis

The criteria discussed previously streamlined the articles to identify 22 studies, which cumulatively covered 15 countries. The sample size or number of respondents involved in the 22 studies in total are 26,186 respondents. Most of the respondents were either students or employees in organizations (Table 2). Although our study is carried out from 1989, cultural effects on technology acceptance were profoundly seen in articles from 2003 onwards (Table 1). Among the 22 studies, 17 are peer-reviewed journal articles and 5 are conference proceedings. The journal *Computers in Human Behavior*, by far, has the most papers on the role of culture on technology acceptance. Technology acceptance model (TAM) is the most commonly used theory in the studies analyzed (see Table 1). UTAUT were seen in papers from

2015 onwards. IT system and e-commerce adoptions were the most common technology types seen in the reviewed papers as shown in Table 2.

## 4.4 Statistical techniques

In this study, 22 papers have been reviewed which specifically focused on the impact of culture on technology acceptance. Several methods were adopted by researchers to analyze the impact of various cultural dimensions on technology acceptance models. As shown in Table 1, many employed various classes of regression methods such as multiple linear regression. Others used least square fitting, including partial least squares (PLS) and weighted least squares (WLS) to determine the regression coefficients. A few studies used correlation and exploratory factor analysis. Most of the studies focused on structural equation modeling (SEM). SEM belongs to a class of confirmatory statistical techniques that can be used to verify theoretical models that define relationships between observed variables and latent constructs (Table 2).

## 4.5 Merging of variables

Among the plethora of constructs in the chosen articles, some had different names but likely stood for the same meaning. Thus, these constructs are merged to be consistent throughout. For effectiveness of the study, the names of the dependent and independent variables with similar meaning were merged into commonly used names as reported by the majority of the papers. For example, 'intension to use e-banking system is reduced to 'Intension to use' (see Table 3). Behavioral intension (BI) and intension to use (IU) stand for the same meaning, and thus, in our study, these variables are both identified as behavioral intension (BI) throughout. Similarly, subjective norm and social norm stand for social influence and thus are collectively labeled social norm (SN). After the merging process, the cultural dimensions, type of the effect (direct/moderator/mediator), and the construct relationships are identified. These relationships are used in the analysis.

# 5 Results

## 5.1 Direct effect of culture

The objective of this section is to analyze the direct effect of Hofstede's cultural dimensions on the constructs. The goal is to examine how cultural dimensions influence the hypothesized relationships between the independent variables and the dependent variables.

**Table 1** Studies profile

Author/s	Country	Sample size	Model	Respondent type	Analysis type
Al-Hujran, Omar et al. [2]	Jordan	197	TAM	Students, Internet café users	Multiple regression
AlKhalidi, Ayman et al. [4]	Jordan	385	TAM	Managers	Factor analysis
AlShare, Khaled A et al. [2]	Chile	156	TAM	Students	SEM
	UAE	169	TAM	Students	
	USA	166	TAM	Students	
Al-Smadi, M. [6]	Jordan	387	TAM	Customers	Multiple regression
Chai, Lin et al. [14]	Greece	70	TPB	Customers	Multiple regression
	USA	181	TPB	Customers	
Constantiou, I.D. et al. [17]	Denmark & UK	200	RBC	Students	Multiple regression
Nazli Ebrahimi et al. [22]	Malaysia	121	TAM	Employees	Correlation analysis
Huang, Linjun et al. [32]	China	423	TAM2	Employees	SEM
Hung, C. L. et al. [34]	Malaysia	214	TAM	Online Forum users	Multiple regression
	Taiwan	265	TAM	Online Forum users	
Udo, Godwin J. et al. [64]	Nigeria	201	TPB, TAM	Internet café users	Multiple Regression
	USA	188	TPB, TAM	Internet café users	
Sheikh, Zaryab et al. [54]	Saudi Arabia	310	UTAUT2	Students	Multiple Regression
Ghanem, Marwa Magdy et al. [23]	Egypt	109	TAM	Managers	Multiple Regression
Mahfuz et al. [46]	Bangladesh	115	UTAUT2, ITM	Bank account holders	SEM
Gonçalo Baptista et al. [11]	Mozambique	252	UTAUT2	Bank account holders	SEM
Zhang, Yun et al. (2018)	Multiple	19,604	UTAUT		WLS regression
Khushman, S. et al. [38]	Arab, UK	458	CTAM	Tourists	Correlation analysis
Osman, N. [50]	Sudan	527	TAM	Employees	SEM
Yujong Hwang [37]	USA	101	TAM	System users	SEM
Al-Hujran, Omar et al. [3]	Jordan	413	TAM	Students, Internet café users	PLS
Cheolho, Yoon [71]	China	270	TAM	Students	SEM
Akour, Iman; Al Share, Khaled A., et al. [1]	Jordan	507	TAM	Managers	Multiple Regression
Srite, M; Karahanna, E [56]	Multiple	197	TAM	Students	PLS

### 5.1.1 Weight analysis

Weight analysis is performed by calculating the weight of the independent variable over the dependent variable. This is done by finding the value of weight, which is the number of times the relationships are being reported to be significant over the number of times the relationships in total are reported (frequency). To identify the most effective predictors, prior studies [38, 54], Baptista and Oliveira [12] classified independent variables into two types: ‘best predictor’ and ‘promising predictor’. Best predictor is defined as the independent variables that are examined by researchers certain times (e.g., 3–5), for example, 5 or more times with a weight of 0.80 or greater where the weight indicates the predictive power of an independent variable. Promising predictor is defined as the independent variables that are examined by researchers fewer than a particular number of times (e.g., 3–5); for example, fewer than 5 times with a weight equal to 1. This study followed the guidelines of Rana et al. [54] and Baptista and Oliveira [12] where the best predictors are independent variables that are examined ‘3’ or more times

with a weight of ‘0.80’ or greater and promising predictors as the independent variables that are examined fewer than 3 times with a weight equal to ‘1’ [54]. This study listed 19 relationships found between the independent and dependent variables (Table 4). Based on results of weight analysis for finding the direct effects of Hofstede’s cultural dimensions, Individualism/Collectivism, Power Distance and Uncertainty Avoidance are found to have reasonable relationships with the constructs of technology adoption, that is, Behavioral Intension (Intension to Use) and Perceived Ease of Use (Effort Expectancy).

Three relationships are found to be best predictors. The relationship Individualism on Intention to Use (weight=0.83) has been examined 6 times out of which 5 are significant making it a best predictor. The average beta (path coefficient) of this relationship is negative indicating the relationship is in the opposite direction, meaning that with a higher degree of IDV, there is a lower intension to use. Power Distance on Behavioral Intension relation results with weight 1 indicating out of 6 studies examined, 6 of them are significant and the relationship is positive (meaning the higher the power distance

**Table 2** Technology used in the studies

Author	Title	Subject	Category
Akour, Iman; Al Share, Khaled A et al. [1]	An Exploratory Analysis of Culture, Perceived Ease of Use, Perceived Usefulness, and Internet Acceptance: The Case of Jordan	Intension to use internet	IT System Adoption
Al-Hujran, Omar et al. [2]	The Role of National Culture on Citizen Adoption of eGovernment Services: An Empirical Study	Adoption of eGovernment Services	e-governance
Al-Hujran, Omar et al. [3]	The imperative of influencing citizen attitude toward e-government adoption and use	Electronic government	e-governance
AlKhalidi, Ayman et al. [4]	Relationship between social influence and video conferencing use: the moderating and direct effect of cultural factors in Jordan	Video conferencing use	IT System Adoption
AlShare, Khaled A et al. [5]	Examining the Moderating Role of National Culture on an Extended Technology Acceptance Model	Use of Computers	IT System Adoption
Chai, Lin et al. [14]	From ancient to modern: a cross-cultural investigation of electronic commerce adoption in Greece and the United States	electronic commerce adoption	e-commerce
Cheolho Yoon [71]	The effects of national culture values on consumer acceptance of e-commerce: Online shoppers in China	Acceptance of e-commerce	e-commerce
Ghanem, Marwa Magdy et al. [23]	The impact of national culture on the adoption of e-tourism in Egyptian tourism companies	E-Tourism	Adoption of e-Tourism
Gonçalo Baptista et al. [11]	Understanding mobile banking: The unified theory of acceptance and use of technology combined with cultural moderators	m-banking	Mobile banking technology adoption
Huang, Linjun et al. [32]	The impact of Power Distance on email acceptance: Evidence from the PRC	e-mail acceptance	IT System Adoption
Hung, C. L. et al. [34]	A Cross-Cultural Study on the Mobile Commerce Acceptance Model	Adoption of mobile commerce	m-banking
Constantiou, I. D. et al. [17]	Does Culture Affect the Adoption of advanced Mobile Services? A Comparative Study of Young Adults' Perceptions in Denmark and the UK	Adoption of Advanced Mobile Services	IT System Adoption
Khushman, S. et al. [38]	The adoption of E-business websites within Arab and UK cultures (Comparison study)	Electronic business websites	e-commerce
Mahfuz et al. [46]	The influence of Culture on M-Banking Technology Adoption: An Integrative Approaches of UTAUT2 and ITM	Mobile banking technology adoption	m-banking
Al-Smadi, M. [6]	Factors Affecting Adoption of Electronic Banking: An Analysis of the Perspectives of Banks' Customers	Adoption of Electronic Banking	IT System Adoption
Nazli Ebrahimi et al. [22]	Cultural Effect on Using New Technologies	Adoption with new technologies in organizations	IT System Adoption
Osman, N. [50]	Does community matter? Social and cultural influences on acceptance and use of collaborative educational technologies	Educational technology acceptance	IT System Adoption



**Table 2** (continued)

Author	Title	Subject	Category
Sheikh, Zaryab et al. [54]	Acceptance of social commerce framework in Saudi Arabia	Adoption of e-business websites	e-commerce
Srite, M; Karahanna, E [57]	The role of espoused national cultural values in technology acceptance	Usage of personal computers	IT System Adoption
Udo, Godwin J. et al. [64]	Exploring the role of espoused values on e-service adoption: A comparative analysis of the US and Nigerian users	User satisfaction in e-service	e-commerce
Yujong Hwang [37]	Investigating enterprise systems adoption: uncertainty avoidance, intrinsic motivation, and the technology acceptance model	Enterprise Systems Adoption	IT System Adoption
Zhang, Yun et al. (72)	The relationships between electronic banking adoption and its antecedents: A meta-analytic study of the role of national culture	Electronic banking adoption	e-banking

**Table 3** Cultural dimensions, effect type and constructs

Authors	Cultural dimensions	Type of effect	Constructs	Country
[2]	UAI, PDI	Direct	PU, PEOU	Jordan
[4]	IDV, PDI	Direct	PU	Jordan
	IDV, PDI	Moderator	SI-U	Jordan
[5]	MAS, PDI, IDV, UAI	Moderator	AT-U, PU-AT, KNOWL-PEOU, PEOU-PU	USA, Chile, UAE
Al-Smadi, M. [6]	PD, UAI, IDV, MAS, LTO	Direct	PU	Jordan
[15]	UAI	Moderator	AT-I, PBC-BI, SN-BI	Greece, USA
Constantiou, I. D. et al. [17]	Culture	Moderator	PB-U, PC-U	Denmark, UK
Ebrahimi, N. et al. [22]	PD, UAI, MAS, INV	Direct	BI	Malaysia
[34]	PD	Moderator	SN-PU	China
[36]	PU, UAI, IDV, MAS, LTO	Moderator	PU-BI, PEOU-BI	Taiwan, Malaysia
[68]	PD, MAS, IDV, UAI	Moderator	PEOU-SAT, ISQ-SAT, PU-SAT	USA, Nigeria
[58]	IDV, UAI	Moderator	BI-UB	KSA
Ghanem, M. et al. [23]	UAI	Direct	PU, PEOU	Egypt
Mahfuz et al. [46]	MAS, PDI	Direct	BI	Bangladesh
[14]	PDI, IDV, UAI	Moderator	BI-UB	Mozambique
[74]	PDI, IDV, UAI, LTO, UAI, MAS	Moderator	PE-BI, TR-BI, PR-BI, SI-BI, EE-BI	Multiple
Khushman, S. et al. [38]	MAS, PDI, IDV, TR, SN	Direct	BI	Arab, UK
Osman, N. [50]	UAI, MAS	Direct	PEOU	Sudan
Yujong Hwang [37]	UAI	Direct	PEOU	US
Al-Hujran, Omar et al. [3]	UAI, PDI	Direct	PEOU	Jordan
Yoon, C. [71]	IDV, PDI, UAI, LTO	Direct	BI	China
	UAI, MAS, LTO	Moderator	PU-BI, PEOU-BI, TR-BI	China
[1]	IDV, MAS, PDI, UAI	Direct	IDV-BI, MAS-BI, PDI-BI, UAI-BI	Jordan
[60]	IDV, MAS, PDI, UAI	Moderator	PEOU-BI, PU-BI, SN-BI	Multiple

Key: PDI—power distance, IDV—collectivism, MAS—masculinity, UAI—uncertainty avoidance, LTO—long-/short-term orientation; U—use; KNOWL—knowledge; PBC—perceived behavioral control; SAT—satisfaction, ISQ—information system quality; BI—behavioral intentions, UB—use behavior, PU—perceived usefulness, PEOU—perceived ease of use, PR—perceived risk, SI—social influence, PE—performance expectancy, EE—effort expectancy, PR—perceived risk, AT—attitude, TR—trust, SN—social norm

**Table 4** Weight analysis results (direct effect of cultural dimensions)

Independent variable	Dependent variable	Relation	Frequency	Significant	Non-significant	Average of Beta	ΣSample Size	Weight = Significant/Frequency
Individualism/Collectivism	Behavioral Intension	IDV-BI	6	5	1	-0.08	1636	0.83
	Perceived Ease of Use	IDV-PEOU	2		2	0.07	800	0.00
	Perceived usefulness	IDV-PU	1		1	0.13	387	0.00
Long-Term Orientation	use	IDV-U	1	1		0.24	385	1.00
	Behavioral Intension	LTO-BI	1	1		-0.15	270	1.00
	Perceived Ease of Use	LTO-PEOU	3		3	0.00	909	0.00
Masculinity/femininity	Perceived usefulness	LTO-PU	2		2	0.02	496	0.00
	use	LTO-U	1		1	0.01	109	0.00
	Behavioral Intension	MAS-BI	6	2	4	0.10	1636	0.33
Power distance	Perceived Ease of Use	MAS-PEOU	3	1	2	0.12	1327	0.33
	Perceived usefulness	MAS-PU	2		2	-0.02	914	0.00
	Behavioral Intension	PDI-BI	6	6		0.05	1636	1.00
Uncertainty avoidance	Perceived Ease of Use	PDI-PEOU	3	2	1	0.14	997	0.67
	Perceived usefulness	PDI-PU	2	1	1	0.13	584	0.50
	use	PDI-U	1	1		-0.15	385	1.00
	Behavioral Intension	UA-BI	6	3	3	-0.18	1636	0.50
Best Predictor Promising Predictor	Perceived Ease of Use	UA-PEOU	6	6		0.26	1734	1.00
	Perceived usefulness	UA-PU	4	3	1	0.16	1220	0.75
	use	UA-U	1		1	0.10	109	0.00

\* Best Predictor

\*\* Promising Predictor

Frequency > = 3 and Weight > = .80 represents best predictor; highlighted in green

Frequency < 3 and Weight = 1 represents promising predictor; highlighted in blue

score is, the higher intention to use is). With an average beta of 0.05. The Uncertainty Avoidance on Perceived Ease of use relationship shows positive effect (meaning the higher the uncertainty avoidance score is, the higher the perceived ease of use score is). A weight of 1 indicates out of 6 studies examined, all are significant, and the average beta is 0.26.

Promising predictors identified are Individualism/Collectivism on Use, long-term orientation on Behavioral Intension and Power distance on Use. Their weights are 1 (all

relationships are significant) with frequency of examination less than 3.

### 5.1.2 Forest plots

To calculate the effect size and draw the Forest plot, we used the tool developed by Suurmond et al., [65]. The forest plot of 19 direct relationships with variables and

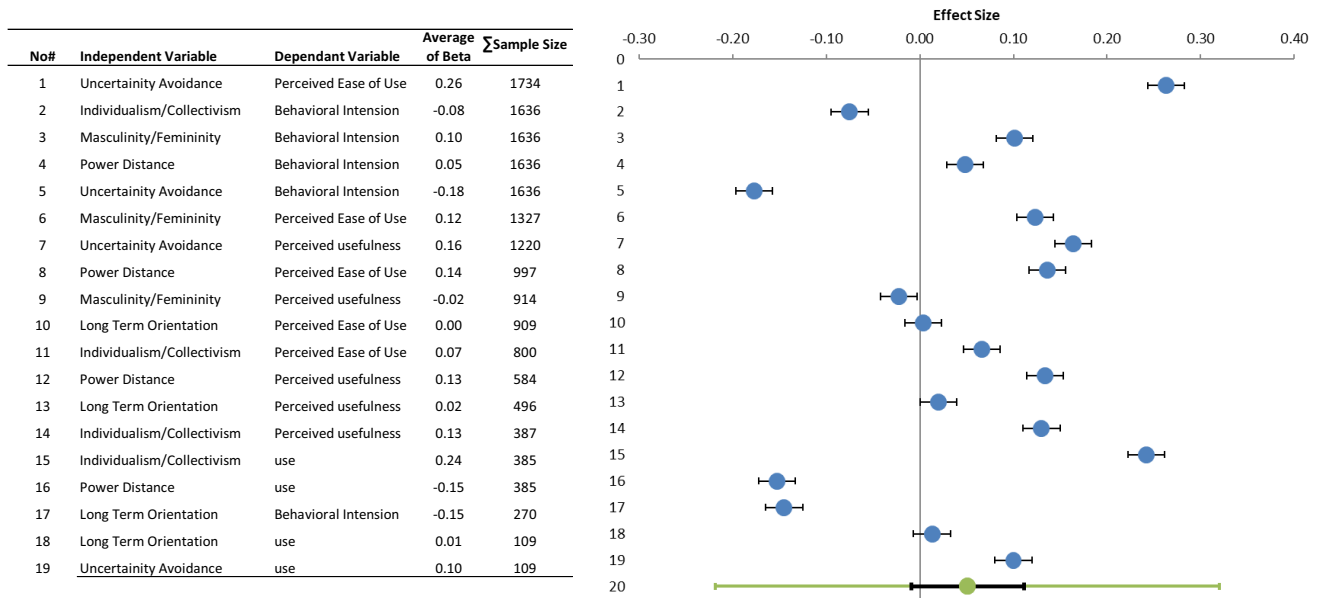
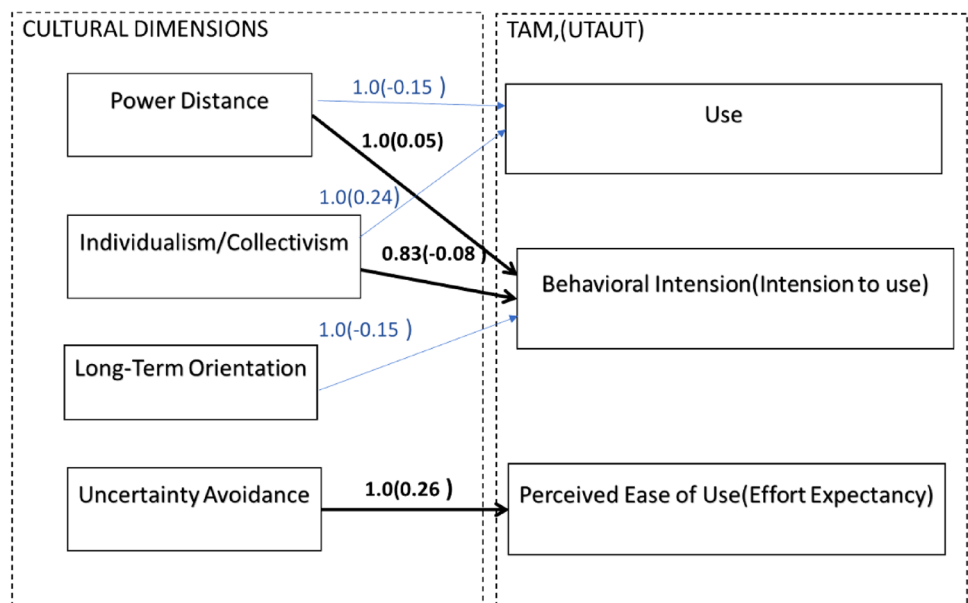


Fig. 2 Forest plot of meta-analysis (19 studies)

constructs is examined and is represented in Fig. 2. The X-axis represents the average of standardized beta ( $\beta$ ) coefficients (path coefficient). Each row, excluding the bottom one (with green line), signifies a study's effect size estimate in the form of a bullet (blue) with a line across the bullet signifying the confidence interval for each relationship (95%). The forest plot is designed in a way that the data are ordered in descending order in terms of sample size (cumulative size).

From Fig. 2, studies 2, 5, 9, 16 and 17 are entirely on the negative side of zero signifying negative effect. The remaining studies except 10 are completely on the positive side of zero signifying positive effect. Study 10 is on the vertical line of zero signifying no effect. The overall effect is toward the positive side of zero. The resulting framework is shown in Fig. 3 with values representing weights and average of beta in parenthesis. Bold arrows in black represent best predictors, and blue arrows represent promising predictors. Masculinity is dropped in the final model as it was found to not have a robust direct effect.

Fig. 3 Resulting model based on effect of culture (direct effect) on technology acceptance



Note: Bold arrows represents best predictors, blue arrow represents promising predictors.

## 5.2 Moderating effect of culture

To analyze the effect of culture dimensions as moderators, a similar method as above is followed with additional settings as the effect here is moderating rather than direct. Weight analysis is performed on each pair of relationships with cultural dimension as a moderator. To conduct this, relationships (pairwise) are listed, which is our dependent variable, and is recorded separately. Following the guidelines of (Rana 51, if the frequency (number of times the relationships are found) is greater than 3 and the relationship weight (significant relation/frequency) is greater than or equal to 0.80, the independent variable is considered as a best predictor, while a promising predictor has a weight of 1 but frequency less than 3. The profound effects of culture as a moderator were found in the 8 relationships as shown in Table 5.

### 5.2.1 Individualism

As shown in Table 6, individualism was found to moderate all relationships positively. The moderating effect is more (promising) on relationships of behavioral intention with

**Table 5** Relationships and moderators

Pairwise relationship	Cultural moderator
BI-UB	IDV, UA, LTO
KNOWL-PEOU	IDV
PEOU-BI	INV, MAS, PDI, LTO, UA
PU-BI	IDV, PDI, UA, LTO, MAS
PU-AT	PDI
PU-SAT	PDI
ISQ-SAT	UA, MAS, IDV, PDI
PEOU-PU	UA

**Table 6** Weight analysis—individualism

Relation	Average of Beta	Frequency	Significant	Non-significant	∑Sample size	Weight = Significant/Frequency
BI-UB	0.21	2	2		562	1.00
PEOU-BI	0.43	2	2		479	1.00
PU-BI	0.42	2	2		479	1.00
ISQ-SAT	0.20	2		2	389	–
SI-U	0.01	1		1	385	–
KNOWL-PEOU	0.45	2	2		322	1.00
TR-BI	0.08	1		1	270	–
SN-BI	0.27	2		2	197	–

Promising predictors are highlighted

usage of technology, perceived ease of use, perceived usefulness with behavioral intension and knowledge with perceived ease of use.

Referring to the forest plot (Fig. 4), there are no effects on the negative side, SI-U has no effect and the remaining are on the positive side.

### 5.2.2 Masculinity

The moderating effect of masculinity is positive on the relationship between attitude and usage, information system quality and satisfaction. Masculinity negatively moderates perceived ease of use with satisfaction as shown in Table 7.

Referring to the forest plot (Fig. 5), studies 1, 4, and 6 are on the negative side and the remaining are on the positive side.

### 5.2.3 Long-/short-term orientation

As reported in Table 8, the study found that long-term orientation moderates behavioral intension with use behavior negatively and perceived ease of use, perceived usefulness and trust with behavioral intension positively.

Referring to the forest plot for Table 8 as shown in Fig. 6, the effect is negative for behavioral intension with use behavior and all others are positively moderated.

### 5.2.4 Power distance

Power distance was found to moderate the relationships of perceived ease of use with behavioral intention as well as perceived usefulness with attitude, behavioral intension and satisfaction as reported in Table 9.

Referring to the forest plot (Fig. 7), the moderating effect is negative for studies 1, 4, 9. No effect for 3 and 8, and positive for the rest.

S#	Relation	Average of Beta	$\Sigma$ Sample Size
1	BI-UB	0.21	562
2	PEOU-BI	0.43	479
3	PU-BI	0.42	479
4	ISQ-SAT	0.20	389
5	SI-U	0.01	385
6	KNOWL-PE	0.45	322
7	TR-BI	0.08	270
8	SN-BI	0.27	197

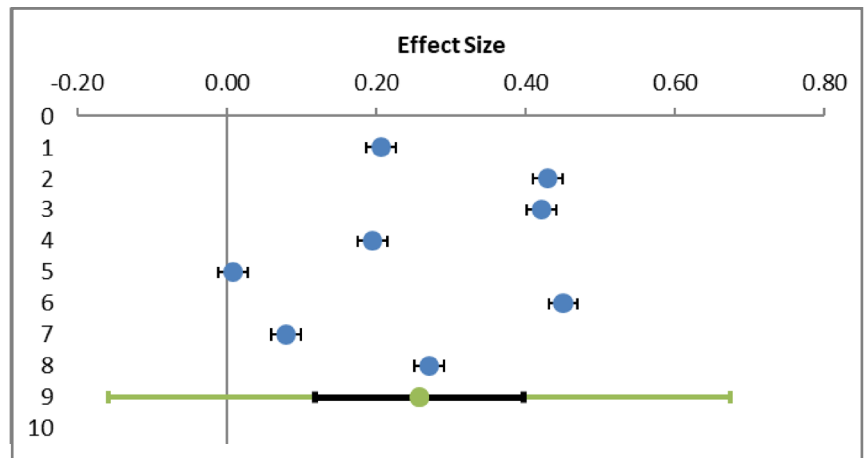


Fig. 4 Forest plot of Table 6

Table 7 Weight analysis—masculinity

Relation	Average of Beta	Frequency	Significant	Non-significant	$\Sigma$ Sample size	Weight = Significant/Frequency
PEOU-BI	-0.05	5	3	2	946	0.60
PU-BI	0.11	5	2	3	946	0.40
ISQ-SAT	0.06	2	2	0	389	1.00
PEOU-SAT	-0.12	2	2	0	389	1.00
A-U	0.12	2	2	0	322	1.00
SN-BI	-0.18	2	1	1	197	0.50

S#	Relation	Average of Beta	$\Sigma$ Sample Size
1	PEOU-BI	-0.05	946
2	PU-BI	0.11	946
3	ISQ-SAT	0.06	389
4	PEOU-SAT	-0.12	389
5	A-U	0.12	322
6	SN-BI	-0.18	197

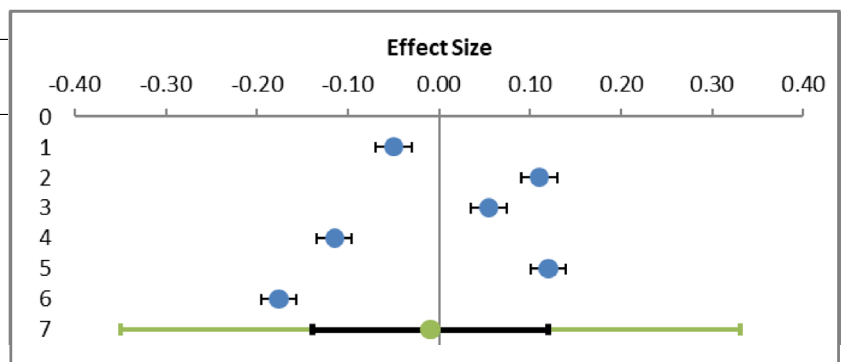


Fig. 5 Forest plot of Table 7

Table 8 Weight analysis—long-time orientation

Relation	Average of Beta	Frequency	Significant	Non-significant	$\Sigma$ Sample size	Weight = Significant/Frequency
PEOU-BI	0.41	2	2	0	479	1.00
PU-BI	0.38	2	2	0	479	1.00
TR-BI	0.50	1	1	0	270	1.00
BI-UB	-0.33	1	1	0	252	1.00

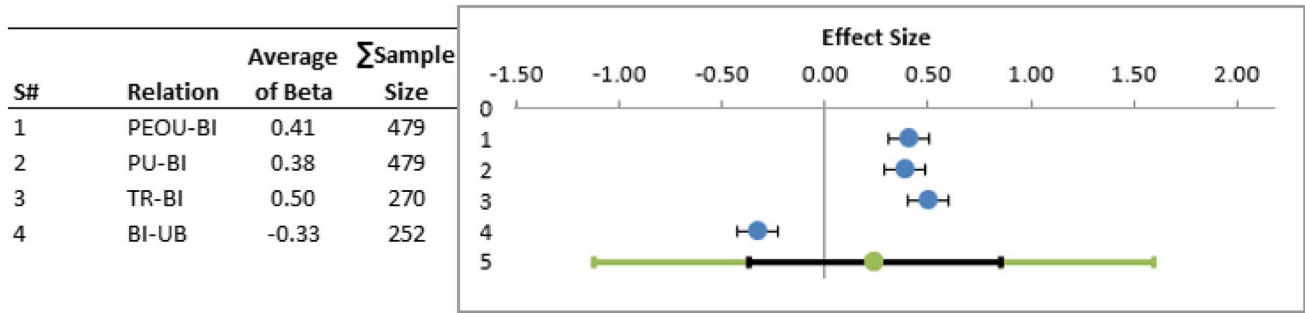


Fig. 6 Forest plot of Table 8

Table 9 Weight analysis—power distance

Relation	Average of Beta	Frequency	Significant	Non-significant	$\Sigma$ Sample size	Weight = Significant/Frequency
SN-BI	-0.09	3	2	1	620	0.67
BI-UB	0.10	2	1	1	504	0.50
PEOU-BI	0.01	2	2		479	1.00
PU-BI	-0.02	2	2		479	1.00
ISQ-SAT	0.03	2		2	389	–
PEOU-SAT	0.05	2		2	389	–
PU-SAT	0.07	2	2		389	1.00
SI-U	0.00	1		1	385	–
PU-AT	-0.25	2	2		335	1.00
PBC-BI	0.22	2	1	1	251	0.50

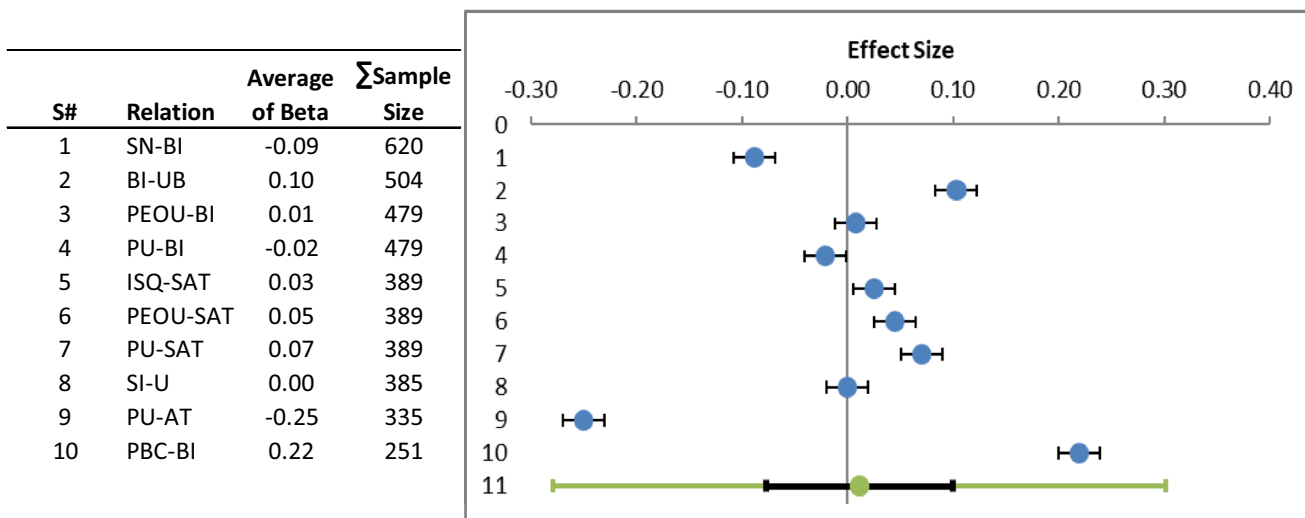


Fig. 7 Forest plot of Table 9

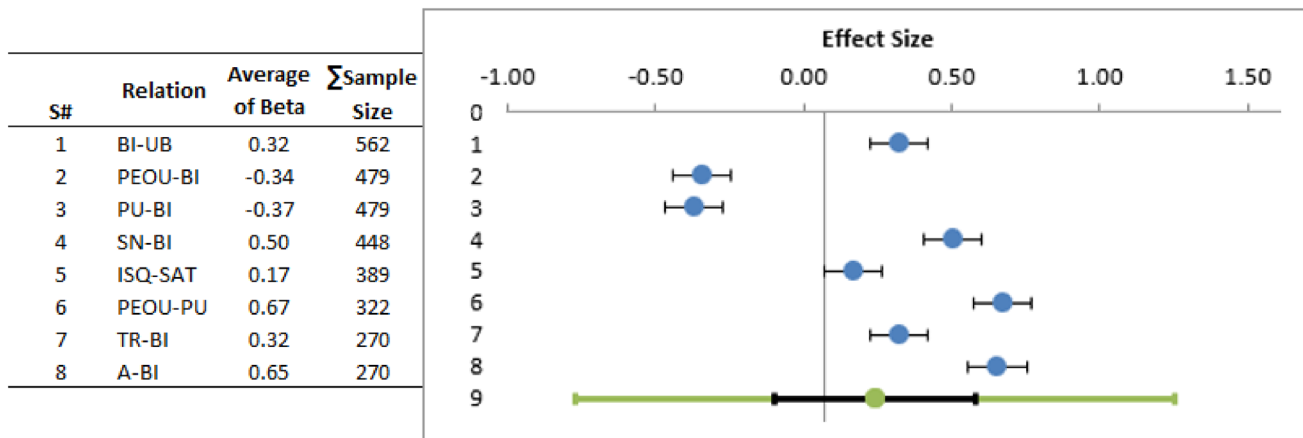
### 5.2.5 Uncertainty avoidance

As shown in Table 10, the results revealed that a positive effect is found on the associations of behavioral intension

with use behavior, information service quality with satisfaction, trust with behavioral intension, and perceived ease of use with perceived usefulness. However, a negative effect is found on the associations of behavioral intension

**Table 10** Weight analysis—uncertainty avoidance

Relation	Average of Beta	Frequency	Significant	Non-significant	∑Sample Size	Weight = Significant/Frequency
BI-UB	0.32	2	2		562	1.00
PEOU-BI	-0.34	2	2		479	1.00
PU-BI	-0.37	2	2		479	1.00
SN-BI	0.50	4	3	1	448	0.75
ISQ-SAT	0.17	2	2		389	1.00
PEOU-PU	0.67	2	2		322	1.00
TR-BI	0.32	1	1		270	1.00
A-BI	0.65	2		2	270	–



**Fig. 8** Forest plot of Table 10

effect is found on the relationships of perceived ease of use and perceived usefulness with behavioral intension.

Referring to the forest plot for Table 10 as shown in Fig. 8, studies 2, 3 have negative moderating effects by uncertainty avoidance and the remaining are all on the positive side.

### 5.3 The proposed conceptual model

To develop a parsimonious technology acceptance model with culture dimensions as moderating factors, the promising predictors of each dimension are listed in Table 11 and a framework is developed.

- Masculinity positively moderates the relationship of **attitude and usage** (Avg.  $\beta=0.12$ )
- Individualism (Avg.  $\beta=0.21$ ) and uncertainty avoidance (Avg.  $\beta=0.32$ ) positively moderate the relationship of **behavioral intension and use behavior**, while long-term orientation moderates in the opposite direction (Avg.  $\beta=-0.33$ )
- Masculinity (Avg.  $\beta=0.06$ ) and uncertainty avoidance (Avg.  $\beta=0.17$ ) positively moderate **information system quality and satisfaction**.

**Table 11** Summary of the moderating relationship investigated and the promising effect with average Beta

Relationship	IDV	LTO	MAS	PDI	UA
A-BI					0.65
A-U			0.12		
BI-UB	0.21	<b>-0.33</b>		0.10	<b>0.32</b>
ISQ-SAT	0.20		0.06	0.03	0.17
KNOWL-PEOU	<b>0.45</b>				
PBC-BI				0.22	
PEOU-BI	<b>0.43</b>	<b>0.41</b>	-0.05	0.01	-0.34
PEOU-PU					<b>0.67</b>
PEOU-SAT			-0.12	0.05	
PU-AT				-0.25	
PU-BI	<b>0.42</b>	0.38		-0.02	<b>-0.37</b>
PU-SAT			0.11	0.07	
SI-U	0.01			0.00	
SN-BI	0.27		-0.18	-0.09	0.50
TR-BI	0.08	<b>0.50</b>			<b>0.32</b>

Weight=1 and frequency <3 are considered as promising predictor; Bold represents strength

- Individualism (Avg.  $\beta=0.45$ ) positively moderates the relationship of **knowledge and perceived ease of use**.
- All five dimensions except Masculinity moderate the relationship of **perceived ease of use and behavioral intention**. Uncertainty avoidance is in the negative direction.
- Uncertainty avoidance moderates the relationship of **perceived ease of use and perceived usefulness** (Avg.  $\beta=0.67$ )
- Masculinity negatively moderates **perceived ease of use and satisfaction** (Avg.  $\beta=-0.12$ )
- Power distance negatively moderates the relationship between **perceived usefulness and attitude** (Avg.  $\beta=-0.25$ ).
- All five dimensions except Masculinity moderate the relationship of **perceived usefulness and behavioral intention**. PDI and UA are in the negative direction.
- Power distance positively moderates **perceived usefulness and satisfaction** (Avg.  $\beta=0.07$ )
- Long-term orientation (Avg.  $\beta=0.50$ ) and uncertainty avoidance (Avg.  $\beta=0.32$ ) moderate the relation of **trust and behavioral intention**.

Based on the findings, all five dimensions have moderating effects on the constructs of technology acceptance models. Among the relationships, masculinity and power distance seems to have feeble effects. The resulting parsimonious model is depicted in Fig. 9.

### 6 Discussion

The study examined the direct and moderating effects of Hofstede’s cultural dimensions on technology acceptance models. When examining the direct effects, there are three best predictors. Uncertainty Avoidance is the best predictor for Perceived Ease of Use (Effort Expectancy) and has a positive effect. In cultures with high uncertainty avoidance, it will be important to keep in mind that employees will try to avoid risk. Helping employees understand the benefits of a new system will be a key factor in their acceptance of the system. Individualism and Power Distance are best predictors of Behavioral Intension (Intension to use). Individualism has a negative effect indicating with a higher degree of IDV, there is a lower intension to use.

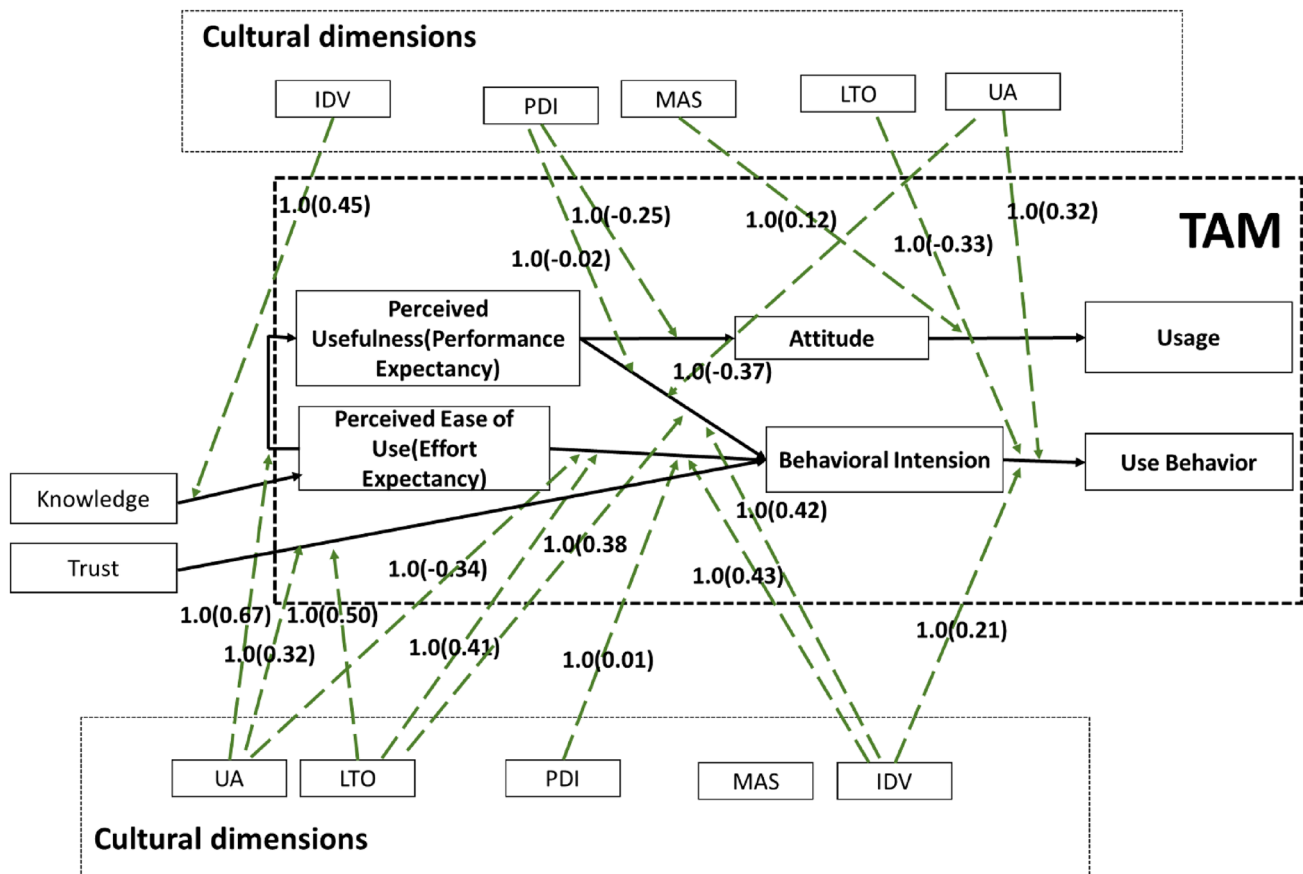


Fig. 9 Proposed Model with cultural dimensions as moderator Note: dashed arrows represent moderating effect with respective values of weight and average beta (in parenthesis)



There is a positive effect with Power Distance indicating with higher Power Distance there is a higher intension to use. When individualism is high, there is more to overcome for employees to use new technology. Perhaps if the scope of the project could include a strong WIFM (What's In It For Me) component, that would encourage the use of the system because there is something of value to the individual in using the system. In environments with high Power distance, it is important for senior management to show strong support for new technology; with the strong support of senior management, employees will be more likely to use the new technology.

A promising predictor of behavioral intension is long-term orientation. Since the direction is negative, with a higher degree of long-term outcome, there is a lower intension to use. Employees with a long-term culture will be thinking about the future; it will be important in the roll-out of the new technology to highlight the positive future impacts of using the technology. Power distance and individualism are promising predictors for use, interestingly in the opposite direction, on behavioral intension. In environments with lower power distance, it would be wise to have peer leaders involved in training and encourage the use of the new system so that employees are more likely to use it. This would also help with the collectivism culture in that all employees would be in it together.

In the analysis of the moderating effects of culture, five different moderators impacted 8 pairwise relationships. Individualism moderated all relationships positively. It is important for employees to understand the benefits of the system to them personally. Masculinity impacted 3 relationships. It positively moderates the relationship between attitude and usage and also between information system quality and satisfaction. It negatively moderates the relationship between ease of use and satisfaction. In masculine cultures, explaining how the system will encourage promotion will be important. In feminine cultures, the group aspect of using and learning together will be important. Long-/short-term orientation moderates 4 relationships. Long-term orientation positively moderates three variables (perceived ease of use, perceived usefulness and trust) with behavioral intention and negatively moderates between behavioral intention and use. Helping employees understand the impacts of the system on the future will be very important. With regard to the relationship between behavioral intention and use, it is important to focus on the short-term gains to encourage the use of the system.

Power distance moderates four relationships. It slightly positively moderates perceived ease of use on behavioral intention. It negatively moderates the relationship between perceived usefulness and both behavioral intension and attitude while positively moderating the relationship between perceived usefulness and satisfaction. The strongest weight

is  $-0.25$  on the PU-AT relationship. When senior management is showing support for the new technology, they need to keep it real and not overdo it as this could cause a negative impact on attitude.

Uncertainty avoidance moderates 6 relationships. It negatively moderates both perceived ease of use and perceived usefulness on behavioral intention. It positively moderates behavioral intention with use behavior, information service quality with satisfaction, trust with behavioral intension, and perceived ease of use with perceived usefulness. Overall, it is important to have training remove as much uncertainty with the new technology as possible.

From the proposed model, all 5 dimensions have moderating effects; it appears that masculinity and power distance have feeble effects. The cultural dimensions of individualism, long-term orientation, and uncertainty avoidance have stronger moderating effects. When planning the roll out of a new system, understanding the culture of the employees on these dimensions should be considered. In global companies, it is important to realize that the cultures of the employees will not be the same in every country. Training and change management plans will need to be adapted to the cultures in order to realize the desired moderating effects.

## 7 Conclusion

The purpose of this paper was to explore the effect of Hofstede's cultural dimensions on technology acceptance models. A meta-analysis approach was carried out by examining 22 prior research studies published between 1989 and 2018 in which cultural dimensions were used as direct predictors or moderators in technology acceptance models. Utilizing the method followed by [38] and Rana, 2015, this paper identifies best and promising predictors of technology adoption constructs and develops a parsimonious model for direct effect of cultural dimension and for moderating effect as well. The results show that the masculinity dimension was not found to have robust direct effect on the technology acceptance models. Also, power distance and masculinity seem to have feeble moderating effect.

Grounded theories have been lacking for including cultural dimensions in technology acceptance theories and models. The main contribution of the study is the use of meta-analysis to develop sound models for the inclusion of cultural dimensions in the technology acceptance theories and models. The findings have several implications to researchers and technology developers. For researchers, this finding will assist in subsequent research on the effect of cultural dimensions on technology acceptance models considering the effect found in this paper. Technology developers can take the direct and moderating effects found in this paper into consideration to understand the impact of

Hofstede's cultural factors on user adoption of their product/technology before they plan to introduce innovative technologies. Typically, cultural effects are not taken into account and the implications are huge. Understanding the culture of the employees will enable those responsible for training and change management to prepare the best messages and training. For example, should the change management message focus on short-term wins, long-term benefits, or in some cases both? Should upper-level management be involved and encourage the use of the new system or should they be less strong and allow peer leaders to lead the initiative?

## 8 Limitations and future work

One limitation is the relative small sample size; however, the authors searched for all studies that used cultural dimensions as part of their research models. Some studies that had the effect of culture on technology acceptance could not be used due to the lack of empirical data and the language of

study being limited to English. Thus, with the inadequate sample size in this study, patterns observed, and relationships found, caution should be used in utilizing the results. Although the objective of the study was also to include the mediating effect of cultural dimensions, this study does not consider the effect of mediators, as the authors could not find any relevant articles reporting mediating effects with empirical values. This study is limited to Hofstede's cultural dimensions, and future work can explore the effects of other culture dimensions.

Future work can include any study using mediating effects. Another possible research endeavor would be examining the organizational culture on TAM. Testing the proposed model in different countries with different culture dimensions would be interesting.

## Appendix

Articles and path coefficients reported.

Article #	Author (Year)	Country	Sample	IV	DV	Direct/ Moderator	Beta	Significance
1	Al-Hujran, Omar et al. [2]	Jordan	197	UA	PU	Direct	0.137	<0.05
	Al-Hujran, Omar et al. [2]	Jordan	197	UA	PEOU	Direct	0.223	<0.01
	Al-Hujran, Omar et al. [2]	Jordan	197	PDI	PU	Direct	0.187	<0.01
	Al-Hujran, Omar et al. [2]	Jordan	197	PDI	PEOU	Direct	0.202	<0.05
2	AlKhalidi, Ayman et al. [4]	Jordan	385	IDV	U	Direct	0.242	<0.001
	AlKhalidi, Ayman et al. [4]	Jordan	385	PDI	U	Direct	-0.153	<0.05
	AlKhalidi, Ayman et al. [4]	Jordan	385	SI	U	Moderator	0.008	N.S
	AlKhalidi, Ayman et al. [4]	Jordan	385	SI	U	Moderator	0.000	N.S
3	AlShare, Khaled A et al. [5]	USA	166	A	U	Moderator	0.140	<0.01
	AlShare, Khaled A et al. [5]	USA	166	PU	AT	Moderator	-0.4	<0.1
	AlShare, Khaled A et al. [5]	USA	166	KNOWL	PEOU	Moderator	0.550	<0.01
	AlShare, Khaled A et al. [5]	USA	166	PEOU	PU	Moderator	0.640	<0.01
	AlShare, Khaled A et al. [5]	Chile	156	A	U	Moderator	0.100	<0.01
	AlShare, Khaled A et al. [5]	UAE	169	PU	AT	Moderator	-0.1	<0.1
	AlShare, Khaled A et al. [5]	Chile	156	KNOWL	PEOU	Moderator	0.350	<0.01
	AlShare, Khaled A et al. [5]	Chile	156	PEOU	PU	Moderator	0.700	<0.01

Article #	Author (Year)	Country	Sample	IV	DV	Direct/ Moderator	Beta	Significance
4	Al-Smadi, M. [6]	Jordan	387	PDI	PU	Direct	0.080	0.862
	Al-Smadi, M. [6]	Jordan	387	UA	PU	Direct	0.266	<0.05
	Al-Smadi, M. [6]	Jordan	387	IDV	PU	Direct	0.130	0.258
	Al-Smadi, M. [6]	Jordan	387	MAS	PU	Direct	0.020	0.862
	Al-Smadi, M. [6]	Jordan	387	LTO	PU	Direct	0.035	0.754
	Al-Smadi, M. [6]	Jordan	387	PDI	PEOU	Direct	0.076	0.501
	Al-Smadi, M. [6]	Jordan	387	UA	PEOU	Direct	0.260	<0.05
	Al-Smadi, M. [6]	Jordan	387	IDV	PEOU	Direct	0.126	0.171
	Al-Smadi, M. [6]	Jordan	387	MAS	PEOU	Direct	0.129	0.175
	Al-Smadi, M. [6]	Jordan	387	LTO	PEOU	Direct	0.084	0.388
5	Chai, Lin et al. [14]	Greece	70	A	BI	Moderator	0.711	<0.05
	Chai, Lin et al. [14]	Greece	70	PBC	BI	Moderator	0.125	>0.01
	Chai, Lin et al. [14]	Greece	70	SN	BI	Moderator	0.305	>0.1
	Chai, Lin et al. [14]	USA	181	A	BI	Moderator	0.597	<0.05
	Chai, Lin et al. ([14]	USA	181	PBC	BI	Moderator	0.314	<0.01
	Chai, Lin et al. [14]	USA	181	SN	BI	Moderator	0.712	<0.01
6	Constantiou, Constantiou, I.D et al. [17]	Denmark & UK	200	PB	U	Moderator	0.140	0.031
	Constantiou, Constantiou, I.D et al. [17]	Denmark & UK	200	PC	U	Moderator	-0.035	0.586
7	Nazli Ebrahimi et al. [22]	Malaysia	121	PDI	BI	Direct	0.204	<0.05
	Nazli Ebrahimi et al. [22]	Malaysia	121	UA	BI	Direct	0.173	<0.05
	Nazli Ebrahimi et al. [22]	Malaysia	121	MAS	BI	Direct	0.070	N.S
	Nazli Ebrahimi et al. [22]	Malaysia	121	IDV	BI	Direct	0.133	<0.05
8	Huang, Linjun et al. (32)	China	423	SN	PU	Moderator	-0.07	0.01
9	Hung, C. L. et al. (34)	Taiwan	265	PU	BI	Moderator	-0.302	<0.01
	Hung, C. L. et al. (34)	Taiwan	265	PU	BI	Moderator	-0.293	<0.01
	Hung, C. L. et al. (34)	Taiwan	265	PU	BI	Moderator	0.217	<0.1
	Hung, C. L. et al. (34)	Taiwan	265	PU	BI	Moderator	0.389	<0.01
	Hung, C. L. et al. (34)	Taiwan	265	PU	BI	Moderator	0.323	<0.1
	Hung, C. L. et al. (34)	Taiwan	265	PEOU	BI	Moderator	0.361	<0.01
	Hung, C. L. et al. (34)	Taiwan	265	PEOU	BI	Moderator	-0.258	<0.1
	Hung, C. L. et al. (34)	Taiwan	265	PEOU	BI	Moderator	0.250	<0.1

Article #	Author (Year)	Country	Sample	IV	DV	Direct/ Moderator	Beta	Significance
	Hung, C. L. et al. (34)	Taiwan	265	PEOU	BI	Moderator	-0.405	<0.01
	Hung, C. L. et al. (34)	Taiwan	265	PEOU	BI	Moderator	0.335	<0.1
	Hung, C. L. et al. (34)	Malaysia	214	PU	BI	Moderator	0.260	<0.1
	Hung, C. L. et al. (34)	Malaysia	214	PU	BI	Moderator	-0.446	<0.001
	Hung, C. L. et al. (34)	Malaysia	214	PU	BI	Moderator	0.624	<0.001
	Hung, C. L. et al. (34)	Malaysia	214	PU	BI	Moderator	0.159	N.S
	Hung, C. L. et al. (34)	Malaysia	214	PU	BI	Moderator	0.446	<0.001
	Hung, C. L. et al. (34)	Malaysia	214	PEOU	BI	Moderator	-0.346	<0.1
	Hung, C. L. et al. (34)	Malaysia	214	PEOU	BI	Moderator	-0.428	<0.001
	Hung, C. L. et al. (34)	Malaysia	214	PEOU	BI	Moderator	0.609	<0.001
	Hung, C. L. et al. (34)	Malaysia	214	PEOU	BI	Moderator	-0.089	N.S
	Hung, C. L. et al. (34)	Malaysia	214	PEOU	BI	Moderator	0.478	<0.001
10	Udo, Godwin J. et al. (64)	USA	188	PEOU	SAT	Moderator	-0.05	N.S
	Udo, Godwin J. et al. (64)	USA	188	PU	SAT	Moderator	-0.07	
	Udo, Godwin J. et al. (64)	USA	188	ISQ	SAT	Moderator	0.040	N.S
	Udo, Godwin J. et al. (64)	USA	188	PEOU	SAT	Moderator	0.010	
	Udo, Godwin J. et al. (64)	USA	188	ISQ	SAT	Moderator	-0.09	
	Udo, Godwin J. et al. (2012)	USA	188	ISQ	SAT	Moderator	0.130	N.S
	Udo, Godwin J. et al. (64)	USA	188	ISQ	SAT	Moderator	0.090	
	Udo, Godwin J. et al. (64)	Nigeria	201	PEOU	SAT	Moderator	0.140	N.S
	Udo, Godwin J. et al. (64)	Nigeria	201	PU	SAT	Moderator	0.210	<0.05
	Udo, Godwin J. et al. (64)	Nigeria	201	ISQ	SAT	Moderator	0.010	N.S
	Udo, Godwin J. et al. (64)	Nigeria	201	PEOU	SAT	Moderator	-0.24	<0.05
	Udo, Godwin J. et al. (64)	Nigeria	201	ISQ	SAT	Moderator	0.200	<0.05
	Udo, Godwin J. et al. (64)	Nigeria	201	ISQ	SAT	Moderator	0.260	N.S
	Udo, Godwin J. et al. (64)	Nigeria	201	ISQ	SAT	Moderator	0.24	<0.05
11	Sheikh, Zaryab et al. (54)	Saudi Arabia	310	BI	UB	Moderator	0.116	<0.05

Article #	Author (Year)	Country	Sample	IV	DV	Direct/ Moderator	Beta	Significance
12	Sheikh, Zaryab et al. (54)	Saudi Arabia	310	BI	UB	Moderator	0.291	<0.001
	Ghanem, Marwa Magdy et al. (23)	Egypt	109	UA	PU	Direct	0.248	<0.05
	Ghanem, Marwa Magdy et al. (23)	Egypt	109	UA	PEOU	Direct	0.353	<0.05
	Ghanem, Marwa Magdy et al. (23)	Egypt	109	LTO	PU	Direct	0.005	<0.05
	Ghanem, Marwa Magdy et al. (23)	Egypt	109	LTO	PEOU	Direct	-0.093	<0.05
	Ghanem, Marwa Magdy et al. (23)	Egypt	109	UA	U	Direct	0.100	<0.05
	Ghanem, Marwa Magdy et al. (23)	Egypt	109	LTO	U	Direct	0.013	<0.05
13	Mahfuz et al. [46]	Bangladesh	115	MAS	BI	Direct	0.496	
	Mahfuz et al. [46]	Bangladesh	115	PDI	BI	Direct	0.229	
	Mahfuz et al. [46]	Bangladesh	115	IDV	BI	Direct	0.012	N.S
	Mahfuz et al. [46]	Bangladesh	115	UA	BI	Direct	-0.057	N.S
14	Gonçalo Baptista et al. (11)	Mozambique	252	BI	UB	Moderator	0.298	<0.01
	Gonçalo Baptista et al. (11)	Mozambique	252	BI	UB	Moderator	0.351	<0.01
	Gonçalo Baptista et al. (11)	Mozambique	252	BI	UB	Moderator	-0.332	<0.01
	Gonçalo Baptista et al. (11)	Mozambique	252	BI	UB	Moderator	0.244	<0.10
	Gonçalo Baptista et al. (11)	Mozambique	252	BI	UB	Moderator	-0.038	N.S
15	Zhang, Yun et al. (72)	Multiple	19,604	PE	BI	Moderator	-0.316	<0.05
	Zhang, Yun et al. (72)	Multiple	19,604	PE	BI	Moderator	0.218	<0.1
	Zhang, Yun et al. (72)	Multiple	19,604	PE	BI	Moderator	-0.48	<0.01
	Zhang, Yun et al. (72)	Multiple	19,604	PE	BI	Moderator	0.551	<0.01
	Zhang, Yun et al. (72)	Multiple	19,604	PE	BI	Moderator	-0.339	<0.01
	Zhang, Yun et al. (72)	Multiple	19,604	EE	BI	Moderator	0.256	<0.05
	Zhang, Yun et al. (72)	Multiple	19,604	EE	BI	Moderator	-0.447	<0.01
	Zhang, Yun et al. (72)	Multiple	19,604	SI	BI	Moderator	0.552	<0.01
	Zhang, Yun et al. (72)	Multiple	19,604	SI	BI	Moderator	0.266	<0.1
	Zhang, Yun et al. (72)	Multiple	19,604	SI	BI	Moderator	-0.353	<0.05
	Zhang, Yun et al. (2018)	Multiple	19,604	PR	BI	Moderator	0.391	<0.1
	Zhang, Yun et al. (72)	Multiple	19,604	TR	BI	Moderator	0.500	<0.05
	Zhang, Yun et al. (72)	Multiple	19,604	TR	BI	Moderator	0.638	<0.01

Article #	Author (Year)	Country	Sample	IV	DV	Direct/ Moderator	Beta	Significance
16	Khushman, S. et al. [38]	Arab	458	MAS	BI	Direct	0.104	<0.05
	Khushman, S. et al. [38]	Arab	458	PDI	BI	Direct	-0.262	<0.01
	Khushman, S. et al. [38]	Arab	458	IDV	BI	Direct	-0.397	<0.01
	Khushman, S. et al. [38]	Arab	458	UA	BI	Direct	-0.575	<0.01
	Khushman, S. et al. [38]	UK	165	PDI	BI	Direct	-0.154	<0.05
	Khushman, S. et al. [38]	UK	165	IDV	BI	Direct	-0.339	<0.01
	Khushman, S. et al. [38]	UK	165	UA	BI	Direct	-0.119	N.S
	Khushman, S. et al. [38]	UK	165	MAS	BI	Direct	-0.145	N.S
17	Osman [53]	Sudan	527	UA	PEOU	Direct	0.284	<0.001
	Osman [53]	Sudan	527	MAS	PEOU	Direct	0.320	<0.001
	Osman [53]	Sudan	527	UA	PU	Direct	0.004	N.S
	Osman [53]	Sudan	527	MAS	PU	Direct	-0.065	N.S
18	Yujong Hwang [37]	USA	101	UA	PEOU	Direct	0.280	<0.01
19	Al-Hujran, Omar et al. [3]	Jordan	413	UA	PEOU	Direct	0.180	<0.01
	Al-Hujran, Omar et al. [3]	Jordan	413	PDI	PEOU	Direct	0.130	<0.05
	Al-Hujran, Omar et al. [3]	Jordan	413	MAS	PEOU	Direct	-0.08	N.S
	Al-Hujran, Omar et al. [3]	Jordan	413	IDV	PEOU	Direct	0.007	N.S
	Al-Hujran, Omar et al. [3]	Jordan	413	LTO	PEOU	Direct	0.020	N.S
20	Cheolho Yoon [71]	China	270	IDV	BI	Direct	-0.128	<0.1
	Cheolho Yoon [71]	China	270	PDI	BI	Direct	0.113	<0.1
	Cheolho Yoon [71]	China	270	PU	BI	Moderator	0.275	<0.1
	Cheolho Yoon [71]	China	270	PEOU	BI	Moderator	0.211	<0.1
	Cheolho Yoon [71]	China	270	UA	BI	Direct	-0.335	<0.01
	Cheolho Yoon [71]	China	270	TR	BI	Moderator	0.319	<0.05
	Cheolho Yoon [71]	China	270	LTO	BI	Direct	-0.145	<0.05
	Cheolho Yoon [71]	China	270	TR	BI	Moderator	0.502	<0.05
	Cheolho Yoon [71]	China	270	TR	BI	Moderator	0.079	N.S
	Cheolho Yoon [71]	China	270	MAS	BI	Direct	-0.158	N.S
21	Akour, Iman; Al Share, Khaled A et al. [1]	Jordan	507	PDI	BI	Direct	0.158	0

Article #	Author (Year)	Country	Sample	IV	DV	Direct/ Moderator	Beta	Significance
	Akour, Iman; Al Share, Khaled A et al. [1]	Jordan	507	IDV	BI	Direct	0.269	0
	Akour, Iman; Al Share, Khaled A et al. [1]	Jordan	507	UA	BI	Direct	-0.150	0.745
	Akour, Iman; Al Share, Khaled A et al. [1]	Jordan	507	MAS	BI	Direct	0.240	0.641
22	Srite, M; Karahanna, E [57]	Multiple	81	PU	BI	Moderator	0.042	N.S
	Srite, M; Karahanna, E [57]	Multiple	81	PEOU	BI	Moderator	-0.492	N.S
	Srite, M; Karahanna, E [57]	Multiple	81	SN	BI	Moderator	-0.319	0.005
	Srite, M; Karahanna, E [57]	Multiple	81	SN	BI	Moderator	0.410	N.S
	Srite, M; Karahanna, E [57]	Multiple	81	SN	BI	Moderator	-0.382	0.1
	Srite, M; Karahanna, E [57]	Multiple	81	SN	BI	Moderator	0.530	0.005
	Srite, M; Karahanna, E [57]	Multiple	116	PU	BI	Moderator	-0.315	N.S
	Srite, M; Karahanna, E [57]	Multiple	116	PEOU	BI	Moderator	0.524	0.1
	Srite, M; Karahanna, E [57]	Multiple	116	SN	BI	Moderator	-0.033	N.S
	Srite, M; Karahanna, E [57]	Multiple	116	SN	BI	Moderator	0.133	N.S
	Srite, M; Karahanna, E [57]	Multiple	116	SN	BI	Moderator	0.188	N.S
	Srite, M; Karahanna, E [57]	Multiple	116	SN	BI	Moderator	0.469	0.1

**Funding** Open Access funding provided by the Qatar National Library.

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