

LAPORAN PENELITIAN



Do Cultural Dimensions Impact the Adoption of IT Innovation? – A Systematic Literature Review

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Profil

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Ringkasan

Penelitian ini bertujuan untuk mengidentifikasi dimensi budaya nasional yang secara konsisten berpengaruh terhadap adopsi teknologi informasi dengan menggunakan metode *systematic literature review*. Sebanyak 49 artikel dipilih berdasarkan sekumpulan kriteria yang telah ditentukan pada tiga tahapan penyortiran data. Dari 49 artikel tersebut, terdapat 64 kasus yang diikutsertakan pada proses analisis. Hasil analisis menunjukkan bahwa intensitas penelitian terkait peranan dimensi budaya nasional dan adopsi teknologi informasi mengalami peningkatan pada periode 2011 sampai dengan 2017, dan mulai mengalami penurunan intensitas sejak 2018 sampai dengan sekarang. *Technology acceptance model* dan *uncertainty avoidance* teridentifikasi sebagai teori adopsi dan dimensi budaya nasional yang paling sering dilibatkan dalam studi dimensi budaya dan adopsi teknologi informasi. Terkait dengan model korelasi antara dimensi budaya nasional dan adopsi teknologi informasi, korelasi tidak langsung (*indirect correlation*) merupakan jenis korelasi yang paling sering diaplikasikan untuk menguji keterhubungan antara dua faktor tersebut. Pada *indirect correlation*, dimensi budaya nasional *uncertainty avoidance* terkonfirmasi paling sering berpengaruh terhadap adopsi teknologi informasi yang dimediasi oleh faktor *perceived ease of use* (kemudahan penggunaan). Dimensi budaya nasional *uncertainty avoidance* juga terkonfirmasi sebagai faktor yang paling banyak memoderasi atau memperkuat hubungan antara faktor *perceived usefulness* (kegunaan) dengan adopsi teknologi informasi. Sementara itu untuk korelasi langsung (*direct correlation*), dimensi budaya nasional *power distance* teridentifikasi memiliki pengaruh secara langsung dengan adopsi teknologi informasi. Penelitian ini dapat digunakan sebagai referensi bagi peneliti baru yang memiliki ketertarikan pada studi mengenai peranan dimensi budaya nasional terhadap adopsi teknologi informasi.

Kata kunci: Dimensi Budaya Nasional, Adopsi Teknologi Informasi, Systematic Literature Review

CHAPTER I

INTRODUCTION

It is undeniable that nowadays innovations in information technology (IT) such as email, mobile banking, ecommerce, cloud computing, eHealth, etc., have become increasingly popular as they are continually adopted in almost every aspect of organizational and individual life and might serve as significant drivers to organizational competitiveness. However, regardless the advantages of certain IT innovations might have, there remain rejections to adopt the innovations. Substantial research has been carried out to identify factors that trigger or inhibit IT adoption (hereinafter we use the terms “IT adoption”, “technology adoption”, and “innovation adoption” interchangeably). Some of the encouraging factors are relative advantages, compatibility, top management support, external pressure, competition, compatibility and organizational readiness; while the hinders are complexity, security, privacy, vendor, and level of uncertainty (e.g., Mangula et al., 2015, 2014; Yen et al., 2014; Alshamaila et al., 2012; Low et al., 2011; Hung et al. 2010). In addition to the factors above, scholars in information systems area began to consider the importance of culture on IT adoption (e.g., Zhang et al., 2018; Lai et al., 2016; Baptista and Oliveira, 2015) as ignorance to cultural differences may disrupt the adoption process that ultimately increase risk of failure (Akour et al., 2006).

In terms of culture definition, it can be defined in many ways which has been discussed amongst anthropologists and sociologists for years. Hofstede, for instance, an anthropologist and the initiator of a well-known concept of national culture, defines culture as “a collective programming of the mind which distinguishes the members of one group of category from another” and “...patterns of thinking and feeling and potential action”. (Hofstede, 1980). Further, Jones highlights the term of “programming” as the key word to interpret culture which refers to a series of programming or learning process that an individual promotes during interaction with their own society (2007). The learning process include beliefs and attitudes, group activities, role model, and symbols; that are obtained from an early age and influenced by the surrounding environment such as family, religion, school, workplace, etc. In regard to these definitions, we construct our own definition of culture by highlighting the term of “programming of the mind” as values inherited by parents or family members that are exercised early in an individual's life and unconsciously internalized and reflected in their behaviour. In order to distinguish one cultural theory to another, a group of dimensions is set out to analyze cultural differences and their consequences. A dimension is “an aspect of a culture that can be measured relative to other cultures” (Hofstede, 1980).

As shown in literature, culture research can be separated into two general research streams: (1) national culture or cross-cultural research (e.g., Bankole & Bankole, 2017; Sanakulov & Karjaluoto, 2017; Tarhini et al., 2017), and (2) organizational culture research (e.g. Senarathna et al., 2014; Smit., 2014; Silic & Back, 2013). However, while the two streams differ, they both share a focus on defining the values that differentiate each stream to another (Leidner and Kayworth, 2006). In this article, we limit our study on national culture based on the following considerations: (1) national culture is originally developed to examine the values of an organization's employees which relate to their technology adoption behaviour (Hofstede, 1980), (2) national culture impacts the cultural values an individual holds, which in turn influence the intention to adopt IT innovations (Shrite and Karahanna, 2006), and (3) values or beliefs embraced by a leader represented on an organization's culture ultimately affect an organization's decision to adopt new technologies into it (Cameron and Quinn, 1999).

In the study of culture, Hofstede national culture has widely been accepted as a method for identifying cultural values (Lee & Peterson, 2000; Van Everdingen & Waarts, 2003). His original dimensions are *power distance*, *uncertainty avoidance*, *individualism vs. collectivism*, and *masculinity vs. Femininity* (Hofstede, 1980). Several years later he added the fifth and sixth dimensions to his model: *long-term vs. short-term orientation* which initially called Confucian dynamism (Hofstede, 2001) and *indulgence vs. restraint* (Hofstede, 2010). Next to Hofstede, Hall's cultural theory relies on communication aspect, an important part of an innovation adoption process, namely *high-context vs. low-context* and *monochronic vs. polychronic* dimensions (Hall, 1976). Seven cultural dimensions were suggested by Schwartz in his research intended to explore the importance of values as the criteria people use to select and justify actions as well as to evaluate people and events. The dimensions are: *conservatism*, *affective autonomy*, *intellectual autonomy*, *hierarchy*, *mastery*, *egalitarian commitment*, and *harmony* (Schwartz, 1994). Similar to Hofstede's cultural dimensions, Trompenaars and Hampden-Turner presented a group of dimensions in the opposite form to understand how national culture differences affect the process of business operations and management (Trompenaars and Hampden-Turner, 1997). Their cultural dimensions are as follows: *universalism vs. particularism*, *individualism vs. communitarism*, *specific vs. diffuse*, *neutral vs. emotional*, *achievement vs. ascription*, *sequential time vs. synchronous time*, and *internal direction vs. outer direction*.

Prior studies have employed a number of theories in an attempt to explain or predict the role of cultural dimensions towards user's adoption and acceptance of technologies. Some of the widely used theories are *diffusion of innovation theory* (Rogers, 1982), *theory of reasoned action* (Fishbein & Ajzen, 1980), *theory of planned behaviour* (Ajzen, 1991), and *technology acceptance model* (Davis, 1989). The theoretical foundation primarily originates from Rogers' adoption and diffusion of innovation theory (DOI), which defines adoption as "*a decision to make full use of an innovation as the best course of action available*" (Rogers, 1982). Developed by Martin Fishbein and Icek Ajzen, the main objective of the theory of reasoned action (TRA) is to understand an individual's behaviour by examining the fundamental motive to perform an action voluntarily (Fishbein & Ajzen, 1980). The theory of planned behaviour (TPB) was submitted by Ajzen (1991) as a refinement to the earlier TRA. Davis' technology acceptance model (TAM) is an adaptation of the TRA which focuses on *perceived usefulness* and *perceived ease of use* that will influence the general intention to use a new technology (Davis, 1989).

Extensive research has been conducted to examine the effects of national cultural dimensions on the adoption of IT innovations (e.g., Zhang et al., 2018; Tarhini et al., 2017; Yildirim & Turkmen, 2016; Baptista & Oliveira, 2015; Jaafar & Thowfeek, 2012). The results, however, are mixed across different studies regarding relations between factors. For instance, *masculinity* found to have positive effect on the adoption of mobile banking in one study (Zhang et al., 2018) and negative relations in other (Baptista & Oliveira, 2015; Al Smadi, 2012). Another example discovered on the study of social media adoption (Facebook) which identified *uncertainty avoidance* as the driving factor referring to Abbas & Mesch (2015) study; whereas two studies (Yildirim & Turkmen, 2016; Al Omoush et al., 2012) consider it as non significant factor. This, of course, raises the question of the overall strength of relations between cultural dimensions and IT innovation adoption. Further, this also makes it difficult for policy makers and practitioners to draw conclusions and act.

The main purpose of this study is to identify the actual cultural dimensions and their impact to the adoption of IT innovation. We focused on gathering relevant literature to present the summarised view on the current research and provide basis for further analysis. To achieve this, we performed a systematic literature review study; a theoretical study and classified as a bibliographical study that analyses existing publication on a specific subject (Creswel, 2017). It

minimizes the bias and random error through a replicable, scientific and transparent process (Cook et al., 1997; Tranfield et al.,2003).

This paper is divided into the following sections. The background and objective of this study are introduced in Section 1. In Section 2 we describe our methodology, while in Section 3 we present our results. Section 4 is intended to answer our research questions and Section 5 is where we present our conclusions.

CHAPTER II

M E T H O D

This study applies a formal systematic literature review initiated by Kitchenham (2004). This method consists of several parts that describe our research questions, explain data search and extraction process, and present the data inclusion, as follows.

2.1 Research Questions

It is known that culture may influence actual behaviour through individual's attitudes and subjective norms that promote or impede the use of IT innovations (Erumban & de Jong, 2006). The potential capability of culture in shaping attitudes and behaviour has inspired a number of studies exploring the impact of culture on the adoption of IT (eg. Guo et al., 2020; Mosunmola et al., 2019; Chopdar & Shivakumar, 2018). As indicated from our initial literature findings, studies on culture and IT innovation adoption has been pioneered by Straub in 1994 (Straub, 1994) up until now. It expected that this SLR will answer the research question below.

RQ1: How active is the field study on national culture effects towards IT innovation adoption?

To verify the role of certain cultural dimensions in relation to the adoption of IT innovation, the researchers engaged with various adoption theories or acceptance models such as *diffusion of innovation theory* (DOI), *technology acceptance model* (TAM), *theory of reasoned action* (TRA), *theory of planned behavior* (TPB), and *unified technology acceptance model and use of technology theory* (UTAUT). Accordingly, the use of SLR aimed to answer the following question:

RQ2: Which adoption theories are commonly used in the study of national culture effects towards IT innovation adoption?

The adoption theories used to identify the impact of culture to IT adoption are constructed using a specific group of cultural dimensions. However, in addition to these dimensions, the researchers often construct models by combining different groups of cultural dimensions, resulting in a wide variety of dimensions involved in determining the adoption of IT innovation. This review is required to discover what cultural dimensions were used by the scholars with the help of the following question:

RQ3: Which national culture dimensions are involved on IT innovation adoption studies?

Cultural dimensions may influence IT adoption directly or indirectly. In a direct relation, cultural dimensions, as the independent variables, are directly influenced the adoption of IT innovations, as the dependent variables (eg., Abbas & Mesch, 2015). This occurs conversely in an indirect relationship, where correlation between the two variables may exist with the help of the third variable that is known as an intermediate variable (eg., Bankole & Bankole, 2017). Additionally, a cultural dimension may act as a moderator variable that affects the strength level of the connection between two variables (eg., Goularte & Zilber, 2018). We use SLR to explore the existence of these relationships in order to answer the following question:

RQ4: Which causal relations between influencing variables occur most frequently and how significance are the relationships?

2.2 Searching Strategy

This stage is carried out to gather studies linked to national culture and IT adoption relationships. The search process was performed on September 3rd, 2022, using Google Scholar Search, an online scientific database due to its accessibility and comprehensiveness. The combination of non-case-sensitive terms relative to the main topic of this research namely "national culture", "information technology", and "adoption" were used as the keywords. Synonyms and alternative spelling of the terms and various combinations of AND and OR Booleans were also used to retrieve as many relevant articles as possible. Since we wish to know the evolution of national culture and IT adoption relationships studies, we put no limitation on the year of publication. Here are the two search strings combinations applied in the search process:

(national culture OR culture OR cultural dimensions) AND (influence OR effect OR role OR impact) AND (information technology OR IT OR technology) AND (adoption OR acceptance OR use OR usage)

(influence OR effect OR role OR impact) AND (national culture) AND (information technology OR internet OR mobile) AND (adoption OR acceptance OR use OR usage)

As the results, there were 2019 articles from journals, proceedings/conferences papers, working paper, and theses were collected. The year of publications ranged from 1964 to 2022.

2.3 Data Extraction

Articles derived from the previous stage underwent a screening process according to predetermined criteria and removed those which unable to comply with the criteria. To ensure article quality and review validity, three cycles of sorting process applied to the articles namely exclusion, pre-inclusion and inclusion. At the exclusion stage, the filtering procedure was implemented in accordance to the article's title, where it should relate or have similar meaning with the terms "culture", "information technology" and "adoption". This process leaves 256 articles included on the next sorting phase.

A set of criteria had been specified at the pre-inclusion stage, as follows: (1) the article is accessible, (2) the article is written in universal language which is the "English language", (3) the article is a complete working paper, (4) the article whose same title with other articles is considered as one study, and (5) the article investigated national culture influence towards IT innovation adoption. One hundred eight articles were dropped and the rest were advanced to the final phase of the sorting process.

Similar to the two prior steps, a number of more specific criteria applied to the remaining articles on the last cycle of selection process, - the inclusion stage. Below are the criteria:

1. The article described the collection data procedure and used primary data as its data sources.
2. The article presented empirical data results for each national culture dimension investigated in the study.
3. If more than one IT innovation evaluated in the study, empirical data results presented for each IT innovation.
4. If more than one country involved in the study, empirical data results presented for each country.

After removing 97 articles due to their inability to meet the above requirements, 49 articles proceeded to the analysis process. They consisted of 42 journal and 7 conference papers that were published between 2002 and 2022.

2.4 Data Inclusion

The list of articles included in the review were inputted and saved in an electronic database. Figure 1 shows a group of attributes that represents each of the articles.

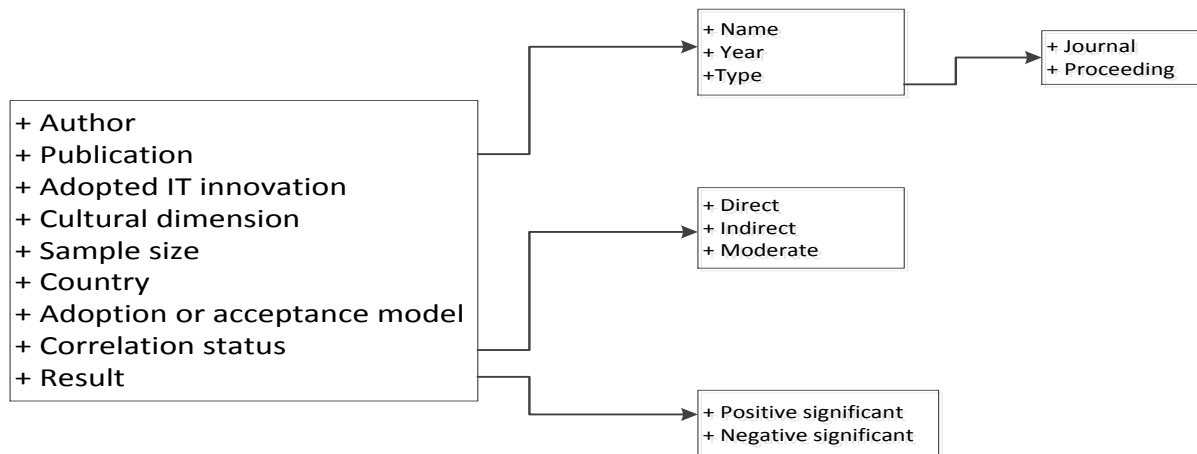


Figure 2.1 – Attributes of each articles

For the attribute of publication, the data is classified into three categories including name, year, and type. Due to quality and validity assurance, we specifically relied on journal and proceeding for the type of publication. The correlation status between national culture dimension and IT innovation adoption is classified into direct, indirect, and moderate relationships, as indicated from the included studies. Results of the empirical data identified as positive and negative significant.

CHAPTER III RESULTS

The analysis process focused on the relations between cultural dimensions and IT adoption in a single country. Of the selected articles, 14 of them are cross-country studies meaning that the investigations were carried out in multiple countries. Overall, there are 27 countries involved in various studies and 64 cases included at the analysis stage as pointed out in Figure 3.1 and Table 3.1. For each case, the table provides its author, publication, IT innovation, and country as the attributes.

Figure 3.1 revealed that the United States is the most frequent country engaged in the study on cultural influence and IT adoption relationships, which followed by Jordan in the second place and China as the third.

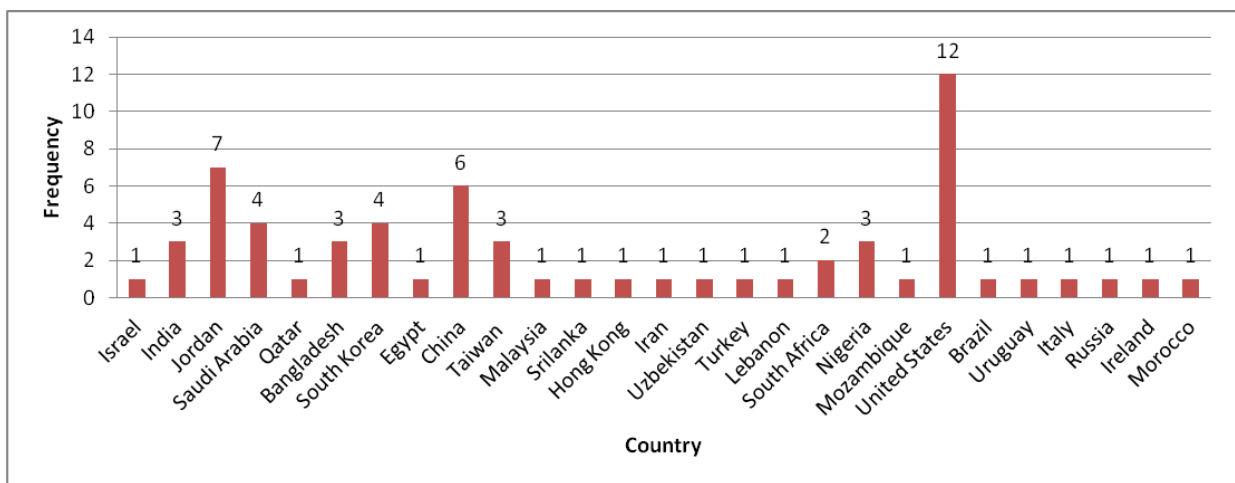


Figure 3.1 - The investigated countries

Thirteen innovations of information technology were indicated from the selected studies as shown in Figure 3.2. The eCommerce, mobile banking, and both eGovernment and Internet technology were the top three of the evaluated IT innovations.

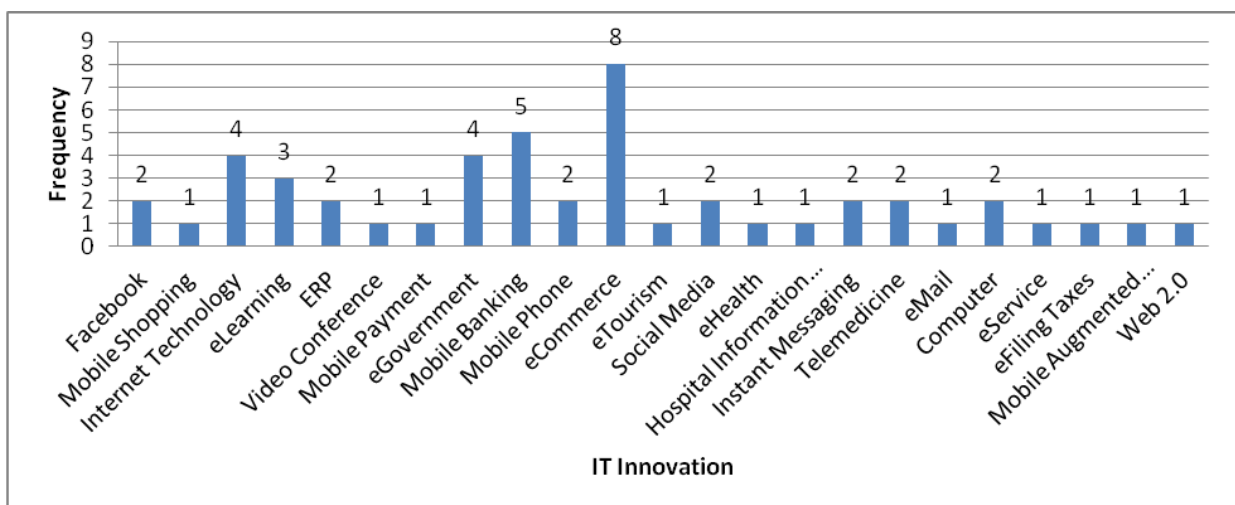


Figure 3.2 – The evaluated IT innovation

Table 3.1 Cases involved on the analysis process

No	Author(s)	Publication			Adopted IT Innovation	Country
		Name	Year	Type		
1	Abbas & Mesch	Computers in Human Behavior	2015	Journal	Facebook	Israel
2	Adapa.	Internet Banking and Commerce	2008	Journal	eCommerce	India
3	Akour et al.	Internet Commerce	2006	Journal	Internet Tech.	Jordan
4	Alamri et al.	6th International Conference on Education and New	2014	Proceeding	eLearning	Saudi Arabia
5	Alhirz & Sajeev	Information Technology & People	2015	Journal	ERP	Saudi Arabia
6	Alkhalidi & Yusof	Theoretical and Applied Information Technology	2013	Journal	Video Conference	Jordan
7	Alshare & Mousa	35th International Conference on Information Systems	2014	Proceeding	Mobile Payment	Qatar
8	Amzaourou & Oubaha	Research in Comparative & International Technology	2018	Journal	Web 2.0	Morocco
9						United States
10	Al Hujran et al.	Computers in Human Behavior	2015	Journal	eGovernment	Jordan
11	Al Hujran et al.	Electronic Journal of eGovernment	2011	Journal	eGovernment	Jordan
12	Al Omoush et al.	Technology Diffusion	2011	Journal	Internet Tech.	Jordan
13	Al Smadi	Business and Social Science	2012	Journal	Mobile Banking	Jordan
14	Ayyash et al.	Electronic Government	2022	Journal	eGovernment	Saudi Arabia
15	Azam & Quaddus	The International Technology Management Review	2013	Journal	Internet Tech.	Bangladesh
16	Bankole & Bankole	Telematics and Informatics	2017	Journal	Mobile Phone	South Africa
17	Bankole et al.	Information Systems in Developing Countries	2011	Journal	Mobile Banking	Nigeria
18	Baptista & Oliveira	Computers in Human Behavior	2015	Journal	Mobile Banking	Mozambique
19	Capece et al.	Knowledge and Process Management	2013	Journal	eCommerce	Italy
20	Choi & Geistfeld	Economic & Psychology	2004	Journal	eCommerce	South Korea
21						United States
22	Chopdar & Shivakumar	Behavior & Information Technology	2018	Journal	Mobile Shopping	India
23	Dagdar et al.	50th Hawaii International Conference on System Sciences	2017	Proceeding	Facebook	United States
24	Faqih & Jaradat	Retailing and Consumer Services	2015	Journal	eCommerce	Jordan
25	Ghanem et al.	Tourism Original Scientific Paper	2017	Journal	eTourism	Egypt
26	Goularte & Zilber	Information Science	2018	Journal	Mobile Banking	Brazil
27	Guo et al.	Information & Management	2020	Journal	Social Media	United States
28						China
29	Hoque & Bao	Telemedicine and eHealth	2015	Journal	eHealth	Bangladesh
30	Hung et al.	IEEE International Conference Management of Innovation & Technology	2010	Proceeding	eCommerce	Taiwan
31						Malaysia
32	Hwang	European Journal of Information Systems	2005	Journal	ERP	United States
33	Jaafar & Thowfeek	Applied Mechanics and Materials	2012	Journal	eLearning	Srilanka
34	Lee-H et al.	Information and Communication Technologies in Tourism	2015	Journal	Mobile Augmented Reality	South Korea
35						Ireland
36	Lee-I et al.	Electronic Commerce	2014	Journal	Internet Tech.	South Korea
37						Taiwan
38	Lin	CIN: Computer, Informatics, Nursing	2015	Journal	Hospital Inf. System	Hong Kong
39						United States
40	Liu et al.	Mobile Communications	2011	Journal	Instant Messaging	Taiwan
41	Lowry et al.	Management Information Systems	2011	Journal	Instant Messaging	China
42						United States
43	Mahfuz et al.	PICMET'16: Technology Management for Social Innovation	2016	Proceeding	Mobile Banking	Bangladesh
44	Mansouri-Rad et al.	46th Hawaii International Conference on System Sciences	2013	Proceeding	Telemedicine	United States
45	McCoy & Jones	Global Information Technology Management	2005	Journal	eMail	United States
46						Uruguay
47	Mensah et al.	Information System in Service Sector	2020	Journal	eGovernment	Russia
48						China
49	Mosunmola et al.	Academy of Management	2019	Journal	eCommerce	Nigeria
50	Nwabueze et al.	42nd Hawaii International Conference on System Sciences	2009	Proceeding	Telemedicine	South Africa
51	Paylou & Chai	Electronic Commerce Research	2002	Journal	eCommerce	United States
52						China
53	Sadeghi et al.	The Turkish Online Journal of Educational	2014	Journal	Computer	Iran
54	Sanakulov & Karjaluoto	Mobile Communication	2017	Journal	Mobile Phone	Uzbekistan
55						South Korea
56	Sheikh et al.	Telematics & Informatics	2017	Journal	Social Media	Turkey
57	Srite et al.	Global Information Management	2008	Journal	Computer	Saudi Arabia
58	Udo et al.	Computers in Human Behavior	2012	Journal	eService	United States
59						Nigeria
60	Tarhini et al.	Interactive Learning Environments	2017	Journal	eLearning	Lebanon
61	Yoon	Information & Management	2009	Journal	eCommerce	China
62	Zaidi et al.	Accounting in Emerging Economies	2017	Journal	eFiling Taxes	India

CHAPTER IV DISCUSSIONS

In the following sections, through our literature review, we manage to provide answers and analysis to our research questions.

4.1 Research Question 1

“How active is the field of study on national cultural effects towards IT innovation adoption?”

Figure 4.1, particularly the red-coloured line chart, indicates the number of studies appeared in the year of 2002 until 2022 referred to 49 selected articles. It is shown that the line is fluctuated during this period where the two highest peaks reached in 2015 and 2017. No publication found in 2003, 2007, and 2021. Since there was no year limitation assigned in this SLR, to further confirm the results, we combined the selected articles with the ones removed at the inclusion stage. Substantially, the composite articles have complied with the fundamental criteria defined at the pre-inclusion stage; hence, we assure that they can be utilized as the comparison. The year sequence of publication resumed from the composite articles is reflected by the blue-coloured line chart ranged between 1994 and 2022. It highlights 2017 as the year with the highest number of publications followed by the second and third highest in both in 2011 and 2013, as well as in 2015, respectively. There is no empirical study identified in 1995, 1998, and 2021.

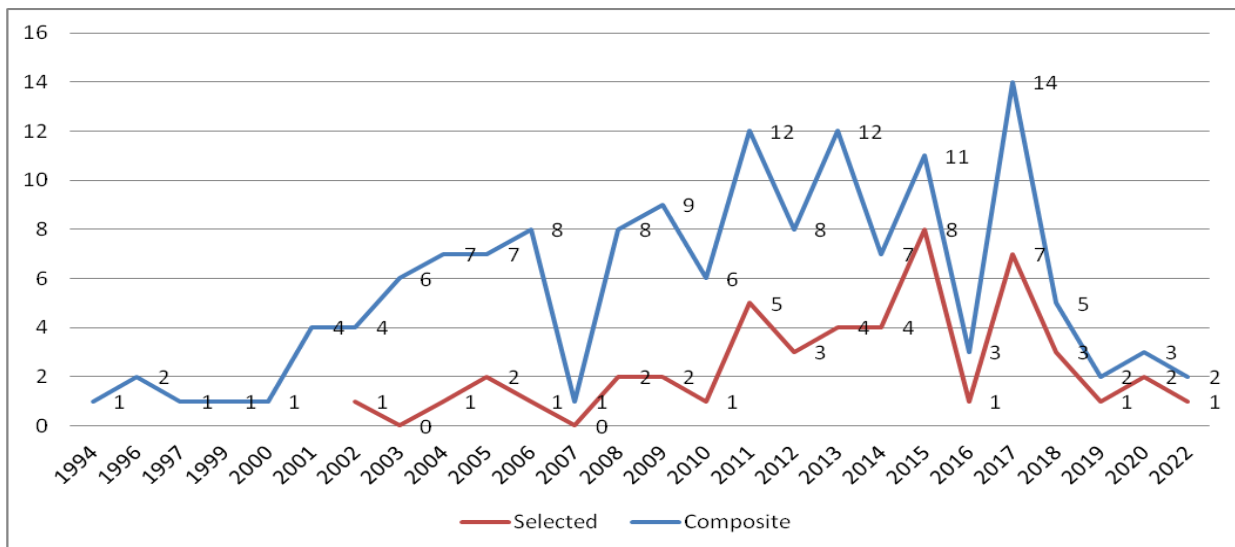


Figure 4.1 Year of publications of the selected and composite articles

If the two lines are contrasted to each other, there are indeed differences in terms of the number and period of publications. However, they also have pattern similarities particularly the line patterns of publications. On the initial period, both lines indicate a low number of publications until they slowly take off on the second quarter of each period. They both experienced significant decline in 2007 and 2016 and kept falling down after they reached notable increment in 2017. In 2020, there was one additional publication opposed to the previous year and went down ever since.

We define no constraint to the year of publications on the search process of the SLR study; therefore, in accordance to the above explanation, we believe that our results pointed out in the

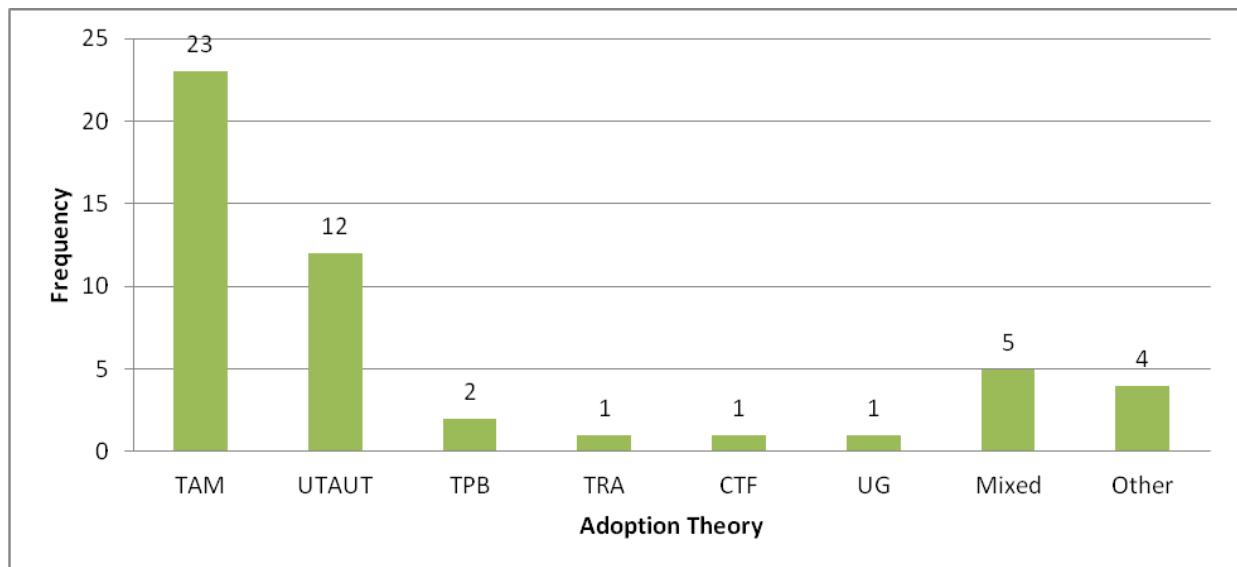
red-coloured chart may answer our research question. It is concluded that the activity level of studies on national culture and IT adoption, particularly noted in the second and third quarters of the publication period between 2008 and 2015, was slightly intense. This might be due to the extensive number of the existing studies, either in the conceptual or research papers, which allows other scholars to utilize them as the references. Conversely, in the early years of the period, the concept on national culture theories and their engagement in information system research was quite new. It is evidenced by the initial findings of our search literature indicated that the concept of national culture was firstly introduced in a book written by Hofstede, a leading anthropologist, in 1980 (Hofstede, 1980); while the scholars of information system area began to consider national culture as the factor of IT adoption in the early 1990s (eg., Ein-dor et al, 1993; Straub, 1994; Philips et al., 1994). Little was known about this concept that consequently led to the low number of publications. A quick fall occurred in 2018 and stays going down up until now. The possibility that the studies on cultural influence and IT adoption have reached a saturation point may become the underlying reason to this phenomenon. In other words, there is no novelty resulted from the studies.

4.2 Research Question 2

“Which adoption theories are commonly used in the study of cultural effect towards IT innovation adoption?”

Our SLR inspected which adoption theories were used by the researchers to analyse the relations between cultural influence and IT innovation adoption. In most cases they used a combination of known models or applied a single model and added additional constructs from various adoption theories. Results of the selected studies are shown in Figure 5. The analysis showed that technology acceptance model (TAM) is the most frequently used theory, followed by the unified theory of acceptance and use of technology (UTAUT), theory of planned behaviour (TPB), theory of reasoned action (TRA), culture-technology fit (CTF), uses & gratification theory (UG), combination of adoption theories including TAM & TPB (Alsmadi, 2012); DOI (diffusion of innovation theory) & TAM (Adapa, 2008); TAM, DOI, and TPB (Nwabueze et al., 2009); TAM & TRA (Srite, 2012); TAM, ISSM (information system success model), & TPB (Zaidi et al., 2017), and other theories.

The TAM is arguably one of the most cited and influential models aimed to predict and explain the motives behind an individual decision to accept and adopt new information technology systems (Akour et al., 2006). It is derived from the TRA (Azjen & Fishbein, 1975). Davis believes that when a person has a positive experience with the technology, this will lead to *behavioural intention* which is a factor that motivates that person to use the technology. The *actual system use* is the final point where it is expected that the person use the technology in daily life or in work activities. The following rationales may explain why TAM was selected by the scholars as the widely referenced theory to determine the correlations between national culture dimensions and IT adoption. Firstly, TAM has a reliable instrument, which has been adapted or replicated, and validated in many studies on the driving factors of IT adoption (Pavloue, 2003; Venkatesh & Davis, 2000; Adams et al., 1992). Secondly, TAM is mostly involved in a quantitative study that provides empirical results at the individual level, which is compatible with considerable studies on national culture that generally designed to evaluate the values or culture of an individual has that reflected in his behavior (Akour et al., 2006; Pavlou, 2003;). Last but not least, numerous studies of IT adoption have incorporated additional factors into TAM such as dimensions of national culture, to improve its predictive powers (Alhujran et al., 2011; Venkatesh & Davis, 2000).



TAM (Technology Acceptance Model), UTAUT (Unified Theory of Acceptance and Use of Technology), TPB (Theory of Planned Behaviour), TRA (Theory of Reasoned Action), CTF (Culture-Technology Fit), Uses & Gratification Theory (UG)

Figure 4.2 - Occurrences number of adoption theories in different studies

4.3 Research Question 3

“Which cultural dimensions are mostly involved in IT innovation adoption studies?”

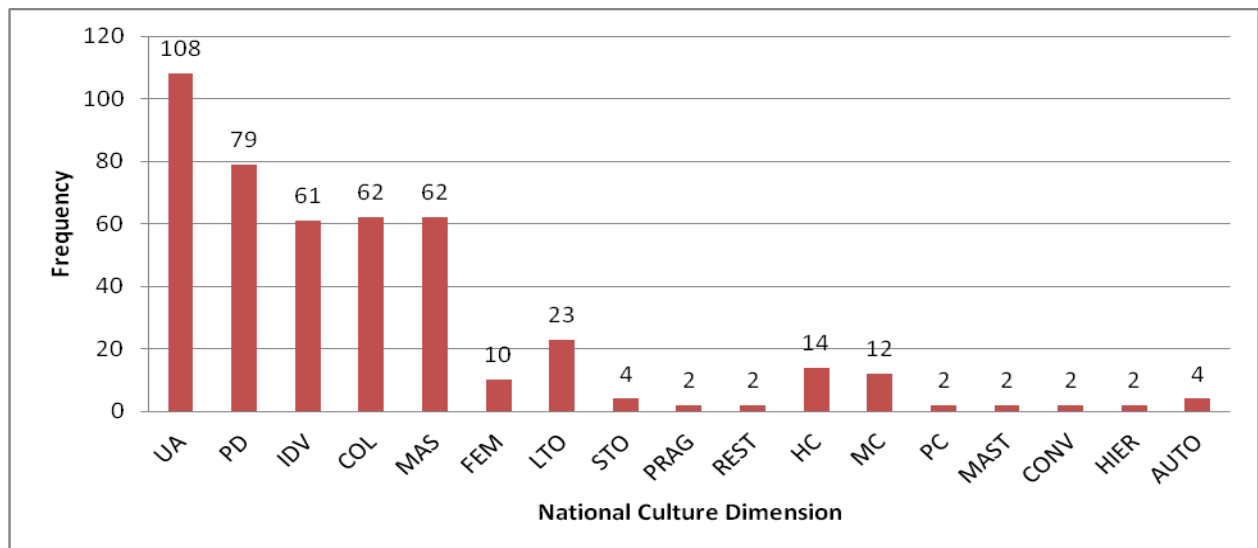
Sixteen dimensions of national culture have been recognized from the selected articles as shown in Table 4.1. For each dimension, the table contains its own abbreviation, extension, definition, and its initiator. The articles that used different abbreviations but corresponded to the same definition and theory like the ones we use, we provide our own for the purpose of this review. Of these cultural dimensions, nine of them belong to Hofstede (1980, 1991, 2001, 2010), while the rest are owned by Hall (1976) and Schwartz (1994).

Despite of the pros and cons, it is uncontested that Hofstede model is a well-known cultural model for many decades. He pioneered his research regarding cultural differences between 1965 and 1970 when he became the personal research manager of a multinational company and administered a survey to the employees which covered 70 national subsidiaries (1980). Over 100.000 employees participated in the survey. Further, to validate his research instrument and confirm the results of his findings, he conducted another survey to the companies' managers from more than 30 countries unrelated to his company. Hofstede found that the same results discovered in the first surveys had reproduced themselves significantly in the second surveys. Confident with his overall findings, the following years later, he suggested his prominent dimensions of national culture that have increasingly been applied in numerous cultural research in various field of studies ever since (Hofstede, 1980, 1991, 2001, 2010). In short, the possible rationales for such findings are: (1) the long process which Hofstede had gone through in constructing his dimensions of national culture, (2) a great number of researchers that included his cultural dimensions into their studies, and (3) the ability of his cultural dimensions to provide some knowledge foundation to new scholars who do not have basic understanding about cultural differences.

Figure 4.3 shows the number of occurrences of each national culture dimension in different studies. Dimension of *uncertainty avoidance* placed at the top rank with 108 causal relations, followed by *power distance* (79 relations) and both *collectivism* and *masculinity* (62 relations) at the second and third positions. Those three are the Hofstede's (1980) cultural dimensions.

Table 4.1 – National cultural dimensions involved on the selected articles

No.	Abbr.	Extension	Definition	Initiator
1	UA	Uncertainty Avoidance	<i>a degree to which the members of a society feel uncomfortable with uncertainty and ambiguity.</i>	Hofstede, 1980, 1991, 2001, 2010
2	PD	Power Distance	<i>a degree to which the less powerful members of a society accept and expect that power is distributed unequally.</i>	
3	IDV	Individualism	<i>a preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families.</i>	
4	COL	Collectivism	<i>a preference for a tightly-knit framework in society in which individuals can expect their relatives or members of a particular in group to look after them in exchange for unquestioning loyalty.</i>	
5	MAS	Masculinity	<i>a preference in society for achievement, heroism, assertiveness, and material rewards for success.</i>	
6	FEM	Femininity	<i>a preference for cooperation, modesty, caring for the weak and quality of life. Society at large is more consensus-oriented.</i>	
7	LTO	Long-term Orientation	<i>people value actions and attitudes that affect the future, persistence/perseverance, thrift, and shame.</i>	
8	STO	Short-term Orientation	<i>people value actions and attitudes that are affected by the past or the present, normative statements, immediate stability, protecting one's own face, respect for tradition, and reciprocation of greetings, favors, and gifts.</i>	
9	REST	Restraint	<i>a society that suppresses gratification of needs and regulates it by means of strict social norms</i>	
10	HC	High Context	<i>people tend to be more aware and observant of facial expressions, body language, changes in tone, and other aspects of communication that are not directly spoken</i>	Hall, 1976
	Other			
11	LC	Low Context	<i>people tend to be more direct, with explicitly speaking what they want to communicate.</i>	
12	MC	Monochronic	<i>people tend to closely follow schedules, focus on one project at a time, and productivity is valued over relationships.</i>	Schwartz, 1994
13	MAST	Mastery	<i>people seek success through personal action, needs independence, courage, ambition, drive and competence.</i>	
14	HIER	Hierarchy	<i>people accept their position in the hierarchy and are expected to be modest and have due self-control.</i>	
15	CONS	Conservatism	<i>people are living or working closely with others and where conformance with group norm is important; they value tradition, security, obedience.</i>	
16	AUTO	Autonomy	<i>people have control over their choices as opposed to having to consider others and shared rules.</i>	



UA (Uncertainty Avoidance), PD (Power Distance), IDV (Individualism), COL (Collectivism), MAS (Masculinity), FEM (Femininity), LTO (Long-term Orientation), STO (Short-term Orientation), PRAG (Pragmatic), REST (Restraint), HC (High Context), MC (Mono Chromic), PC (Poly Chromic), MAST (Mastery), CONV (Conventions), HIER (Hierarchy), AUTO (Autonomy)

Figure 4.3 – Occurances number of national culture dimensions in different studies

Adoption is a decision taken by an individual to use an innovation, while rejection is an intention not to use an innovation (Rogers, 1982). Further, Rogers argued that the term of innovation refers to “an idea, system, or object that is considered new by an individual or other

unit of adoption”; therefore, a decision to adopt or reject a new technology depends on “how new” is the technology perceived by an individual. The dimension of *uncertainty avoidance* focuses on how an individual copes with anxiety or ambiguity by minimizing the risk owned by a new technology (Hofstede, 1991). It is known that the anxiety emerges just immediately after an individual is confronted to an innovation or a new technology and it involves the individual’s feeling that is associated with the cultural dimension of *uncertainty avoidance* (House et al., 2004). A feeling, in psychology, is the perception of events within the body, closely related to emotion and it may affect not just the outcome of the decision, but also the speed of decision making (Lerner, 2015). Accordingly, it is not a surprised that *uncertainty avoidance* plays a crucial role on the adoption of IT compared to the other cultural dimensions (Snitker, 2007; House et al., 2004).

4.4 Research Question 4

“Which causal relations between influencing variables occur most frequently and how significance are the relationships?”

Aim of this research question is to find which relations between national culture dimensions and IT adoption are occurring most frequently. The 64 cases listed previously were used and the relations between them were examined (see Table 3.1). Of these cases, there were 453 causal relations. Next, we set a limitation for the causal relations that they should be analysed at least in two different studies and yielded positive or negative significant relationships. After the limitation was applied the process resulted in 225 different causal relations.

To facilitate the analysis process, the causal relations are classified into three different groups according to the following correlation status: direct correlation, indirect correlation, and moderate correlation. Of those causal relations, most of them were appeared in the scheme of indirect correlations to recognize the influences of the national culture dimensions towards IT adoption through the intermediary factors (105 relations), as indicated in Figure 4.4. The second most occurrences is in the moderate correlation status to see how the national culture dimensions influence the direction and/or the strenght of the relations between the predictor variables and IT adoption as the dependent variable (74 relations). Direct correlations are the least frequent causal relations, in which the cultural dimensions were predicted having a direct influence on the adoption of IT (46 relations).

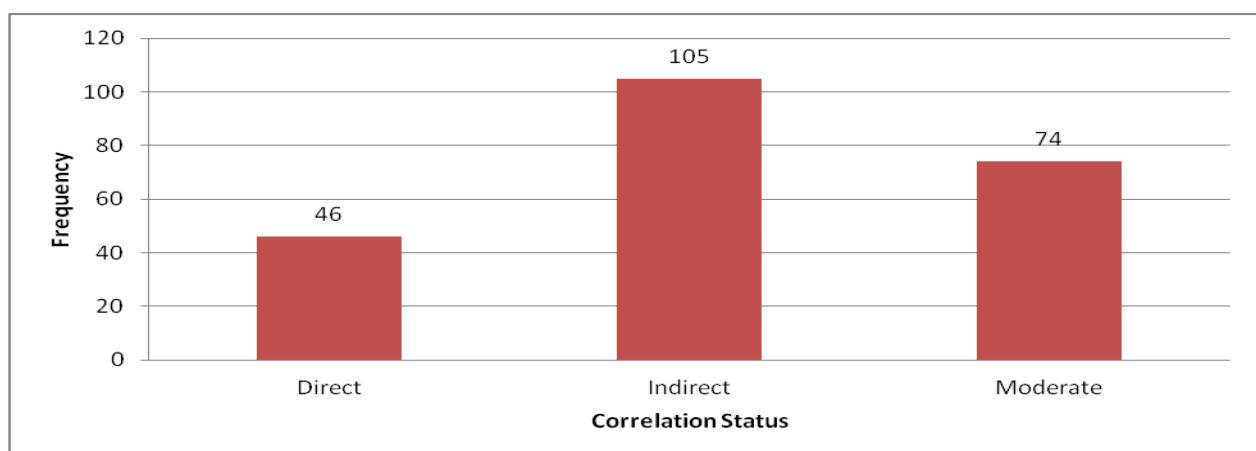
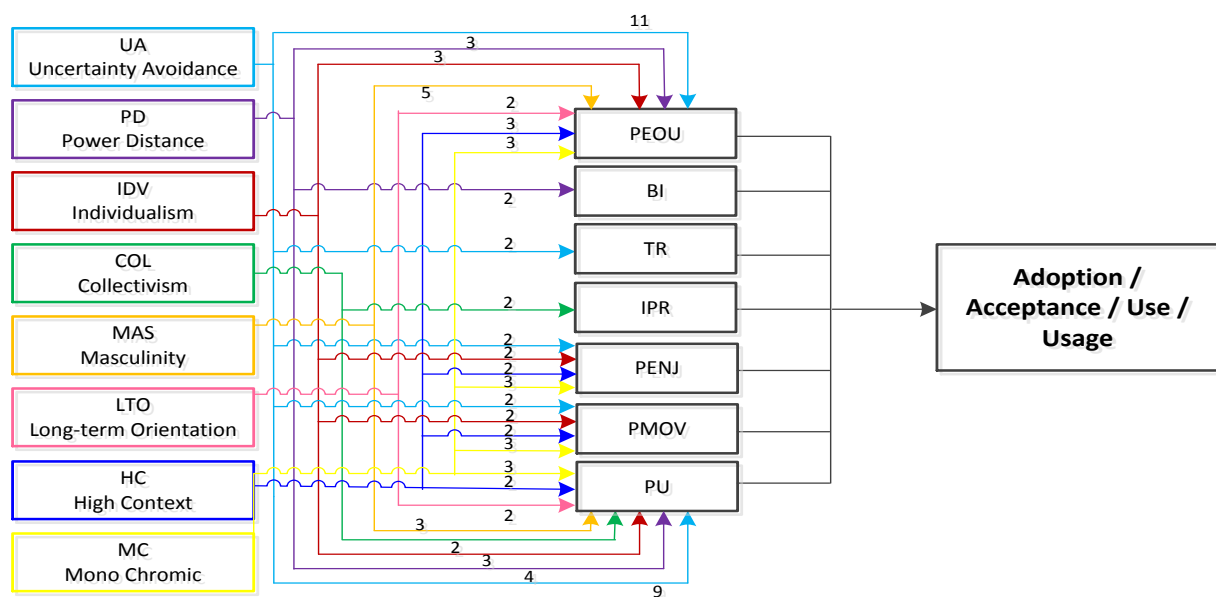


Figure 4.4 – Occurences number of correlation status involved in different studies

A mediation factor, in indirect correlation, has an important effect in constructing the relationships amongst two different variables. In our study, there are seven factors that

intervene the connections of the national culture dimensions and IT adoption namely *perceived ease of use*, *perceived usefulness*, *trust*, *perceived enjoyment*, *perceived monetary values*, *information privacy*, and *behavioral intention*, as shown in Figure 4.5. The mediation factors along with the dimensions of national culture including *uncertainty avoidance*, *power distance*, *individualism*, *collectivism*, *masculinity*, *long-term orientation*, *high context*, and *mono chronic* were confirmed having positive significant influences to the adoption of IT. In overall, there are 82 positive significant indirect correlations. Of these, 11 correlations are represented by the relationships of: *uncertainty avoidance* → *perceived ease of use* → *IT adoption*, as the most occurring relations yielded through *perceived ease of use* as the intermediary factor. The other 9 and 5 correlations were mediated by the *perceived usefulness* factor that each formed the following associations: *uncertainty avoidance* → *perceived usefulness* → *IT adoption* and *masculinity* → *perceived usefulness* → *IT adoption*



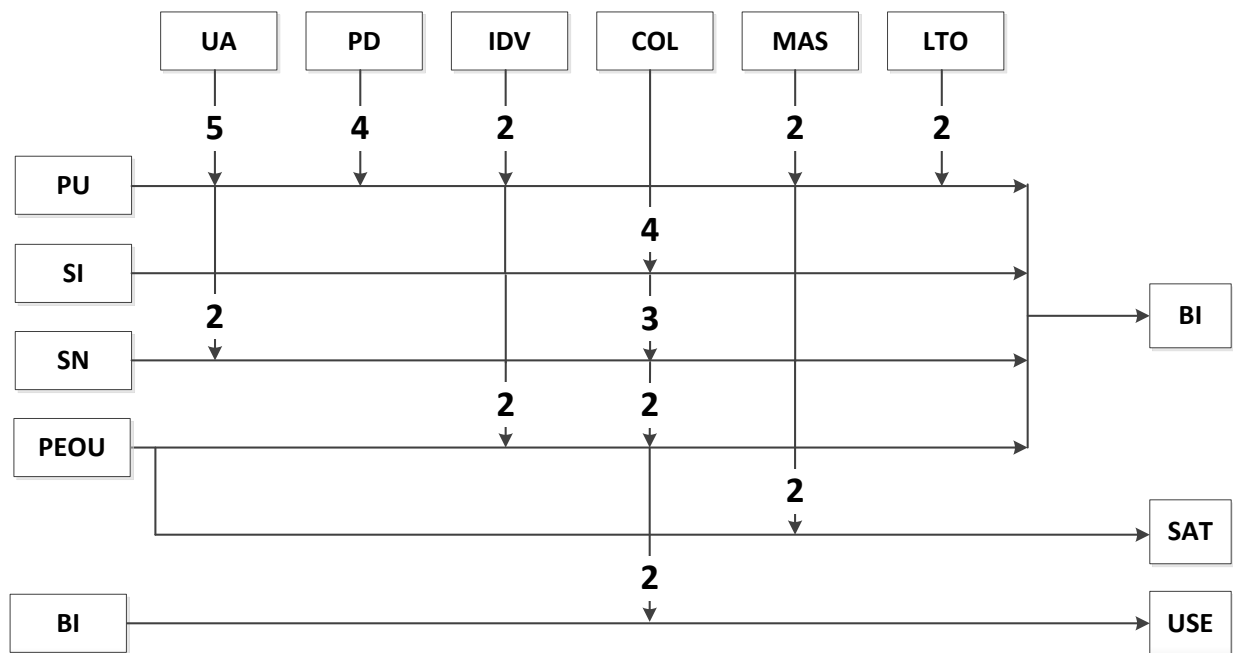
PEOU (Perceived Ease of Use), PU (Perceived Usefulness), PMV (Perceived Monetary Values), PE (Perceived Enjoyment), TR (Trust), IPR (Information Privacy), BI (Behavioral Intention)

Figure 4.5 - Indirect correlations

The cultural dimension of *uncertainty avoidance* refers to a situation where an individual feels discomfort and anxious towards a new technology. The essence of this dimension is a subjective experience based on a feeling sensed by an individual (Hofstede et al., 2010). Enjoyable experiences generate positive feelings that an individual might make a quick decision without considering the implications; while inconveniences impact to negative feelings that might take an individual longer to choose (Lerner et al., 2015). One of good experiences that appears as a major consideration is the ease of use provided by a new technology which promotes a positive impression. This impression, ultimately, increase the confidence level of an individual to adopt the technology (Mensah et al., 2020; Bankole & Bankole, 2017; Ghanem et al., 2017). In our case, this complies with the findings shown in Figure 4.5 which confirmed the *perceived ease of use* as the substantial intermediary factor that mostly involved in delivering positive significant relations between the cultural dimension of *uncertainty avoidance* and IT adoption.

A group of relationships between two factors and a number of cultural dimensions serves as the third variable or simply known as the moderator are illustrated in Figure 4.6. In this sort of correlation, the moderator owns an important role in affecting the direction and/or strength of the relationships amongst the two variables. Of the available relationships below, they cover 8

explanatory or independent variables and 3 response or dependent variables. The explanatory factors are as follows: *perceived usefulness* (PU), *social influence* (SI), *social norms* (SN), *perceived ease of use* (PEOU), and *behavioral intention* (BI); while the response variables include BI, *satisfaction* (SAT), and *actual usage* (USE). In this study, we found that *uncertainty avoidance* was the cultural dimensions that frequently moderated the positive relations between *perceived usefulness* and *behavioral intention* (5 cases). In addition, we also noticed that the following cultural dimensions: *power distance* and *collectivism*, for several times, had successfully strengthened the positive correlations between *perceived usefulness* and *behavioral intention* (4 cases), *social influence* and *behavioral intention* (4 cases), as well as *social norms* and *behavioral intention* (3 cases), respectively.



UA (Uncertainty Avoidance), PD (Power Distance), IDV (Individualism), COL (Collectivism), MAS (Masculinity), LTO (Long-term Orientation), PU (Perceived Usefulness), PEOU (Perceived Ease of Use), SI (Social Influence), SN (Social Norms), BI (Behavioral Intention), SAT (Satisfaction), USE (Actual Usage)

Figure 4.6 – Moderate Correlations

The usefulness, benefit, or advantage is “something that produces good or helpful results of effects or that promotes well-being” (Merriam-Webster Dictionary, 2000). The *perceived usefulness* factor refers to “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1989). It does not matter if a new technology has numerous advantages; what does matter is whether an individual perceives the technology as advantageous (Rogers, 1980). Further, he asserted that the greater the perceived usefulness of a new technology, the more rapid its rate of adoption will be. The keyword is the “perceive” or “feeling” that an individual has towards an innovation which necessarily affects to the decision making. The perceive itself is an outcome from what the individual has experienced in his interaction with the innovation; in which, good experiences encourage positive feelings, and vice versa. In regard to the dimension of *uncertainty avoidance*, it is known that people in countries with high index of *uncertainty avoidance* tend to be intolerant to uncertainty or ambiguity belonged to a new technology; conversely, in low *uncertainty avoidance* countries, people are risk-taking and more open to change (Choi & Geistfeld, 2004). In principal, *uncertainty avoidance* will promote negative influences on IT adoption (Hofstede, 1991). However, the advantageous offered by a new technology to an individual, particularly when dealing with the challenges in his work or daily life activities, ultimately impact to his approval to adopt the technology. In relation to the above illustration, five studies have

confirmed that the moderation effect of the *uncertainty avoidance* factor was able to strengthen the relationship between *perceived usefulness* and *behavioral intention*, specifically in countries with high level of uncertainty avoidance (Tarhini et al., 2017; Lin). , 2015; Hung et al., 2010; Yoon, 2009; McCoy & Jones, 2005).

In the last category of the resulted causal relations, direct correlations status, we found a number of cultural dimensions including *uncertainty avoidance*, *power distance*, *individualism*, *collectivism*, *masculinity*, and *long-term orientation*, - that directly connected to IT adoption, either in positive or negative directions. These cultural dimesions are as follow. Among those correlations, seven of them linked to the *power distance* factor in the positive significant directions. The *uncertainty avoidance* and *collectivism* factors came after it, each with six and five relationships to IT adoption. Aside from the former factors, we also noted two cultural dimensions that negatively correlated to IT adoption namely *individualism* and *long-term orientation*.

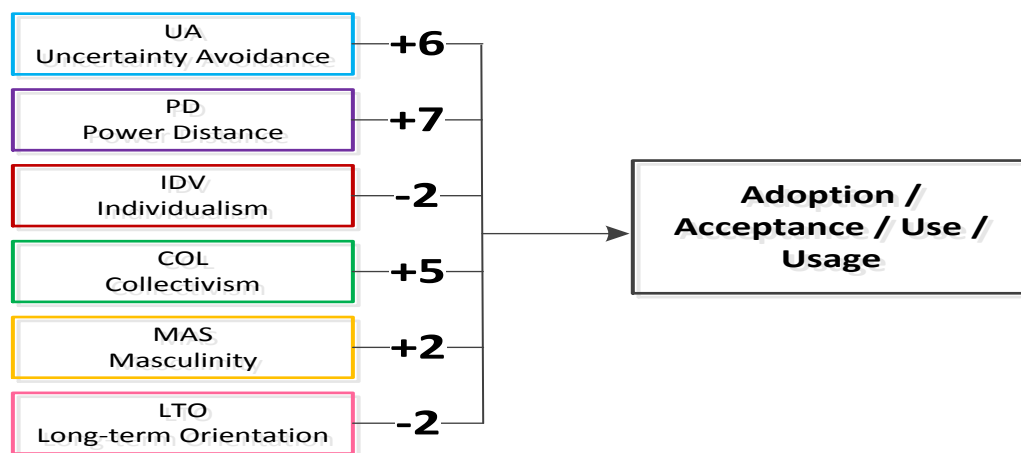


Figure 4.7 – Direct correlations

The *power distance culture* deals with the desirability or undesirability of inequality and of dependence versus interdependence in society (Abbas & Mesch, 2015). In large power distance countries, there are clear boundaries and roles, and inequality is accepted and expected among members. In the context of technology adoption which applies decentralization, people in these countries consider the information technology as a threat to the existence of the hierarchy that reflects inequality in power between the superiors and their subordinates. In contrast, the small power distance cultures treat everyone equally, are more democratic, and place large emphasis on the individual to work hard to achieve respect and powerful roles. Therefore, individuals in these cultures are likely to be more open toward new information technology, as the technology conforms to their perception of power distribution and supports them to attain higher positions and receive more appreciations (Lin, 2015; Zakour, 2004).

In accordance to the explanations above, it can be summarized that the *power distance* culture has positive influences to the adoption of IT, specifically in countries with low power distance index. Nevertheless, we found that of the seven positive relationships between *power distance* and IT adoption, five of them involved studies in large power distance countries which contradict with the aforementioned arguments. The following evidences could be regarded as the possible reasons to these unexpected results: (1) in high power distance societies, superiors and subordinates consider each other as unequal and subordinates expect to be told what to do (Yoon, 2009), (2) the adoption of information technology is taken by superiors and the low powerful individuals expected to adopt it (Jaafar & Thawfeek, 2012; Yoon, 2009), and (3) individuals are too fearful of disagreeing with the power holders (Ayyash et al., 2022).

CHAPTER V

CONCLUSIONS

The objective of our systematic literature review (SLR) is to analyse cultural dimensions that influence the adoption of information technology. From the initial search results that returned 2019 articles, we selected 49 primary studies. These studies were used to explore the activity in the field of study on national cultural effects towards IT innovation adoption and to determine which cultural dimensions are more widely researched. Thereafter it also aimed to explore which adoption theories are most commonly used in the studies on cultural influence and IT adoption relations. Additionally, the review focused on the national cultural dimensions that are involved in IT adoption research with addition to exploring the causal relations between two factors.

Our SLR reveals that the publication's activity on cultural influences and IT adoption studies were quite intense particularly in the years of 2011 until 2018, with the highest number of publications occurred in 2017. Contradicted with the former situations, the low publications number were indicated between 2002 and 2011. In 2018, there were significant decreases in the number of publications that keeps going down up until now. This possibly appeared due to the absence of novelty resulted from those studies.

A number of adoption theories have been used to analyse how cultural dimensions may affect the adoption of IT such as DOI, TAM, UTAUT, TPB, and TRA. Amongst these theories, TAM was confirmed to be the most widely used of adoption theories as indicated from our study. This might be due to the reliability owned by its research instrument that has largely been adapted, replicated, and evaluated by many IT adoption studies.

For the national cultural dimensions, we found that Hofstede's cultural dimensions have dominated the studies on cultural influence and IT adoption. The *uncertainty avoidance* dimension is noticed as the most investigated dimension because of its effect to the rate of IT adoption decision taken by an individual. The greater the experiences perceived by an individual when interacting with a new technology, the faster the decision taken by the individual to adopt the technology; and vice versa.

The *uncertainty avoidance* culture, basically, encourages negative influence to the adoption of IT. A total of 453 causal relations were delivered from 64 selected cases (as seen in Table 1); in which, 255 of them advanced to the analysis process. These causal relations were, then, classified into three correlations status include direct correlations (46 relations), indirect correlations (105 relations), and moderate correlations (75 relations). In the indirect correlations, the connections between *uncertainty avoidance* and IT adoption that mediated by the *perceived ease of use* factor were confirmed having the most numbers of positive significant relationships. Meanwhile, in the moderate correlations, the *uncertainty avoidance* culture is indicated as the moderating factor that frequently strengthened the relationships between *perceived usefulness* and *behavioral intention*. Lastly, for the direct correlations, the *power distance* culture is mostly found having direct positive relations with IT adoption.

5.1 Limitation and Implication

Readers of this SLR should interpret our results considering the following limitations. First, this study only used the electronic database Google Scholar, which may not extensively cover all studies on cultural influences and IT adoption. Second, this study relied on specific keywords in the search stage to answer the research questions, which may impact the resulting set of the investigated literature. Third, this review only addressed the factors and the relations

that occurred more than twice in separate studies, which may not provide comprehensive analysis. Fourth, the countries participated in our analysis came from various scores of cultural index, which may provide different analysis. Fifth, the nature of the study is theoretical, which may limit it in practice.

Despite of the relatively small number of articles reviewed which is due to the specific criteria applied to data extraction, the results of this review can be used as basis for new researchers who have interest on this topic, particularly in terms of the used adoption theories, the evaluated national cultural dimensions, and the implemented correlation status, in order to examine the influence of national culture towards IT adoption.

5.2 Future Research

On the search strategy, in order to cover more studies regarding cultural influences and IT adoption, with the exception of using Google Scholar, we will also use other online scientific databases such as ScienceDirect, ACM Digital Library, Emerald, and Scopus.

In addition to add more numbers of the publications reviewed in the future study, the analysis process will be classified into two types of technology innovation namely product innovation and process innovation to see any differences in the analysis results for each type of innovation. Furthermore, to receive equivalent results, the analysis process will also be conducted according two groups of countries: the eastern and western countries, which have diverse scores of cultural dimensions.

The empirical data results obtained from the statistical calculations performed in the selected studies can be utilized to conduct a meta-analysis study to indicate consistency of the results amongst these two research method, the systematic literature review and the meta-analysis study.

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