Journal of Theoretical and Applied Information Technology
31st January 2019. Vol.97. No 2

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

E-GOVERNMENT ADOPTION SUCCESS FACTORS AND THEIR WEIGHT ANALYSIS: A CITIZEN PERSPECTIVE

[1]MUSTAFA A. A., [2] FAIZAL M.A. AND [3]NURUL AZMA ZAKARIA

[1, 2 and 3]Information and Communication Technology Department, University Technical Malaysia Melaka

E-mail: [1]mustafaalany88@gmail.com, [2]faizalabdollah@utem.edu.my, [3]azma@utem.edu.my

ABSTRACT

Since there are many theories, models and factors to choose when investigating the e-government adoption, the issue of how to choose the appropriate factors arises. Hence, this study's purpose is to overcome this issue by highlighting e-government adoption success variables by performing a weight analysis of the variables relationships. Data were gathered from 141 studies associated to the e-government adoption. Out of those 141 studies, only 94 utilized a variety of constructs with appropriate values of correlation that are required to perform a weight analysis. Both non-significant and significant relationships from all 94 publications are also presented in a diagram. Our findings shows that 15 independent variables were found to be categorized as best predictors, 7 independent variables were found to be categorized as promising predictors, and 12 independent variables were found to be categorized as least effective predictors. This paper contributes by implementing an up to date variables weight analysis, moreover it contributes theoretically to the literature body of e-government and suggests further future work directions.

Keywords: *E-government, E-government Adoption, Weight Analysis, Citizen Adoption, Success Factors.*

1. INTRODUCTION

Electronic government (E-government), also known as online government, is defined as the usage of information and communication technology (ICTs) to enhance more effective and efficient government, making the accessibility of government services easier, allowing easier and greater reachability to information, and making government more accountable to citizens [1]. Research interest in e-government systems implementation is increasing; in the coming decade, e-government is believed to be one of the most effective organizational challenges and IT implementations [2].

The fast development of ICT, mainly the Internet and its utilization by citizens, have made many changes in organizations, transforming and changing the socioeconomic order (industry, telecommunications, trade, education, tourism etc.) [3]. Nowadays, the investment of companies in information technology (IT) reached 7.6% of their revenue, a three times value compared to the last 18 years [4]. This increased IT usage in all different sectors reached the public administration. The use of the internet along with IT as a tool for public management is known as e-government and its purpose is to enhance the provision of e-services and to make the public administration (e-Administration) more efficient, delivering citizens more desired and effective participation (e-Democracy) in the political process [3].

Moreover, although nowadays e-government services and systems have a significant impact on public administration, individuals, society and organizations, only a few comprehensive and methodical studies have been done on this subject [2]. Despite the fact that e-government services are being continuously studied in different countries, this study is needed because there is only a few studies that focused on the success constructs of the adoption of e-government along with the utilization of various theories and frameworks [2]. Furthermore, although research of e-government areas have been explored for more than a decade, there is no up to date study of success construct and the relationship between them with their weight analysis. Such e-government studies will enable researches to identify gaps associated with the current knowledge. Therefore, the purpose of this study is to review the adoption of e-government studies and explore the relationship of their

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

constructs and to perform the weight analysis in order to answer the question of how and which models and factors to choose and investigate when adopting e-government.

As it is obviously seen throughout the literature, the selection of factors and theories to analyze is tend to be random [2], the need for such a study is crucial to overcome this issue and to have a clear method of choosing the appropriate factors to investigate.

The paper is organized as follows: the following section explaining the used research methodology followed with our findings section. Afterwards, a diagram of constructs relationships followed by a table that presents the 41 relationships that are most utilized showing their significance degree (i.e., non-significant & significant), and each predictor's weight. The next section is a description of a table (table 2) which contains the used technology, the sample size, and the country where the research was held. Moreover, the findings section is followed by the discussion and conclusion.

2. METHODOLOGY

Since the goal of this research is to find E-government adoption success factors, a systematic literature review was done on the existing research on E-government adoption [5]. Our method started by searching for articles associated with e-government by utilizing keywords such as e-government, electronic government, egov, e-gov, online government, usage, acceptance, diffusion and adoption in all possible combinations and permutations. Moreover, our exploration included the ISI Web of Knowledge® online database of journals. In total, 503 studies that are related to the e-government acceptance and adoption area were found.

The 503 studies were scanned again to find articles that have an empirical nature and found that just 141 studies utilized various constructs to investigate e-government adoption. Moreover, out of the 141 studies, only 94 of them used different models, theories and frameworks. Our research analyzed the constructs and their statistical details which can be utilized for weight analysis performance. Furthermore, since weights are the indicator and measure of predictive power of the relationship between independent variables (IV) and dependent variables (DV) for more than a few times, thus weight analysis is done [6], [2].

After identifying the 94 studies that investigate the adoption of e-government by citizens, the information of relationships between the independent variables (IV) and the dependent variables (DV), these relationships were defined as non-significant and significant groups. Moreover, all 94 studies have been listed with their sample size and proper citation. The weight analysis was done for all relationships based on the number of the analyzed relationships within a group of dependent variables (DV) and independent variables (IV) and the number of relationships that were found significant

3. FINDINGS

Figure 1 shows all the variables (constructs) and their relationships used to examine e-government services and systems adoption by citizens. Our analysis shows that the most utilized dependent variable is behavioral intention accompanied by attitude, perceived usefulness, satisfaction, actual use and perceived behavioral control as the most utilized dependent variables. The most utilized independent variables include perceived ease of use, perceived usefulness, trust, compatibility and attitude, followed by social influence, facilitating condition, performance expectancy, effort expectancy, self-efficacy, relative advantage, behavioral intention, perceived risk, information quality, subjective norms and perceived behavioral control.

Moreover, our analysis shows that the constructs of the technology acceptance model (TAM) include: intention to use, perceived usefulness and perceived ease of use are the most utilized constructs in the investigated studies and across the e-government literature. One of the main reasons for TAM constructs being used frequently is that the survey instrument is widely validated. Furthermore, the constructs of the diffusion of innovation (DOI) theory such as relative advantages and image, are moderately utilized except for compatibility being utilized 23 times. The constructs of unified theory of acceptance and use of technology (UTAUT) such as behavioral intention, social influence, effort

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

expectancy and performance expectancy are also have been utilized moderately.

Our findings also support what is stated in the studies of [6], [2], that variables such as security, privacy and risk are not assimilated.

4. WEIGHT ANALYSIS AND CONSTRUCTS RELATIONSHIPS

Table 1 briefly describes the 41 most used relationships between e-government constructs in the adoption research. The description consists of the number of non-significant (using NS as abbreviation) relationships, significant (using SIG as abbreviation), the number of total relationships between two constructs is included along with the computation of the weight for each relationship. According to [6], [2], the evaluation of the weight is a technique of examination of the predictor (i.e. independent variable), this analysis helps in the evaluation of the predictor in a given relationship in order to highlight the success factors.

Our analysis shows that TAM's constructs relationships (i.e. perceived usefulness-behavioral intention, perceived ease of use-perceived usefulness, and perceived ease of use-behavioral intention) are the most utilized relationships besides trust--behavioral intention and attitude--behavioral intention. Moreover, there is an increased utilization of the unified theory of acceptance and use of technology (UTAUT) constructs compared to the result of [2] study. Furthermore, behavioral intention is seen to be the most used dependent variable out of the 41 most used relationships. Weight analysis has been done for each relation for the examination of their effectiveness [6].

For an effective predictor to be recognized, the study of [6] distinguished two types of independent variables: a predictor that has been examined five or more times is classified as 'well-utilized', while a predictor that has been examined less than five times is called 'experimental'. Thus, the best predictor benchmark was set as the weight of independent variable to be equal or greater than 0.80, and should have been used five or more times. In order to calculate the relationship strength between independent variables and dependent variables, two things need to be known. First of all, how many times the relationship between the variables have been examined. Second of all, how many times the relationship is significant. Then, by dividing the value of the second data by the first (example, perceived ease of use (PEOU) on behavioral intention (BI), Weight=25/37= 0.67) giving the relationship weight significance between the constructs.

A weight of 1 states that the relationship is significant among two variables across all studies, while 0 states that the relationship is non-significant among two variables across all studies [6], [2]. According to [6] the definition of best predictor, many predictors were found to fall under the best predictor category including: Service quality on Satisfaction, Information quality on behavioral intention, Relative advantage on Attitude, Compatibility on Attitude, Perceived behavioral control on Behavioral Intention, Subjective norm on Behavioral Intention, Behavioral intention on Actual Use, Perceived ease of use on Attitude, Perceived usefulness on Attitude, Performance expectancy on Behavioral Intention, Social influence on Behavioral Intention, Perceived ease of use on Perceived Usefulness, Attitude on Behavioral Intention, Trust on Behavioral Intention, and Perceived usefulness on Behavioral Intention.

The variables analysis throughout the most utilized relationships states that all the well-utilized predictors were found to be significant throughout all the investigations, and those include: information quality on behavioral intention (number of tests =5, number of significant tests =5), Relative advantage on Attitude (number of tests =5, number of significant tests =5), perceived behavioral control on behavioral intention (number of tests =9, number of significant tests =9), subjective norm on behavioral intention (number of tests =9, number of significant tests =9), and Behavioral intention on actual use (number of tests =12, number of significant tests =12). Thus, according to the technique mentioned in [6], their weights are calculated as 1, and that's why they represent a significant and important position within the e-government adoption context. However, some relationships of independent variables with their dependent variables also scored the weight 1, despite being investigated less than five times in relationships [6], these relationships include:

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

Habit on behavioral intention (number of tests =3, number of significant tests =3), Information quality on Perceived Usefulness (number of tests =3, number of significant tests =3), Self-efficacy on Perceived Ease of Use (number of tests =3, number of significant tests =3), Facilitating condition resources on Behavioral Intention (number of tests =3, number of significant tests =3), Primary influence on Behavioral Intention (number of tests =3, number of significant tests =3), Perceived security on behavioral intention (number of tests =4, number of significant tests =4), and Facilitating Conditions on Perceived Behavioral Control (number of tests =4, number of significant tests =4).

Independent variables which have been investigated less than five times and scored weights equal to 1 are called Promising predictors [6]. Despite these relationships being significant every time they were investigated, these variables (known as experimental variables as well) require more examination to be qualified as best predictors, thus researchers are encouraged to investigate these promising predictors in future studies [6], [2].

Moreover, some independent variables are seen as least effective predictors despite being well-utilized, those include: Trust of the government on Behavioral Intention (number of tests =5, number of significant tests =3), System quality on Satisfaction (number of tests =5, number of significant tests =3), Job relevance on Perceived Usefulness (number of tests =5, number of significant tests =3), Compatibility on Perceived Usefulness (number of tests =6, number of significant tests =4), Trust on Perceived Risk (number of tests =6, number of significant tests =4), Perceived risk on Behavioral Intention (number of tests =6, number of significant tests =4), Self-efficacy on Behavioral Intention (number of tests =8, number of significant tests =6), Relative advantage on Behavioral Intention (number of tests =9, number of significant tests =5), Compatibility on Behavioral Intention (number of tests =10, number of significant tests =7), Compatibility on Behavioral Intention (number of tests =10, number of significant tests =7), Facilitating condition on Behavioral Intention (number of tests =14, number of significant tests =11), Effort expectancy on Behavioral Intention (number of tests =16, number of significant tests =11), and Perceived ease of use on Behavioral Intention (number of tests =37, number of significant tests =25).

Thus, according to [6], researchers should have good reasons to utilize such predictors. Having said that, authors in [2] think that it's premature to judge using these relationships. Moreover, out of all the 41 investigated relationships, only 27 are found to be utilized five or more times. This indicates that the empirical research of e-government adoption is still not developed as the adoption research of IS/IT, were predictors with five or more utilizations are shown, as stated in the analysis of [6]. Moreover, we think more information and communication (ICT) variables need to be explored and examined in the context of e-government to give a technological insight beside the social one.

Figure 2 shows the 41 most utilized relationships in a model of e-government adoption research. The strength of a predictor is mentioned by stating the weight of each predictor, in order to show the effectiveness of the predictors [6]. This diagram is a summarization of the combined diagram in Figure 1 and relationships (in Table 1) into a diagrammatic representation.

Moreover, Table 2 helps the researchers by highlighting e-government studies across more than two decades and shows a brief summary of these utilized studies in this research along with their research area, sample size and the country where the research is adopted. The table indicates that e-government research has a grown interests across the globe.

5. COMPARISON WITH PREVIOUS WORK

Compared with previous work done by [2] & [6], our study provides an up-to-date weight analysis of e-government success factors. In this study, 15 independent variables were found to be categorized as best predictors, 7 independent variables were found to be categorized as promising predictors, and 12 independent variables were found to be categorized as least effective predictors. While in study of [2], 13 independent variables were found to be categorized as best predictors, 5 independent variables were found to be categorized as promising predictors, and 11 independent

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

variables were found to be categorized as least effective predictors. Whereas, in study of [6], 8 independent variables were found to be categorized as best predictors. 39 independent variables were found to be categorized as promising predictors, and 8 independent variables were found to be categorized as least effective predictors. Additionally, a new increased utilization of the constructs of the diffusion of innovation (DOI) theory such as relative advantages and image are shown in this study, also the constructs of unified theory of acceptance and use of technology (UTAUT) such as behavioral intention, social influence, effort expectancy and performance expectancy are also increased as this study shows.

6. CONCLUSION

Taking the variety of studies in the context of e-government adoption utilizing constructs, models, and theories with proper quantitative justifications, it is very important and significant to analyze and discuss their findings. The purpose of this study was to undertake a review on the most used relationships of constructs in the area of e-government adoption in order to highlight the success variables. The aim of the study was achieved by: exploring 503 studies related to the area of e-government adoption, out of these 503 only 141 utilized a range of various constructs to investigate the adoption of e-government. Moreover, out of the 141 studies only 94 of them used different models, theories and frameworks. Furthermore, out of these 94 studies, the 41 most used relationships of constructs were extracted and investigated. Out of these 41 relationships, 15 independent variables were found to be categorized as best predictors with weights greater or equal to 0.80. Moreover, 7 independent variables were found to be categorized as promising predictors (examined less than 5 times with weight of 1). Furthermore, 12 independent variables were found to be categorized as least effective predictors (examined 5 or more times with weight less than 0.80).

As a limitation of this study, only the weight analysis is used as a parameter of classifying the factors as weight analysis depends on how many times a specific factor been utilized and how many of those times this particular factor turned out to be significant. More methods can be undertaken such as Meta-analysis and Critical Success Factors (CSFs).

This study offers many implications for both practice and research. The information presented in this study helps by guiding the researchers to make good decisions when it comes to variables selection. The weight analysis trends of variables can work as a guideline for the upcoming variables, and can be analyzed further to visualize their performance.

The key lessons learnt from this research are: (i) TAM model is the most used model investigating the e-government services adoption, (ii) UTAUT theory usage have been increased over the last three years, (iii) although this research shows the success factors of the adoption of e-government i.e. (well-utilized factors which are utilized more than 5 times) researchers are advised to investigate the experimental factors in future studies as they are considered promising factors.

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Journal of Theoretical and Applied Information Technology
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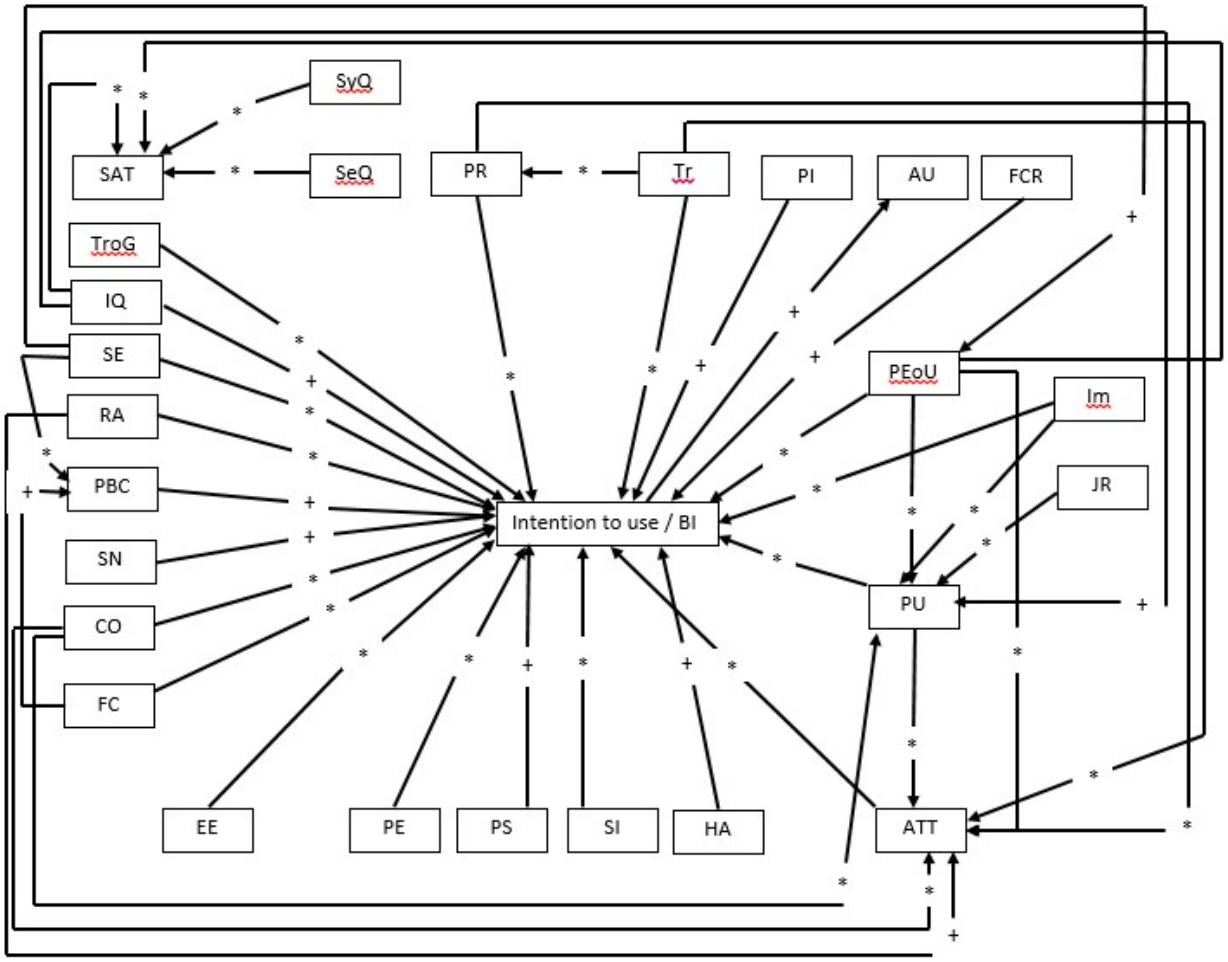

*Figure 1: Relationships Between Constructs Of E-Government Adoption. BI: Behavioral Intention; Peou: Perceived Ease Of Use; Im: Image; JR: Job Relevance; PU: Perceived Usefulness; ATT: Attitude; HA: Habit; SI: Social Influence; PS: Perceived Security; PE: Performance Expectancy; EE: Effort Expectancy; FC: Facilitating Condition; CO: Compatibility; SN: Subjective Norms; PBC: Perceived Behavioral Control; RA: Relative Advantages; SE: Self-Efficacy; IQ: Information Quality; Trog: Trust Of Government; SAT: Satisfaction; Syq: System Quality; Seq: Service Quality; PR: Perceived Risk; Tr: Trust; PI: Primary Influence; AU: Actual Use; FCR: Facilitating Condition Resources. + Refers To Significant Relationship, * Refers To Mixed Relationship.*

Table 1: Weight Analysis For The Most Utilized Relationships. (Adopted from [2] & [6])

Independent variable	Dependent Variable	SIG	NS	Total	Weight
Trust	Attitude	1	2	3	0.33
Perceived ease of use	Satisfaction	2	1	3	0.66
Information quality	Satisfaction	2	1	3	0.66
Image	Perceived Usefulness	2	1	3	0.66
Habit	behavioral intention	3	0	3	1
Information quality	Perceived Usefulness	3	0	3	1
Self-efficacy	Perceived Ease	3	0	3	1

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	of Use				
Facilitating condition resources	Behavioral Intention	3	0	3	1
Primary influence	Behavioral Intention	3	0	3	1
Image	Behavioral Intention	1	3	4	0.25
Self-efficacy	Perceived Behavioral Control	3	1	4	0.75
Perceived risk	Attitude	3	1	4	0.75
Perceived security	behavioral intention	4	0	4	1
Facilitating Conditions	Perceived Behavioral Control	4	0	4	1
Trust of the government	Behavioral Intention	3	2	5	0.60
System quality	Satisfaction	3	2	5	0.60
Job relevance	Perceived Usefulness	3	2	5	0.60
Service quality	Satisfaction	4	1	5	0.80
Information quality	behavioral intention	5	0	5	1
Relative advantage	Attitude	5	0	5	1
Compatibility	Perceived Usefulness	4	2	6	0.66
Trust	Perceived Risk	4	2	6	0.66
Compatibility	Attitude	6	1	7	0.85
Perceived risk	Behavioral Intention	5	3	8	0.62
Self-efficacy	Behavioral Intention	6	2	8	0.75
Relative advantage	Behavioral Intention	5	4	9	0.55
Perceived behavioral control	Behavioral Intention	9	0	9	1
Subjective norm	Behavioral Intention	9	0	9	1
Compatibility	Behavioral Intention	7	3	10	0.70
Behavioral intention	Actual Use	12	0	12	1
Facilitating condition	Behavioral Intention	11	3	14	0.78
Perceived ease of use	Attitude	13	2	15	0.86
Perceived usefulness	Attitude	13	2	15	0.86
Effort expectancy	Behavioral Intention	11	5	16	0.68

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Performance expectancy	Behavioral Intention	16	1	17	0.94
Social influence	Behavioral Intention	16	3	19	0.84
Perceived ease of use	Perceived Usefulness	18	2	20	0.90
Attitude	Behavioral Intention	20	1	21	0.95
Trust	Behavioral Intention	21	3	24	0.87
Perceived usefulness	Behavioral Intention	30	4	34	0.88
Perceived ease of use	Behavioral Intention	25	12	37	0.67

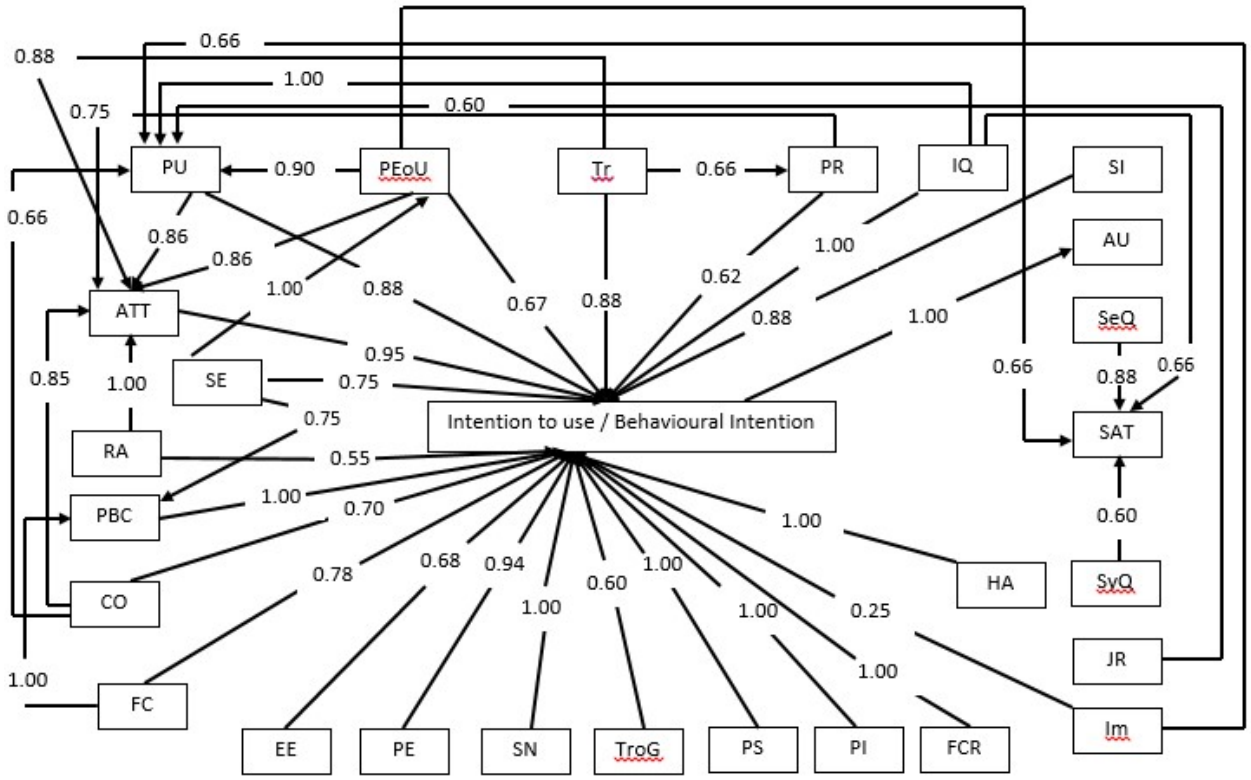

Figure 2: E-Government Adoption Most Utilized Relationships With Their Weight Analysis. PU Perceived Usefulness, PEOU Perceived Ease of Use, Tr Trust, PR Perceived Risk, IQ Information Quality, SI Social Influence, AU Actual Use, SeQ Service Quality, SAT Satisfaction, SyQ System Quality, HA Habit, JR Job Relevance, Im Image, FCR Facilitating Condition Resources, PI Primary Influence, PS Perceived Security, TroG Trust of Government, SN Subjective Norms, PE Performance Expectancy, EE Effort Expectancy, FC Facilitating Condition, CO Compatibility, PBC Perceived Behavioral Control, RA Relative Advantages, SE Self-efficacy, ATT Attitude.

Table 2: Studies Utilized In This Research

Study	Sample/Technology	Respondents	Country
[7]	E-government	529	Turkey
[8]	E-government	247	Mauritius
[9]	E-government	377	India
[10]	E-government	291	Jordan
[11]	e-learning systems	833	Qatar and USA

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[12]	E-government	1,132	Jordan
[13]	E-government	382	China
[5]	E-government	/	systematic review
[14]	E-government	380	UAE
[1]	E-government	543	Malaysia
[15]	E-government	898	Sri Lanka
[3]	E-government	715	Brazil
[16]	e-tax Filing and Payment System	372	Thailand
[17]	web-based information system	135	Peru
[18]	E-government	105 USA & 140 UK	UK & USA
[19]	E-government	419	India
[20]	E-government	248	Oman
[21]	E-government	413	Jordan
[22]	E-government	759	Jordan
[23]	E-government	912	Saudi Arabia
[24]	E-government	115	Pakistan
[25]	E-government	356	Jordan
[26]	e-Syariah Portal by/E-government	35 (pilot)	Malaysia
[27]	E-government	138	Pakistan
[28]	E-government	400	Jordan
[29]	E-government	400	Saudi Arabia
[30]	online tax / E-government	500	Malaysia
[31]	E-government	146	Gambia
[32]	E-Government System	751	Indonesia
[33]	Website Application	648	USA
[34]	E-Government System	626	Saudi Arabia
[35]	e-Services Systems	422	Sweden
[36]	Online Tax Filing System	304	USA
[37]	Information Systems	121	China
[38]	E-Government Technology	40 field officers	USA
[39]	transformational Government System	37	USA
[40]	E-government	502	UAE
[41]	E-government	112 public officers in 12 ministries	Cambodia
[42]	E-government	200	Malaysia
[43]	SMS based E-Gov System	589	Indonesia
[44]	Electronic Channels	893	Netherlands
[45]	Online Tax Filing System	422	Taiwan
[46]	E-Filing Systems	411	Malaysia
[47]	E-Procurement System	358	Malaysia
[48]	Tax Information System	340	Greece
[49]	E-Government System	304	China
[50]	E-Filing Systems	260	USA
[51]	E-Filing Systems	260	USA

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[52]	E-Government System	230	Greece
[53]	E-Filing Systems	200	Malaysia
[54]	Online Tax Filing System	824	Japan
[55]	ATM Systems	500	Malaysia
[56]	E-Government Portal	385	China
[57]	Online Tax Filing System	310	India
[58]	E-Voting System	281	Taiwan
[59]	information kiosks/E-government	244	Taiwan
[60]	E-Document System	186	Taiwan
[61]	E-Reverse Auction	156 employees	Multi-Countries
[62]	E-government	150	Malaysia
[63]	E-Government System	112 public officers	Cambodia
[64]	Wi-Fi Systems	54	Qatar
[65]	Internet Services	1,225	Netherlands
[66]	Website Application	647	USA
[67]	E-Government Services	481	Romania
[68]	Information Systems	443	USA
[69]	E-Declaration System	351	Portugal
[70]	E-Government System	214	USA
[71]	E-Government Website	214	Singapore
[72]	Internet Systems	124	Thailand
[73]	E-Government System	119	Taiwan
[74]	E-Government System	105	USA
[75]	E-Services System	70	Bangladesh
[76]	E-Commerce System	87	Hong Kong
[77]	Broadband System	138	Saudi Arabia
[78]	E-Government System	163	India
[79]	E-Government System	226	China
[80]	Broadband System	237	Pakistan
[81]	Broadband System	237	Pakistan
[82]	E-Kiosk System	244	Taiwan
[83]	Electronic Voting System	453	USA
[84]	Information Systems	139	China
[85]	Official-Doc System	631	Taiwan
[86]	Digital Democracy	895 officers	South Korea
[87]	Online Tax System	1099	Taiwan
[88]	electronic tax filing	59,166	Taiwan
[89]	E-government	99	China
[90]	E-government	105	USA
[91]	Internet tax-filing systems	141	Taiwan
[92]	E-Government Services	128	Singapore
[93]	Internet Systems	100 executives	Brunei
[94]	E-Tendering System	158	Taiwan
[95]	E-Government Services	198	Hong Kong
[96]	E-government	111	Guildford - UK
[97]	electronic tax filing systems	260	Taiwan