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USER SATISFACTION MODEL TO MEASURE OPEN GOVERNMENT DATA USAGE

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USER SATISFACTION MODEL TO MEASURE OPEN GOVERNMENT DATA USAGE

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ABSTRAK

Inisiatif data terbuka kerajaan (OGD) dibentangkan oleh kerajaan mana-mana negara untuk mencapai promosi ketelusan, kawalan sosial dan penyertaan warga negara dalam pembuatan dasar. Penggunaan OGD di Malaysia masih dalam peringkat awal dan menghadapi masalah seperti kurang penyertaan, isu keselamatan, dan kurangnya kesedaran. Sementara sebahagian besar penyelidikan dalam Teknologi Komunikasi Maklumat (ICT) yang disokong oleh Teori Pengesahan Harapan (ECT) difokuskan kepada kepuasan pengguna dan penentuan niat penggunaan semula pengguna, kajian ini memberi tumpuan kepada anteseden langsung dalam niat penggunaan OGD oleh pengguna dan pengaruhnya terhadap kepuasan pengguna OGD, di mana kajian ini masih terhad. Kajian ini bertujuan mengkaji model ECT terhadap kepuasan pengguna yang diperantara oleh niat dalam menggunakan data terbuka kerajaan (OGD). Objektif penyelidikan ini adalah dalam tiga peringkat; (1) untuk mereka bentuk model ECT dan TAM yang bersepadu bagi menerangkan kepuasan terhadap OGD, (2) untuk mengkaji peranan perantaraan niat tingkah laku warga negara di antara harapan, pengesahan, prestasi yang diamati, insentif penggunaan, risiko yang diamati dan kepuasan warga negara terhadap data terbuka kerajaan, (3) dan untuk mengesahkan kesan insentif terhadap penggunaan dan risiko yang diamati dalam menjelaskan model ECT baru dalam konteks OGD. Data dikumpulkan daripada 250 sampel pengguna OGD di Malaysia. Bukti empirik dikumpulkan melalui soal selidik sendiri menggunakan skala Likert. Data dianalisa dengan menggunakan *Partial Least Square Structural Equation Modelling (PLS-SEM)* untuk menguji model. Model terakhir disahkan oleh pakar dalam bidang ini. Hasil kajian menunjukkan bahawa jangkaan mempunyai hubungan yang signifikan dengan pengesahan, namun prestasi yang diamati menunjukkan hubungan yang tidak signifikan dengan pengesahan yang berfungsi sebagai penemuan yang unik. Selain itu, pengesahan, jangkaan, prestasi yang diamati, insentif penggunaan dan risiko yang diamati mempunyai hubungan yang signifikan dengan niat untuk menggunakan OGD. Sementara itu, analisis membuktikan bahawa niat untuk menggunakan mengantara hubungan antara pengesahan, jangkaan, prestasi yang diamati, insentif penggunaan, risiko yang diamati dan kepuasan terhadap penggunaan OGD. Kajian ini mencadangkan bahawa jangkaan pengguna terhadap OGD mesti dipenuhi dalam mewujudkan hasrat dan kepuasan yang lebih kuat. Implikasi kajian ini adalah untuk meningkatkan kualiti perkhidmatan data, menyokong pembangunan perkhidmatan inovatif, meningkatkan ketelusan data, dan mendorong potensi pelaburan.

Kata kunci: Niat penggunaan, Kepuasan pengguna, Data terbuka kerajaan, Insentif penggunaan, Risiko yang diamati.

ABSTRACT

The open government data (OGD) initiative is presented by the government of any country to achieve promotion of transparency, social control and citizens participation in policy making. The use of OGD in Malaysia is still in its early stage and facing problems such as less participation, security issues, and lack of awareness. While most of the research in Information Communication Technology (ICT) that underpinned by Expectation Confirmation Theory (ECT) are focused on user satisfaction and determination of users' reuse intention, this study focus on the direct antecedents of OGD users' intention to use and its influence on OGD users' satisfaction, as this research is still scarce. This research aims to examine ECT model on users' satisfaction mediated by the intention to use the open government data (OGD). The objectives of this research are in three folds; (1) to design an integrated ECT and TAM models for explaining OGD satisfaction, (2) to examine the mediating role of citizens' behavioural intention between the expectations, confirmation, perceived performance, incentive on usage, perceived risk and citizen's satisfaction of open government data, (3) and to validate the impact of incentives on usage and perceived risk in explaining the new ECT model in the OGD context. Data were collected from 250 samples of OGD users in Malaysia. Empirical evidences were gathered through self-administered questionnaires using the Likert scale. The data were analysed using Partially Least Square Structural Equation Modelling (PLS-SEM) in order to test the model. The final model was verified by experts in the area. Results revealed that expectation has significant relationship with confirmation, but perceived performance showed insignificant relationship with confirmation which serves as a unique finding. Additionally, confirmation, expectation, perceived performance, incentive on usage and perceived risk has significant relationship with intention to use OGD. Meanwhile, the analysis proved that the intention to use mediates the relationship between confirmation, expectation, perceived performance, incentive on usage, perceived risk and satisfaction on use of OGD. This study suggests that the user's expectations on OGD must be met in creating stronger intention and satisfaction. The implications of the study are to improve data service quality, support innovative services development, increase data transparency, and boost up potential investment.

Keywords: Intention to use, User satisfaction, Open Government Data, Incentives of usage, Perceived risk

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List of Abbreviations

APC	Association for Progressive Communication
BBTOD	Better Business through Open data
BI	Behaviour Intention
CB	Covariance-Based
CODE	Canadian Open Data Experience
CSOGD	Citizen's Satisfaction from Open Government Data
DIO	Diffusion of Innovation
DTPB	Decomposed Theory of Planned Behaviour
ECT	Expectation Confirmation Theory
GoF	Goodness of Fit
ICT	Information and Communication Technology
IDRC	International Development Research Centre
IoU	Incentives on Usage
IS	Information Systems
NCER	Northern Corridor Economic Region
NCIA	Northern Corridor Implementation Authority
ODB	Open Data Barometer
ODPP	Open Data Pure Plays
OGD	Open Government Data
OGDI	Open Government Data Index
PLS	Partial Least Square
PP	Perceived Performance
PR	Perceived Risk
PSI	Public Sector Information
SCT	Social Cognitive Theory
SEM	Structural Equation Modelling
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
UBI	User Behavioural Intention
UK	United Kingdom
UNIMAP	Universiti Malaysia Perlis

USA	United State of America
USM	Universiti Sains Malaysia
UTAUT	Unified theory of Acceptance and Use of Technology
UTP	Universiti Teknologi PETRONAS
UUM	Universiti Utara Malaysia
VIF	Variance Inflated Actor
WJP	World Justice Project

CHAPTER ONE

INTRODUCTION

This chapter presents the overviews of study. It covers the background of the study, problem statement, and justification in conducting this study. Besides, research questions, research objectives, significance of study and scope of the research have also been highlighted. The last section of this chapter provides the organisation of the thesis.

1.1   Introduction

Individuals, companies and industries have viewed data as popular and useful source that assists the finding of solutions to problems. Individuals, companies and industries use data to achieve their goals in desired ways (Cole, 2012). The use of historical or forecasted data is documented as a source of competitiveness and value addition that provides direction to take appropriate action (Bachmann & Bernstein, 2009; Chesbrough, 2010).

Data comes in various structures and sizes, which can be classified as either big or small data (Jaakkola, Mäkinen, & Eteläaho, 2014; Linna, 2014). Big data refers to the collection of large complex datasets, either structured or non-structured, that may not be processed using traditional applications or processes (Jaakkola et al., 2014; Linna, 2014). On the other hand, small data is categorised as a collection of a dataset that can be handled by traditional information systems (Jaakkola et al., 2014) as given in Figure 1.1.
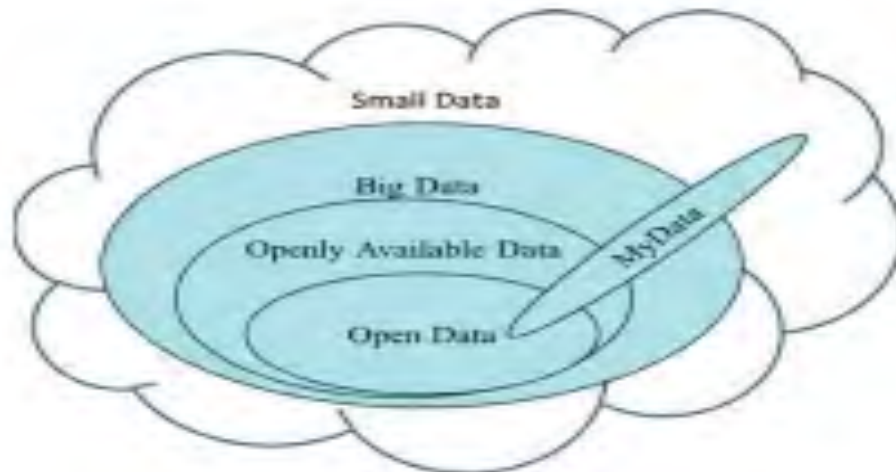
Source: (Jaakkola et al., 2014)

Figure 1.1. Categories of data

1.1.1 Classification of Data

Both big and small data can be featured in open and closed status and can be seen as a secondary classification of data. Researchers have presented MyData (referred to in Figure 1.1) as a data type which is more personal and can be processed in electronic form. On the other hand, openly available data is a data source that are lined to public networks (Soini, 2014; Berkovsky & Freyne (2010). Studies have shown that the availability of data to the public ensures exploration of data in innovative ways, which assists in planning and managing social and economic developments (Soini, 2014; Andreiwid et al., 2015). This shows that data is bound to be open to users to achieve their objectives. Open data is created to facilitate project development and policy creation.

Hence, openness of data encourages individuals, businesses and entrepreneurs towards the creation of economic activities and social values and to find solutions for prevailing problems (Crespi & Dutrénit, 2014). In explaining open data, Manyika et al. (2013) mentioned that open

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data is machine-readable information that mostly consists of government data and are always available for the public in a unified standard, which means that the data can be used and reused. This idea is supported by Davies & Perini. (2013) and Zeleti, Ojo and Curry (2016). On the other hand, studies by Ding et al. (2010), Berkovsky and Freyne (2010), and Guttmann et al. (2013) argued on open data as a free access and well-established pattern of data.

Most researchers have agreed that open data is purposely made free for individual use for problem discovery, empowerment and research collaborations (Fatemeh et al., 2014; Berkovsky & Freyne 2010; Guttmann et al., 2013). Besides that, the existence of open data has helped form a fundamental issue in modern business activities, management and strategic governance and leads to the initiation of open data as a problem-solving approach (Fatemeh et al., 2014; Berkovsky & Freyne 2010).

Furthermore, the origin of open data can be traced to various initiatives like freedom of information, transparency, public participation, data exchange, reuse of public sector information, open access, open source and open government data (Lee, 2014). It was further highlighted that such initiatives favoured by technology and information innovation assist in the rapid transformation of data to the public. Details on the open government data will be discussed in below subsection 1.1.2 and Chapter 2.

1.1.2 Open Government Data

However, not all data is always open to the public, at least with little restriction in some sources other than government data (Lee, 2014). This implies that open government data providers play important roles in making data available for the use of individuals, companies and industries. Past literature indicates that the development of information and communication technology (ICT) serves as a platform for non-manipulated raw open government data to ensure the

reliability of open data (Matheus et al., 2012; Pinho, 2008; Mello & Slomski, 2010). Therefore, the promotion of transparency by ICT has assisted in easing the access of public information provided by the government in a readily available format for public use (Agune et al., 2010; Parycek & Sachs, 2009).

The open government data initiative is presented by the government of any country to achieve promotion of transparency, social control and citizen's participation in policymaking (Andreiwid et al., 2015; Matheus et al., 2012). Meanwhile, many researchers have proposed that successful implementation of open government data should be based on attributes such as completeness of information and timeliness which refers to past to recent data, accessibility, machine process-able, non-discriminatory, non-proprietary and license-free data (Andreiwid et al., 2015; Wolfgang et al., 2013).

Many countries around the world have engaged in open government data initiatives due to its transparency and democratic policies (Harlan & David, 2012; John & Jeni, 2010). Open government data has been launched in countries like the United States, Australia, New Zealand, the Netherlands, Sweden, Spain, Austria and Denmark, and Malaysia. In other words, both developed and developing countries have purposely ventured into open government data, which provide input to the nation through the stimulation of data-based products and services, together with public services delivery and support of economic growth (John & Jeni, 2010). This shows that open government data benefits both the government and citizens to assist in social and economic prosperity.

1.1.3 The Benefits of Open Government Data (OGD)

There is evidence that open government data enhances the relationship between public organisation and its users (Andreiwid et al., 2015; Alvado & Javier, 2015). Open government

data ensures that public agencies allow users to have constructive and opposing views (Lee et al., 2012). Therefore, this strengthens the policy of the government to operate as an open system that can indirectly affect the public and make use of the available data for their planning. Indeed, studies have revealed that the disclosure of open government data drastically increases research and development carried out by journalists, economists, political analysts and scientists among others (Andreiwid et al., 2015; Fitzgerald et al., 2010).

However, in light of the importance of open government data for public prosperity and growth, the initiative taken does not lead to extensive users utilizing the data fully to help the government serve the purpose of open government data initiatives in Malaysia. Thus, much efforts should be done from the citizen's perspective regarding open government data. The citizens should be encouraged to utilise open government data, and their concerns regarding their privacy and security should be addressed. Therefore, this study aims to assess the factors that could affect the behavioural intention to use open government data among citizens and to measure their satisfaction.

1.1.4 Open Government Data in Malaysia

The cluster analysis of six Southeast Asian countries conducted by open government data showed that many countries including Malaysia face challenges in mainstreaming the data. The countries also face challenges in establishing a sustainable open government data where initiative appears as supply-side driven, which means engagement from users is very low. Moreover, if the ranking of the Malaysian open government data is compared with the previous years or other counties, it becomes obvious that Malaysia has been performing poorly in this context (World Wide Web Foundation, 2015).

According to the comparison made by World Wide Web Foundation (2015), Malaysia held the 53 OGD rank in 2016, 51 in 2015 compared to 41st in 2014 while for 2017 and above, Malaysia is no longer in open government data global ranking. Besides, the ranking in the citizen driven OGDI was very weak at 112, which reflected that there was lack of citizens' participation and awareness about open government data usage and adoption. In addition, like other similar countries, Malaysia has a tradition of restricting public information access and is poorly ranked in information openness. The level of trust between the citizen and the government is very low and citizens consider government data as a less reliable source of information (World Wide Web Foundation, 2015).

Additionally, Lean, Zailani, Ramayah and Fernando (2009) and Bhunia (2017) compared the government services and open data among Asian countries, Hong Kong was ranked 9th (86.4%), Singapore 10th (85.6%), Taiwan ranked 11th (84.5%), while Malaysia 24th (49.1%) among others. This indicate that Malaysia is still behind in the use of open government data and services.

The four dimensions of OGD, divided into publicized law and government data, right to information, civic participation and complaint mechanism also showed the ranking of Malaysia's open government data as poor (refer to Figure 1.2). Specifically, in terms of publicized law and government data, Malaysia fell under the category of top tercile countries with a score of 0.51, while in terms of right to information was 0.46, civic participation was 0.37 and complaint mechanism was 0.37, in which Malaysia was ranked as a bottom tercile country (World Justice Project, 2015). Thus, this indicates that overall ranking was disappointing and shows the lack of participation from the citizens.

On the other hand, the statistics on Malaysian open government data also showed an unsatisfactory situation of the data where World Justice Project (2015) through its Open Government Index measured open government data on the basis of several indicators where openness was one of the indicators. From the report, Malaysia scored 0.43 out of 1, while the overall openness global ranking score was 88 over 102 countries which indicated a low level of openness, low participation, less awareness and low trustworthiness.
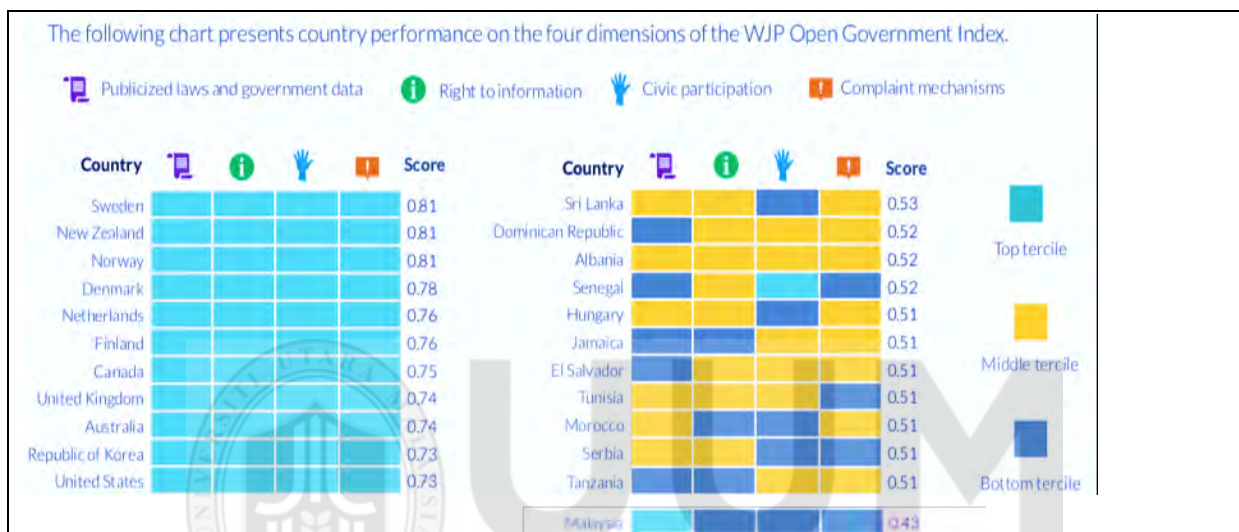
Source: World Justice Project, 2015

Figure 1.2. WJP open government index (2015)

The available open government data shows very promising features that can compete with the open government portal of other countries, but the real situation is different. The users of open government data do not use the data as perceived by the government and the outcomes does not reflect the desired results for the government's initiatives. The open data barometer results show a poor performance of Malaysian open government data. For example, in 2016, most of the sector data was not completely available to the users. In Figure 1.3, the red highlighted scores in the box are scores of different sectors' data availability out of 100. Only data on

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primary and secondary education scored high at 75/100, while other sectors' scores were poor.

The red dots also denote the non-satisfactory position of the available open government data.
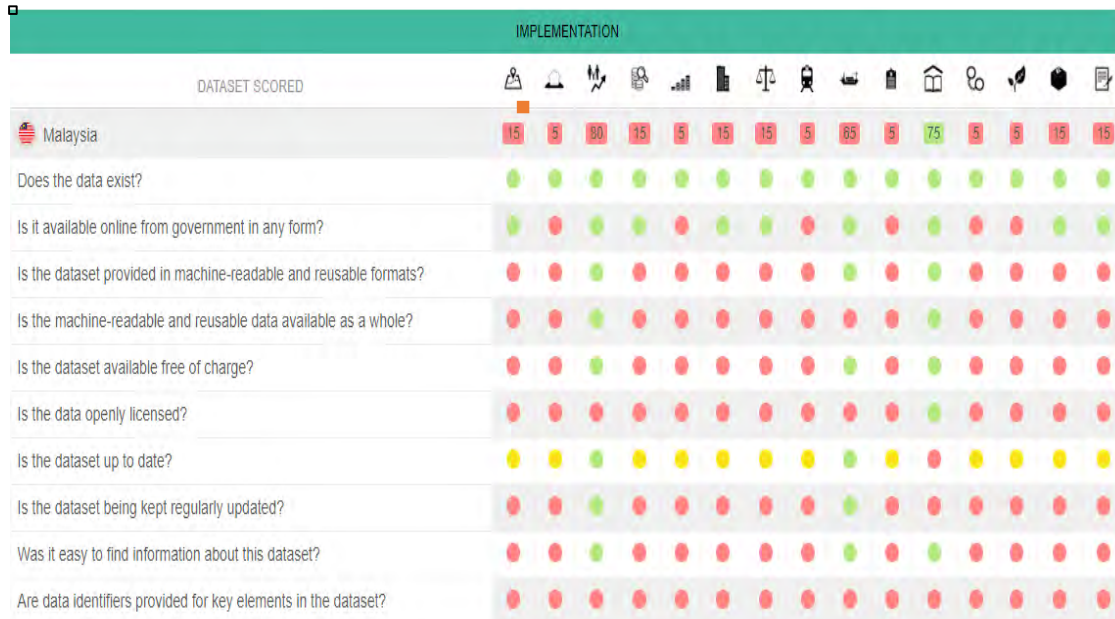
Source: opendatabarometer.org

Figure 1.3. Open data barometer Malaysia (2016)

Moreover, a review of literature indicates that studies generally show dissatisfaction among users of open government data. For example, Association for Progressive Communication (2012) indicated lack of satisfaction among citizens towards open government data. Only five percent were fully satisfied, while the remaining showed dissatisfaction with open government data. Similarly, Xiaojuan, Cheng and Jinpeng (2018) highlighted the failure of open government data to meet many requirements of data openness and lack of satisfaction from open government data.

1.2 Problems Statement

Conceptually, open government data adds value to accountability, citizen's participation and higher collaboration of public organisations (Kellyton & Vinicius, 2015; Janssen et al., 2012).

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This implies that open government data may give some impact to the delivery of public services. Besides that, researchers have stressed that open government data promote a strong association between government offices and citizens (Francoli, 2011; Ubaldi, 2013). Indeed, the availability of open government data has a positive impact on the output of workers and citizens in terms of time management, planning and forecasting of future challenges (Juan et al., 2014; Margetts & Partington, 2010; Lynn, 2012). It can be inferred that citizens are an element that ensures the successful implementation of open government data.

In addition to the identified gap in terms of theory, very little research has used intention as a predictor of satisfaction (performance of open government data). The current research based on Finn and Wang (2009), Keiningham et al. (2007) and Pingitore et al. (2007) used intention to use as a mechanism that can determine satisfaction from open government data. Citizens' behavioural intention on open government data and how this intention leads to the satisfaction of citizens also explains the open government data subject. Lack of the studies on open government data has addressed the highlighted issues above. Hence, this study intended to investigate the factors that potentially influence the citizens' behavioural intention to use open government data and how the behavioural intentions affect citizens' satisfaction.

Moreover, several studies have been conducted in the domain of open data and open government data from the citizens' perspective (John & Jeni, 2010; Harlan & David, 2012). Anneke and Marijn (2014) investigated the negative impact of open government data on citizens, while Juan et al. (2014) explored the evolution of open government data. On the other hand, the study by Julian et al. (2011) investigated the effort to increase the citizen's utilisation of open government data, thus bringing about the trend of movement of open government data among the public.

This raised the importance to increase the citizens' utilisation of open government data for their individual, research and business purposes. The factors which are helpful to increase the intentions of the citizens to use open government data and how they can be satisfied from the use of open government data has still been scarcely discussed by the previous literature (John & Jeni, 2010). Available literature on open government data measures the continuity of data, whereas, satisfaction has been stressed as the substitute of the efficiency and success of a system (Harlan & David, 2012).

In fact, users are a central part of the information system and they serve as the determinant of both satisfaction and dissatisfaction of technology that could suggest onward usage (Usha, et al., 2010). Researchers have cleared the distinction between use and satisfaction, where use is voluntary in the case of enforcing policies or rules, while satisfaction determines the success and continuity of a system (Igbaria, Livari & Maragahh, 1995; Ives et al., 1983). Thus, a citizen's satisfaction can be described as a means of measuring information system success (Cho et al., 2009). The satisfaction and use of the citizen remain an important success factor for any information system, including open government data which is the subject of this work.

Most available models in explaining the performance of e-government services use the perspective of satisfaction of users from these services (Bertot, Jaeger & Grimes, 2010). Very little is known on the intention to use open government data and the satisfaction of the users in general and in particular to Malaysia. Some studies such as by Wirtz, et al. (2018) assessed the antecedents of intention to use open government data. This research not only identified the scarcity of studies on open government data from the user's perspective, but also extended the view of Wirtz et al. (2018).

Limitation from the previous study has brought the realization that even the models shows a relatively high explanatory power, there still seem to be other factors that contribute to citizens' intention to use OGD (Wirtz et al. 2018). Further asserted by Wirtz et al (2018), future research should concentrate on extending the spectrum of determinants, for instance, by integrating components of social motivation and applying other theoretical frameworks such as technology acceptance model and use of technology to investigate the user of OGD. Thus, this research intended to integrate TAM with ECT as recommended by previous study (Premkumar & Bhattacherjee, 2008).

ECT advocates that the users' satisfaction and intention come from fulfilment of expectation and perceived performance, which lead to satisfaction and intention. This depicts that satisfaction acts as measure of the performance of open government data in the perspective of users. However, in the case of open government data, the users' intention to use can be more appropriate to assess the performance of open government data. Finn, Wang and Frank (2009) provided evidences shows that intention predicts performance better than customer satisfaction (Keiningham et al. 2007, Pingitore et al, 2007). So, reflected from the evidences provided by the previous studies (Finn, Wang & Frank, 2009; Keiningham et al, 2007; Pingitore et al, 2007), this study assumed that the OGD intention to use seem to be more appropriate since the users do not use the OGD as expected by the government and the factor that affects the intention to use could be more suitable in the context of Malaysian citizens.

The standard ECT theory has been widely applied in various contexts such as e-commerce, e-participation and e-government (Wu et al, 2006; Erevelles et al, 2003; Hsieh et al, 2010) where intentions of users have being assessed through satisfaction. These factors (expectations, confirmation and perceived performance) were found to indirectly influence the intentions of the users. Nevertheless, in some cases apart from the indirect relationship with intention,

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researchers measured the direct effect of the factors on intention to use. For instance, Rana et al. (2013) assessed the impact of system quality, information quality and perceived usefulness on intention to use rather than through the satisfaction of users from the online public grievance redressal system. This system is part of open government data and the concept can be applied to Malaysian open government data

Lack of public interest towards using open government data can reflect the lack of security and assurance provided by the system to its users (World Justice Project, 2015). In the open government data portal, there is no surety provided to the users that the data provided to them is error free and that they can use it for strategic planning purposes. Rather, it has been stated that there is no guaranty from the open institute (MaMPU) in case of any error or omission in the data (refer to Figure 1.4). This indicates lack of privacy and transparency of data that is a perceived risk.

Additionally, Siau and Shen (2003) pointed out that consumers have many doubts in perceiving transactions, which leads to an increase in perceived risks and decline in behavioural intention to use. Similarly, citizens may fear the risk of wrong information provided by the open government portal and/or loss of their own profile information while connecting to open government data portals. This can be evident from Figure 1.4 below which it can be clearly seen from the portal that The Open Data Institute is not liable for any loss, injury or damage upon its usage.
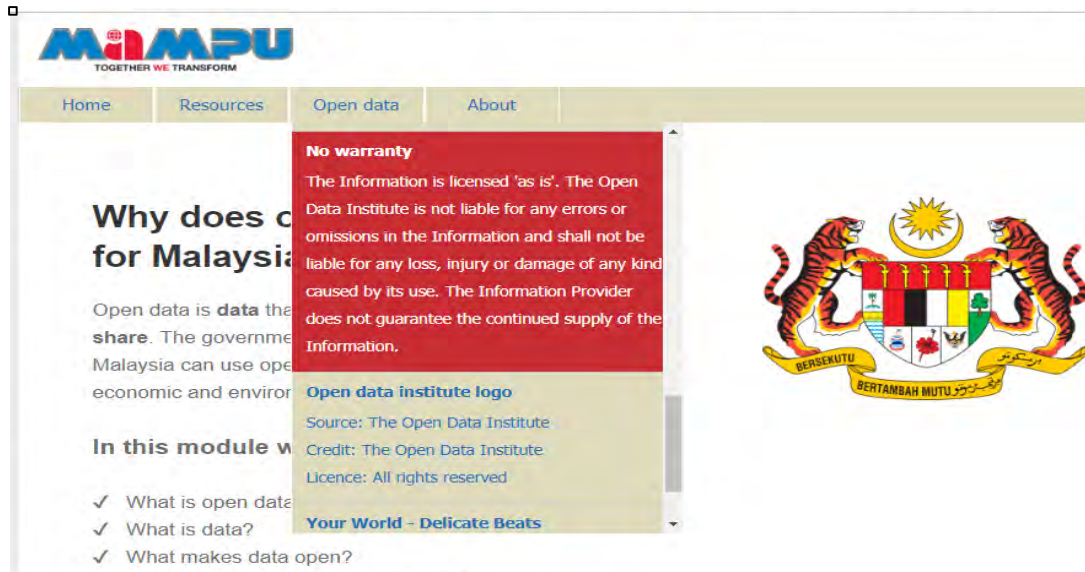
Source: (MaMPU, 2018)

Figure 1.4. No warranty on data

In order to increase the use of the open systems, users should be motivated enough to use the open government data. Wirtz et al. (2018) identified motivation as a factor that acts as an antecedent of intention to use open government data. Motivational approaches have been successfully applied recently to understand citizen participation in the context of an open government, suggesting that citizens' motives or motivations play an essential role in determining their engagement in open government activities (Hutter et al., 2011; Wijnhoven et al., 2015). In this perspective, Bélanger and Carter (2008) suggested that agencies could provide incentives to encourage citizens to try e-government services.

Furthermore, Canares and Shekhar (2015) reported that incentives to use open government data act as a critical factor in open data usage. Similarly, Susha et al. (2015) reported that users must have an incentive to participate or use open government data that is available on open government data portals. The cited literature provides support in favour of increasing the intention to use open government data by providing incentives on usage. Incentives on open

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government data usage can be a potential factor that enhances the intention of citizens to use open government data.

The review of literature documented factors such as expectation, perceived performance and confirmation that significantly contribute to users' satisfaction and intention to use open government data. In addition, perceived risk appears as a hindrance to the usage of open government data and reduces the intention to use open government data. Moreover, incentives on usage appear as a significant factor that influence the intention to use open government data.

1.3 Motivation of Study

The ECT is leading theory in understanding the satisfaction of users, in which understanding the antecedents of satisfaction and their effects on the satisfaction level of users is deemed crucial in past literature (Hossain & Quaddus, 2012). In the information system literature, the theory has been constantly used to assess intention with different independent variables depending on the context of the study and subject matter. These variables are usually logical and multi-varied based on the context. In addition, until there is no general agreement on the definition, relationship and measurement methods of construct in the ECT as mentioned by Hossain and Quaddus (2012). In most studies related to ECT, university students were taken as the sample. Besides that, ECT was used in combination with other related theories/models such as TAM and TPB to provide a better understanding of user satisfaction and intention. This integration of related theories or incorporating variables has a better fit in related areas of applications. Most of the research conducted using ECT was based on samples from the USA, Hong Kong, and Taiwan, but little has been done using other developed or developing countries where the ECT model application can be tested and confirmed.

The above cited literature and discussion provide a way forward to assess user satisfaction and intention by extending the ECT framework. The ECT framework has the flexibility and integration to be extended with other related theories and variables. ECT holds that consumers' intention to repurchase a product or service is determined primarily and solely by their satisfaction with prior use of that product or service (Oliver, 1980; Swan & Oliver, 1991; Anderson & Sullivan, 1993; Oliver & Westbrook, 1993). On the other hand, a first-time user should be assessed for their intention to use which can explain satisfaction or dissatisfaction from the products/services. Intention to use as well as the decision to adopt a product/service depends on many factors such as personal factors, financial factors and environmental factors (Hossain & Quaddus, 2010).

It has been noted that ECT has a lot of limitations if applied in the context of knowing the usage of products/services. In the literature, consumer intention and satisfaction have been assessed from the view of repurchase intention or continuous usage of products/services, but for first-time users of technology, the model failed to provide sufficient evidence. The current research postulated that the expectation from services, perceived performance and confirmation will lead to intention to use and that usage will determine the satisfaction from the services, which is the open government data in the current research context. Also, ECT is unable to provide a comprehensive detail on intention to use and satisfaction as Premkumar and Bhattacherjee (2008) mentioned that TAM and ECT together provide a better explanation of IT usage intention compared to a single individual model/theory.

In line with this, the current research also intended to measure intention to use open government data using ECT by combining ECT with TAM to provide a better explanation. Due to the limited ability of ECT to explain how intention to use can lead to satisfaction, the incorporation of both theories provide an opportunity to assess the impact of intention to use on satisfaction.

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Thus, the current research finds the limitations of ECT as a motivation to assess first-time users' intention to use based on expectations, confirmation and perceived performance and measure the level of satisfaction from open government data from the intention's perspective.

1.4   Research Questions

The completeness of this study produces answers to the following questions:

1) How can the ECT model and TAM model be integrated for measuring OGD satisfaction?

2) Is intention a significant mediator to satisfaction?

3) Do incentives on usage and perceived risk contribute in explaining the new ECT model in the OGD context?

1.5   Objectives of the Study

The objectives of this study are as follows:

1) To design an integrated ECT and TAM models for explaining OGD satisfaction.

2) To examine the mediating role of citizens' behavioural intention between the expectations, confirmation, perceived performance, incentive on usage, perceived risk and citizen's satisfaction of open government data.

3) To test the impact of incentives on usage and perceived risk in explaining the new ECT model in the OGD context.

1.6   Significance of Study

This study seeks to examine the level of satisfaction from open government data from the intention's perspective. Hence, it is expected to contribute towards the improvement in academic field and for the benefit of practitioners.

1.6.1   Significance of the Research to the Academics

This study enhances the ECT model by integrating some concepts of the IS model and the ECT model in one model in the context of open government data. The inclusion of expectation, confirmation and perceived performance constructed in the ECT represents the independent variable in this study. Previous studies have investigated the contributing factors of user satisfaction in technology devices by considering the predictors of ECT as a determinant factor (Park et al., 2009; Chen, 2008; Ham et al., 2012; Eriksson & Nilsson, 2007). Thus, the ECT model is able to assist in determining the measurement of citizens' behavioural intentions and satisfaction from open government data in Malaysia.

Moreover, the ECT model has been widely used in IS research and has been identified as a model that recognises user satisfaction and continuity while using technology (Curtis et al., 2010; Sumac et al., 2010; Loo et al., 2009; Finn et al., 2009; Suha & Anne, 2008) but has yet to be tested in open government data study areas. Thus, this study will help determine the measurements of open government data in terms of the citizen's intentions and satisfaction in Malaysia.

Also, this study will theoretically contribute to the new insights by developing and validating an instrument for collecting data towards determining the influential factors to measure citizens' intentions and satisfaction from open government data in Malaysia. This is necessary and is in line with the argument of Straub et al. (2004) that it is essential to develop and validate new instruments in a situation where theory is advancing. This study added the impact of incentives to usage and perceived risk in the ECT model to increase the explanation on citizens' behavioural intentions and satisfaction from open government data.

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1.6.2 Significance of Research for Practitioners

This study contributes to practical aspects on open government data. It raises the importance to establish strong infrastructures that help the acceptability of open government data among citizens (Dolores et al., 2014; Preston & Cawley, 2008; Cawley & Preston, 2007). The input from the determined factors to measure citizen's behavioural intention and satisfaction in Malaysia will serve as a positive insight for open government data providers. This is necessary as some companies and government agencies that control the open data for the citizen's use would derive efficiency from their operation and their work on factors that lead to behavioural intention and satisfaction among the citizens.

This research also highlights that open government data (OGD) is also an important element of information system (IS) due to the fact that OGD involves the technique in publishing data for the public use (Wolfgang et al. 2013; Anne et al. 2013) through the integration of ICT in achieving transparent accessibility (Andreiwid et al., 2015). Specifically, the understanding on the open government data will be looked in depth through the application of Expectancy Confirmation Theory (ECT) and Technology Acceptance Model (TAM).

Furthermore, the provision of access to open government data and services is considered crucial for economic and social development and better quality of life (Afra et al., 2015; Gang-Hoon et al., 2014; Ayres & Williams, 2004). However, many users of open government data who are citizens do not have the motivation to continuously use the data due to lack of satisfaction on the available open data. Hence, this study may serve as a recommendation for policy makers such as regulatory bodies on the communication to meet the satisfaction of citizens who are users of the services. There is no benefit to provide the offering of open government data if users are reluctant to use the provided services (Taewoo & Djoko, 2011; Lydia et al., 2012; Eriksson & Nilsson, 2007).

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1.7   Scope of the Research

This study is concerned with the users of open government data particularly in Malaysia. The current research measured user's satisfaction level from an individual's perspective. The northern region of Malaysia was found to be prevalent in culture and agriculture in nature, rainforest, historical and archaeological features which are attributes of the rural area. This shows that the northern region of Malaysia requires both social and economic developments, which thus need open government data for users planning purposes.

Moreover, open government data users in the Northern Corridor Economic Region (NCER) who are the staff of the northern corridor implementation authority (NCIA) covering the Kedah, Perlis, Perak and Penang states of Malaysia were engaged during the data collection along with users in universities (UTP, USM, UUM, UINMAP). This is as a result of their extensive use of available data for planning and development of the northern region of Malaysia. In addition, the study focused on measuring the citizens' behavioural intention and satisfaction from open government data through the extensive quantitative approach. This study used highly reliable and consistent measures with tested instruments.

The data collected was examined using Structural Equation Modelling (SEM) due to its ability to determine the fitness of model and its usefulness in testing the theories (Hayes, 2009; Henseler, et al. 2009). Besides that, this study used the Partial Least Square technique of SEM (PLS-SEM) which is a quantitative research approach to analyse the collected data from the citizens on behavioural intention and satisfaction from open government data. PLS-SEM helps the researcher to maximise the variance explained for the dependent variable (Hair, 2011; Henseler et al., 2009, Suha & Anne, 2008) which is the citizen's satisfaction from open government data in Malaysia. Moreover, the mediating role of the citizen's behavioural control

is tested between the factors that affect citizens' satisfaction from open government data using the bootstrap model which provides detailed and robust results.

1.8   Thesis Outline

Chapter One of this thesis is the introduction that gives an overview to what the study is about. It embeds the background of the study, problem statement, research questions, research objectives, significance of the research, scope of the research and an annotated research plan.

Chapter Two reviews related literature on open data and its concepts, open government data concepts, and factors that impact the citizens' behavioural intentions and satisfaction under related IS theories. It also discusses the theoretical framework.

Chapter Three describes the research methodology in general. It focuses on the research design, research approach, sampling methods, population of the study and research instruments. Moreover, it also discusses the data analysis techniques suitable to achieve the objectives of the current study.

Chapter Four presents the results of the data collected for this study. The assumptions of data analysis were tested before hypothesis testing. It further examined the reliability and validity of the measurement scales using scores on internal consistency, convergent validity and discriminant validity. The structural model assesses the proposed hypotheses, average variance explained, effect size and predictive relevance of the model.

Chapter Five: In this chapter, the results of the analysis are discussed at length with the help of previous literature. Theoretical, methodological and practical implications of the use and application of the current research results were discussed. The theoretical and methodological

limitations were elaborated, and future recommendations were given to overcome the limitations and to guide future researchers in the area of open government data.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the related literature on the topic under discussion and divided it into three main parts. Part One reviewed existing literature on open data and related issues. Part Two provides a discussion on open government data and its archetype. Lastly, Part Three covers the review of related theories on the use of technology which leads to the discovery of the base models for this study.

2.2 Open Government Data

Eberius et al. (2013), Petrou et al. (2013) and Castanie et al. (2013) indicated that open source and open government data, open access, data exchange initiatives, reuse of public sector information (PSI), freedom of information, transparency and participation initiatives are ways to trace the core elements of open data. The emergence of the concept of open data can generally be referred as far back as 2007, with most of the preliminary activities taking place in the United States of America (USA) and the United Kingdom (UK). Researchers stressed that many gatherings have been held with the intent to build a more robust understanding of why open government data is indispensable to democracy and the present administration of countries in the world (Fitzgerald et al., 2013; Gomes & Soares, 2014).

2.2.1 Open Government Data Business Model

According to the developed strategy and modern business management, data is considered as a basic element (AbdulMajid, 2012; Muzamil & Kaur, 2014). These studies focused on the general gap related to the process on data creation value for companies (Khor, Ismail, Md Rashid, Wan Ismail, Omar & Mohd Zanal, 2015; Lean et al., 2009). Prior studies have shown

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that the business model of open government data is aggressively studied by McKinsey in the US and Deloitte in the UK, whereby they introduced five business model standards of open data which include the supplier, inventor, aggregators, enablers and enrichers (Brajawidagda et al., 2015; Khor & Ismail, 2015; Lean et al., 2009).

Similarly, Better Business through Open data (BBTOD) is a flawless business model which used open government data in different sectors including energy, finance, healthcare and education to enhance the performance of service providers (Radl et al., 2013; Graves & Bustos-Jimenez, 2015). The other business model, Open Data Pure Plays (ODPP) has disorder issues that does not exist without open government data. There are business models for reuse of government data which rely on eight archetypes selected from 13 firms' case studies without proper use of open government data (AbdulMajid, 2012; Muzamil & Kaur, 2014). Therefore, these eight archetypes do not pertain open government data related to financial analysis (Radl et al., 2013; AbdulMajid, 2012). Thus, there are not many published studies available for those considering open government data which finalises a robust model of open government data.

2.2.2 Open Government Data Archetype

Previous researches indicated that an open government data archetype can be effective with the presence of enablers as shown in Figure 2.1 which mentioned the businesses that arrange for customers with technologies, such as application or software programs (Correa et al., 2015; Britos & Garcia, 2015). Similarly, on the supply side, enablers can be considered as the controller of the backbone of the open government ecosystem by facilitating governments and public organisations for the assortment, organisation and revelation of public data with formal art technologies (Gonzalez et al., 2014; Correa et al., 2015; Britos & Garcia, 2015).

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Open Government Data Archetypes could highlight services such as cloud computing, hosting and data management software that converts into mandatory government levels which have the capacity to attain a high outcome in the return of data-intensive issues for some years. For the users, enablers that make products or services that collect data from different resources like public sources or with other types of data including user data, third party data and crowdsourced data innovatively gather open government data (Hoxha et al., 2011; Magalhaes et al., 2013).
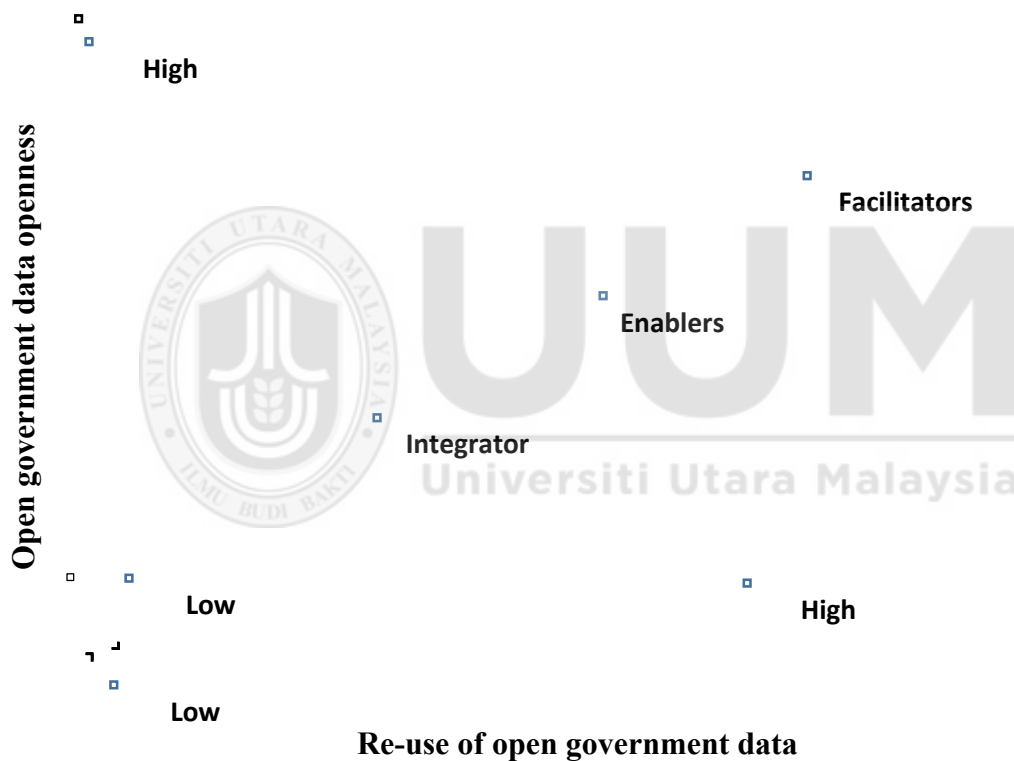
Source: (Gonzalez et al., 2014)

Figure 2.1. Open government data archetypes

Additionally, the business model archetype is considered an important intermediary and growing element in the open government system (Hoxha et al., 2011; Magalhaes et al., 2013). The facilitators assist or boost the data access and exchange among users and suppliers by

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enhancing and improving open government data access (Verma & Gupta, 2013; Chattapadhyay, 2014). The reposting of data by the use of technologies suggested for the APIs, databases and web applications, therefore, both end users and developers explore, direct and attain data understanding. The organization named Quandl makes data accessible for users and investigates complex economics, finance, health, society, energy and demographic data (Chattapadhyay, 2014), whereas the national online mapping instrument is a policy map for above 20,000 U.S. Census Bureau, consumer financial protection bureau and labour statistics bureau indicators (Verma & Gupta, 2013; Chattapadhyay, 2014).

Previous studies have approved that the facilitator is a significant element of the open government data archetype which helps private sectors, government agencies and organizations with the process of necessary legislative data submission with public regulations (Millic et al., 2012; Chattapadhyay, 2014). For this purpose, the Wyoming Department of Education created a level one technology based on web applications and permits government agencies to organize and account their use of federal incentive funds. The facilitator of an open government data archetype can be stated as a developing group of services that connects the power of the new government delegated data standard XBRL (Verma, 2013; Prieto et al., 2012).

Companies such as IPHIX, Ez-XBRL, and Calcbench support their consumers, particularly firms in the financial sector, to access, proceed and submit data resourcefully from the SEC's corporate financial data depository. The progress of the business model archetype discusses the firms that incorporate the existing business model with open government data with more improvements in the existing deal (Matheus et al., 2012; Prieto et al., 2012).

However, any business can work as an incorporator that makes use of the open government data by merging it with inside data or other types of exclusive data with the purpose of expanding its business aptitudes. The incorporator has open government data archetypes which can be established in numerous sectors, such as insurance, real estate, investment banking, and biotechnology (Sandoval-Almazan et al., 2012; Lipuntsov, 2014). In other words, incorporators can extract worth at any level of the value chain in logistics, R&D, marketing and sales from open government data. Furthermore, studies have shown that many companies that work as incorporators are found between large firms, such as LexisNexis and Experian (which has records from uncountable sources including public, private, regulated, and derived data) to Van Lines affecting businesses that use census zip code data to deliver potential customers with price estimates (Canares, 2014).

2.2.3 Principles of Open Government Data

In order to support the development of open government data, different sets of principles have been put forward by different studies (Gonzalez et al., 2014; Agbabiaka & Ojo, 2014). These principles are extremely useful as revealed in Table 2.1 and provide best practice and recommendations to guide governments around the world on the approach to publish government data on the Internet, as well as avoid the publication of inconsistent, incomplete, low quality and unusable data.

Table 2.1

Eight Principles of Open Government Data

Principles of open government data	Descriptions
Completeness	All public data are made available and are not subject to valid privacy, security or privilege limitations.
Primary	This is the act of collecting data from the main source with the highest possible level of granularity, not in aggregate or modified forms.
Timely	Making data available as quickly as necessary to preserve the value of the data.
Accessible	The act of making data available to the widest range of users for the widest range of purposes.
Machine processable	The act of making data be reasonably structured to allow automated processing.
Non-discriminatory	Data is available to anyone with no requirement of registration.
Non-proprietary	The act of making data to available in a format over which no entity has exclusive control.
License-free	Data is not subject to any copyright, patent, trademark or trade secret regulation. Thus, reasonable privacy, security and privilege restrictions may be allowed.

Source: Adapted from Chattapadhyay (2013).

2.3   Development of open government data

Past research on ICT and open government data provides a gap to identify a comprehensive model which can successfully measure intention to use open government data and satisfaction from open government data use. The meta-analysis conducted by Kvamsdal (2017) shows the results of 33 studies on open government data where most of the studies conducted were empirical (65%) while 35% were non-empirical.

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On the other hand, 56% of studies used the qualitative inquiry approach, 21% used the quantitative approach, 14% focused on presenting a conceptual model to advance the research while 9% used mixed methods. It was documented that 34% of the studies used a case study method, 27% used secondary data, 20% used primary data/survey, 10% used design research and 2% used scenario-based research. The details are given in Table 2.2.

Table 2.2

Meta-analysis Open Government Data

OGD Studies	N	Percentage
Type of Knowledge		
Empirical	28	65%
Non-empirical	15	35%
Approach Used		
Qualitative	24	56%
Quantitative	9	21%
Conceptual	6	14%
Mixed	4	9%
Data Collection Methods		
Case study	14	34%
Secondary	11	27%
Primary/ Survey	8	20%
Design Research	4	10%
Interviews	3	7%
Scenario	1	2%

Source: Kvamsdal (2017)

Majority of the studies conducted on open government data are qualitative in nature and being conducted as the case study as methods in dealing with particular issues. Besides, limited attention has been given on the development of the conceptual model to investigate the phenomenon in more detail to provide a comprehensive model of open government data. Moreover, the data collection methods applied earlier also show that a limited population has been reached with limited generalisability.

Quantitative studies mainly developed predictive, non-explanatory theories through either a mixed or analysing theory. This includes studies dealing with the identification of determinants either for adoption (McNutt et al., 2016; Wang & Lo, 2016; Yang & Wu, 2016) or publication (Sayogo et al., 2013; Thorsby et al., 2017). Qualitative and mixed studies progressed from no clear theory into analysing (Conradie & Choenni, 2014; Zuiderwijk & Janssen, 2014) and designing the theory (De Mendonça et al., 2015). However, only few have focused-on users' perspectives and moved from analysing to explaining, both focusing on users (Ohemeng & Ofosu-Adarkwa, 2015; Ruijer et al., 2017).

Among the papers that moved to a new type of theory, only two developed a framework or theory and most of the frameworks or models came from the literature which systematized the existing knowledge (Kvamsdal, 2017). Further explained, most research developed and applied the framework, but none had any additional testing or further refinement done. A few frameworks for the same purpose seemed to be developed in parallel. For example, within policy comparison (Nugroho et al., 2015; Zuiderwijk & Janssen, 2014) and assessment of quality of data portals (Vetrò et al., 2016; Viscusi et al., 2014). No models or frameworks were developed within the utilization and adoption area. The cited literature shows a lack of studies that extended the theories and applied multiple theories to propose a comprehensive model of

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open government data, where rigorous techniques of analysis and sample selection would make the results more generalizable and robust.

Based on the above discussion, in order to provide in depth understanding on the user intention and satisfaction where this cannot be obtained through the usage one single theory, the integration of more than one theory will assist in understanding the open government's intention and satisfaction which remains the focus of the study (Premkumar & Bhattacherjee, 2008).

2.4   Intention to Reuse Open Government Data

Prior studies have focused on the reuse of open government data which can assist other purposes that include public data analysis, assessment and performance on the basis of public citizens (Zuiderwijk et al., 2015; Zuiderwijk & Janssen, 2014). This study suggested that the reuse of open government data increase the citizens' accessibility on the government securities and possess empowerment. Similarly, the reuse of open government data is also considered as highly profitable and beneficial for the society as indicated by Zuiderwijk and Janssen (2012) and Zuiderwijk et al. (2015).

The private sector uses open government data to increase profitability from product and services. Besides that, the reuse of open government data is considered as a tool to impact the economy and society by providing jobs, innovation and wealth creation (Zuiderwijk et al., 2013; Zeleti et al., 2014). Furthermore, researchers have argued that political accountability and technology innovation have assisted the use of open government data (Bertot et al., 2012). On the other hand, the current alteration introduced top-down strategies of the government that enhances open data economy based on the interests of prevalent capitalists of the private sector

who have free access to expensive data (Arumugam et al., 2008; AbdulMajid, 2012; Muzamil & Kaur, 2014).

The provision of open government data for use and reuse revealed benefits for individuals, public organisations and private organisations. The potential use and reuse of open government data assists individuals to shape their business and society in innovative ways. The proper utilisation of the available data can be a source of socio-economic prosperity and promotion of innovative ideas to solve social and business issues faced by individuals and organisations. The next section provides the potential uses of open government data for business models.

2.5   Impact of Open Government Data on Citizen

An open government data can be proficient with the use of new technology (Gonzalez et al., 2014; Agbabiaka & Ojo, 2014). An open government can be defined as a government where inhabitants not only have entrance to the information, data, documents, and records, but can also develop members in an expressive context (Chattapadhyay, 2013). Nevertheless, the open source drive is considered by its supporters as clear, participative, and cooperative. On the other hand, it can be signified by governmental values with considerable history in independent theory which is relevant to the comprehensive processes of inhabitant action related to elective and public policy adoptions (Andrews & Da Silva, 2013; Chattapadhyay, 2013).

Alliance has not been habitually linked with the democratic political theory (Chattapadhyay, 2013). An alliance is a procedure of democratic contribution that varies in imperative ways from outmoded participative and calculated practices that influence conditions detached from judgments. Furthermore, a discussion sometimes goes into a chance for the exchange of opinions relatively than to define an exact plan of action (Scherer et al., 2015; Matheus et al., 2014). Although there are remunerations to confirm that varied viewpoints are combined into

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government policies, collaboration is a modern form of participation in democracy that carries people together with government policy makers to make resolutions that will be applied.

2.6   Summary

This chapter provides a detailed discussion about the previous works on open data and open government data. The chapter covers issues on the open government data ecosystem, the basic principles of open government data and their model. However, the chapter also shows that previous research lack studies on examining satisfaction of open government data usage among citizens of Malaysia.

CHAPTER THREE

THEORIES AND MODELS

3.1   Theories and Models Related to Intention and Satisfaction

In past research, various theories have been used to address in different ways to serve as a panacea to contemporary issues on the use of technology and their services (Ho, 2010; Park et al., 2009; Eriksson & Nilsson, 2007). The current research established the Expectation Confirmation Theory (ECT) as the base theory to support the model and the Technology Acceptance Model (TAM) to support the theory in examining citizens' satisfaction from open government data in Malaysia.

Researchers have stressed that Information Systems (IS) theories are capable of discovering factors or drivers to address issues in societies (Ho, 2010; Premkumar & Bhattacherjee, 2008; Damiani et al., 2008; Venkatesh et al., 2003). Thus, applying both ECT and TAM could provide the required support to the research model. Therefore, this study proposed to combine ECT and TAM to identify the factors that affect citizen's behavioural intention and satisfaction from open government data in Malaysia. the below subsections will provide the theories and models which have been applied in relation to intention and satisfaction.

3.1.1   Theory of Reasoned Action (TRA)

Theory of Reasoned action (TRA), developed by Fishben and Ajzen in 1975 is explaining on the behavioural intention. In this theory, intention has been viewed as most significant predictor of human behavior (Ajzen & Fishben, 1980). According to TRA, the behavior intention of individuals is determined by two factors of attitude and subjective norm, in which the

subjective norm is influence by normative beliefs in the society and the attitude can be divided into positive or negative aspects.

Relatively, in its first development stage, TRA has been used in analysing intention as the basis of daily life decision making process. Thus, this makes TRA being considered as an effective theory in explaining the psychological/cognitive processes when it comes to understanding consumer/customer decision making (Han & Kim, 2010). In this theoretical context, "intention" refers to the willingness or readiness to engage in certain behaviours that under consideration (Han & Kim, 2010; Ajzen, 1985). Figure 3.1 illustrate the Theory of Reasoned Actions.
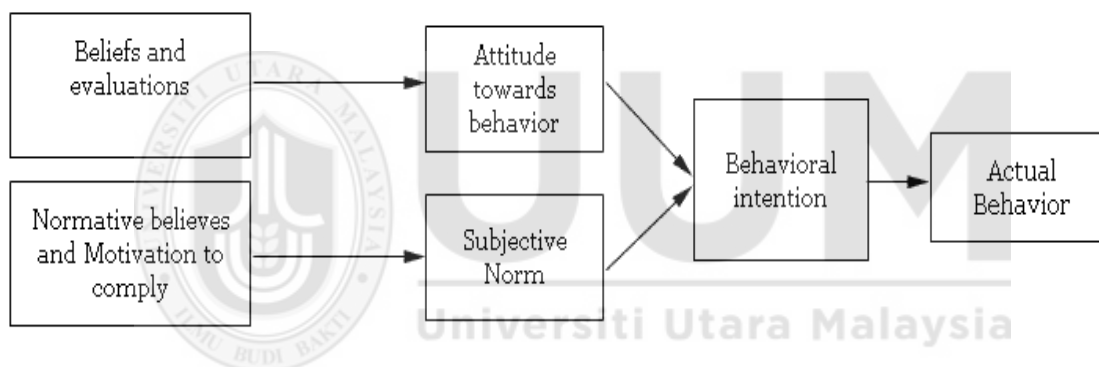
Source: (Fishben & Ajzen, 1985)

Figure 3.1. Theory of reasoned action

TRA has been widely studied in the social psychological field (Malhotra & McCort, 2001; Eagly & Chaiken, 1993) and the growth has been seen in marketing and consumer behaviours areas where TRA is used as in predicting intention and behavioural intention (Choo et al., 2004; Lam & Hsu, 2004).

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3.1.2 Theory of Planned Behavior (TPB).

Theory of Planned Behaviour is established based on the theory of multi attribute attitude (TMA) and Theory of Reasoned Action (TRA). This theory is related to behavioural decision-making process which targeting on comprehending and predicting individual's behaviour which mainly controlled by the will. As to improve the power in prediction and improving TRA, Ajzen (1985) added the construct of perceived behavioural control, in complementing subjective norms and attitude.

Additional variable of perceived behavioural control is derived from the Self-Efficacy Theory which refer to the individual's feelings in taking certain acts that depends on three (3) factors which are capabilities, resources and opportunities (Ajzen, 1985). This indicates that when an individual think that they are having more capacities, resources and opportunities, they perceived that there will be less obstacles and stronger perceived behavioural control and intention (Ajzen, 1991). TPB is illustrated as below in Figure 3.2;
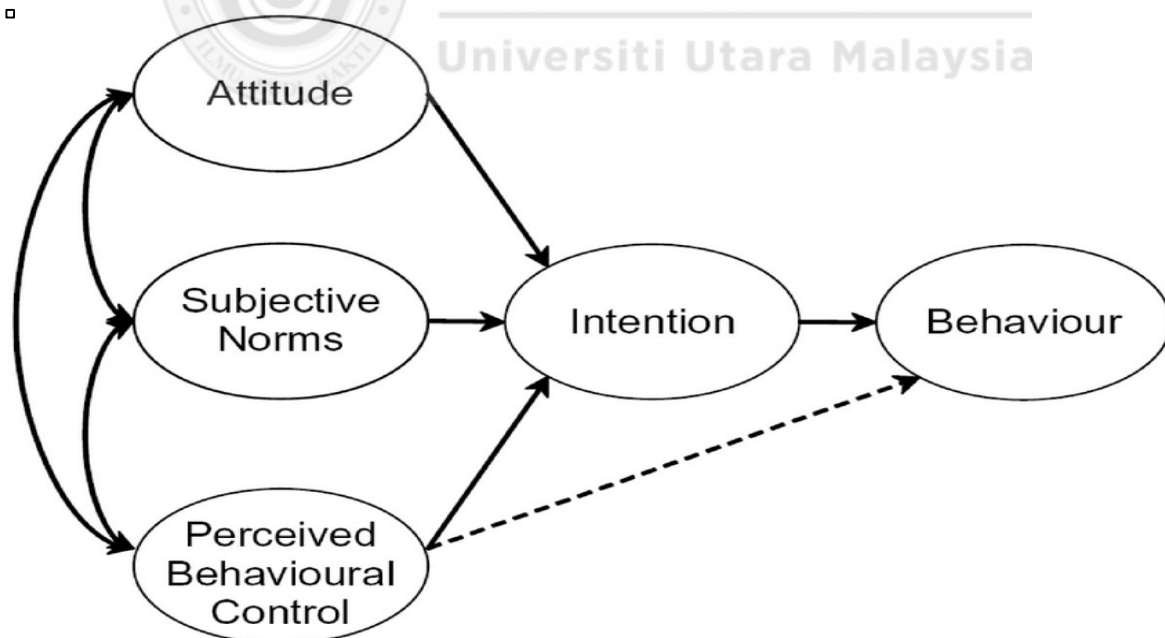
Source: (Ajzen, 1991)

Figure 3.2. Theory of planned behavior

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Regardless its improvements from TRA, several limitations have been addressed regarding the application of TPB. For example, TPB only examine specific behavior within specific time and context with only specific objectives, not recommended to cover more than one behavior at different timeline (Zhang, 2018). Besides, TPB mostly used to predict new behaviors without considering repetitive behaviors or habits in one stable context (Ouellette & Wood, 1998). Furthermore, TPB do not incorporate the emotion factors which have been known as the collective factors in decision making process, but unfortunately, this not being included in TPB (Bagozzi, Dholakia & Mokerjee, 2006).

3.1.3 Technology Acceptance Model (TAM)

Technology Acceptance Model established from TRA with the aim "to provide an explanation of the determinates of computer acceptance that is general, capable of explaining user behaviour across a broad range of end-user computing technologies and user populations, while at the same time being both parsimonious and theoretically justified" (Davis et al, 1989). TAM differ from TRA itself since it excludes the subjective norms elements and TAM asserted that the actual technology usage is actually determined by behavioural intention.

Specifically, Technology Acceptance Model (TAM) adopts the theory of reasoned action and causal links to explain an individual's IT acceptance behaviour (Park et al., 2009; Premkumar & Bhattacherjee, 2008). It proposes that perceived usefulness and perceived ease of use of IT are important determining factors that determine technology acceptance. Perceived usefulness is defined as the grade of a person's faith that using a specific structure would improve job performance. The perceived ease of use was clarified as the belief of a person that using a specific system would be free of effort.

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Both perceived usefulness and perceived ease of use have been argued to influence citizens' intention to use rather than the citizens' satisfaction (Taylor & Todd, 1995; Thompson et al., 1991). Moreover, a key purpose of TAM is to provide a basis to trace the impact of external factors on internal beliefs, attitudes and intentions, while the satisfaction of users for the short or long term is not taken into consideration.

The behaviour intention (BI) is a construct of the power of one's aim to achieve a stated behaviour. Based on ECT theory, user approval and usage behaviour are determined by the purpose to use IT (Bischoff et al., 2014; Chiu & Wang, 2008). It is an important self-prediction or behavioural anticipation that is designated as one of the greatest accurate forecasters accessible for a person's future behaviour.

3.1.4 Information System Success Model (ISSM)

Information System Success Model (ISSM) was introduced by DeLone and McLean in 1992 where this theory provides details on IS success through identifying, describing, and explaining the relationships among six of the most critical dimensions of success along which information systems are commonly evaluated. This theory is considered as one of the most influential theories that have been used in current information systems research.

This theory postulates on the six (6) distinct dimensions of IS success which are system quality, information quality, use, user satisfaction, individual impact, and organizational impact. The authors contributed two important facts that lead to IS success; first, this theory assert a scheme in differentiating and categorizing IS multitudes measures. Second, it suggested a model of causal and temporal interdependencies between the related categories (Seddon, 1997).

Few years after its publication, DeLone and Mclean in 2002 proposed an updated and improved IS success model. The difference in the first and updated version are (1)t the addition of service

quality element which cover the importance and how it supports the successful e-commerce system, (2) addition of intention to use in measuring user's attitude, (3) the collapsing of individual impact and organizational impact into a more frugal construct. Specifically, the updated version comprises of six interrelated dimensions of IS success information, system, and service quality; (intention to) use; user satisfaction; and net benefits.

To create a simpler comprehension about the model, this model can be clarified in a way that a system can be assessed by its information, system and its service quality which affecting user's intention and satisfaction afterwards. The users will gain some benefits from the system's usage and the benefits will be evaluated either it is positive or negative, thus influencing user's satisfaction and their further use of the system (DeLone & McLean, 2002)

3.1.5 Expectancy Confirmation Theory (ECT)

Expectancy Confirmation Theory (ECT) is developed by Oliver in 1980 which is fundamentally a cognitive theory that viewed on post-purchase or post-adoption satisfaction as a function of expectations, perceived performance, and disconfirmation of beliefs. This theory has been recognised as a widely used theory to measure consumer satisfaction from products or services. In addition, ECT is well-used in studies related to consumer behaviour towards the satisfaction of services which may be public or private (Hwang et al., 2011; Lee & Kwon, 2009; Chiu & Wang, 2008) especially in marketing field where it has been applied in signifying customer's repurchase intention of different products and services (Dabholkar et al. 2000)

Besides, ECT also being used in other research areas such as sociology, which measure on individual's satisfaction level (Reisig & Chandek, 2001) where there is an incorporation of psychological elements in understanding the initial expectation of specific products and services where this mainly based on the prior purchase and it took into consideration the

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preliminary experience, existing knowledge, interaction with communication channels (Zeithaml & Berry, 1990)

Prior to any event (purchase of product or service), consumers have expectations. If that expectation is met in a positive fashion, then they are satisfied. If that expectation is met in a negative fashion, then they will be dissatisfied. It is this elegant simplicity that makes ECT such a powerful explanatory tool (Jiang & Klein, 2009). Models using ECT often derive satisfaction as an antecedent to further variables to explain behaviour (Oliver, 1980). The logic (or further theory) is that satisfaction, in turn, will lead to action. Further subsections are explaining in detail about the components in ECT and how these elements relate to the open government data.

3.1.5.1   Satisfaction

Satisfaction is an individual's feelings of pleasure or disappointment resulting from comparing a product's perceived performance (or outcome) in relation to his or her expectations. Oliver (1980) claimed that satisfaction is positively correlated with future intentions, both directly and indirectly via its impact on attitude. In addition, a significant association between satisfaction and intention was also found within the retail service industry (Swan & Trawick, 1981).

In another study, Patterson and Spreng (1997) also reported a strong connection between satisfaction and one's repurchased intention in the business-to-business professional context. Likewise, Tih et al. (2005) while conducting a study to uncover the continuation of the usage of the portal site also delineated a strong influence of satisfaction over the intention to continue using the portal site. All these studies showed a significant relationship between satisfaction and intention to a greater extent, which is one of the proposed areas of the current study.

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Satisfaction conceptually delineates the sense of satisfaction or disappointment experienced by individuals while comparing a product's performance with its expected level. In a business context, satisfaction is a critical factor that affects an individual's repurchase intention and thereby indicates a significant relationship between them (Swan & Trawick, 1981). According to Bhattecherjee (2001a), continuance intention is largely affected by the post purchase satisfaction or satisfaction with a previous product. While conducting a study on IS banking customers, Bhattecherjee (2001a) found satisfaction as a significant predictor of IS continuance intention.

Several studies pertaining to e-commerce have also attempted to examine the relationship between satisfaction and repurchase intention of business-to-business partners and found a significant positive association between both of them (Devaraj et al. 2002; Patterson, Johnson & Spreng, 1997). In the International Development Research Centre (IRDC) 2012 report, it was mentioned that 55% of citizens were unsatisfied, 26% were a little satisfied, 14% were moderately satisfied while 5% were found to be satisfied with the open government data in Uganda.

IDRC (2012) provides support for the relationship between satisfaction and intention. However, in the current research context, the behavioural intention to use open government data tends to lean towards satisfaction for the open government data. This study does not consider the reuse intentions but the intention to use the open government data and how the participants' intentions can lead to satisfaction from open government data.

After reviewing the related concepts and literature on factors affecting behavioural intentions, this study proposed that factors such as expectation, confirmation, perceived performance, incentive on usage and perceived risk will have a significant impact on the users' behavioural

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intentions which will lead the user towards satisfaction of the open government data. Therefore, citizens' satisfaction of open government data is proposed to be determined directly by behavioural intention or indirectly by expectation, confirmation, perceived performance, incentive on usage and perceived risk.

3.1.5.2 Repurchase Intention

An open government is "the notion that people have the right to access the documents and proceedings of government" (Lathrop & Ruma, 2010, pxix). It addresses the following key objectives of the public sector: increasing social and economic benefits, and strengthening democracy through citizen participation (Francoli, 2011). According to Palka et al. (2013), past discussions on open government primarily focused on freeing up government information and making it readily available for public use, so that the government itself can get the benefit from the use of open government data.

Furthermore, researchers (Scholl & Luna-Reyes, 2011; Ganapati & Reddick, 2012) agreed that current discussions on open government data is largely based on generating transparency, collaboration and participation. It is useful to unveil and understand what spurs one's behavioural intentions to use open government data for both academic as well as practical reasons. Intention to use technology is a predetermined state in which a user plans to use new or relatively modified technology features but has not used it yet. Based on the usage of e-government services, Carter, et al. (2011) focused on the TAM factors constituting perceived ease of use and perceived usefulness to determine one's intention to use e-government services. They measured perceived usefulness by addressing the personal value of the service that is provided or available to the user, time savings, general usefulness of the website and enhancement of user's effectiveness.

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Subsequently, open government data can provide benefits such as accountability, transparency and efficiency that can stimulate the generation of public value (Zuiderwijk et al., 2014). Although several types of open government data initiatives exist, their key objective is to create public value Conradie & Choenni,(2014). This goal will not be accomplished immediately by simply opening the data because the government data has no value itself; however, the value can be created once the data is used (Janssen et al. 2012). Thus, knowing the intention to use open government data and to determine what leads the users to use open government data is significantly important to serve the purpose of the open government data initiative. Open government data has no worth if the users do not use the data and apply it to find solutions of for various social and economic problems.

Therefore, to measure the perceived ease of use pertaining to e-government services, research studies generally used items such as easy learning, website flexibility, clear and understandable process and ease of becoming skilful in using a website. In line with the past studies concerning the similarities of open government and e-government, the current study employed the expectation-confirmation theory to examine one's intention to use open government data and how these intentions lead to users' satisfaction from open government data.

3.1.5.3   Expectation

In measuring intention to use, continuous use or satisfaction, expectation plays a significant role. Raita and Oulasvirta (2011) referred to product expectation as one's beliefs and/or emotions relating to a particular product that are developed before the product's actual use. Liao et al. (2015) stated that even when trying a novel technology, certain preconceptions shape one's experiences. Expectations generally refer to the characteristics or attributes that an individual predicts or anticipates and is likely to associate it with an entity such as technology artefact, product or services. These expectations may originate from numerous sources, such

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as word of mouth, advertisement, product reviews, and exposure to related products. Unmet expectations may lead to customer complaints and user dissatisfaction (Bly et al., 2006; Den Ouden et al., 2006; Olsson & Salo, 2012).

Furthermore, Zuiderwijk et al (2015) noted that the expectations of open data users to perform better with open data technologies have the strongest influence on their behavioural intention to use subsequent open data technologies. In a practical rationale, this finding may lead policy decision makers towards a certain direction whereby they may take initiatives that ultimately increase performance expectancy. It can be inferred that to know the expectations of users about particular services (i.e. open government data), it is important to measure the intention to use. The users decide to use or not to use a particular product or service after confirming their expectations associated with the product.

In addition, Zuiderwijk et al. (2015b) asserted that governments should primarily focus on creating awareness of how open data technologies can be utilized and the kinds of benefits one can attain from it. Governments can increase the usage of open data technologies simply by increasing users' expectations in a way that such technologies will potentially benefit them by assisting them to accomplish their tasks/goals more quickly, increase their productivity levels and improve their job performance. Thus, in the case of awareness on the application of open government data into individuals' lives and business, this can increase the likelihood to use open government data and raise their expectation of open government data. Also, individuals may more willing to try open government data and its application will increase their efficiency. In the case of the current study, it is also inferred that expectation can lead to intentions to use open government data.

Based on the literature, expectations have not been scarcely studied in the open government data and user satisfaction perspective. Yet, expectation can be considered as one of the core attributes that users can have while experiencing any product or service (Hassenzahl & Tractinsky, 2006; Mahlke & Thüring, 2007). It is noted that such emotions or expectations are common and relevant in open government data studies. By examining such expectations, one can be aware of what constitutes as citizens' intention to use and the level of satisfaction derived from the use of open government data. In the context of the current study, expectations can have a significant relationship with user behavioural intentions.

3.1.5.4 Confirmation

Confirmation is a cognitive belief which refers to the extent to which user expectations of service usage are fulfilled in reality while experiencing the actual product or service. According to Ajzen (1991) and Oliver (1980). expectation confirmation is a user criterion through which users evaluate products or services based on certain criteria (expectations) that they already have in their mind. When the expectation is confirmed, users tend to accept the products and services for current or future use. Satisfaction from the products or services can be derived only when the perceived expectation of the users meet the actual benefits received from the use of products or services.

Within the confirmation process, users first develop a kind of expectation about any product or service before buying it. Second, their usage experience pertaining to a particular product or service develops perceptions about its expected performance. Third, by evaluating perceived performance relative to their frame of reference (i.e. expectations), the users either confirm or disconfirm their pre-purchase expectations. A buyer's expectations are said to be confirmed when a product or service performs as per the expected; a negatively disconfirmed product/service is that when it is found to be worse than what is expected by consumers. In

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contrast, a positively disconfirmed product/service is that when it performs better than what is expected by the users (Churchill & Surprenant, 1982; Hong et al, 2005).

According to ECT, one's satisfaction is primarily affected by expectation or disconfirmation, whereby disconfirmation refers to the gap between expectations and a product/service's perceived performance. Swan and Trawick (1981) studied the subsequent concepts of satisfaction and disconfirmed expectation in retail businesses. The results indicated that the higher the level of positive disconfirmation, the higher the satisfaction level among users. Spreng et al. (1996) extended this ECT by, developed a model and pointed out that disconfirmation has a significant impact on the satisfaction of product/service attributes and information, which can then influence the overall level of satisfaction.

Moreover, Bhattacherjee (2001a, 2001b) also noted that confirmation has a positive association with satisfaction and product/service perceived usefulness. Warkentin (2015) explained confirmation as an individual's affective state that is consequent of one's cognitive evaluation of the potential difference between initial expectation and experience gained from product/service performance. Generally, in a later stage, individuals develop a level of satisfaction based on the extent to which their expectations are met and confirmation is established. Finally, all these interactions can lead to repeated or continued usage of a particular system.

In sum, the discrepancy between expectation (pre-usage) and perceived benefits (post usage) signifies the level of confirmation or disconfirmation, which subsequently affects the behavioural intention and satisfaction of end users. In light of the above-mentioned literature, consumers always have some expectations from a product or service. These expectations should be met when they actually experience the product. In the case of consumers' expectation

met with actual use, this confirms the continuous use of the product or service and acts as a source of satisfaction for the consumers.

In the case of discrepancy between actual and expected expectation, consumers may not achieve confirmation of what they perceived in their mind and may stop the use of products or services which creates a sense of dissatisfaction among users. In the case of open government data, it is expected that the confirmation of citizens' expectations will lead to intention to use which satisfy the citizens regarding open government data usage. It has been postulated that confirmation will have a significant relationship with citizens' behavioural intention to use open government data and satisfaction.

3.1.5.5 Perceived Performance

Perceived performance is referred to as customers' perception of how well a product has performed and fulfilled their needs, wants and desires (Cadotte, Woodruff, & Jenkins, 1987), Oliver, (1980). Spreng et al. (1996) defined it as one's beliefs regarding product attributes, its level of attributes or outcomes. In the context of the current study, the perceived performance of open government data is the outcome of open government data to enhance the performance, productivity, effectiveness, improvement in skill and overall usefulness for the users.

Yu (2010) explained that before making any decision to purchase, a consumer develops expectations about a product or service. After a purchase decision has being made, the consumer gains experience of the product or service by using it, which ultimately leads them to make a perception about its performance. Consequently, it leads a consumer to either confirm or disconfirm the pre-buying expectations after evaluating perceived performance relative to the prior frame of reference. The user's expectations are likely to be confirmed when a product or service performs according to what was expected earlier; it is negatively

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disconfirmed when it performs lower than what is expected and is positively disconfirmed when it performs higher or better than expected (Churchill & Surprenant, 1982).

Likewise, the post-purchase performance of a product or service that meets or even exceeds pre-purchase expectations can induce negative disconfirmation which leads to customer satisfaction. Therefore, there is a strong likelihood that satisfied consumers will purchase the same products or services in the future. When post-purchase performance is below pre-purchase expectation, positive disconfirmation happens which leads to dissatisfied consumers. As a result, there is a likelihood that dissatisfied consumers will avoid purchasing those products or services in the future (Susanto et al, 2016).

Perceived performance is known to predict repurchase intentions, which has been confirmed by ECT-based research not only in the repurchase of traditional goods (Churchill & Surprenant, 1982; Anderson & Sullivan, 1993) but also to reuse information systems or web-based services (Bhattacherjee, 2001a; Bhattacherjee, 2001b; Kim et al, 2005; Wu et al, 2006). Notably, original ECT studies did not posit that performance expectation is a significant antecedent of repurchase intentions (Anderson and Sullivan, 1993), but some researchers (Compeau & Higgins, 1995; Hsu et al, 2004) found that performance expectations is a salient belief construct that markedly impacts use continuance. Based on the above-reviewed literature, it can be argued that perceived performance of users about a particular product or service plays an important role in behavioural intention to use and satisfaction.

In the context of the current study, it can be asserted that citizens have a perception about open government data in their minds and while experiencing the data, users tend to match their expected performance with the actual performance received. In comparison, if the expected performance is greater or equal with the performance received, it will lead to intention to use

and bring satisfaction. On the other hand, a discrepancy between perceived and actual performance may lead to discontinuing use and dissatisfaction. Based on the above-cited literature and arguments, this study proposed that perceived performance will be significantly related to citizens' behavioural intentions and satisfaction.

3.2   ECT and TAM on Intention and Satisfaction

The related IS theories such as, TRA, TAM, TPB have been stressed that they truly focus on the first-time use of technology (Venkatesh et al., 2003; Bandura, 1986; Rogers, 1983; Ajzen & Fishbein, 1985), thus, cannot be used alone for determining the full satisfaction of users of technology, specifically the technological success. For example, in TPB, this theory does not incorporate other psychological motivational factors in providing better understanding towards behavioural intention and basically, TPB more emphasize on the individual desired behaviour rather than intention (Dinev & Hu, 2007). Thus, the usage of one theory despite their limitations is not enough in understanding the intention and satisfaction constructs.

On the contrary, previous studies have argued that Expectation Confirmation Theory (ECT) is well used in study consumer's behaviour towards satisfaction of services which may be public or private (Hwang et al., 2011; Lee & Kwon, 2009; Chiu & Wang, 2008). Thus, it can be used to study the satisfaction of inhabitants of Malaysia towards the use of open government data. Many theories that relate to the ICT usage have been postulated such as Technology Acceptable Model (TAM), Theory of Planned Behaviour (TPB) and other models are mainly focus on the first-time use (Ajzen, 1991; Davis, 1989; Rogers, 2003).

However, researchers have argued that the success of IS and the technology rely on their long-term use which is a result of satisfaction derived from the technology (Bischoff et al., 2014;

Bhattacherjee, 2001). This implies that accepting only first-time use of technology cannot be used as measure for determining its success, thus calling for the ECT model which is specifically describes how the satisfaction of technology could be determine in the usage of technology or ICT like open government data. Therefore, the ECT will be taken as based model in this study towards determining the measurement of citizen's satisfaction of open government data in Malaysia.

In the current research, the ECT theory has been employed to measure the satisfaction of citizens from open government data. In the perspective of citizens, the perceived performance and expectations of the citizens should be fulfilled to confirm the level of services provided by the open government data. In the case when the perceived performance and expectations of the citizens does not match the actual, there is a discrepancy between expected and what is actually received from open government data portals. This creates disconfirmation.

In related literature on satisfaction and intention, most studies used satisfaction as a means to create intention among users (Hwang et al., 2011; Bhattacherjee, 2001b). The current research applied the ECT theory by following Finn et al. (2009) where intention predicts performance better than customer satisfaction (Keiningham et al, 2007; Pingitore et al, 2007). Another supporting evidence can be derived from (Rana, et al,2013), where the effect of antecedents such as system quality, information quality and perceived usefulness was assessed on the intention of users to use the online public grievance redressal system rather than their satisfaction from the system. This online public grievance redressal system is under the domain of open government data. A similar concept can be applied to the Malaysian open government data with some modifications to ensure that the elements that fit the Malaysian context are well addressed.

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In open government data, intention to use open government data is a good predictor of the performance of open government data. The intention to use open government data can define how good the open government data services is. In the current research, open government data intention to use seemed more appropriate as the users do not use the open government data as expected by the government. Thus, the factors that affect the intention to use could be more suitable in the context of Malaysian citizens. Thus, ECT was used to study the satisfaction of citizens of Malaysia towards the use of open government data.

Furthermore, many researchers have considered the ECT as the related theory that gives a clue to the measures of satisfaction of users of information systems (Ham, 2012; Hwang et al., 2011; Bhattacherjee, 2001b). Besides that, Bhattacherjee (2001b) stressed that frequent patronage of information systems or a specific site could be traced to the level of satisfaction by the previous users in the ECT. Hence, this study intended to use the ECT as the base model to measure user satisfaction of open government data in Malaysia towards the frequent use of government open data and services

The review of literature further guides that in the current context, the application of only ECT factors may not be able to provide sufficient explanation and predication of Malaysian citizens' usage of open government data. In order to fill in the identified gap and limitations of the ECT to explain intention to use, the current research integrated the technology acceptance model (TAM) and ECT to assess the intention rather than the satisfaction of the citizens from open government data. The concept of intention to use has been widely applied and has been empirically confirmed as a useful variable with regards to the use of public information systems (e.g., Almahamid, Mcadams, Al Kalaldeh, & Al-Sa'Eed, 2010; Carter & Bélanger, 2005) and thus is also applied in the study at hand. Moreover, Wirtz (2018) also applied TAM in open

government data and the use of additional factors to determine the intention to use open government services.

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On the other hand, satisfaction should be regarded as a personal behaviour and not a pair shared value, thus, TAM could not serve as the base model for this study. Thus, this research integrated ECT and TAM to assess the impact of perceived performance, expectations, incentive to use open government data and perceived risk on intention to use open government data and investigate how intention to use can lead to the satisfaction of users from open government data. Similarly, Purwanto et al. (2017) assessed the relationship from intention to use towards satisfaction in information system research. The current research also proposed that intention to use will lead to satisfaction from open government data.

In addition to the identified gap in terms of theory, very little research has used intention as a predictor of satisfaction (performance of open government data). The current research based

on Finn and Wang (2009), Keiningham et al. (2007) and Pingitore et al. (2007) used intention to use as a mechanism that can determine satisfaction from open government data. Citizens' behavioural intention on open government data and how this intention leads to the satisfaction of citizens also explains the open government data subject. So far, none of the studies on open government data has addressed the highlighted issues above. Hence, this study intended to investigate the factors that potentially influence the citizens' behavioural intention to use open government data and how the behavioural intentions affect citizens' satisfaction.

3.3   Incentive on Usage and Perceived Risk in Open Government Data

From the above discussion on the factors established in ECT and TAM, this study proposed additional variables which are incentive on usage and perceived risk in order to give more comprehensive insights on open government data concept in Malaysia.

3.3.1   Incentive on Usage

Incentives on the usage of a product and service significantly impacts users' behavioural intentions and satisfaction. In order to develop success stories, developers should have an incentive to contribute to the governments' open data initiatives and effectively make use of the data available on portals. Critical factors that enhance usage include awareness programs and incubators that supports start-ups through which one can take advantage of the open data. Additionally, festivals, competitions and hackathons are also used as a source to enhance the usage of open government data (Susha et al. 2015).

Incentives need proper funding programs, ongoing collaboration and cooperation, for example, with tech companies, universities and other third parties (Stagars, 2016). Incentives can be viewed as a critical component to encourage users to use open government data in an innovative way to develop applications or find solutions to problems. This technique will involve users in

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two perspectives: one, they can use open data, and secondly, they will be compensated for using the open government data.

Furthermore, different NGOs like the Open Knowledge Foundation also organize open data awareness seminars such as Open Data Days, which is an international open data hackathon. Governments, too, organize these types of hack days, such as the Canadian government which organizes the Canadian Open Data Experience (CODE) with the aim to attract potential developers to find innovative infrastructure and applications for open data on subsequent data portals. Hackathons often focus on municipalities or cities, for instance, Hackathon Open Data Brussels. It can be argued that organising an open data day or any event related to open government data can increase the awareness and intention to use open government data. Through this program, citizens will be engaged to find innovative ways to use open government data to develop applications or provide business solutions.

Publicly available open data may be low in quality and may be lacking in timeliness and accuracy. Tensions between data producers, data intermediaries, information end users and citizens further complicated the discussion on building "information commons" (Blakemore & Craglia, 2006). According to Napoli and Karaganis, (2010) existing contracts with commercial data providers may also be one of the hurdles of making data publicly, readily and freely available. Moreover, confusion over the availability of the type of data and who controls it also prevails within government agencies (European Commission, 2011). Such kinds of incentive schemes can open the communication between open government data providers and citizens that can reduce confusion about the open government data.

Finally, numerous studies reported that there is a lack of interest among the public regarding the re-use of open government data. This may be due to the lack of skills or certain

incompetence to analyse and assimilate data, difficulty to measure it from local to national initiatives, or lacking potential incentives for open data users to participate (Hellberg & Hedström, 2015). It is often unidentified and unclear which type of data is actually needed by the data users (Zuiderwijk & Janssen, 2012). In this regard, providing users with an incentive to use open government data may increase the likelihood of its usage.

Canares and Shekhar (2015) conducted a case study which identified the critical factors that hasten or prevent open data use. The results showed that incentive to use open data is the most critical factor among others which prevents users to use open government data. It can be asserted that incentives can play a significant role in urging citizens to use or reuse open government data. Moreover, it can be argued that higher incentives will increase the intention to use open government data by citizens. The current research proposed that incentives on using open government data will significantly impact user behavioural intention to use open government data.

3.3.2 Perceived Risk

Perceived risk is defined as the possibility of perceived uncertainty or unfavourable outcomes by consumers when or before deciding to purchase products or services (Dowling & Staelin, 1994). According to Baker et al. (2002a), psychological risk is associated with consumers' perception that the subsequent product or service is problematic and purchase decision pertaining to the product/service could possibly hurt them. Behavioural intention is a popular topic in marketing and an important predictor of consumer behaviour. Siau and Shen (2003) pointed out that consumers have many doubts in perceiving transactions, signalling an increase in perceived risks and a decline in behavioural intention.

Risk refers to an individual's beliefs or perception regarding the likelihood of gains or losses. Because risk is mainly attributed as a subjective term that could be difficult to measure in an

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objective way, therefore, in literature, it is discussed and conceptualized through user perceptions about anything they consume or use (Bélanger & Carter, 2008). Risk has a significant influence on user purchase cautiousness to show their readiness to exchange information online (Fu, Farn, & Chao, 2006). By viewing the internet as a global marketplace, perceived risk may impede a consumer's purchase decision because of the possible concerns created by the security and privacy of online shopping (Miyazaki & Fernandez, 2001). When users go online and interact using the internet, the sense of insecurity or perceived risk can be found among the users. Perceived risk refers to a specific kind of uncertainty that a user perceives, providing a window on the degree of uncertainty that the system user feels in the situation. The risk theory delineates that one's risk perception can negatively affect his/her willingness to exercise a risky behaviour (Keil et al, 2000; Sitkin & Pablo 1992).

In an exchange system, one has to accept or bear some risk associated with certain products or services because transactions sometimes can or cannot go as expected. Similarly, Sitkin and Weingart (1995) noted that decision-makers are likely to make risky decisions when the level of perceived risk is low. Perceived risk is assumed to be a strong determinant of purchase intention as it is associated with an element of uncertainty that also exists in the online purchase endeavour to a greater extent (Nicolaou & McKnight, 2006).

Moreover, the perception of risk reduces the intention of the users to perform certain behaviour (De Sena Abrahão et al., 2016). In open government data, there is a risk associated with the privacy of the user. Kucera and Chlapek (2014) reported that open data initiatives by the government not only promise benefits, but that there are also risks associated with its possible negative impacts. Moreover, Melin (2016) added that risks or challenges with open government data have been described as its dark side. For example, Zuiderwijk and Janssen (2014)

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suggested violating privacy, misuse and misinterpretation of data as the dark aspects of open government data which can stop users from using the data.

Moreover, risks of fraud and losing privacy are highlighted by the National Audit Office (2012) of UK In the report, risk management processes are recommended to set up a response to this issue. It is clear that there is a risk associated with the usage of open government data that can make open government data users resist from using the data. These risks could be a danger of losing privacy, fraud risk, violation of privacy policy, misinterpretation of data and inaccuracy of data. Researchers have examined the perceptions of risk in many different contexts, including the evaluation of products and services and the adoption of new technologies and products. Research has found that risk perceptions associated with making poor or inappropriate decisions reduce the likelihood of a consumer purchasing an alternative (Bhatnagar et al. 2000; Vijayasarathy & Jones, 2000).

Perceived risk is a major barrier for online consumers who intend to make an online transaction. A consumers' perceived risk regarding the purchase of a product or service is found to influence their decisions (Antony et al. 2006). It is common for a consumer to be reluctant while making any transaction to purchase because of the risk he or she perceives (Kim, Ferrin & Rao, 2008). It can be assessed that as a consumer interacts using online media, they perceive risk as associated with online transactions or interaction. In the case of high-risk perception, citizens (users of open government data) may be reluctant to interact with the open government data portal.

Prior studies have proved that perceived risk has a strong influence on the intention to use e-government (Taiwo et al. 2012). In the current study, the effect of perceived risk proposed in the model was to assess its impact on users' behavioural intentions to use open government

data. Based on the above, it was noted that perceived risk can play a significant role in forming the intentions to use open government data. Current research argues that in the case of high perceived risk of losing privacy, identification and inaccuracy of data may lead to citizens not using open government data. Thus, it can be proposed that perceived risk significantly influences citizens' behavioural intention and satisfaction from using open government da

3.4 Related Studies on Satisfaction and Intention

This section briefly described on the theories application and variables selection based on selected theories application.

Table 3.1

Analysis of the Related Work

No.	Reference	Research Type	Discipline Area	Model	Theories Used	Brief Finding	Contribution	Limitation
1	Wu et al. (2006)	Analytical	Internet search	IV: Performance DV: Satisfaction	ECT	Developed a direct comparative framework (DCF) for satisfaction evaluation and measurement	This study has shown that environment, organizational, technology and product are the four discriminating factors for RFID adoption, regardless of the moderator of supply chain. RFID is being utilized in various enterprises to improve efficiency of operation. The historical review found an	Thus, the results have some practical implications to organizations in general. This study has not included all the factors identified as relevant to the RFID con- text under the technology-organization-product-environment framework. Some factors, such as mimetic factors (competitive pressure, status

No.	Reference	Research Type	Discipline Area	Model	Theories Used	Brief Finding	Contribution	Limitation
							increasing variety of enterprises employing RFID to improve their efficiency of operations and to gain a competitive advantage (Chao et al., 2007). As RFID technology progresses in its development and application over the next decade, there will be vast opportunities for management researchers to not only study the advancement of this technology, but to examine its implications from a wide variety of perspectives. Hence, this information can be utilized to promote the acceptance and implementation	pressure), normative factors (industry and trade associations, favourable climate) and coercive (regulatory pressure, dominating partner pressure), are not related in the framework. Thus, this can be an area for future research.

No.	Reference	Research Type	Discipline Area	Model	Theories Used	Brief Finding	Contribution	Limitation
							of RFID. From an organization point of view, attention should be given to improve employee participation in adopting RFID as a strategic tool.	
2	Khalifa and Liu (2004)	Critical Review	IS satisfaction	IV:NA DV:ITSatisfaction	NA	Described the evolution of IS satisfaction research and emphasized for further research to strengthen explanatory power of ECT in IS area.	the state of IS satisfaction research reveals that there is still ample room for the development of an IS satisfaction theory. Future research should take into consideration of the variability of the determinants of satisfaction and model the appropriate drivers depending upon the stage of adoption. To	Future research can explore whether an interaction effect exists when they form or whether they converge over time. Future research should also verify whether satisfaction becomes static at a certain point of time at post-adoption

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No.	Reference	Research Type	Discipline Area	Model	Theories Used	Brief Finding	Contribution	Limitation
							explain the inconsistent significance of expectations/desires reported in different adoption stages, future research could consider the inclusion of moderating variables to strengthen explanatory power of the expectation disconfirmation theory for IS satisfaction in all adoption stages.	
3	Erevelles et al. (2003)	Empirical	ISP services	IV: Expectation, confirmation DV: Consumer Satisfaction	ECT, attribution, affective, and competitive model	Low expectation does not ensure more satisfaction. Building customer relationship is more important for ISPs to achieve more customer satisfaction.	Consumer analytics is at the epicentre of a Big Data revolution. Technology helps capture rich and plentiful data on consumer phenomena in real time. Thus,	Big Data has the potential to impact nearly every area of marketing. Firms that do not develop the resources and capabilities to effectively use

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No.	Reference	Research Type	Discipline Area	Model	Theories Used	Brief Finding	Contribution	Limitation
							unprecedented volume, velocity, and variety of primary data, Big Data, are available from individual consumers. To better understand the impact of Big Data on various marketing activities, enabling firms to better exploit its benefits, a conceptual framework that builds on resource-based theory is proposed	Big Data will be challenged to develop sustainable competitive advantage and to survive the Big Data revolution. Thus, Big Data consumer analytics appears to be a fruitful area of research far into the future.
4	Au et al. (2002)	Critical review	End-user IS	IV: Expectation, performance, disconfirmation. DV: Satisfaction	ECT, equity theory, needs theory	Suggests to redesign the procedures for users to exploit the advantages of IS so that their needs and expectations can be fulfilled better. Proposed an integrated	The need for reliable and valid instruments to assess the performance of IS is becoming crucial as organisations	The root of the problem is a lack of a theoretical/conceptual foundation to explain the EUISS construct. Earlier

No.	Reference	Research Type	Discipline Area	Model	Theories Used	Brief Finding	Contribution	Limitation
						conceptual model based on equity theory and needs theories.	increase their reliance on IT to help them compete more electively and evidently. Errors in evaluation can cause ex- pensive mistakes in terms of subsequent medication. More importantly, it impacts on the individual user's quality of work life, the functioning of the IS department and the over- all voluntary usage of the IS within the organisation.	approaches to measuring EUISS assume a direct positive linear relationship between the receipt of a desired out- come and the level of satisfaction. Other approaches have built on, expanded and re ned the measurements of EUISS. Yet, these approaches fail to explain the varied levels of satisfaction with regard to the same IS performance.
5	McKinney et al. (2002)	Empirical	Online shopping	IV: Expectation, perceived performance, disconfirmation. DV: Satisfaction	ECT	Using information quality and service quality concepts in the context of Web customers' satisfaction, proposed a model named	This imperative is due to the fact that customers dissatisfied with Web site information contents will	The reported results are obviously limited by the type of subject, the nature of laboratory

No.	Reference	Research Type	Discipline Area	Model	Theories Used	Brief Finding	Contribution	Limitation
						expectation disconfirmation effects on web-customer satisfaction (EDEWS).	leave the site without making a purchase. Similarly, no matter how thorough the information content of a site is, a customer who has difficulty in searching and getting the needed information is likely to leave the site. Therefore, one can add value and create insight by examining Web-customer satisfaction with the information content as well as the system quality. Having access to reliable and scientifically tested metrics, the practitioners would be able to ex-amine the	experimentation, and choice of Web sites. Using students as subjects could have an impact on the results. Testing the measurment model with other strata of Web customers will add to the generalizability of our results. Second, the nature of lab experiments and the choice of Web sites limit the reported results. Because the purchase of air-line tickets is a prevailing practice among Web users, this study employed Web sites of online travel

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No.	Reference	Research Type	Discipline Area	Model	Theories Used	Brief Finding	Contribution	Limitation
							structure and dimensionality of Web-customer satisfaction.	agents for experiments.
6	Brown et al. (2008)	Analytical	IS implementation	IV: Expectation, experience. DV: Satisfaction	TAM, ECT, polynomial modeling	Empirical comparison between three models. Did not find ECT as an important theory to explain satisfaction, rather the "experience only" model provides better explanation about *ease of use*.	This research examined the relationship among expectations, experiences, and satisfaction. In addition to reviewing the central tenets of three different expectation confirmation models—i.e., disconfirmation, ideal point, and expectations only—the current work pre-sented graphical and analytical representations of the models and tested the complex models of expectation confirmation	No support was found for the disconfirmation or ideal point models. The results supported an experiences only model for ease of use and a modified experiences only model for usefulness. This work thus provides key insights into the role of expectations and experiences in the formation of satis-faction both in general and in the important context of information systems implementations

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No.	Reference	Research Type	Discipline Area	Model	Theories Used	Brief Finding	Contribution	Limitation
							using confirmatory procedures of polyno-mial regression analyses.	
7	Sørebø and Eikebrokk (2008)	Empirical	Mandatory IS use	IV: Confirmation, ease of use, perceived usefulness DV: User satisfaction.	ECM	*Ease of use* and *confirmation* are significant antecedents of satisfaction while *perceived usefulness* is not.	research This study has presented an outline to our understanding of IS continuance in complete mandatory environments based on the post-acceptance model of IS continuance Empirical data was collected from a field survey of waiters and shop assistants using a cash transaction system to verify the fitness of the hypothetical model.	concepts as unproductive appropriate or ineffective use, as an assumed consequence of dissatisfaction, should be of importance for further research. Researchers that take this challenge into consideration should consult seminal work on system usage in their conceptualization of unproductive, inappropriate or ineffective use

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No.	Reference	Research Type	Discipline Area	Model	Theories Used	Brief Finding	Contribution	Limitation
8	Hsieh et al. (2010)	Empirical	Web blogs	IV: Confirmation, perceived performance, expectation DV: Satisfaction	ECT	Identified and measured key constructs of blog quality to blog users' satisfaction using expectation confirmation paradigm.	This study explored blog-user satisfaction from the integrated perspective of IS success and marketing. We identified the dimensions of blog quality, and synthesized the expectation–disconfirmation paradigm with these dimensions to develop the measurement model for blog-user satisfaction. The testing of the hypotheses further helped our understanding of the factors contributing to blog-user satisfaction.	The survey was con- ducted for a particular type of blog in a limited geographic area, and the results would be strengthened if the survey could include a wider spectrum of blog types across a greater area. Moreover, the influences of factors due to social and cultural differences and those due to potential social resources of a weblog, knowledge sharing, and community activities were not investigated in this study. Finally, we have divided blog quality into

No.	Reference	Research Type	Discipline Area	Model	Theories Used	Brief Finding	Contribution	Limitation
								information quality and system quality, based upon DeLone and McLean's IS success model. Such segregation, however; may not be adequate for evolving blogs with targeted audiences. Exploring other potential quality constructs would thus be worthwhile in a future study
9	Susha et al. (2015)	*case study*	Open Data	IV: Legislation, regulation and licenses, Success stories, Incentives for open data use, Training and support for open data users, Feedback and	NA	The current research identified the factor that are important for open data initiative and these factors are potential in influencing the open data usage.	This paper aimed to answer the question: Which factors are critical for the publication and use of open data in particular practical cases? A brainstorming	complement the three case studies with other cases from a variety of contexts. This could help to determine the criticality of success factors in other contexts,

No.	Reference	Research Type	Discipline Area	Model	Theories Used	Brief Finding	Contribution	Limitation
				sustainability and Research and education DV: Open Data usage			session and two interactive workshops were used to first identify a comprehensive list of factors which are important for open data publication and use. Subsequently, the findings from three case studies showed which of these generic factors were critical for open data publication and use in particular contexts. The open data initiatives that we studied were selected based on diversity, and they focused on different geographical	and to obtain more insight in whether a particular open data initiative may be successful or not. It may also offer guidance to decision-makers regarding whether they will participate in an open data initiative and under which conditions. Additionally, further research could investigate whether quantitative approaches towards measuring the success of open data initiative could be useful. *(18) (PDF) Critical Factors for Open Data*

No.	Reference	Research Type	Discipline Area	Model	Theories Used	Brief Finding	Contribution	Limitation
							levels, namely on city, regional and transnational level.	*Publication and Use: A Comparison of City-level, Regional, and Transnational Cases.*
10	Veeramootoo et al. (2018)	Empirical	e-filing	IV: Information quality, system quality, service quality, confirmation, perceived risk, habit DV: e-filing continuance usage intention, satisfaction	ECM and IS Success	Findings suggest that citizens' continual usage intention of e-filing is influenced by system quality, user satisfaction and habit	This study has provided an understanding of the salient factors influencing e-filing continuance usage intention. Results from the research can be useful for tax collection agencies like MRA which can use the findings to improve their e-filing platform to	he study has validated a comprehensive model of intention to continue using e-filing, it did not analyse actual usage behaviour. Continuance usage intention does not necessarily drive actual behaviour and the inclusion of actual behaviour can

No.	Reference	Research Type	Discipline Area	Model	Theories Used	Brief Finding	Contribution	Limitation
							promote continuance usage.	allow re-searchers to make more precise and credible conclusions
11	Baabdullah, Nasseef and Alalwan (2016)	Empirical	M-government	IV: perceived risk, innovativeness, perceived usefulness, perceived ease of use and behavioural intention DV: Adoption of M-government	TAM	Perceived risk, innovativeness, perceived usefulness, perceived ease of use influence behavioural intentions to adopt M-government.	this study seems to be a more theoretical and conceptual attempt to understand how Saudi citizens could react and perceive M-Services.	It does not provide empirical evidence about the main factors that could actually influence the Saudi citizens' intention and adoption

In the review of literature, it has been observed that in IS and ICT-related research, the ECT theory has been extensively used. However, the theory alone is unable to provide sufficient explanation on the phenomenon. Researchers, for instance, Erevelles et al. (2003), Au et al. (2002) and Brown et al. (2008) used a combination of different theories to increase the explanation power of the ECT theory. In addition, the usage of the ECT theory in terms of open government data seems scarce. (Tambouris et al. 2015) clarified that although researchers paid attention towards opening government data, the adaption and usage of open government data received less attention. The envisioned benefits of open government data also cannot be realised if it is not used by the public. Among the few studies that extended the ECT data, Susha et al. (2015) provided a case study and identified the factors that are important for open government data usage.

Among the factors in ECT, the presence of confirmation, expectations and perceived performance determined the satisfaction and usage indirectly, but additional explanation is needed on how this usage and satisfaction can be enhanced. As per Susha et al. (2015) in their case study, incentives on usage can be a factor that enhances the usage of open government data. Moreover, Veeramootoo et al. (2018), Kucera and Chlapek (2014) and Zuiderwijk and Janssen (2014) stressed that perceived risk also serve as an important factor that influences the intention to use open government data. In this regard, there was no research found that extended ECT and explored it from the perspective of users of open government data and included the incentive to usage and perceived risk in the existing model.

This research was extended by incorporating TAM with ECT to provide more explanation on the phenomenon of open government data usage. Thus, the current research fills in the existing gap in the theory and literature by combining ECT and TAM and add two additional variables such incentives on usage and perceived risk to comprehend the model on open government data usage and satisfaction.

3.5   Literature Gap

The use of open government data plays as important role in the economic development of any country thorugh citizens' participation in government policy making. The use of open government data and the satifaction of the citizens have immense importance for open government data providers and policy makers. In this regard, the growing concern on usage and satisfaction urged academicians and researchers to explore this phenomenon. In the past literature, very limited attention has been paid to the cocnpet of open government data. For example, Wirtz et al. (2018) studied the antecdents of intention to use open government data.

The application of ECT advocates user satisfaction and intention, which come from the fulfilment of expectations and perceived performance, while the current research extended the work of Wirtz et al. (2018) and intergated it with ECT. This study proposed that expectation, perceived pefrormance and confirmation influence intention to use open government data, while intention to use determines the satisfaction of citizens for open government data. The performance of the data repesents the satisfaction of the users. It can be argued that the users' intention to use can be more appropriate in determining satisfaction which is supported by Finn et al. (2009) who asserted the evidence that shows intention predicts performance better than customer satisfaction (Keiningham et al, 2007; Pingitore et al., 2007). In the current

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research, open government data's intention to use seems more appropriate as the users do not use the open government data as expected by the government. Thus, the factor that affects intention to use could be more suitable in context of Malaysian citizens.

Factors such as expectations, confirmation and perceived performance are found to have an indirect influence on intention to use. Nevertheless, in some cases, apart from an indirect relationship with intention, researchers measured the direct influence of these factors on intention to use. This concept is in line with Rana et al. (2013) where the antecedents of the online public grievance system (i.e. impact of system quality, information quality and perceived usefulness) were assessed on intention to use rather than indirectly through satisfaction of users. This online public grievance system is part of open government data and can be applicable in the context of Malaysia.

In addition, it has been identified that there is lack of security and assurance provided to users of open government data portals. There is lack of surety on the accuracy of data, which means that there is a chance of loss of personal information. Based on Siau and Shen (2003), there is a decrease in behavioural intentions when consumers perceive risk. Similarly, user's intention to use open government data can be decreased with perceived risk. Another factor that has been identified was lack of motivation among the users to use the data. Lack of motivation significantly influences the intentions of the users. Canares and Shekhar (2015) identified incentive on usage as a significant factor that determines the intention to use.

Based on the identified gap in the open government data usage perspective, there is a lack of empirical studies conducted and the majority of the studies used the qualitative research approach, and which included user perspective. The current research fills the

identified gap by using the ECT model and integrating it with TAM to identify the users' satisfaction from using open government data through intention to use. Moreover, additional identified variables such perceived risk and incentive on usage have been added to ECT to further explain the intention to use and satisfaction from the users' perspective.

3.6   Theoretical Framework

Many theories that relate to ICT usage have been postulated such as the Technology Acceptable Model (TAM), the Theory of Planned Behaviour (TPB) which mainly focused on first-time use (Ajzen, 1991; Davis, 1989; Rogers, 2003). However, researchers have argued that the success of IS and technology relies on its long-term use which is a result of satisfaction derived from the technology (Bischoff et al., 2014; Bhattacherjee, 2001b).

Thus, this implies that accepting only first-time use of technology cannot be used as a measure to determine its success, thus calling for the ECT model which specifically describes how the satisfaction of technology could be determined in the use of technology or ICT such as open government data. Therefore, the ECT will be taken as base model in this study towards determining the measurement of citizen's satisfaction of open government data in Malaysia.
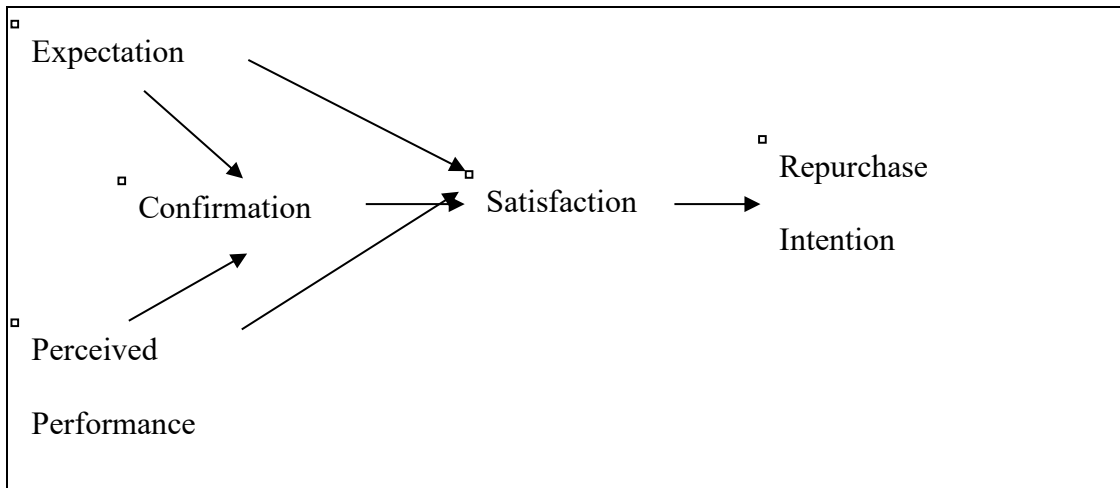
Source: (Oliver, 1980)

Figure 3.3. Expectation-confirmation theory

Previous literature argued that the process of achieving satisfaction from the use of technology could be deeply understood by understanding ECT (Hwang et al., 2011; Chiu & Wang, 2008). Bhattacherjee (2001a) emphasised that consumer's intention to continuously use a technology or service is synonymous to the user's behaviour towards satisfaction by considering the ECT. Meanwhile, consumers or users possess the initial expectation prior to the assessment of a service. Thus, consumers or users of services are bound to compare perceived performance with actual performance, which leads to satisfaction as a result of behaviour built by the users as shown in Figure 3.3.

Moreover, the ECT has been widely used while studying the behaviour of consumers and their satisfaction on the services of technology (Hwang et al., 2011; Lee & Kwon, 2009; Park et al., 2009). The predictive ability of the ECT has been demonstrated over a wide range of product repurchases and service continuance contexts. The wider

acceptability and adaptability of ECT allows this current research to use it as the main theory to support the proposed framework.

In addition, the current research used ECT as the base theory and TAM as the supporting theory to assess the citizens' satisfaction from open government data. In the previous research, Purwanto et al. (2017) used intention to use as a mediation between antecedents to satisfaction in the information system context. The current research also examined users' intention to use open government data as a mediator between perceived performance, expectation, confirmation, incentive to use open government data, perceived risk and satisfaction. This integration of ICT theories (ECT and TAM) provide a way to extend the ECT model with additional variables such as incentive to use the open government data and perceived risk associated with open government data as shown in Figure 3.4.
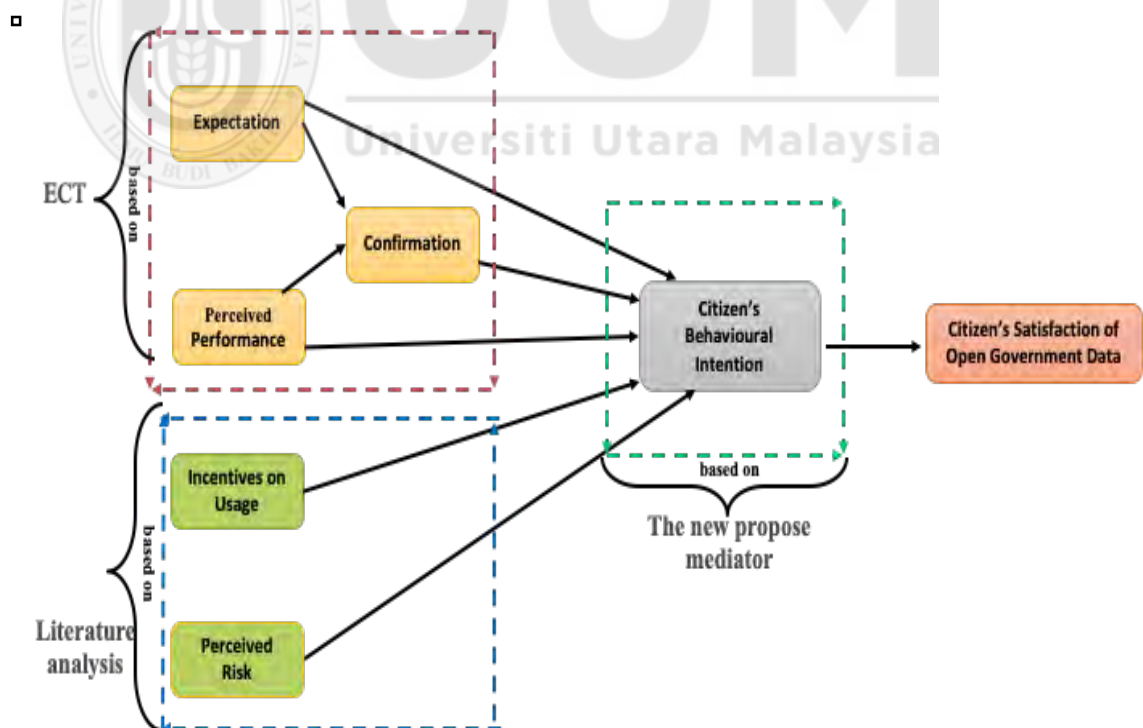
Figure 3.4. The conceptual model.

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The above figure is about the conceptual model of this study. The red dotted lines the factors in ECT, while blue dotted lines identify factors from literature analysis that related to the problem statements. Whereby, the green dotted lines represent the citizen's behavioural intention as the new proposed mediator.

3.7   Summary

The chapter also discusses the related theories as they have been widely used by the IS researchers in relation to technological usage. However, they lack focus on the long-term usage of technology which is referred to as user's satisfaction. This leads the researcher to adopt the Expectation Confirmation Theory as the base model for this study to measure the citizen's satisfaction of open government data in Malaysia. Moreover, it presents a review on related previous research on expectations, confirmation, and perceived performance, incentive on usage, perceived risk, behavioural intentions and satisfaction.
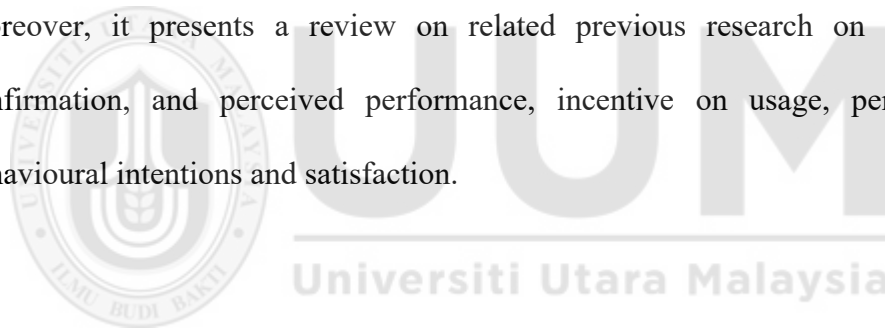
CHAPTER FOUR

RESEARCH METHODOLOGY

4.1   Introduction

This chapter presents the research model that was designed to assess the relationship between a set of variables: expectation, confirmation, perceived performance, incentive on usage and perceived risk, and citizens' behavioural intention on open government data. It is also to assess the mediating variable of citizens' behavioural intention between expectation, confirmation, perceived performance, and incentive on usage, perceived risk and citizen's satisfaction on open government data.

The discussion in this chapter includes the details of the research processes which were carried out to achieve the research objectives by implementing a sampling method which focused on sampling technique, sampling location, population and sample size. Besides that, the discussion critically explains the strategy used in designing an appropriate survey instrument, including validating the designed instrument through experts and pilot study. Lastly, this chapter elaborates the choice of SEM to measure the relationship among variables and its related testing measure. The flow of research activities that were taken in this study is given in Figure 4.1.
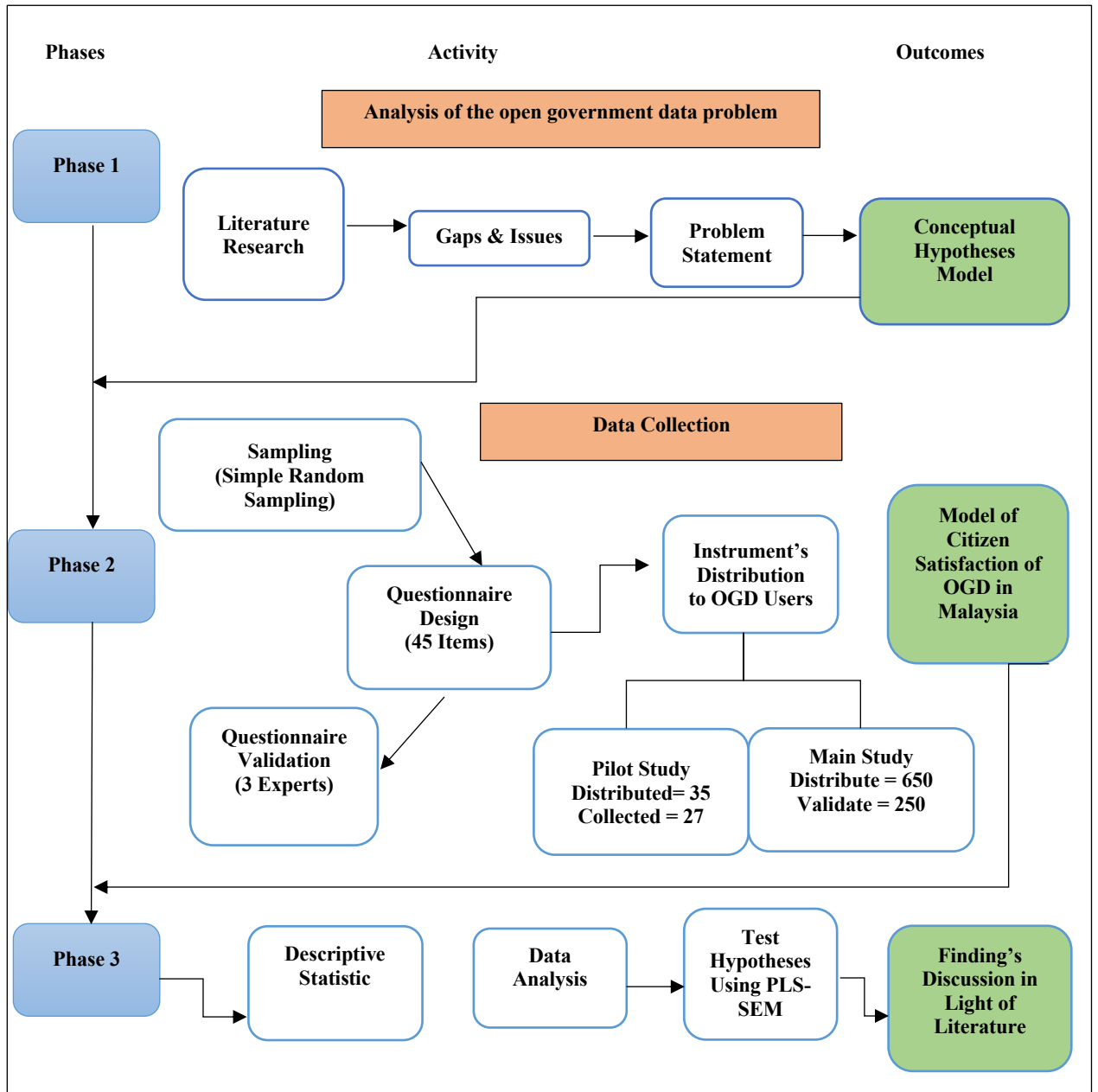
*Figure 4.1.*Research activities

Figure 4.1 shows the research flow that researcher went through which comprises of several stages. After the development of hypotheses in Phase 1, the appropriate samples were chosen through the simple convenience sampling. Next, the designation of the questionnaire has taken place and have been validated by 3 OGD experts from the information technology field. Once the questionnaires have been reviewed and

validated, the distribution processes took place where this involved 2 different level, for the pilot study and for the main study. Details on each process also being discussed in the sections of Chapter 4.

4.2   Research Model

A discussion which was performed in Chapter 3 which identified ECT and TAM models and led this study to propose an extended version of the ECT model which is meaningful to measure users; behavioural intention and satisfaction on open government data as illustrated in Figure 4.2.

Independent variables   **Mediator**   **Dependent   variable**
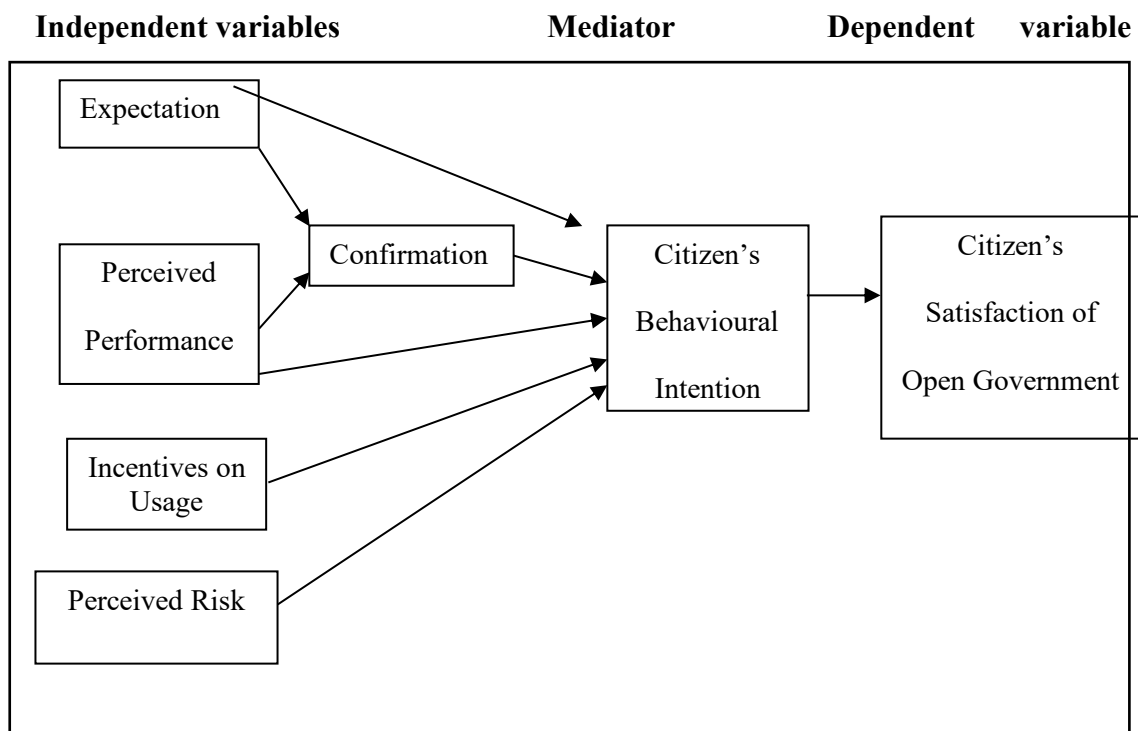
Figure 4.2. Proposed research framework

The proposed research framework in Figure 4.2 suggests that expectations, perceived performance, incentive on usage and perceived risk indirectly influence users'

satisfaction on open government data through users' behavioural intention. Therefore, users' behavioural intention acts as a mediating variable.

The process of experts' review on the proposed model ensured the formulation was conducted independently. Each expert was briefed on the objectives of the study, problems that were addressed and existing ECT and TAM models that were referred to. They were asked to review the proposed model as depicted in Figure 4.2.

The proposed model on users' satisfaction on open government data was supported by the experts in the field. The experts were provided with the printed proposed model for the evaluation. After getting the acceptable reviews on the proposed model, the experts signed and stamped the proposed model. The validation of the model was authenticated by the signature and stamp of the experts. This validation process authenticated the model and provided authenticity to the proposed relationships. The validation from experts on the research model is given in Appendix B.

4.3   Research Hypothesis

The independent variables were expectation (EXP), perceived performance (PP), confirmation (CNF), incentives on usage (IoU) and perceived risk (PR), which were also determinants of user behavioural intention (UBI). The UBI determined the citizen's satisfaction from open government data (S), thus forming a direct relationship between the independent variables, mediating variables and dependent variables. The proposed model as depicted in Figure 3.4 shows that there is a relationship between CNF, EXP, PP, IoU, PR and UBI. Besides that, this study also proposed a relationship between UBI and S. The details are given in Table 4.1.

Table 4.1

Research Hypotheses between Independent and Dependent Variables

Codes	Description of Hypotheses	Independent Variables	Dependent Variable
H$_1$	EXP has a relationship with CNF	EXP	CNF
H$_2$	PP has a relationship with CNF	PP	CNF
H$_3$	CNF has a relationship with UBI	CNF	UBI
H$_4$	EXP has a relationship with UBI	EXP	UBI
H$_5$	PP has a relationship with UBI	PP	UBI
H$_6$	IoU has a relationship with UBI	IoU	UBI
H$_7$	PR has a relationship with UBI	UBI	UBI
H$_8$	UBI has a relationship with S	UBI	S

CNF = Confirmation, EXP = expectations, PP = Perceived Performance, IoU = incentive on usage, PR = Perceived Risk, UBI = Behavioural Intentions, S = Citizens' satisfaction from open government data.

This study also hypothesised that the relationships between expectations, confirmation, perceived performance, incentives on usage, perceived risk and citizen's satisfaction from open government data is mediated by citizens' behavioural intention as shown in Table 4.2.

Table 4.2

Research Hypotheses among the Mediating Variables

Codes	Description of Hyupotheses	Independent Variables	Mediator	Dependent Variable
H$_9$	UBI mediates the relationship between EXP and S	EXP	UBI	S

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H_{10}	UBI mediates the relationship between CNF and S	CNF	UBI	S
H_{11}	UBI mediates the relationship between PP and S	PP	UBI	S
H_{12}	UBI mediates the relationship between IoU and S	IoU	UBI	S
H_{13}	UBI mediates the relationship between PR and S	PR	UBI	S

CNF = Confirmation, EXP = expectations, PP = Perceived Performance, IoU = incentive on usage, PR = Perceived Risk, UBI = Behavioural Intentions, S = Citizens' satisfaction from open government data.

4.4   Research Design

This study was performed in three phases. **Phase One** of the study concerns the extensive analysis of the previous literatures which led to the formulation of the research problem and gathering in depth understandings about the study on the open government data portal in Malaysia. The identified and significant factors from past literature were considered in modelling users' satisfaction on open government data in Malaysia.

Phase Two of the study focused on the survey activities which were aimed to determine the factors to measure user satisfaction on open government data in Malaysia. This involved designing a research framework, identifying the right sampling technique, developing a suitable survey instrument and validating the developed instrument by the experts.

Finally, **Phase Three** concerned performing the necessary analyses on the collected data to gain findings and lastly discuss the findings appropriately. Besides, the approach implemented for this study is through the deductive approach since it

intended to use the existing Expected Confirmation Theory (ECT) and TMA as the base model to measure users' satisfaction on open government data in Malaysia. Quantitative research techniques were used to collect data from users of open government data and the results were analysed using PLS-SEM.

Regarding the type of research, quantitative research design was employed to test the proposed model of users' satisfaction on open government data. In this research, the self-administered questionnaire technique was used to collect data from the users regarding open government data. This research adopted the ETC and TAM to propose a model to measure users' satisfaction on open government data in Malaysia. This research considered that cross-sectional as an appropriate method since the survey is expected to be conducted once from the users of open government data. This survey method provided a wider acceptability to the proposed model and a higher level of generalisability of the findings.

4.5   Population and Sample

Prior to the extensive procedures, the sampling begins with the identification of the population who will be the target interest of the researcher.

4.5.1   Population Selection and Sample Size Determination

This study is conducted on the users who used the open government data. The choice of using citizens as the unit of analysis in this study was due to their reliability in technological device usage and exposure to the latest ICT. The study of Komerik (2005) stressed that the Internet and its services serve as a learning tool that encourages researchers in their activities (Komerik, 2005), which thus made the citizens of Malaysia relevant in this study.

The respondents in this study were users of open government data in the Northern Corridor Economic Region (NCER) is basically a development plan that covers Kedah, Perlis, Perak and Penang states of Malaysia which launched in 2007 by the federal government with the aim of transforming the region towards a sustainable socio-economically balanced region by 2025. The mission of NCER is carried by The Northern Corridor Implementation Authority (NCIA) who established NCER's policies, directions and strategies.

Additionally, the staff of NCIA is selected due to the fact that they used open government data for strategic analyses in identifying the issues faced by Northern region, hence establishing effective plans for future implementation and creating economic values by creating new business opportunity. This is also based on the Andreiwid et al. (2015) and Fitzgerald et al. (2010) where they have asserted that the prominent usage of open government data has been categorized into four (4) which are for political, economic, research and for normal usage. Since NCIA responsible in planning the economic growth of Northern region, the selection of NCIA staff is relevant in relation to open government data.

Moreover, in order to cover a wider range of population, this study included the staff and students of universities in the region including UTP, USM, UUM and UNIMAP. The reason for choosing them as the respondent also based on Andreiwid et al. (2015) and Fitzgerald et al. (2010) where research area is included as one of the most active field that used open government data. Besides, university's staffs and students are chosen based on the dataset scores which shows that Ministry of Education scored among the highest in using open government data, as mentioned in Chapter 1, Figure 1.3.

Furthermore, the Northern region is selected because this region comprises of both developing and developed areas, where Perlis, Kedah and Perak are classified as the developing states and Penang classified as the developed state. Penang is considered as the fast-growing state in economy development. The combination of these state clarifies the view that Perlis, Kedah and Perak still trying to boost up their economic growth and Penang will be the "gate" for these states to grow economically.

Tanaka (1987) also pointed out that more complicated models will require larger samples if stable estimates are to be obtained, although he suggested a sample size to parameter ratio of 4:1 should be able to provide stable estimates. As 44 parameters were to be estimated in the suggested model, a sample of about 176 would be suitable for the present study. Hair, Hult, Ringle and Sarstedt (2016) mentioned that with larger data sets (N = 250), CB-SEM and PLS-SEM results are very similar when an appropriate number of indicator variables (4+) are used to measure each of the constructs (consistency at large). In the case of current study, there are 4 indicators and a sample size of 250 will be sufficient to generate good results.

Based on the above discussion on various sample size selection criterions. The current study distributes 650 questionnaires by keeping in mind the low response rate for the social sciences data collection. Therefore, 250+ sample size in this study satisfies the suggestions of previous researchers while measuring the citizen's satisfaction of open government data in Malaysia.

4.5.2 Sampling Techniques

The current research used the convenience sampling technique to select the target respondents who were citizens of Malaysia and users of open government data. This

method allows the researcher to reach the target respondents which can provide more adequate data related to users' satisfaction on open government data. As per the selection criteria, those who met the study requirements were selected as the respondents. Besides, the respondents were asked these pre-requisite questions before the questionnaire was handed to them. Those who fulfilled the requirements in this category, were given the questionnaire to fill in the data.

4.6 Instruments Development

Previous studies have stressed the need to design a research instrument to understand the underlying assumptions which help formulate questions that needed to be answered by the participants. Therefore, by keeping in mind the objectives of research and the respondents, the instrument was designed. This study intended to measure users' satisfaction on open government data in Malaysia.

In addition, the related items from the past literature were adapt to measure expectations, confirmation, perceived performance, incentives on usage, perceived risk and behavioural intentions. The items related to user satisfaction were adapted and modified to the extent which fulfilled the objectives of the study.

The adapt instruments bear an adequate level of reliability and validity as reported by previous researchers. The adapt version was approved by experts and was piloted to validate the instruments to measure the focal constructs. The following section explains the detailed items used to measure the focal construct used to design the model for users' satisfaction on open government data.

4.6.1 Satisfaction

Users' affect with (feelings about) use of services (Bhattacherjee, 2001b). Moreover, users' satisfaction is a collective outcome of perception, evaluation, and psychological reactions to the consumption experience with a product/service (Yi, 1990). In context of the current study is the user's feeling such as be pleased, contented and delighted after using the open government data.

Satisfaction items were adapted from Bhattacherjee (2001a) using seven items. A 5-point Likert scale was used starting from (1) 'Strongly Disagree' to (5) 'Strongly Agree'. Table 4.3 presents the items of the satisfaction construct.

Table 4.3

Satisfaction Items

No.	Item	Source
1	I am satisfied with my decision on the use of the open government data approach.	Bhattacherjee (2001a)
2	My choice to use this open government data approach was a wise one.	
3	I think I did the right thing by deciding to use open government data approach.	
4	Using the web portal makes me feel very satisfied	
5	Using the web portal makes me feel very pleased	
6	Using the web portal makes me feel very contented	
7	Using the web portal makes me feel very delighted	

4.6.2 Confirmation

Chen, Huang et al, (2010) defined expectations as when actual performance meets the expected standard. Furthermore, when there is no difference between customer's expectation and actual performance of specific product or services, means perceived

performance is equal with expectation and simple confirmation is occurred (Elkhani & Bakri, 2012). Users' perception of the congruence between expectation of open government data and its actual performance is the confirmation (Bhattacherjee, 2001).

Confirmation measurement items were adapted from Bhattacherjee (2001b) and Oliver (1980) using ten items. A 5-point Likert scale was used starting from (1) 'Strongly Disagree' to (5) 'Strongly Agree'. The items of confirmation are given in Table 4.4.

Table 4.4

Open Government Data Confirmation Items

No.	Item	Source
1	My experience with using the open government data approach was better than what I expected	Bhattacherjee (2001b) and Oliver (1980)
2	The service level provided by the open government data provider was better than what I expected.	
3	Overall, most of my expectations from using open government data approach were confirmed.	
4	My online use experience via open government data falls short of my expectations.	
5	Open government data are generally good at handling questions or complaints before or after use.	
6	After-sales service provided by open government data meets my expectations.	
7	I generally get the level of service I expect from open government data.	
9	Products and services recommended to me by open government data meet my expectations.	
10	Open government data direct marketing activities meet my expectations.	

4.6.3   Perceived performance

Perceived performance is defined as customers' perception of how product performance fulfills their needs, wants, and desires (Cadotte, Woodruff, & Jenkins, 1987). Moreover, Spreng et al. (1996) defined perceived performance as ''beliefs regarding the product attributes, levels of attributes, or outcomes''. In context of the current study perceived performance of open government data is the outcome of open government data to enhance the performance, productivity, effectiveness, improvement in skill and overall   usefulness for the users.

Perceived performance measurement items were adapted from Bhattacherjee (2001b) and Davis et al. (1989) using seven items. A 5-point Likert scale was used starting from (1) 'Strongly Disagree' to (5) 'Strongly Agree'. The items of perceived performance are shown in the Table 4.5.

Table 4.5

Perceived Performance Items

No.	Item	Source
1	Using open government data approach improves my performance in managing personal investment.	Bhattacherjee (2001b) and Davis et al. (1989)
2	Using the open government data increases my productivity in managing personal investment.	
3	Using the open government data approach enhances my effectiveness in managing personal investment.	
4	Overall, the open government data is useful in managing personal investment.	
5	Using open government data improves performance of my learning.	

| 6 | Using open government data improves my skill in searching data. |
| 7 | Using open government data enables me to access a lot of usefulness information. |

4.6.4 Behavioral Intention

The intention to use a technology is the state in which a person is planning to use a new technology (Lee & Rao, 2009). Behavioral intention implies an individual's intention, prediction or plan to use a technology in the future (Saxena, 2016). In this study, the intention refers to intention of user's willingness and likeliness to use the open government data.

Intention measurement items were adapted from McKnight, Choudhury and Kacmar (2002) using five items. A 5-point Likert scale was used starting from (1) 'Strongly Disagree' to (5) 'Strongly Agree'. The items of intention are presented in Table 4.6.

Table 4.6

Intention items

No.	Item	Source
1	I intend to continue using the open government data rather than discontinue its use.	McKnight, Choudhury and Kacmar (2002)
2	My intentions are to continue using the open government data rather than use any alternative means.	
3	I am willing to using open government data.	
4	It is very likely that I will use open government data in the future.	
5	I am willing to use open government data continuously.	

4.6.5 Expectation Measures

Raita and Oulasvirta (2011) defined product expectations as the beliefs and/or emotions related to a product that are formed before its actual use". They state that even when a technology is novel to its users, certain preconceptions nevertheless shape experiences. Expectations refer to the attributes or characteristics that a person anticipates or predicts will be associated with an entity such as a product, service, or technology artefact (Liao, Huang & Wang, 2015). In this case the expectation refers to the expectation of the users of open government data from the open government website or data providers.

Expectation measurement items were derived from Brown et al. (2008) using four items. A 5-point Likert scale was used starting from (1) 'Strongly Disagree' to (5) 'Strongly Agree'. The items for expectation are presented in Table 4.7.

Table 4.7

Expectation Items

No	Item	Sources
1	I expect that open government data will enable me to accomplish tasks more quickly.	Brown, Venkatesh, Kuruzovich and Massey
2	I expect that open government data will improve the quality of the work I do.	(2008)
3	I expect that open government data will make it easier to do my job	
4	I expect that open government data will enhance my effectiveness on the job.	
5	I expect that open government data will give me greater control over my job.	
6	I expect that open government data will improve my productivity.	

4.6.6 Perceived Risk

A user's uncertainty about the quality of information being gathered can potentially lea d to anxiety, which can come in the way of their adoption decision. The expected social or economic loss caused from using a new system constitutes perceived risk (Labay & Kinnear, 1981; Rogers & Shoemaker, 1971). In this context, the perceived risk will be used to measure users' apprehensions of inputting personal information onto such websites, and also their confidence in using the information available on such websites.

Provide incentive schemes to engage citizens in open data usage (Susha, Zuiderwijk, Charalabidis, Parycek, & Janssen, 2015). Moreover, Incentives are not just related to financial benefits; there are also incentives related to public value. In this current study, incentive refers to the benefits provided by the government to the users of open data.

This study adapted items of perceived risk from the study by Jurisch et al. (2015). A 5-point Likert scale was used starting from (1) 'Strongly Disagree' to (5) 'Strongly Agree' to measure perceived risk. The items are as given in Table 4.8.

Table 4.8

Perceived Risk Items

No	Item	Source
1	Using open government services and offerings online is risky because of a lack of data security	Jurisch et al, (2015)
2	Data and information provided through open government online are often inconsistent.	
3	Government authorities will probably use my personal data for unknown purposes.	
4	The underlying transaction processes of open	

government appear risky because of a lack of transparency.

5   Government authorities will probably not respond to my open government related requests/inputs.

4.6.7 Incentive on Usage

Provide incentive schemes to engage citizens in open data usage (Susha, Zuiderwijk, Charalabidis, Parycek, & Janssen, 2015). Moreover, Incentives are not just related to financial benefits; there are also incentives related to public value. In this current study, incentive refers to the benefits provided by the government to the users of open data.

This study adapted incentive to usage measurement items from the study of Zuiderwijk et al, (2015). The items were measured on a 5-point Likert scale starting from (1) 'Strongly Disagree' to (5) 'Strongly Agree' to measure perceived risk. Table 4.9 presents the items of incentive on usage.

Table 4.9

Incentive to Usage Items

No	Item	Source
1	Open government data provide incentive schemes to engage citizens in open data usage.	Zuiderwijk et al, (2015)
2	Government stimulate the development of specialized, open-data driven start-up incubators.	
3	Government stimulate the development of business models to allow enterprises to develop add-on services on top of open data platforms, at a cost.	
4	Open Government data support issue-oriented community building through participatory events.	
5	Government align events, competitions and hackathons with, for example, university curricula, awards, festivals and direct marketing for awareness on usage of government data.	

4.7   Questionnaire Design

In order to ensure that the designed items met the target audience in Malaysia, the designed questionnaire underwent validity and reliability tests. The current research used a questionnaire that met the stated research objectives guided by the ECT. The survey questionnaire was divided into three parts: the demographics, the experience of respondents on the open government data and their perception on the proposed constructs to measure user satisfaction on open government data.

The questionnaire design and measurement were selected by careful review of related literature available on the measurements of these constructs. Moreover, the selected measurements held an acceptable level of reliability and validity based on current and previous research results. Besides, the questionnaires were validated prior to data collection by using face validity and content validity by the experts in the field. The items of questionnaire were approved by the experts and modified based on suggestions to ensure validity.

Construct validity was conducted during the analysis stage focusing on conceptual research model's components. The designed questionnaire was used to measure the Malaysian citizens' satisfaction of open government data. The researcher started the instrument by asking five demographic questions namely age, gender, ethnicity, and academic qualification, followed by questions related to the dependent and independent variables.

The data collection was done by means of a self-administered survey. The target population was selected based on their experience in browsing and searching for information on open government's data web portals. The link of open government data

is http://www.data.gov.my. Prior to the distribution of questionnaire, the targeted sample need to answer few questions as the requirements in ensuring that they are entitled to be the respondents of this survey.

The respondents were selected through the following screening questions:

1) Have you ever visited the government agencies' Web sites? If yes, then:

2) Have you ever searched for the information in the government's Web portal?

3) Have you ever browsed http://www.data.gov.my?

Consequently, by the use of self-administrated questionnaires, the data was collected from users who were exposed to the government's web portal. This study intended to measure the user's satisfaction on open government data, thus, the study obtained the maximum number of participants that used open government data. These citizens were representative of the total population of the open government data users.

4.7.1   Validity Evaluation

A validity test is a set of measures that correctly represents the concepts of the study (Buttle, 1995). Two types of validity measurements were used in the present study, which were face validity, and content validity. According to Sekaran and Bougie (2013), face validity is a basic index of content validity.

Face validity was used to test if the questionnaire was worded in a clear and understandable manner so the respondents could progress smoothly in answering the questions. It was also used to check the ability of the questionnaire to achieve its purpose to identify the factors that influence open government data in Malaysia by the NCER members and the users in universities (UTP, USM, UUM, UNIMAP). Therefore, 35 staff (12 from the school of accounting, 12 from the school of economics

and 11 from the school of finance at UUM) were asked to fill in the questionnaire. When they finished it, they were asked if there were any problems in understanding the questionnaire or the questions. Based on their feedback, the wording of some questions was modified to improve clarity.

Content validity refers to the degree of appropriateness of all items for the purposes of the measurement instrument (Zikmund et al., 2010). To ensure this, three experts in information systems from universities as shown in Table 4.10 were solicited; then, the questionnaire was given to check the accuracy of the questionnaire contents. Based on their feedback, improvements were made on the items identified in terms of sentence structure, appropriate choice of words and its arrangement.

Table 4.10

The Biography of the Experts

Expert	Academic Rank	Specialization	Department	University
Expert A	PhD. Associate Prof./ lecturer	e-Government, e-Participation, and e- Business	College of Arts and Sciences	Universiti Utara Malaysia.
Expert B	PhD. Associate Prof./ lecturer	e-Government, and e-Commerce.	College of Arts and Sciences	Universiti Utara Malaysia.
Expert C	PhD. Assistant Prof. External expert in the postgraduate admissions	e-Democracy, and e-Participation	College of Business	Universiti Utara Malaysia.

Through the content validity process, there are few amendment and suggestion have been outlined by the experts in ensuring that the items used in the questionnaires able to represent the operational definition of the constructs, suitable with the context of the study.

4.8   Pilot Test

A pilot study was conducted to ensure that the items used to measure focal constructs can be used to collect the data from users of open government data. Any type of shortcomings in the survey design or measurement items were removed before the final data collection.

For this study, the pilot study helped in: (1) determining the validity and reliability of the questionnaire items; (2) assessing the adequacy of item-wording, phrasing and questions' construction in order to get accurate results; (3) evaluating the questions' frame in a way that could give a better response; and (4) finding out whether the respondents could supply the needed data.

By using Statistical Package for Social Science SPSS version 23, the internal consistency of the constructs was tested using data from 35 respondents that have been returned from the 27 distributed questionnaires (Sheatsley, 1983). It was found that all the measures possessed a high reliability standard ranging from 0.746 to 0.935, which were acceptable. Table 4.11 depicts that all the items included in the study have a good level of internal consistency when measuring their respective intended measures.

Table 4.11

Reliability Analysis of Pilot Study

Reliability Analysis of Pilot Study Construct	No. of Items	Cronbach's Alpha
Expectation	6	0.932
Confirmation	10	0.934
Perceived Performance	7	0.935
Incentives on Usage	5	0.746
Perceived Risk	5	0.895
User Behavioural Intention	5	0.905
Citizen's Satisfaction of Open Government Data	7	0.923

From the Table 4.11, the results of the pilot study indicated that the Cronbach's Alpha values for the constructs under examination were all above 0.70. Consequently, given the established benchmark of 0.70, so this showed that all the constructs were reliable (Hair, Black, Babin & Anderson, 2010; Nunnally, 1994).

4.9   Data Collection Procedures

Data collection is an essential component of quantitative research. The most common research instrument to collect data for the quantitative research approach is a questionnaire survey. The present study utilized a questionnaire as the primary tool of data collection as it is appropriate and effective. A questionnaire enables respondents to give the required data in a short time while minimizing response bias (Sekaran & Bougie, 2013).

The present study utilized a geographical area as the strategy for distributing the questionnaire as it is appropriate and effective because NCER is located in Penang as the central organization and four universities (UTP, USM, UUM, UINMAP) were

located nearby in Perak, Penang, Kedah and Perlis.   600 questionnaires were distributed in these four areas. The areas contained four universities and Koridor Utara 125 questionnaires were distributed by the researcher for each university, and 100 for the NCER.

The questionnaires were conveniently delivered and collected in person. Four (4) research assistants have been assigned to each of the states involved (Perlis, Kedah, Penang, and Perak) where they assisted in distributing and collecting back the questionnaires; besides, they also helped in explaining the purpose and benefits of the study to the respondents and motivate them to give honest responses (Sekaran & Bougie, 2013).

Thus, personal delivery was found to be useful for the present study, which aimed to get a high response rate and more than the consensual critical sample size required. The questionnaire was distributed from November 2016 until February 2017. As a result, 400 questionnaires were collected as shown in Table 4.12.

Table 4.12

The Data Collection Procedures for Questionnaire

Group	Collage	Quota Sample	Feedback
Group A	Universiti Teknologi PETRONAS	Total 125 • 25 students • 40 employees • 12 lecturers	77
Group B	Universiti Sains Malaysia	Total 125 • 60 students • 14 employees • 9 lecturers	83

Group C	Universiti Utara Malaysia	Total 125	
		• 70 students	
		• 22 employees	89
		• 7 lecturers	
Group D	Universiti Malaysia Perlis	Total 125	
		• 54 students	81
		• 24 employees	
		• 3 lecturers	
Group E	The Northern Corridor Economic	• 70 staff	70

The process of data collection procedures with the related number of samples is illustrated in the following Figure 4.3.
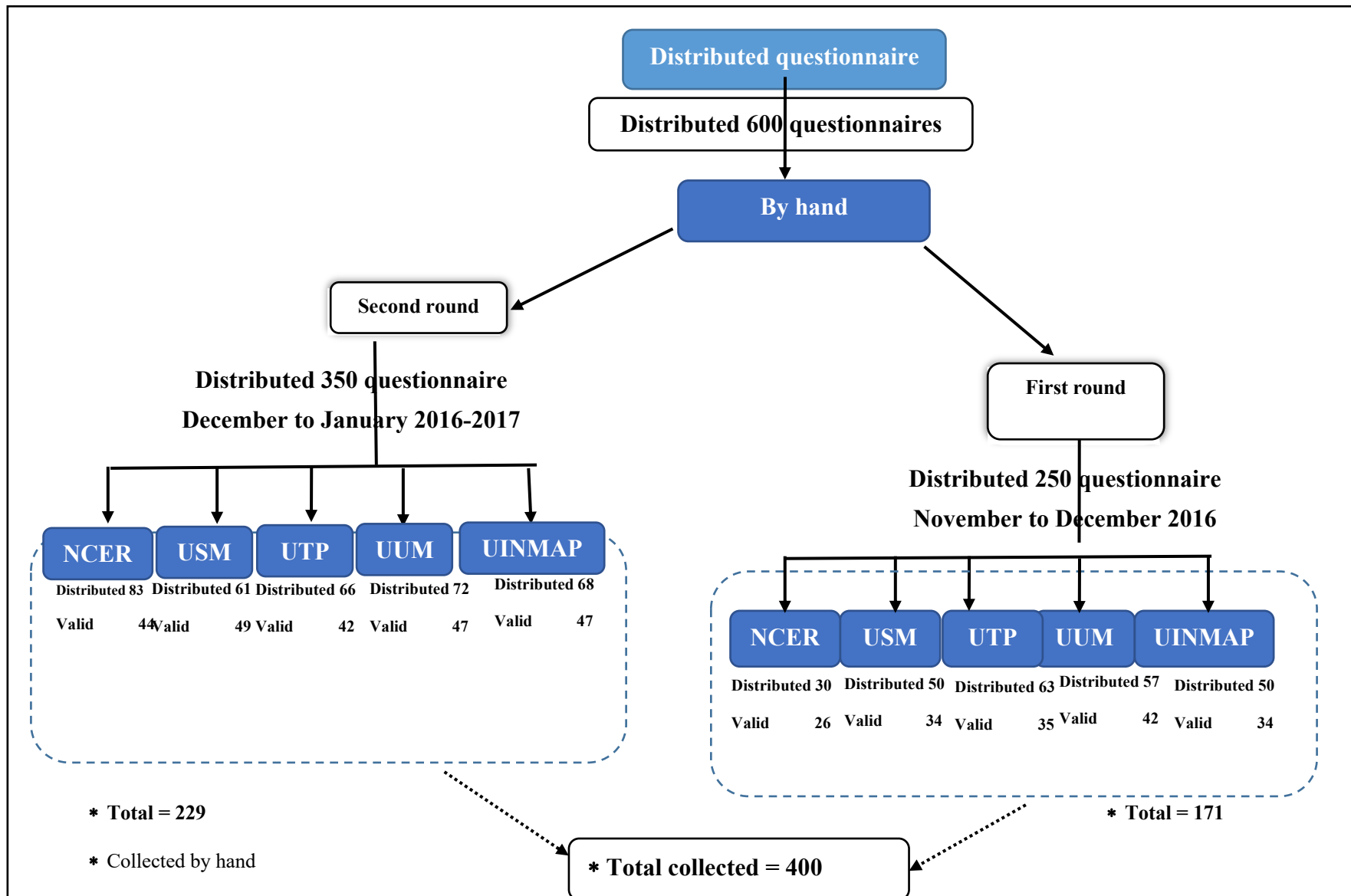
Figure 4.3. Distributed data

4.10   Data Analysis Procedures using Structural Equation Modelling

The data analysis method used to analyse the collected data from the responses of the gathered questionnaires is critical step in any research. In this study, the first stage of the data analysis focused on data screening and data preparation to identify potential outliers and missing values in the dataset prior to the main analysis. For the analysis, this study performed basic analysis using SPSS version 20 and hypothesis testing was performed using SmartPLS 3.2.7. The detailed analysis is given in Chapter 5.

The second stage of the analysis involved the assessment of reliability, convergent validity and discriminant validity to eliminate casual relationships in the gathered dataset based on the suggestion from Gefen and Straub (2005). The reliability and validity assessments were done using structural equation modelling (SEM) through the measuring model technique. This technique provides values of reliability and validity on the used measurements. The SEM was chosen in this study due to its ability to address a confirmatory approach of a structural theory that generates observation on multiple variables (Barbara, 2010).

In addition, studies have shown that there are two types of SEM named as the Covariance-Based SEM (CB-SEM) and Partial Least Square SEM (PLS-SEM). The CB-SEM is for the estimation of the parameters of the model to reduce the variation between the sample covariance and those predicted by the theoretical model. However, CB-SEM cannot be used to reduce the effort to predict the existence of the dependent variables through the maximization of the variance explained (R^2) of the dependent variable (Barroso et al., 2010). On the other hand, PLS-SEM is capable of making use of both normal and non-normal

dataset. Hence, this study used PLS-SEM version 3.2.7 to analyse the collected data on open government data in Malaysia. The hypothesis testing was done using the structural model.

4.11   Summary

The chapter discussed the methodologies that were used to achieve the objectives of the study. The methods included research process, research approach, research design, sampling method and instrument for collecting and analysing the data. The following chapter presents the data analysis results. This chapter followed the conceptual research model that guided the instrument development and data collection towards determining the measurement of citizen's satisfaction of open government data in Malaysia

CHAPTER FIVE

DATA ANALYSIS AND RESULTS

5.1   Introduction

This chapter discusses all results obtained from the analysis conducted using SmartPLS 3.2.7. The first section in this chapter discussed the collected data to conduct a diagnostic analysis to identify missing value analysis, outlier assessment, normality test and multicollinearity test. Results obtained from this diagnostic analysis provide information about the suitability of data for more complex analysis purposes. The descriptive analysis was done to understand the pattern of the data. The measurement and structural models were run to test the proposed hypotheses and to provide statistical evidence to support the relationships. In the last section, a summary of hypothesis testing, and overall chapter is given.

5.2   Background of Data

The questionnaire was given to open government data users to get their response on their intentions and satisfaction from open government data. A total of 600 questionnaires were distributed to the respondents in the northern region of Malaysia. In order to improve the response rate, personal visits and face-to-face meetings with respondents while administering the questionnaire were conducted. The purpose of face-to-face administering was to get appropriate responses. Out of 400 questionnaires collected, 49 were discarded due to a significant portion of questionnaire being missing or the majority of the responses were

not filled. The remaining 351 questionnaires were found to be useful to conduct further analysis and hypothesis testing.

The descriptive analysis was conducted to get useful information and understanding on the collected data prior to much complex analysis. All collected information were coded into SPSS which later can be analysed using PLS. Prior to SEM-PLS, the data was cleaned from any missing data and outliers. Besides that, normality and multicollinearity assessment were executed to ensure that only good data was analysed to avoid misleading results or violation of any modelling assumptions.

The original dataset contained 63 randomly missing values, which accounted for 0.039% of the total dataset. Specifically, the expectations had 11 missing values whereas, confirmation had 24; perceived performance had 4; incentives had 3; perceived risk had 6; intention had 9; and satisfaction had 6 missing values. In dealing with missing data, this study deployed replacement using the median.

In order to check for outliers, frequency distribution was tabulated, where the minimum and maximum values were computed for all the latent variables. Any latent variable which differed extremely from the rest may have the issue of being a potential outlier. None of the values were found outside the expected range. Meanwhile, the study computed the Mahalanobis distance (D^2), a tool to identify the multivariate outliers in the data set. Mahalanobis distance (D^2) identified 101 observations as outliers. As a result, these cases were deleted from the dataset as these outliers could affect the accuracy of the data analysis technique. Hence, after deleting these outliers, the final dataset in the present study was 250.

The collected data for this study was assessed for normality assumption, and the results indicated that the data followed a normal pattern as all the bars on the histogram were close to the normal curve as given in Figure 5.1.
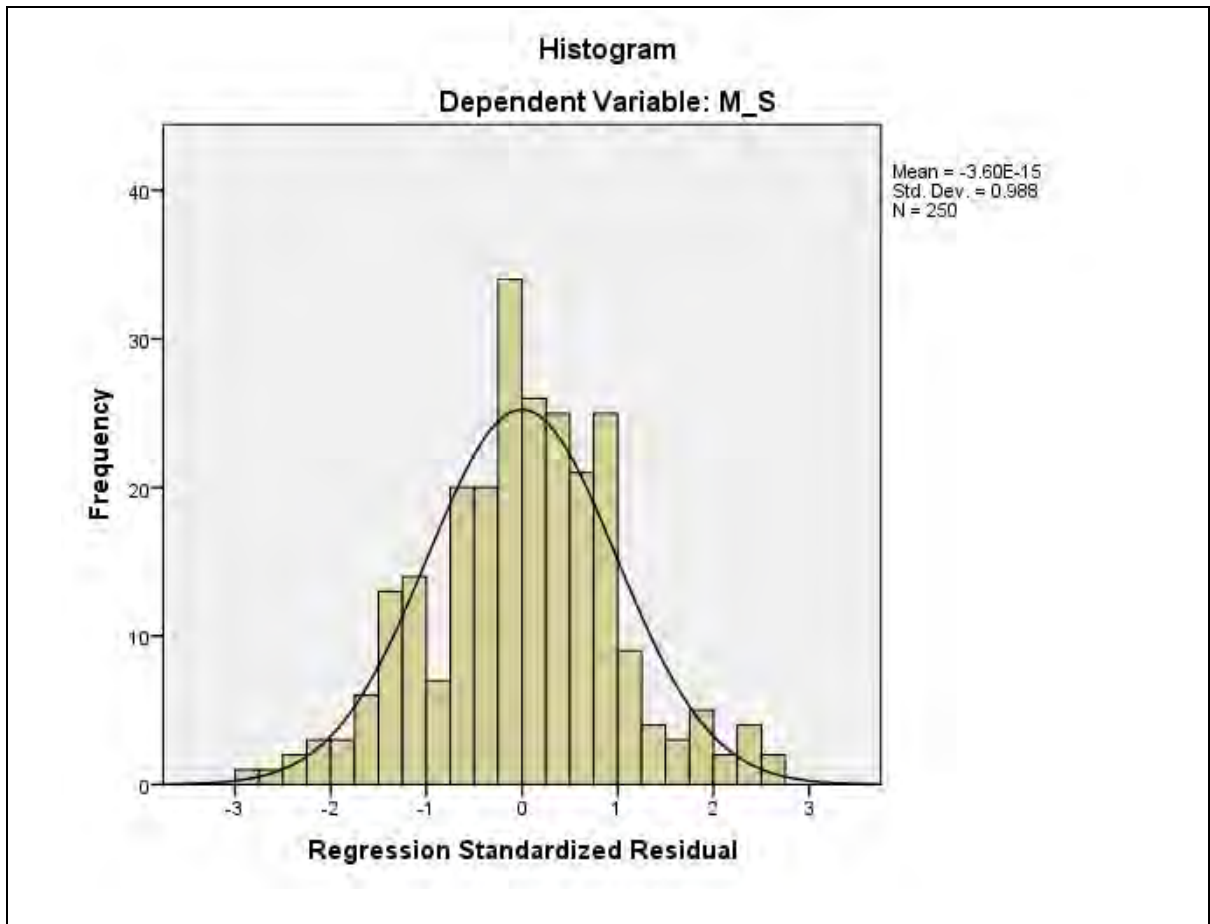
Figure 5.1. Histogram and normal probability plot

Prior to model development and estimation, some preamble analyses were performed to evaluate multicollinearity among variables. If the value of correlation between variables was strong, then there was indication for the existence of multicollinearity among the variables. This strong correlation appeared as problem in regression analysis, as it can mislead the results and create difficulty in the interpretation of the effects of different variables. Table

5.1 clearly indicates that there was issue of multicollinearity as the values of correlation between exogenous variables were less than 0.90. It can be inferred that there was no issue of multicollinearity based on obtained values.

Table 5.1

Correlation Matrix of the Exogenous Latent Constructs

	1	2	3	4	5	6	7
1. Confirmation	1.000						
2. Expectation	0.503	1.000					
3. Incentive on use	0.428	0.376	1.000				
4. Users' Intention	0.402	0.429	0.429	1.000			
5. Perceived Performance	0.007	-0.092	-0.050	-0.148	1.000		
6. Perceived risk	0.255	0.199	0.371	0.421	-0.016	1.000	
7. Users' Satisfaction	0.354	0.344	0.392	0.494	-0.053	0.297	1.000

In addition, to determine multicollinearity among the variables, the variance inflated factor (VIF) and tolerance were also used. Following Hair, Ringle and Sarstedt (2011), this study considered in case where a VIF greater than 5 and tolerance values less than 0.20 will reflect the existence of multicollinearity.

Table 5.2

Tolerance and Variance Inflation Factors (VIF)

Constructs	Collinearity Statistics	
	Tolerance	VIF
Confirmation	0.671	1.490
Expectations	0.707	1.413
Incentives on use	0.716	1.397
Perceived Risk	0.850	1.176

Perceived Performance	0.986	1.014

Table 5.2 presents the values of VIF and tolerance of the exogenous variables obtained from the data. The values calculated were lower than the threshold or cut-off suggested by Hair et al. (2011). Thus, it can be inferred that there was no issue of multicollinearity among the variables of the current study.

5.3   Demographic Profile

The demographic profiles of the respondents are given in Table 5.3. It shows that there were 54.8% male and 45.2% female respondents who had participated in the survey. In terms of age, 32.3 % of these respondents belonged to the age group of below 25 years old, 53.2% from the age group of 25-35 years, and 14.5 % belonged to the age group of 36-45 years.

Moreover, 72.03% of them were unmarried, 25.42% were married, and 2.54% were divorced. It was also revealed that 28.14% of the respondents had a monthly income of RM2000 and below, while 43.29% had an income between RM2000-RM4000.

Among the respondents, 22.94% had an income between RM4100-RM6000, 4.33% between RM6100-RM8000 and 1.29% had income of RM8100 and above. Among the respondents, 15.5% had intermediate (Diploma and SPM) qualification, 31.0% had a graduate degree (bachelor's degree), 40.69% had postgraduate (Master) education, 6.98% had a PhD and 5.81% had other academic qualifications.

Table 5.3

Demographic Characteristics of the Respondents

Demographic Variables	Frequency	Percentage
Gender		
Male	136	54.8
Female	112	45.2
Age		
Below 25 Years	80	32.3
25-35 Years	132	53.2
36-45 Years	36	14.5
Marital Status		
Unmarried	170	72.03
Married	60	25.42
Divorced	6	2.54
Income		
Below RM. 2000	65	28.14
RM 2000 – RM 4000	100	43.29
RM 4100 – RM 6000	53	22.94
RM 6100 – RM 8000	10	4.33
RM 8100 and Above	3	1.29
Education		
Intermediate	40	15.50
Graduate	80	31.01
Post Graduate	105	40.69
PhD	18	6.98
Others	15	5.81

5.4   Descriptive Analysis of Constructs

Table 5.4 displays the mean and standard deviation of the constructs investigated. The table

shows that expectation had the highest mean value (3.794) with the standard deviation 0.628.

The value indicated that open government data users had high levels of expectation from the open government data.

Meanwhile, the perceived performance of the open government data recorded the mean value (3.748) and standard deviation (0.596). The calculated mean values indicated that users of open government data had higher perceived performance from the open government data.

Table 5.4

Descriptive Statistics for Latent Variables

Latent Variables	Mean	Standard Deviation
Expectations	3.794	0.628
Performance	3.748	0.596
Intentions	3.669	0.628
Incentives on use	3.659	0.594
Citizens' satisfaction	3.641	0.638
Perceived Risk	3.630	0.613
Confirmation	3.594	0.594

Intention to use had a mean value of 3.669 and standard deviation of 0.628, indicating that users of the open government data had the intention to use the open government data.

The mean value calculated for incentives on use was 3.659 with standard deviation of 0.594, which depicted that incentive to use was important for the motivation of the users. The score suggested that users may intend to use the open government data if they are provided with incentives on using the data.

Citizens' satisfaction had a mean value of 3.641 and standard deviation of 0.638, which indicated that the users showed satisfaction from the use of the open government data. Improved services can increase the level of satisfaction of the users of the open government data.

The mean value of perceived risk was 3.630 and standard deviation was 0.613, which showed that the users perceived risk with the use of open government data. The users had high levels of risk and they agreed that by using open government data, their perceived risk was of losing their data or personal information threatening their privacy.

Confirmation had a mean value of 3.594 which was the lowest among all constructs with a standard deviation of 0.594. The value indicated that the users believed the service expectation met the actual services received from open government data. A higher level of confirmation can lead to a higher level of satisfaction from the services.

5.5   Assessment of PLS-SEM Path Model

In the current study, a two-step process of the data analysis and reporting was used to report the results of PLS-SEM as recommended by Henseler et al. (2009). As per the suggestions by Henseler and Sarstedt (2013) and Hair *et al*. (2014), the goodness of fit index (GoF) is not recommended for model validation because GoF is unable to separate the valid and invalid models. The evidence was provided by Hair, Ringle and Sarstedt (2013) in their study using PLS path models. This study adopted a two-step approach to estimate the measurement model and obtain hypothesis testing results using PLS-SEM as shown in Figure 5.2.
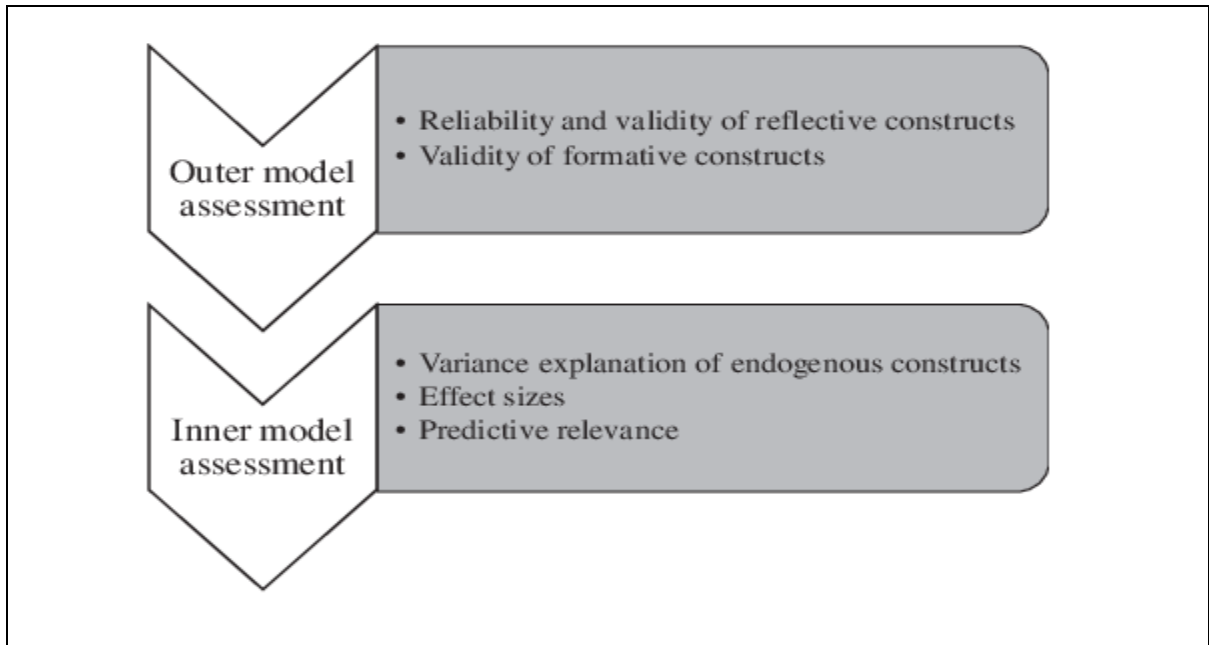
Source: (Henseler et al., 2009)

Figure 5.2. PLS Path modelling assessment (Two Step Process)

5.6 Assessment of Measurement Model

In order to assess the measurement model for the collected data, this study used the approach by Hair et al. (2014) and Henseler et al. (2009). According to Hair et al. (2014) and Henseler et al. (2009), to assess the measurement model, researchers need to 1) determine individual item reliability, and 2) determine internal consistency, content validity, convergent validity and discriminant validity.

5.6.1 Individual Item Reliability

As per the literature guidelines, individual item reliability should be assessed by looking at the outer loadings of each measure (items) for each construct (Duarte & Raposo, 2010; Hulland, 1999; Hair et al., 2014; Hair et al., 2012). The measurement model results of the present study revealed that out of 44 items, 6 were deleted due to their lower loadings than

the above suggested threshold. Thus, in the whole model, 38 items were retained due to their loadings range of between 0.585 and 0.860. Table 4.5 provides the detailed information on item loadings.

5.6.2 Internal Consistency Reliability

The extent to which all the items of a given (sub) scale measure the same concept is called internal consistency reliability (Bijttebier et al., 2000; Sun et al., 2007). The present study adopted composite reliability coefficient to ascertain the internal consistency reliability of the adapted measures as shown in Table 5.5.

Table 5.5

Loadings, Composite Reliability and Average Variance Extracted

Latent Constructs and Items	Loadings	Average variance Extracted (AVE)	Composite Reliability
Confirmation			
Conf7	0.745		
Conf6	0.730		
Conf8	0.704		
Conf1	0.729	0.505	0.877
Conf5	0.717		
Conf2	0.688		
Conf10	0.658		
Expectations			
Exp3	0.837		
Exp2	0.813		
Exp1	0.799	0.612	0.904
Exp4	0.786		
Exp5	0.727		
Exp6	0.724		
Incentives on use			
Incen2	0. 804		
Incen3	0.773	0.528	0.847
Incen1	0.739		
Incen4	0.713		

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Incen5	0.584		
Intentions to use			
Int3	0.822		
Int1	0.792		
Int2	0.769	0.613	0.888
Int5	0.768		
Int4	0.763		
Perceived Risk			
Pr2	0.797		
Pr4	0.736		
Pr3	0.731	0.506	0.835
Pr1	0.652		
Pr5	0.626		
Perceived Performance			
Perf5	0.739		
Perf3	0.721	0.512	0.807
Perf2	0.701		
Perf1	0.700		
Satisfaction			
S4	0.860		
S5	0.856		
S2	0.839		
S3	0.818	0.679	0.937
S1	0.817		
S6	0.793		
S7	0.781		

Bagozzi and Yi (1988) and Hair et al. (2011) provided a rule of thumb for interpreting composite reliability coefficient which was that the composite reliability coefficient value for a particular construct should be 0.7 or above. The composite reliability coefficient for each latent variable ranged from 0.807 and 0.937 and indicated adequate internal consistency reliability of the measures. Figure 5.3 provides the full measurement model.
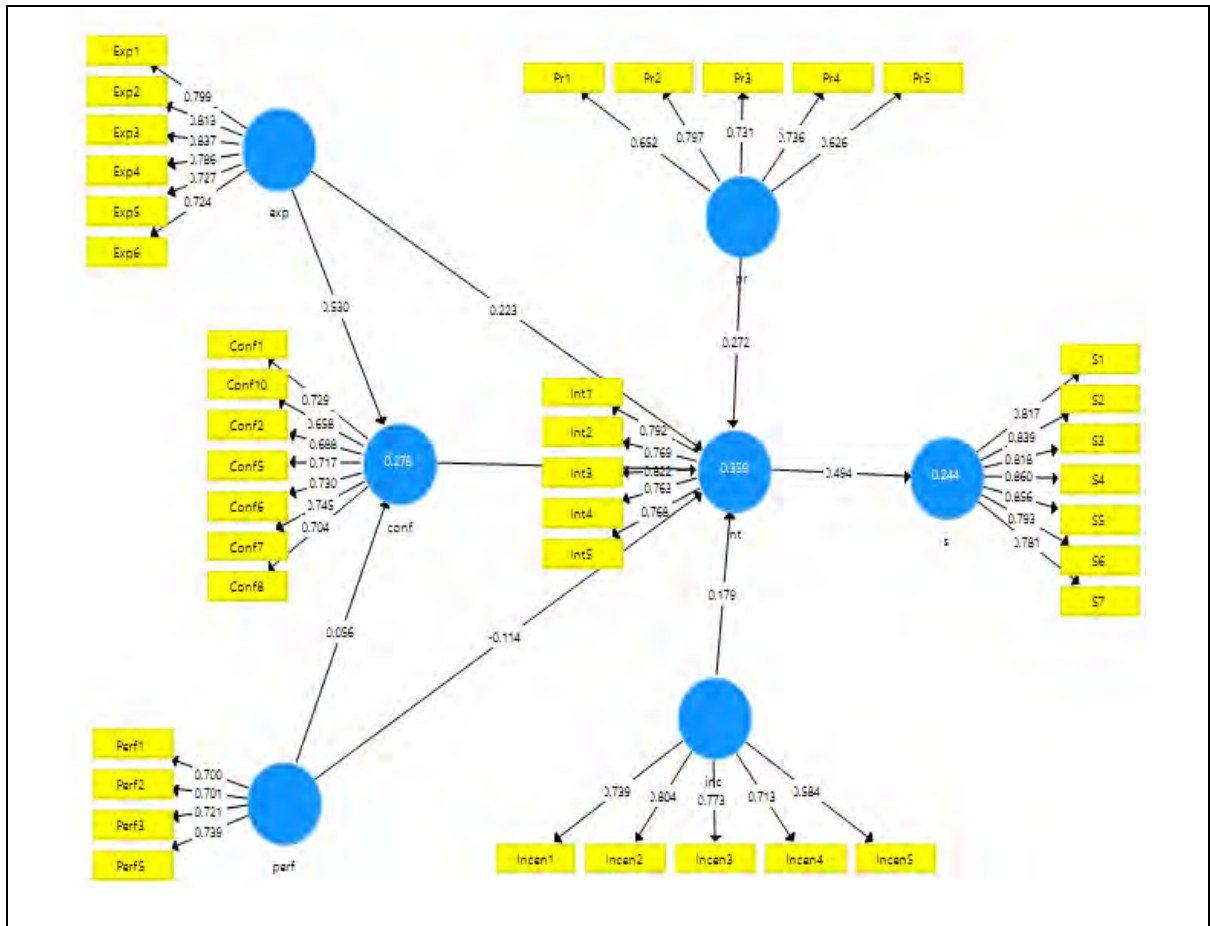
Figure 5.3. Measurement model

5.6.3   Convergent Validity

Convergent validity is explained as the extent to which items truly represent the intended latent variable and correlate with other measures of the same latent variable (Hair *et al*., 2006). The AVE scores provided in Table 5.5 indicated that the study demonstrated adequate convergent validity of all latent variables.

5.6.4 Discriminant Validity

Duarte and Raposo (2010) defined discriminant validity as the extent to which a specific latent construct is different from other latent constructs. The present study assessed discriminant validity using AVE. In doing so, the correlations among latent constructs were compared with the square roots of average variance extracted Table 5.6 suggests that the AVE for all the latent constructs were above the minimum cut-off of 0.5 and the square root of average variance extracted was higher than the correlations among the latent variables. Therefore, it indicated that latent variables hold an accepted level of discriminant validity.

Table 5.6

Latent Variable Correlations and Square roots of Average Variance Extracted

	1	2	3	4	5	6	7
1. Confirmation	**0.711**						
2. Expectations	0.524	**0.782**					
3. Incentive on use	0.427	0.380	**0.727**				
4. Users' Behavioural Intention	0.401	0.429	0.429	**0.783**			
5. Perceived Performance	0.006	-0.094	-0.050	-0.148	**0.715**		
6. Perceived Risk	0.259	0.202	0.371	0.421	-0.016	**0.711**	
7. Satisfaction	0.357	0.352	0.392	0.494	-0.053	0.297	**0.824**

Secondly, the discriminant validity was also ascertained by comparing the indicator loadings with cross loadings. Table 5.7 provides a comparison of indicator loadings with other reflective indicators. All the indicator loadings were found to be sufficiently higher than the cross-loadings, thus suggesting that the measures demonstrated adequate discriminant validity.

Table 5.7

Cross Loadings

Items	Conf	Exp	Incen	Int	Perf	Pr	S
Conf1	**0.729**	0.526	0.295	0.332	-0.033	0.225	0.366
Conf10	**0.658**	0.283	0.271	0.214	0.085	0.103	0.153
Conf2	**0.688**	0.392	0.33	0.332	-0.041	0.215	0.337
Conf5	**0.717**	0.354	0.273	0.224	-0.015	0.209	0.221
Conf6	**0.73**	0.254	0.29	0.243	0.084	0.143	0.204
Conf7	**0.745**	0.385	0.353	0.289	-0.001	0.235	0.211
Conf8	**0.704**	0.315	0.302	0.314	0	0.116	0.206
Exp1	0.342	**0.799**	0.261	0.334	-0.032	0.131	0.215
Exp2	0.318	**0.813**	0.284	0.38	-0.066	0.13	0.244
Exp3	0.356	**0.837**	0.32	0.328	-0.097	0.181	0.258
Exp4	0.459	**0.786**	0.298	0.333	-0.115	0.15	0.246
Exp5	0.44	**0.727**	0.26	0.276	-0.069	0.095	0.302
Exp6	0.5	**0.724**	0.341	0.352	-0.057	0.238	0.359
Incen1	0.303	0.33	**0.739**	0.308	0.034	0.229	0.301
Incen2	0.302	0.305	**0.804**	0.352	0.034	0.346	0.283
Incen3	0.322	0.331	**0.773**	0.357	-0.15	0.286	0.304
Incen4	0.292	0.239	**0.713**	0.279	-0.061	0.227	0.234
Incen5	0.35	0.142	**0.584**	0.248	-0.034	0.248	0.311
Int1	0.341	0.355	0.338	**0.792**	-0.077	0.362	0.338
Int2	0.339	0.377	0.319	**0.769**	-0.187	0.271	0.351
Int3	0.284	0.3	0.3	**0.822**	-0.115	0.369	0.362
Int4	0.263	0.326	0.352	**0.763**	-0.119	0.337	0.389
Int5	0.339	0.322	0.367	**0.768**	-0.084	0.308	0.479
Perf1	0.025	-0.017	-0.055	-0.096	**0.7**	0.012	-0.033
Perf2	-0.029	-0.011	-0.002	-0.076	**0.701**	-0.013	0.008
Perf3	-0.018	-0.107	-0.038	-0.088	**0.721**	0.019	-0.051
Perf5	0.021	-0.108	-0.04	-0.141	**0.739**	-0.046	-0.058
Pr1	0.242	0.101	0.351	0.279	0.064	**0.652**	0.106
Pr2	0.212	0.202	0.297	0.393	0.01	**0.797**	0.278
Pr3	0.18	0.123	0.257	0.268	0.015	**0.731**	0.24
Pr4	0.195	0.156	0.217	0.272	-0.047	**0.736**	0.217
Pr5	0.079	0.114	0.184	0.252	-0.119	**0.626**	0.195
S1	0.282	0.213	0.323	0.429	-0.053	0.261	**0.817**

S2	0.324	0.286	0.333	0.437	-0.082	0.23	**0.839**
S3	0.24	0.263	0.291	0.384	-0.044	0.245	**0.818**
S4	0.31	0.3	0.32	0.407	0.016	0.304	**0.86**
S5	0.337	0.337	0.391	0.425	-0.016	0.288	**0.856**
S6	0.257	0.316	0.309	0.38	-0.057	0.202	**0.793**
S7	0.303	0.319	0.288	0.378	-0.071	0.171	**0.781**

5.7 Assessment of the Developed Structural Model

After ascertaining the measurement model, the present study assessed the structural model. In doing so, the present study employed the standard bootstrapping procedure with 5000 bootstrap samples and 250 cases to determine the significance of the path coefficients. This was carried out by following the guidelines provided by eminent scholars in their recent studies (i.e. Hair *et al.*, 2014; Hair *et al.*, 2011; Hair *et al.*, 2012; Henseler *et al.*, 2009). Figure 5.4 and Table 5.8 provide the details of the structural model and hypothesis testing results respectively.
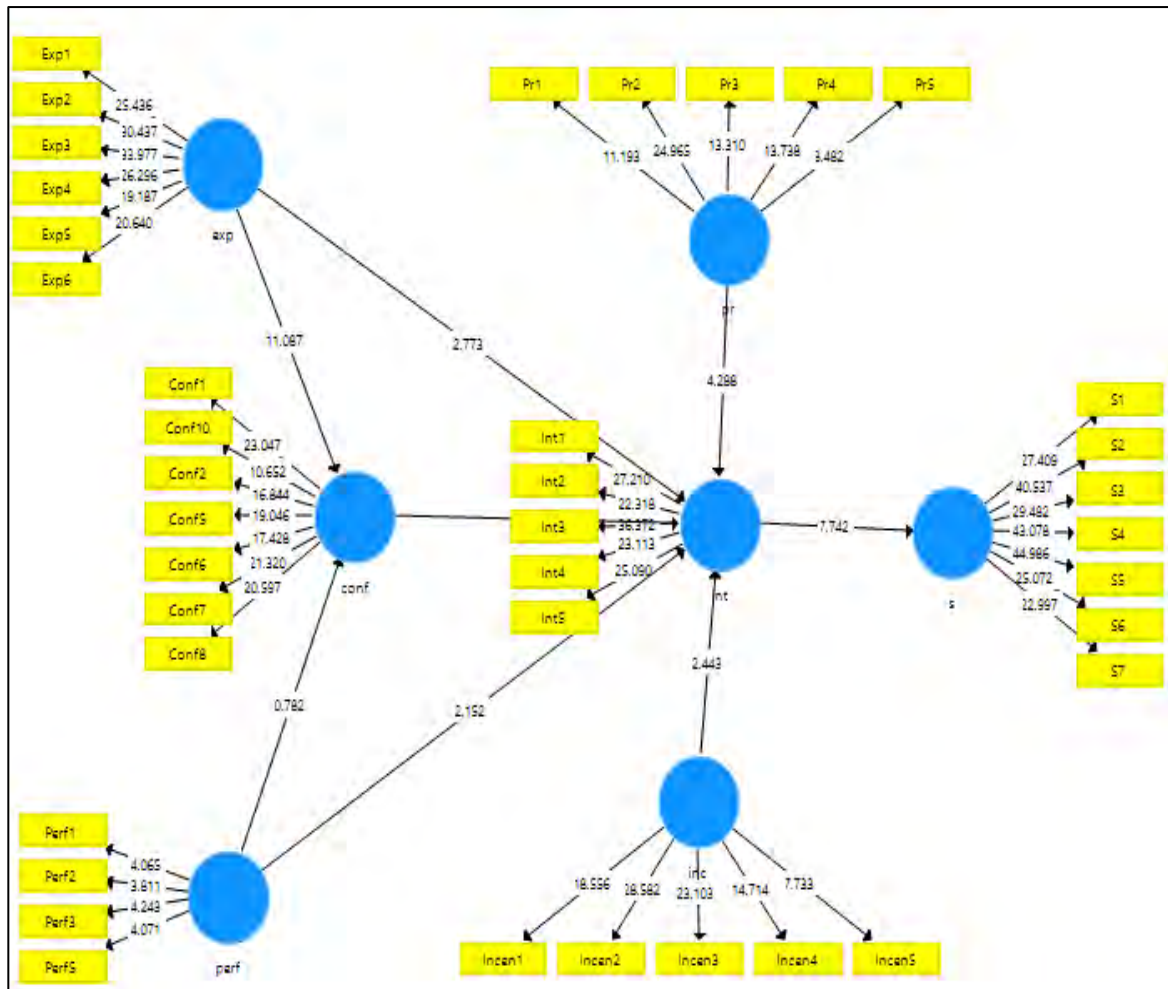
Figure 5.4. Estimated model of users' satisfaction on open government data

Hypothesis 1 proposed that expectation is significantly related to confirmation. The obtained results confirmed that expectation was significantly related to confirmation (β=0.530*, p=0.000). Hypothesis 2 proposed that perceived performance is significantly related to confirmation. The analysis result revealed that perceived performance was not significantly related to confirmation (β=0.056, p=0.434). These two results gave evidence that expectation had a relationship to confirmation, but not perceived performance.

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Investigation on Hypothesis 3 which stated that confirmation is significantly related to users'

behavioural intentions showed a significantly positive relationship between confirmation

and users' behavioural intentions (β=0.138***, p=0.060). Also, the results show that

expectation was significantly related to users' behavioural intentions (β=0.223**, p=0.006).

Additionally, the present study assessed that perceived performance was significantly related

to users' behavioural intentions in H_5, and the results revealed that there was a significant

relationship between perceived performance and behavioural intention (β=-0.114**,

p=0.031). Furthermore, the results indicated that incentives on usage was significantly

related to users' behavioural intentions (β =0.179**; p=0.015).

In the analysis, the proposed relationship between perceived risk and users' behavioural

intentions was significant (β =0.272*, p=0.000). Moreover, Hypothesis 8 proposed that

users' behavioural intention is significantly related to user's satisfaction of open government

data and the results showed that the users' behavioural intentions were related to their

satisfaction from open government data (β =0.494*, p=0.00).

Investigation on mediation analysis (β =0.146*, p=0.000) showed and supported the

mediating role of users' behavioural intentions. In addition, users' behavioural intention

mediated the relationship between confirmation and user's satisfaction of government data

(β =0.068***, p=0.081)

The obtained results (β =-0.053***, p=0.061) supported the mediating role of users'

behavioural intention. Also, the mediation analysis revealed that there was a significant

mediating role of users' behavioural intention between incentives on use and users'

satisfaction from open government data (β =0.089; t=2.167; p=0.030). Lastly, H_{13} obtained

the result (β =0.134*; p=0.000) which confirmed that users' behavioural intention mediated

the relationship between perceived risk and users' satisfaction from open government data.

A summary of investigation is provided in Table 5.8.

Table 5.8

Structural Model Assessment

Hypothesis	Statement	Beta	S.E	t	p-value	Decision
H1	Expectation has a significant relationship with Confirmation	0.530	0.073	11.087	0.000	Supported
H2	Perceived performance has a significant relationship with Confirmation	0.056	0.071	0.782	0.434	Not Supported
H3	Confirmation has a significant relationship with citizens' behavioural intentions.	0.138	0.073	1.878	0.060	Supported
H4	Expectation has a significant relationship with citizens' behavioural intentions.	0.223	0.080	2.773	0.006	Supported
H5	Perceived performance has a significant relationship with citizens' behavioural intentions.	-0.11	0.053	2.152	0.031	Supported

H6	Incentives on usage has a significant relationship with citizens' behavioural intentions.	0.179	0.073	2.443	0.015	Supported
H7	Perceived risk has a significant relationship with citizens' behavioural intentions.	0.272	0.063	4.228	0.000	Supported
H8	Citizens' behavioural intention is significantly related to citizens' satisfaction of government data	0.494	0.064	7.742	0.000	Supported
H9	Citizens' behavioural intention mediates the relationship between expectation and citizens' satisfaction of government data.	0.146	0.042	3.509	0.000	Supported
H10	Citizens' behavioural intention mediates the relationship between Confirmation and citizens' satisfaction of government data.	0.068	0.039	1.743	0.081	Supported
H11	Citizens' behavioural intention mediates the relationship between perceived performance and citizens' satisfaction of government data.	-0.05	0.028	1.874	0.061	Supported

H12	Citizens' behavioural intention mediates the relationship between incentive on use and citizens' satisfaction of government data	0.089	0.041	2.167	0.030	Supported
H13	Citizens' behavioural intention mediates the relationship between perceived risk and citizens' satisfaction of government data	0.134	0.034	3.997	0.000	Supported

5.7.1 Assessment of Variance Explained in the Endogenous Latent Variable

The PLS-SEM structural model assessment recommends another important criterion, which is the R-Squared value assessment. According to Falk and Miller (1992), the R-square value of 0.10 is acceptable. In this case, when expectations and perceived performance were independent variables for confirmation, they both explained 28% of the variance in confirmation. The research model explained about 36% of the total variance in the users' behavioural intention. This suggests that five exogenous latent variables (i.e. confirmation, expectations, perceived performance, incentive on use and perceived risk) collectively explained 36% of the variance in the users' behavioural intention. The R-squared value obtained was acceptable and is given in Table 5.9.

Table 5.9

Variance Explained in the Endogenous Latent Variable

Latent Variable	Variance explained (R^2)
Confirmation	0.278
Intention	0.359
Satisfaction	0.244

In the final model, the effect of users' behavioural intention was tested on user's satisfaction of government data. The value of R-square (24%) showed that the variance explained was acceptable and above the minimum acceptable cut-off.

5.7.2   Assessment of Effect Size (f2)

According to Chin (1998), the relative effect of a specific exogenous latent variable on endogenous latent variable(s) by means of changes in the R-squared values is called effect size. The effect sizes for the present study were calculated as per the above formula and indicated that the effect sizes for the expectation and perceived performance were 0.385 and 0.004 respectively where expectation had a larger effect size on confirmation. Confirmation, expectations, perceived performance, incentive on use and perceived risk were 0.019, 0.053, 0.020, 0.036 and 0.098 respectively on users' behavioural intention. The effect size of the users' behavioural intention on satisfaction of government data was 0.322, which was large and acceptable. The results in Table 5.10 are aligned with the literature on SEM-PLS.

Table 5.10

Effect Sizes of the Latent Variables

R-square	f-squared	Effect size
Confirmation		
Expectations	0.385	Large
Perceived Performance	0.004	Small
Users' Behavioural Intentions		
Perceived Performance	0.020	Small
Incentives on Use	0.036	Small
Expectations	0.053	Small
Confirmation	0.019	Small
Perceived Risk	0.098	Small
User's Satisfaction of Government Data		
User Behavioural Intention	0.322	Large

5.7.3 Assessment of Predictive Relevance

Using the blindfolding procedure, the present study employed the Stone-Geisser test for predictive relevance of the research model (Geisser, 1974; Stone, 1974). In PLS-SEM, the Stone-Geisser test of predictive relevance is normally applied as a supplementary assessment of goodness-of-fit (Duarte & Raposo, 2010). Henseler *et al*. (2009) stated that in a research model where the Q^2 value(s) is found greater than zero, it is considered that the model has a predictive relevance. Table 5.11 provides the cross-validated redundancy Q^2 test results.

Table 5.11

Construct Cross-Validated Redundancy

Total	SSO	SSE	Q² (=1-SSE/SSO)
Confirmation	1,750.000	1,538.550	0.121
Expectation	1,500.000	1,500.000	
Incentive on use	1,250.000	1,250.000	
Citizens' behavioural intention	1,250.000	996.5820.	203
Perceived performance	1,000.000	1,000.000	
Perceived risk	1,250.000	1,250.000	
Citizens' satisfaction from Open government data	1,750.000	1,481.938	0.153

The results suggest that the model has predictive relevance. Interestingly, the Q^2 values obtained for the model were 0.121 (confirmation), 0.203 (intention) and 0.153 (citizens' satisfaction from government data) which were greater than zero; hence it confirms that the tested model and relationship also demonstrated predictive relevance. After the data analysis and providing evidence in support of the proposed hypothesis, model fitness, reliability, validity, model assessment and effect size of variables, it can be concluded that the study fulfilled the assumptions of the SEM model testing and that the hypothesis testing also confirmed most of the proposed relationships in users' satisfaction on open government data.

5.8   Summary

The current chapter presents the results of the data analysis using SmartPLS. The data was collected from the users of open government data. The collected data was evaluated to assess the quality and suitability of the data to test the proposed hypothesis. The preliminary data analysis was conducted using SPSS. A preliminary analysis in SPSS is important to ensure that data is suitable from further analysis. After preliminary analysis, the data was analysed using SmartPLS.

The use of PLS path modelling was discussed to justify the use of PLS for hypothesis testing. The data was analysed using a two-step approach proposed by previous literature, in which the first step was to assess the measurement model and the second was the structural model. The results of the measurement model ensured that the measurements were reliable and established sufficient level of discriminant and convergent validity.

The structural model was run to test the proposed hypotheses which resulted in a significant relationship between expectation and confirmation and an insignificant relationship between perceived performance and confirmation. Moreover, a significant relationship was found between expectation, confirmation, perceived performance, incentive on use and perceived risk which were significantly related to users' behavioural intention. Furthermore, the main relationship between users' behavioural intention and users' satisfaction from open government data also appeared to be strongly significant.

Moreover, in mediation analysis, the data found support for the mediation role of users' behavioural intention between the relationship of expectation, confirmation, perceived

performance, and incentive on use, perceived risk and users' satisfaction from open government data. In Chapter 5, the findings of the study will be discussed in light of previous literature, theory and practical perspectives. The practical implications, future research recommendations and conclusion will be discussed in detail.

CHAPTER SIX

DISCUSSION, IMPLICATIONS, RECOMMENDATIONS AND CONCLUSION

6.1 Introduction

This chapter discusses the results of the data analysis. The key findings were discussed with the help of previous literature and theory on user's intention to use open government data and users' satisfaction from open government data. The first section reiterated the research questions and objective of the current study. The second section discusses the key findings in light of previous research studies and underpinning theories employed to support research framework. The third section provides theoretical, methodological contribution and practical implications for open government data providers. The fourth section provides the limitations and future research recommendations. The last section provides the conclusion of the current study.

6.2 Recapitalisation of the Study

This study aimed to examine the influence of expectations, confirmation, and perceived performance, incentives on usage and perceived risk on citizens' behavioural intention from open government data. It also assessed the influence of citizens' behavioural intentions on citizens' satisfaction from open government data. This study assessed the mediating role of citizens' behavioural intention between expectations, confirmation, perceived performance, incentives on usage and perceived risk on citizens' behavioural intention and citizens' satisfaction from open government data.

The following research questions were posed for this research:

1. How can the ECT model and TAM model be integrated for OGD?

2. Is intention a significant mediator to satisfaction?

3. Do incentives on usage and perceived risk contribute in explaining the new ECT model in the OGD context?

The above-mentioned research questions were answered by collecting data from open government data users in Malaysia. As detailed out in Chapter 3, data collected from 250 respondents were used to confirm the proposed model of users' satisfaction on OGD. All results which were presented and discussed in Chapter 4 indicated that related to confirmation, expectation was significant while perceived performance had a insignificant influence on confirmation.

Furthermore, it was also found that confirmation, expectation, perceived performance, incentives on usage and perceived risk had a significant influence on citizens' behavioural intentions. The evidence also found that citizens' behavioural intentions had a significant influence on citizens' satisfaction from open government data. The mediating analysis showed that citizens' behavioural intentions mediated the relationship between confirmation, expectation, perceived, incentives, perceived risk and citizen's satisfaction from open government data. The next section discusses in detail the findings and relate them with previous literature and theory.

6.3 Discussion on Findings

The following section discusses the findings obtained from the current study in detail which are based on the research objectives.

6.3.1 Discussion on Influence of Expectation and Perceived Performance on Confirmation

This relationship is tested in fulfilling the 1st research objective which is to design the integrated ECT and TAM model in the OGD context. The results of Hypothesis 1 stated that expectation was significantly related to confirmation. The result of analysis showed that there was a significant relationship between expectation and confirmation.

The findings were in line with the findings of previous researches where expectation had a significant influence on confirmation. A customer or buyer's expectation is confirmed when the product/service performs according to the expectation of the customers (Churchill & Surprenant, 1982; Hong, Thong, & Tam, 2005). This signifies the importance of the expectations to be fulfilled by the product/service. In relation to this study, based on results, it can be confirmed that the expectation of the citizens from open government data is significantly related to confirmation. As the citizens perceived that their expectation from the data will be met or confirmed by the open government data, they were more inclined to use open government data. Thus, more efforts can be made by open government data providers to understand the expectations of the citizens, and steps should be taken to meet the expectations of the citizens. This will increase confirmation.

Hypothesis 2 proposed that perceived performance is significant related to confirmation. The results showed that perceived performance was not related to the confirmation of the citizens. These findings contradicted previous literature where perceived performance was related to confirmation. In light of the current research findings, it can be argued that perceived performance did not match actual performance, which created a discrepancy. This discrepancy disconfirmed the open government data expectation and received performance. When performance does not reach expectations, people will consider quality to be low, and when performance exceeds expectations, the perception of that quality improves (Aladwani, 2013). Thus, an evaluation of customers' expectations is fundamental to that evaluation and their confirmation is necessary for users' intention. Based on the above, it can be asserted that in the open government data context, the perceived performance did not lead to confirmation. It is suggested that open government data providers should pay attention to the perceived performance of the citizens and take actions to match the perceived performance with actual performance to achieve confirmation.

6.3.2 The Influence of Confirmation on Citizens' Behavioral Intentions

This relationship is examined in fulfilling the 1st research objective. Hypothesis 3 proposed that confirmation is significantly related to citizens' behavioural intentions. The results of the analysis confirmed that confirmation was significantly related to citizens' behavioural intentions. Wu (2013) discussed that confirmation of consumers' expectation affects their intentions. Moreover, Eveleth et al. (2015) also supported that confirmation influenced individual intentions. However, this study proposed the direct effect of confirmation on the citizens' behavioural intentions while other studies tested the indirect effect of the

confirmation on citizens' behavioural intentions. Furthermore, previous research studies reported that confirmation of users' expectations form behavioural intentions (Cyr, et al, 2009; Davis, et al , 1992; Thong, et al, 2006; Van der Heijden, 2004; Van Schaik & Ling, 2010).

The current study empirically proved that confirmation of citizens' expectation about the open government data influenced their intention to use the data. A higher level of confirmation will lead to higher levels of intention to use open government data. The results of the current study were supported with the expectation-confirmation theory, where confirmation of the citizens' expectations creates an intention to use the services or products. These findings suggest that confirmation significantly influenced the citizens' behavioural intention to use open government data.

6.3.3   The Relationship Between Expectation and Citizens' Behavioural Intentions

This relationship to achieve the 1st research objective. Hypothesis 4, the current study proposed that expectation had a relationship with citizens' behavioural intention. The results revealed that expectation had a significant relationship with citizens' behavioural intention. The results confirmed the proposed relationship and supported that when the expectations of users were met with open government data, users have strong intentions to use the data. The results of the analysis were as proposed in the current research. In the past literature, Eveleth et al. (2015) mentioned that one key to determine this is the extent to which the website confirms or disconfirm the individuals' expectations prior to the experience.

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The results confirmed that confirmation influenced individuals' intentions and shaped the intentions of individual users. Moreover, it was suggested that intention can be explained by the extent to which a website confirms or disconfirms the expectations of the users of a company (Eveleth et al, 2015). These results revealed a unique finding in which expectations had a significant relationship with citizens' behavioural intentions while in previous studies, most of the studies proposed an indirect effect of expectation on users' behavioural intentions.

In addition, in organizational behaviour literature, the extent to which individual expectations were met was related to behavioural intentions (Brown et al. 2008; Turnley & Feldman, 2000; Wanous et al. 1992). These results found support from the ECM, where confirmation was used as an indirect factor to determine the users' behavioural intentions. On the basis of the current study results, it can be argued that apart from the indirect effect, expectations had a direct relationship with citizens' behavioural intentions to use open data. In the current study context, it can be suggested that the expectations of the users should be fulfilled to keep the behavioural intention levels high. Thus, based on the above, it can be argued that confirmation plays a significant role in determining the citizens' behavioural intentions to use open government data.

6.3.4 Discussion on Influence of Perceived Performance on Citizens' Behavioral Intentions.

This relationship is tested in fulfilling the 1st research objective which is to design the integrated ECT and TAM model in the OGD context.

Hypothesis 5, it was proposed that there was a significant influence of perceived performance on citizens' behavioural intentions. The findings showed that perceived performance significantly influenced citizens' behavioural intentions. Chen (2008) investigated the indirect impact on perceived performance on behavioural intentions of customers and reported that there was a significant impact of perceived performance on behavioural intention. In contrast, the current study empirically investigated and found that perceived performance had a significant impact on citizens' behavioural intentions to use open government data. This study argued that citizens' behavioural intention to use open government data can be determined by perceived performance.

In line with the above, Burton, Sheather and Roberts (2003) also mentioned that behavioural intention is influenced by customers' perceived performance. This relationship can be supported by the ECT theory where perceived performance was used as an antecedent of users' behavioural intentions. Thus, based on the ideas of previous studies, the current research empirically examined the proposed relationship and found statistical support for the relationship between perceived performance and citizens' behavioural intentions. The current study recommended that in order to increase the citizens' behavioural intention to use open government data, perceived performance should be considered as an important factor.

6.3.5 Discussion on Relationship Between Incentive on Usage and Citizens' Behavioral Intentions.

This relationship represents the research objective 3 in examining the influence of incentive on usage and citizens' behavioural intentions in OGD context. To test the relationship between incentive on usage and citizens' behavioural intentions, it was proposed that incentives on usage is significantly related to citizens' behavioural intentions.

The results of the analysis indicated that incentives on usage was significantly related to citizens' behavioural intentions. Open government was widely understood as the leveraging of information technologies to generate participatory, collaborative dialogue between policymakers and citizens (Evans & Campos, 2013).

A lesser participation of the citizens in utilising open government data was reported by previous researchers. In this regard, Bélanger and Carter (2008) suggested that agencies could provide incentives to encourage citizens to try e-government services. Furthermore, Canares and Shekhar (2015) reported incentive to use open government data as the most critical factor in open data usage. In a similar way, Susha (2015) reported that users must have an incentive to participate or use open government data that is available on open government data portals.

The incentive to the users will enable them to use open government data for their own benefit. If economic incentives are given to open government data users, they are expected to exploit the open government data and use it in the commercial or civic contexts to fully utilise the open government data (Davies, 2010). Governments may use competitions (app

contests, hackathons) and other incentives to encourage individuals to find innovative uses for the data sets that they release (Eyler-Werve & Carlson, 2012; Huijboom, & Van den Broek, 2011; Ubaldi, 2013).

Furthermore, the results of the current study are also in line with the previous studies' results. In order to create intention or increase the level of intention among open government data users to use the data in Malaysia, government agencies should use incentives to motivate and encourage the users. The incentive on usage will not only increase the intentions of the citizens' but also enhance the use of the data for innovation and research purposes.

6.3.6   Discussion on Influence of Perceived Risk on Citizens' Behavioural Intentions

This relationship represents the research objective 3 in examining the on influence of perceived risk on citizens' behavioural intentions in OGD context. To examine the influence of perceived risk on citizens' behavioural intentions, the current research proposed that perceived risk has a significant influence on citizens' behavioural intentions. The results of the analysis supported the hypothesis and revealed that perceived risk significantly influenced citizens' behavioural intentions.

In a review of the literature, perceived risk refers to the users' expectation of suffering a loss in pursuit of a desired outcome (Warkentin, 2002a). In the context of the current study, it was operationalised as the security and privacy risk faced by the users of open government data while interacting with an open government. This risk perception also includes the fear of incorrect information that can distract the projects of open government data users.

The results of the study are in line with various studies conducted on perceived risk of losing privacy or security concerns. Davies (2010) documented that in open government data, all data is extracted using online interfaces. The principles of data publishing could be developed to ensure that users have a good opportunity to access the data through a trusted data source and get granular information without losing privacy or security. In addition, Bashir, et al, (2013) reported that perceived risk had a significant effect on individual intentions. Similarly, Bashir at et,(2015) mentioned perceived risk as a determinant of individual behavioural intention.

This study is in line with the previous research and reported a direct influence of perceived risk on citizens' behavioural intentions to use open government data. It can be argued that while interacting with open government portals and using open government data, the users perceived risk in losing their privacy and security. The feel that personal information like their identity might be revealed while accessing the portal. The fear of incorrect information also created hesitation among the users to use open government data for their research. Accumulatively, this perception of risk (perceived risk) directly impacts their intention to use the data. It is thus recommended that data providers should reassure the users that their information will be kept confidential and the information provided on the portal is free of errors. This can reduce the perceived risk and increase the intention to use open government data.

6.3.7 The Influence of Users' Behavioral Intentions on Citizens' Satisfaction from Open Government Data

Next, 2nd objective has been fulfilled in examining the influence of users' behavioural intentions on citizens' satisfaction from open government data. It was further proposed that citizens' behavioural intention was significantly related to citizens' satisfaction from open government data. The findings showed that citizens' behavioural intention was significantly related to citizens' satisfaction of open government data.

The current study rationalised that intention to use open government data can lead to citizens' satisfaction from the data, which is unique in the current study compared to previous research studies. In the current study, it was positioned that users must have the intention to use open government data which is a depiction of actual behaviour (Ajzen, 1991). Thus, it was postulated that first, the intention to use the data should be established before assessing the satisfaction of the citizens.

The current study provides empirical support for the idea that citizens' behavioural intention has a significant influence on satisfaction from government data. In the current study, the intention to use open government data by Malaysian citizens acted as a source to know their possibility of using the data. After having the intention, the users will use the open government data and their experience with the data can lead to satisfaction or dissatisfaction.

Thus, it can be recommended that the government should emphasise on creating intentions to use the open government data and provide users with a good experience. These intentions to use the data can be a tool to satisfy the users with open government data services.

6.3.8 Mediating role of Citizens' Behavioral Intentions Between Expectations and Citizens' Satisfaction from Open Government Data

In order to assess the mediating role of citizens' behavioural intention between expectations and citizens' satisfaction from open government data, the current study proposed that citizens' behavioural intention mediated the relationship between expectations and citizens' satisfaction from open government data, which represent the 2nd research objective.

The results of the analysis did not support the mediating role of citizens' behavioural intentions between expectations and citizens' satisfaction from open government data. It can be argued that if the expectation of the users remains unmet, it reduces the intention to use the data and unmet expectations can lead to dissatisfaction among the users.

Thus, the perceived expectations of open government data should be met while experiencing the data to generate satisfaction among the citizens. It is recommended that the Malaysian data providers should try to match their services with the perceived expectations of the open government data users. This will lead to the generation of a higher level of intention and a higher level of satisfaction from the open government data portals.

6.3.9 Mediating Role of Citizens' Behavioral Intentions Between Confirmation and Citizens' Satisfaction from Open Government Data

The mediating role of citizens' behavioural intentions was tested by proposing that citizens' behavioural intentions mediated the relationship between confirmation and citizens' satisfaction from open government data. The mediation results indicated that citizens' behavioural intention significantly mediated the relationship between confirmation and

citizens' satisfaction from open government data. Previous studies provided support that confirmation of the expectations significantly influence behavioural intentions (Eveleth et al. 2015; Wu, 2013). In the context of the current study, it can be argued that citizens' behavioural intentions bridge the confirmation of expectations from open government data and the satisfaction derived from open government data usage.

This finding is unique in nature where the indirect impact of the confirmation is tested using behavioural intentions as mediator. Based on the results, it can be argued that confirmation of expectations significantly influences the citizens' behavioural intentions which lead to satisfaction from open government data. It is suggested that open government data providers in Malaysia should meet the perceived expectation of the citizens to develop a sense of confirmation of expectations among the citizens. This confirmation creates behavioural intention and ultimately satisfaction from open government data usage.

6.3.10 Mediating Role of Citizens' Behavioral Intentions Between Perceived Performance and Citizens' Satisfaction from Open Government Data.

This relationship is related to the 2nd research objective which examining the mediating role of citizens' behavioural intentions between perceived performance and citizens' satisfaction from open government data. Hypothesis 11 proposed that citizens' behavioural intentions mediate the relationship between perceived performance and citizens' satisfaction from open government data. The results indicated that citizens' behavioural intentions acted as a mediator between perceived performance and citizens' satisfaction from open government data.

In previous studies, Liu and Forsythe (2011) identified perceived performance as the most salient factor that determined users' intentions. The format of data and metadata, information system outsourcing, level of information, legislation and policy can either facilitate or impede the ability and performance of open government data providers (Yang, Lo, & Shiang, 2015). The lower perceived performance can lead to low intentions and dissatisfaction among the users.

In the context of open government data users, the perceived performance of the open government data significantly enhanced citizens' behavioural intentions and create satisfaction among the users. The empirical testing provides evidence that citizens' behavioural intention significantly mediates the relationship and link between perceived performance and citizens' satisfaction from the open government data. It can be argued that perceived performance is a significant determinant of citizens' behavioural intention and indirectly influence the satisfaction through behavioural intentions.

Besides, it is suggested that open government data providers in Malaysia should make the effort to meet the perceived performance of the users of open government data. In the case of perceived performance and actual performance, the citizens' behavioural intentions will be increased and lead to higher levels of satisfaction. On the other hand, if the actual performance is less than perceived performance, it will decrease the intention to use and lead to dissatisfaction from open government data.

Thus, in order to get more users of open government data and increase the utilisation of open government data, open government data providers should provide standardised data and

related services to urge the citizens. This will increase the innovative use of open government data among the Malaysian citizens.

6.3.11 Mediating Role of Citizens' Behavioral Intentions Between Incentives on Usage and Citizens' Satisfaction from Open Government Data.

This relationship being analysed under the research objective 2. In Hypothesis 12, citizens' behavioural intention was proposed to mediate the relationship between incentives on usage and citizens' satisfaction from open government data. The mediation analysis results provided that there was a significant mediating rolein citizens' behavioural intentions between incentives on usage and citizens' satisfaction from open government data.

Past studies supported that incentive on open government data use acted as a significant factor in building strong intention to use the data (Bélanger & Carter, 2008; Canares & Shekhar, 2015; Susha, 2015). Susha (2015) explained that open government data users must be provided with an incentive to participate or use the data. In addition, Roumani, Nwankpa and Roumani (2015) suggested that when incentives are introduced, users perceive the behavioural intention to try a new technology as being a usual behaviour.

In the current study, the incentive on usage was found to indirectly influence the citizens' satisfaction from open government data. In the case where open government data was provided with sufficient incentive on usage, this may lead to a stronger intention to use the data and their intention can lead to satisfaction from the open government data. In order to stimulate the use of open government data, open government data providers in Malaysia should embed incentives for the users to engage and encourage them to use the data. Users

who are stimulated with incentives are expected to have more intention to use open government data compared to those without intention. Once the users intend to use the data, their intention and experience can lead to higher levels of satisfaction from the open government data. It is suggested that those who have the issue of low participation in open government data can use incentives to stimulate intentions, which can enhance the level of satisfaction among the citizens.

6.3.12 Mediating Role of citizens' Behavioral Intentions Between Perceived Risk and Citizens' Satisfaction from Open Government Data

To assess the mediating role of citizens' behavioural intentions between perceived risk and citizens' satisfaction from open government data, the current study proposed that citizens' behavioural intentions mediates the relationship between perceived risk and citizens' satisfaction from open government data, which represents 2nd research objective. In the current research context, perceived risk served as a significant factor that influences the intentions to use the data and can reduce the level of satisfaction. In previous research studies, it is clear that perceived risk appears as a significant factor that influences the behavioural intentions of the user (Bashir, Madhavaiah, & Naik, 2013; Davies, 2010; Warkentin, 2002).

It can be argued that the risk of losing personal information or the inaccuracy of open government data can reduce the intentions of open government data users. In the open government access, the web is used to create a potential threat to the users and increase the risk of privacy lost. Some government agencies share information of the users and even use the information of users for other projects. These serve as potential threats to the users.

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Moreover, the inaccuracy of the data can lead to incorrect findings and reduce the intention to use open government data for innovative projects. It can be suggested that open government data providers in Malaysia should ensure users of anonymity and provide trusted sources of data downloading that may not harm the users.

The information on the various open government data sources should be synchronised to remove doubt on information inaccuracy. This threat can be reduced by providing users with the procedures of data collection to ensure that the data is collected properly and are free of errors.

6.4   Theoretical, Methodological and Practical Implications of the Study

The current research presents theoretical, methodological and practical implications based on the findings of the current study. The following section discusses the theoretical, methodological and practical implication in detail.

6.4.1   Theoretical Implications

The theoretical implications of the current study highlighted the unexplained phenomenon of open government data citizens' behavioural intention and satisfaction in the Malaysian context. There was a lack of clarity and less explanation provided in previous research studies on the issue of the lack of open government usage by Malaysian citizens. Past studies only used ECT model constructs to highlight the issue but a discussion on what additional factors can determine users' intention and satisfaction were found to be scarce in a review of the literature. This study extended the use of ECT and TAM model by incorporating two

additional variables namely incentives on usage and perceived risk that were empirically tested, and the link between the additional variables were successfully established.

In addition to the extension, the current study positioned satisfaction as the end result and proposed behavioural intention as the mediating role between ECT factors and satisfaction. In the past studies, none of the studies had empirically reported that expectations, confirmation and perceived performance had a significant direct influence on the users' behavioural intention rather than an indirect influence through satisfaction. This study proposed that expectation, confirmation and perceived performance had an indirect impact on the citizens' satisfaction via their behavioural intentions.

The final proposed model found support from empirical data which assessed the impact of expectations, confirmation, perceived performance, incentive on usage and perceived risk on citizens' behavioural intention and an indirect impact on citizens' satisfaction from open government data. Thus, this study contributed to the existing literature by incorporating additional variables in the ECT model and extended the use of the ECT theory in the context of open government data users and provided empirical support for the proposed model.

6.4.2 Methodological Implications

This section discusses the methodological implications of the current study. This study used a diversified sample of Malaysian citizens to know their behavioural intentions and satisfaction from open government data. This study used well-established scales to measure expectations, confirmation, perceived performance, incentive on usage, perceived risk, behavioural intentions and satisfaction. This study employed the Structural Equation

Modelling technique using PLS-SEM to test the proposed hypothesis with bootstrapping of 7000. The scales of reliability and validity were found to be above the satisfactory level and hypothesis testing results also supported the proposed hypothesised relationships.

6.4.3 Practical Implications

Based on findings the current study, several implications that were relevant for open government data providers and users. In the first implication, the findings suggest that confirmation, expectations and perceived performance had a significant relationship with the users' behavioural intentions. Open government data providers should meet the expectations users have with open government data. In this case, when the expectations of the users are met with the data provided to them, this can lead to higher intentions to use and a sense of satisfaction.

Moreover, expectation confirmation should be kept in mind while providing open government data and related services to the users. These users will confirm their perceived expectations with the open government data and form intentions to use the data. If their expectations are confirmed, this leads to their satisfaction from the open government data usage. The perceived performance of the data providers should match the actual performance. In the case of discrepancy between these two, the users may not form intentions to use and feel dissatisfied with the data. Thus, the data should meet the expectations of the users and offer standardised service packages to develop a high level of intention and satisfaction among the users.

In addition, this study provides two additional factors that were empirically proven as significant to influence the users' behavioural intentions and satisfaction from the open government data. In order to increase the usage of the data and enhance the intention to use the data, open government data providers should utilise incentives on data usage. Perceived risk acts as a significant factor that can influence the intentions and satisfaction from open government data users. The open government data providers should provide a clear indication to the users that their personal data will be not used for any purpose and they should also provide anonymity statements on their portals. This can reduce the level of perceived risk among the users and enhance intention and satisfaction.

Thus, based on the results, the data providers and users can use these implications to enhance the ue and application of open government data for innovation and policy making. By using open government data, users can find empirical support for their stance and propose policies to the government that can significantly contribute to the social and economic development of Malaysia.

6.5   Limitations and Future Research Directions

The current research provides useful findings and significantly contribute in theoretical, practical and methodological aspects but like other studies, the current study has limitations that require the attention of future researchers. These limitations are predominantly related to the methodology and generalizability of the results. These limitations generally occur due to time and money-related constraints, which limits the research boundaries. This section presents several limitations and future research directions to extend knowledge in the field of open government data usage.

The first limitation is that the current research was conducted to examine the influence between expectation, confirmation, perceived performance, incentive on usage and perceived risk on citizens' behavioural intention and satisfaction. Further research studies may investigate other factors that can potentially influence the citizens' behavioural intentions and satisfaction from open government data. An advanced model of open government data can reconfirm the insignificant results of the mediating effect of users' behavioural intention between expectations and satisfaction from open government data by including more factors that can significantly influence users' behavioural intentions and satisfaction from open government data.

Secondly, the current research model measures the direct influence of expectation, confirmation, perceived performance, incentive on usage and perceived risk on users' behavioural intentions without using any moderating variables. Further studies can use other variables that can be potentially moderate the relationship between ECT factors and users' behavioural intentions.

Thirdly, the cross-sectional design of this study came with limitations pertaining to the nature of the data set. The respondents in this study were surveyed during a particular time frame which provided a snapshot of the condition and subsequently may result in a different response under a different time frame. As such, the ability to conclude with absolute certainty is restrained to a certain extent, especially where long term behaviour predication is the objective of the research. Future research studies can use longitudinal data to predict the users' behavioural intentions and satisfaction over a period of time. Moreover, future

studies can incorporate behavioural intervention to assess the effect of skills training and assess the after effect of these trainings on open government data usage.

Fourthly, this study was conducted in Malaysia, which is a developing country. Precautions must be taken while generalising the results of the study. Therefore, the results may be generalised only to similar environments and a similar stage of development in any related context. Since the fourth recommendation is to understand the open government data users' behavioural intention and satisfaction across cultures. Future studies may collect data from more than one country to compare the cross-culture behaviour of citizens to measure their behavioural intentions and satisfaction.

Fifthly, in the present study, the mediating role of users' behavioural intentions was tested between expectation, confirmation, perceived performance, incentive on usage and perceived risk and users' satisfaction from open government data. This model provided that users' behavioural intention is a critical component in explaining their satisfaction from open government data. Future research may incorporate mediated moderation or moderated mediation models to extend the model to predict users' satisfaction in a more robust manner.

Finally, the phenomenon of open government data was discussed using additional variables in the existing ECT model. The use of quantitative or qualitative methods may not provide a full understanding to support the findings. Future research may employ mixed methods or triangulation to explore the unexplored part of open government data usage with the help of both qualitative and quantitative data.

6.6 Conclusion

In an attempt to provide explanation and evidence on the factors that potentially enhance citizens' satisfaction from open government data, this study established empirical evidence to support the proposition that users' behavioural intention mediates the relationship between confirmation, expectation, perceived performance, incentive on usage and perceived risk and satisfaction. In the previous research, the ECT model was used to assess the impact of expectation, confirmation and perceived performance on users' satisfaction which leads to behavioural intentions. The key relationships proposed in the current study was found to be statistically significant.

The theoretical framework of the current study had an addition of two variables (incentive on usage and perceived risk) which added an explanation to the existing ECT theory. These two variables significantly influenced the citizens' behavioural intentions directly and citizens' satisfaction indirectly. In addition, the present study provided critical theoretical and practical implications for academia and the industry, especially to open government data providers. To conclude, expectation, confirmation, perceived performance, incentive on usage and perceived risk are significant determinants of users' behavioural intentions directly and users' satisfaction indirectly.

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APPENDIX

Appendix A

Content validity of the main questionnaire

TITLE: USER SATISFACTION MODEL TO MEASURE OPEN GOVERNMENT DATA USAGE
School of Computing, College of Arts and Sciences, Universiti Utara Malaysia
For any information required about the questionnaire, please contact:
Mohammed Shihab Ahmed through the above address.
Telephone: +6012 324 0464.
Email: memo.uum@gmail.com

This survey is seeking for panel of experts' view on the proposed instruments that are proposed to be included in the final questionnaire that aiming to get respondents' feedback on their satisfaction with the Open Government Data in Malaysia. Each panel needs to go through all the listed items and to evaluate each item on two aspects; (i) clarity, and (ii) reprehensiveness. Besides, each panel may put some comments (if necessary) in the space provided.

Suggestion for Evaluation **–** This measure is designed to evaluate the content validity of a measure. Please rate each item as follow:

1. Please rate the level of representativeness on a scale of 1-4, with 4 being the most representative. Alongside every item, space is provided for you to comment or suggest revisions on the item.

2. Please indicate the level of clarity for each item on a scale of 1 – 4. Please make comments or suggestions on the items in the space provided.

3. Lastly, please evaluate the comprehensiveness of the measure by indicating items that should be deleted or added. Thanks for your valuable time.

Kindly provide the below information

1. Your current age

    a) Less than 30

    b) 31- 40

    c) 41-50

    d) More than 51

2. Your Gender please

    a) Male

    b) Female

3. Your Profession

    a) Academician

    b) Database Expert

    c) Consultant

    d) Other (Please Specify) _____.

4. Your highest level of education achieved

    a) Diploma

    b) Degree/Master

    c) PhD

    d) Other (Please Specify)

5. Your field of expertise (Please Specify)

The enclosed survey asks you to evaluate how representative and clear the item(s) are in measuring expectation of open government data users. That is, to what extent do you think that each question on the survey measures the expectation of user? Please also indicate how clear you think each item(s) is. Lastly, you are requested to evaluate the overall comprehensiveness of the entire measure by either adding or deleting items for expectation construct.

Theoretical definition	Representativeness	Clarity
Raita and Oulasvirta (2011) defined product expectations as the beliefs and/or emotions related to a product that are formed before its actual use". They state that even when a technology is novel to its users, certain preconceptions nevertheless shape experiences. Expectations refer to the attributes or characteristics that a person anticipates or predicts will be associated with an entity such as a product, service, or technology artefact (Liao, Huang & Wang, 2015). In this case the expectation refers to the expectation of the users of open government data from the open government website or data providers.	**1**= item is not representative **2**= items need major revisions to be representative **3**=items need minor revisions to be representative **4**= items are representative	**1**= items are not clear **2**= items need major revisions to be clear **3**= items need minor revision to be clear **4** = items are clear

Each items of this section is will be based on 5-point Likert scale (1 represent strongly disagree and 5 represents strongly agree).

S/N	Items of the construct Expectations of open government data users.	Representativeness **Please rate on scale of 1-4**	Clarity **Please rate on scale of 1-4**
1	I expect that open government data will enable me to accomplish tasks more quickly.		
Please comment on above item.			
2	I expect that open government data will improve the quality of the work I do.		
Please comment on above item.			
3	I expect that open government data will make it easier to do my job		
Please comment above this item.			
4	I expect that open government data will enhance my effectiveness on the job.		
Please comment on above item			

S/N	Items of the construct Confirmations of users of open government data users.	**Representativeness** **Please rate on scale of 1-4**	**Clarity** **Please rate on scale of 1-4**
5	I expect that open government data will give me greater control over my job.		
Please comment on above item.			
6	I expect that open government data will improve my productivity.		
Please comment on the above item			

Please give your overall comments on the construct

The enclosed survey asks you to evaluate how representative and clear the item(s) are in measuring confirmation of open government data users towards the performance of open government portal. That is, to what extent do you think that each question on the survey measures the confirmation of open government data users?. Please also indicate how clear you think each item(s) is. Lastly, you are requested to evaluate the overall comprehensiveness of the entire measure by either adding or deleting items for confirmation construct.

Theoretical definition	Representativeness	Clarity
Chen, Huang, Hsu, Tseng and Lee (2010) defined expectations as when actual performance meets the expected standard. Furthermore, when there is no difference between customer's expectation and actual performance of specific product or services, means perceived performance is equal with expectation and simple confirmation is occurred (Elkhani & Bakri, 2012). Users' perception of the congruence between expectation of open government data and its actual performance is the confirmation (Bhattacherjee, 2001).	**1**= item is not representative **2**= items need major revisions to be representative **3**=items need minor revisions to be representative **4**= items are representative	**1**= items are not clear **2**= items need major revisions to be clear **3**= items need minor revision to be clear **4** = items are clear

Each items of this section is will be based on 5-point Likert scale (1 represent strongly disagree and 5 represents strongly agree).

S/N	Items of the construct Confirmations of users of open government data users.	**Representativeness** **Please rate on scale of 1-4**	**Clarity** **Please rate on scale of 1-4**
1	My experience with using the open government data approach was better than what I expected		
Please comment on above item.			
2	The service level provided by t open government data provider was better than what I expected.		
Please comment on above item.			
3	Overall, most of my expectations from using open government data approach were confirmed.		
Please comment above this item.			
4	My online use experience via open government data falls short of my expectations.		
Please comment on above item			
5	Open government data are generally good at handling questions or complaints before or after use.		
Please comment on above item.			
6	After-sales service provided by open government data meets my expectations.		

	Please comment on the above item

S/N	Items of the construct Confirmations of users of open government data users.	Representativeness Please rate on scale of 1-4	Clarity Please rate on scale of 1-4
7	I generally get the level of service I expect from open government data.		
	Please comment on above item.		
8	Products and services recommended to me by open government data meet my expectations.		
	Please comment on above item.		
9	Open government data direct marketing activities meet my expectations.		
	Please comment above this item.		
10	My experience with using the open government data approach was better than what I expected.		
	Please comment on above item		

Please give your overall comments on the construct

Section C: Perceived performance

The enclosed survey asks you to evaluate how representative and clear the item(s) are in measuring perceived performance of open government data portal. That is, to what extent do you think that each question on the survey measures the perceived performance of open government data?. Please also indicate how clear you think each item(s) is. Lastly, you are requested to evaluate the overall comprehensiveness of the entire measure by either adding or deleting items for perceived performance construct.

Theoretical definition	Representativeness	Clarity
Perceived performance is defined as customers' perception of how product performance fulfills their needs, wants, and desires (Cadotte, Woodruff, & Jenkins, 1987). Moreover, Spreng et al. (1996) defined perceived performance as ''beliefs regarding the product attributes, levels of attributes, or outcomes''. In context of the current study perceived performance of open government data is the outcome of open government data to enhance the performance,	1= item is not representative 2= items needs major revisions to be representative 3=items needs minor revisions to be representative 4= items is representative	1= items is not clear 2= items needs major revisions to be clear 3= items needs minor revision to be clear 4 = items is clear

S/N	Items of the construct perceived performance of open government data	Representativeness Please rate on scale of 1-4	Clarity Please rate on scale of 1-4
	productivity, effectiveness, improvement in skill and overall usefulness for the users.		

Each items of this section is will be based on 5-point Likert scale (1 represent strongly disagree and 5 represents strongly agree).

S/N	Items of the construct perceived performance of open government data	Representativeness Please rate on scale of 1-4	Clarity Please rate on scale of 1-4
1	Using open government data approach improves my performance in managing personal investment.		
Please comment on above item.			
2	Using the open government data increases my productivity in managing personal investment.		
Please comment on above item.			
3	Using the open government data approach enhances my effectiveness in managing personal investment.		
Please comment above this item.			
4	Overall, the open government data		

S/N	Items	Representativeness	Clarity
	is useful in managing personal investment.		
Please comment on above item			
5	Using open government data improves performance of my learning.		
Please comment on above item.			
S/N	Items of the construct Confirmations of users of open government data users.	**Representativeness** Please rate on scale of 1-4	**Clarity** Please rate on scale of 1-4
6	Using open government data improves skill of my search data.		
Please comment on the above item			
7	Using open government data enables me to access a lot of usefulness information.		
Please comment on the above item			
Please give your overall comments on the construct			

The enclosed survey asks you to evaluate how representative and clear the item(s) are in measuring incentives on usage of open government data portal. That is, to what extent do you think that each question on the survey measures the incentive to use open government data?. Please also indicate how clear you think each item(s) is. Lastly, you are requested to evaluate the overall comprehensiveness of the entire measure by either adding or deleting items for incentive construct.

Theoretical definition	Representativeness	Clarity
Provide incentive schemes to engage citizens in open data usage (Susha, Zuiderwijk, Charalabidis, Parycek, & Janssen, 2015). Moreover, Incentives are not just related to financial benefits; there are also incentives related to public value. In this current study, incentive refers to the benefits provided by the government to the users of open data.	**1=** item is not representative **2=** items needs major revisions to be representative **3=**items needs minor revisions to be representative **4=** items is representative	**1=** items is not clear **2=** items needs major revisions to be clear **3=** items needs minor revision to be clear **4 =** items is clear

Each items of this section is will be based on 5-point Likert scale (1 represent strongly disagree and 5 represents strongly agree).

S/N	Items of the construct perceived performance of open government data	Representativeness Please rate on scale of 1-4	Clarity Please rate on scale of 1-4
1	Open government data provide incentive schemes to engage citizens in open data usage.		
Please comment on above item.			

2	Government stimulate the development of specialized, open-data driven start-up incubators.		
Please comment on above item.			
3	Government stimulate the development of business models to allow enterprises to develop add-on services on top of open data platforms, at a cost.		
Please comment above this item.			
4	Open Government data support issue-oriented community building through participatory events.		
Please comment on above item			
5	Government align events, competitions and hackathons with, for example, university curricula, awards, festivals and direct marketing for awareness on usage of government data.		
Please comment on above item.			
Please give your overall comments on the construct			

Section E: Perceived Risk

The enclosed survey asks you to evaluate how representative and clear the item(s) are in measuring perceived risk of using open government data portal. That is, to what extent do you think that each question on the survey measures the perceived risk of using open government data?. Please also indicate how clear you think each item(s) is. Lastly, you are requested to evaluate the overall comprehensiveness of the entire measure by either adding or deleting items for perceived risk construct.

Theoretical definition	Representativeness	Clarity
A user's uncertainty about the quality of information being gathered can potentially lea d to anxiety, which can come in the way of their adoption decision. The expected social or economic loss caused from using a new system constitutes perceived risk (Labay and Kinnear 1981; Rogers and Shoemaker 1971). In this context, the perceived risk will be used to measure users' apprehensions of inputting personal information onto such websites, and also their confidence in using the information available on such websites.	1= item is not representative 2= items needs major revisions to be representative 3=items needs minor revisions to be representative 4= items is representative	1= items is not clear 2= items needs major revisions to be clear 3= items needs minor revision to be clear 4 = items is clear

Each items of this section is will be based on 5-point Likert scale (1 represent strongly disagree and 5 represents strongly agree).

S/N	Items of the construct perceived performance of open government data	Representativeness **Please rate on scale of 1-4**	Clarity **Please rate on scale of 1-4**
1	Using open government services and offerings online is risky because of a lack of data security.		
Please comment on above item.			
2	Data and information provided through open government online are often inconsistent.		
Please comment on above item.			
3	Government authorities will probably use my personal data for unknown purposes.		
Please comment above this item.			
4	The underlying transaction processes of open government appear risky because of a lack of transparency.		
Please comment on above item			
5	Government authorities will probably not respond to my open government related requests/inputs.		
Please comment on above item.			

Please give your overall comments on the construct

Section F: Intention to use

The enclosed survey asks you to evaluate how representative and clear the item(s) are in measuring intention to use open government data portal. That is, to what extent do you think that each question on the survey measures the intention to use open government data?. Please also indicate how clear you think each item(s) is. Lastly, you are requested to evaluate the overall comprehensiveness of the entire measure by either adding or deleting items for intention to use construct.

Theoretical definition	Representativeness	Clarity
The intention to use a technology is the state in which a person is planning to use a new technology (Lee & Rao, 2009).Behavioral intention implies an individual's intention, prediction or plan to use a technology in the future (Saxena, 2016). In this study, the intention refers to intention of users willingness and likeliness to use the open government data.	1= item is not representative 2= items needs major revisions to be representative 3=items needs minor revisions to be representative 4= items is representative	1= items is not clear 2= items needs major revisions to be clear 3= items needs minor revision to be clear 4 = items is clear

Each items of this section is will be based on 5-point Likert scale (1 represent strongly disagree and 5 represents strongly agree).

S/N	Items of the construct perceived performance of open government data	Representativeness **Please rate on scale of 1-4**	Clarity **Please rate on scale of 1-4**
1	I intend to continue using the open government data rather than discontinue its use.		
Please comment on above item.			
2	My intentions are to continue using the open government data rather than use any alternative means.		
Please comment on above item.			
3	I am willing to using open government data.		
Please comment above this item.			
4	It is very likely that I will use open government data in the future.		
Please comment on above item			
5	I am willing to use open government data continuously.		
Please comment on above item.			

Please give your overall comments on the construct

Section G: Satisfaction

The enclosed survey asks you to evaluate how representative and clear the item(s) are in measuring users' satisfaction with use of open government data portal. That is, to what extent do you think that each question on the survey measures the users' satisfaction with use of open government data?. Please also indicate how clear you think each item(s) is. Lastly, you are requested to evaluate the overall comprehensiveness of the entire measure by either adding or deleting items for satisfaction construct.

Theoretical definition	Representativeness	Clarity
Users' affect with (feelings about) use of services (Bhattacherjee, 2001). Moreover, users' satisfaction is a collective outcome of perception, evaluation, and psychological reactions to the consumption experience with a product/service (Yi, 1990). In context of the current study is the user's feeling such as be pleased, contented and delighted after using the open government data.	1= item is not representative 2= items needs major revisions to be representative 3=items needs minor revisions to be representative 4= items is representative	1= items is not clear 2= items needs major revisions to be clear 3= items needs minor revision to be clear 4 = items is clear

Each items of this section is will be based on 5-point Likert scale (1 represent strongly disagree and 5 represents strongly agree).

S/N	Items of the construct perceived performance of open government data	Representativeness Please rate on scale of 1-4	Clarity Please rate on scale of 1-4
1	I am satisfied with my decision on the use of the open government data approach.		
Please comment on above item.			
2	My choice to use this open government data approach was a wise one.		
Please comment on above item.			
3	I think I did the right thing by deciding to use open government data approach.		
Please comment above this item.			
4	Using the web portal makes me feel very satisfied.		
Please comment on above item			
5	Using the web portal makes me feel very pleased		
Please comment on above item.			

S/N	Items of the construct	Representativeness	Clarity
6	Using the web portal makes me feel very contented		

Please comment on above item.

S/N	Items of the construct Confirmations of users of open government data users.	**Representativeness** **Please rate on scale of 1-4**	**Clarity** **Please rate on scale of 1-4**
7	Using the web portal makes me feel very delighted.		

Please comment on above item.

Please give your overall comments on the construct

Kindly provide if you have any further comment.

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I am very much thankful to you for your precious time and valuable comments

Appendix B

Survey Questionnaire

Dear Respondent,

I am a PhD scholar at University Utara Malaysia. I am conducting research on *users'*
satisfaction from open government data in Malaysia. I request you to participate in this study
by answering the attached questionnaire that will hardly take your 10 minutes.

The questionnaire is anonymous and your responses will be used for the academic
research purpose only. If you have any questions or concerns about the questionnaire or
about participating in this study, you may contact me at **memo.uum@gmail.com.** You can
also request for key research findings through same email address.

Thanks for your cooperation.

Sincerely,

Shihab Mohammed
School of Computing
UUM College of Arts and Sciences
Universiti Utara Malaysia, 06010 Sintok, Kedah Darul Aman
Cell: +60 12 324 0464
memo.uum@gmail.com

Code	Please encircle the number that indicates the extent to which you agree or disagree with the statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Exp1	I expect that open government data will enable me to accomplish my job tasks more quickly.	1	2	3	4	5
Exp2	I expect that open government data will improve the quality of the work I do.	1	2	3	4	5
Exp3	I expect that open government data will make it easier to do my job.	1	2	3	4	5
Exp4	I expect that open government data will enhance my effectiveness on the job.	1	2	3	4	5
Exp5	I expect that open government data will give me greater control over my job.	1	2	3	4	5
Exp6	I expect that open government data will improve my productivity.	1	2	3	4	5
Conf1	My experience with using the open government data approach was better than what I expected.	1	2	3	4	5
Conf2	The service level provided by the open government data provider was better than what I expected.	1	2	3	4	5
Conf3	My experience of using open government data does not meet my expectations.	1	2	3	4	5
Conf4	Open government data administrator generally good at handling questions or complaints.	1	2	3	4	5
Conf5	Services provided by open government data administrators meet my expectations.	1	2	3	4	5
Conf6	I generally get the level of service I expect from open government data.	1	2	3	4	5
Conf7	Products and services recommended to me by open government data meet my expectations.	1	2	3	4	5

Conf8	Open government data direct marketing activities meet my expectations.	1	2	3	4	5
Conf9	My experience with using the open government data approach was better than what I expected.	1	2	3	4	5
Conf10	Overall, most of my expectations from using open government data approach were confirmed.	1	2	3	4	5
Perf1	Using open government data approach improves my performance at my job.	1	2	3	4	5
Perf2	Using the open government data increases my productivity at my job.	1	2	3	4	5
Perf3	Using the open government data approach enhances my effectiveness at my job.	1	2	3	4	5
Perf4	Using open government data improves my learning at my job.	1	2	3	4	5
Perf5	Using open government data improves my skills.	1	2	3	4	5
Perf6	Using open government data enables me to access a lot of useful information.	1	2	3	4	5
Perf7	Overall, the open government data is useful in managing my job.	1	2	3	4	5
Code	Please encircle the number that indicates the extent to which you agree or disagree with the statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Incen1	Open government data provides incentive schemes to engage citizens in open data usage.	1	2	3	4	5
Incen2	Government stimulates the development of specialised, open-data driven start-up incubators.	1	2	3	4	5
Incen3	Government stimulate the development of business models to allow enterprises to develop add-on services on top of open data platforms.	1	2	3	4	5

Incen4	Open Government data supports issue-oriented community building through participatory events.	1	2	3	4	5
Incen5	Government arrange events, competitions and hackathons for increasing the awareness on the usage of government data.	1	2	3	4	5
PR1	Using open government services and offerings are risky because of a lack of data security.	1	2	3	4	5
PR2	Data and information provided through open government are often inconsistent.	1	2	3	4	5
PR3	Government authorities will probably use my personal data for unknown purposes.	1	2	3	4	5
PR4	The underlying transaction processes of open government appear risky because of a lack of transparency.	1	2	3	4	5
PR5	Government authorities will probably not respond to my open government related requests/inputs.	1	2	3	4	5
Int1	I intend to continue using the open government.	1	2	3	4	5
Int2	My intentions are to continue using the open government data over using alternative data sources.	1	2	3	4	5
Int3	I am willing to use open government data.	1	2	3	4	5
Int4	It is very likely that I will use open government data in the future.	1	2	3	4	5
Int5	I am willing to use open government data continuously.	1	2	3	4	5
S1	I am satisfied with my decision on the use of the open government data approach.	1	2	3	4	5
S2	My choice to use open government data approach was a wise one.	1	2	3	4	5
S3	I think I did the right thing by deciding to use open government data approach.	1	2	3	4	5

S4	Using the open government data makes me feel very satisfied	1	2	3	4	5
S5	Using the open government data makes me feel very pleased	1	2	3	4	5
S6	Using the open government data makes me feel very contented	1	2	3	4	5
S7	Using the open government data makes me feel very deligh	1	2	3	4	5

Demographics of Respondents:

Gender

1. Male **2**. Female

Age Group

1. Below 25 Years **2**. 25-35 Years **3**. 36-45 Years

4. 46-55 Years **5**. 56 Years and Above

Marital Status

1. Unmarried **2**. Married **3**. Divorced

4. Widow

Average Income (Per Month)

1. Below RM. 2,000 **2**. RM. 2,000 – RM. 4,000

3. RM. 4,000 – RM. 6,000 **4**. RM. 6,000 – RM. 8,000

5. RM. 8,100 and Above

Academic Qualification

       1. Intermediate   **2**. Graduate   **3**. Post Graduate

       4. PhD   **5**. Others

Please feel free to write additional comments on open government data:

_____

   _____

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Expert Review

For

Open government data satisfaction in Malaysia for Malaysian users

The existing assessment is mainly the evaluation of expert satisfaction about **the model of open government data** satisfaction **in Malaysia**. This review separated into two parts (Section A, and B). Section A indicates the general information of the expert, while section B will be for providing comments and suggestions about reviewing the model and questionnaire.

Thank you for your time and assistance

PhD Candidate

Mohammed Shihab Ahemd

Section A: General Information

Name: --

Official Position: ---

Specialization: ---

Section B: Expert Evaluation

 After reviewing, how do you rate the model?

Other comments or suggestions: --

Expert's Signature & Official Stamp

Problem Statement

Conceptually open government data add values to accountability, citizen's participation and more collaboration of public organisations (Kellyton & Vinicius, 2015; Janssen et al., 2012). This implies that the open government data may give some impact to the delivery of public services and efficiencies. Besides, researchers have stressed out that open government data promote strong association between government offices and citizens (Francoli, 2011; Ubaldi, 2013). Indeed, availability of open government data have positive impact on the output of workers and citizens in terms of time management, planning and forecasting of future challenges (Juan et al., 2014; Margetts & Partington, 2010; Lynn, 2012). It can be inferred that citizens are part of the elements in the societies' benefit and ensures the successful implementation of open government data.

Moreover, several studies have been conducted in the domain of open data and open government data from citizen's perspective (John & Jeni, 2010; Harlan & David, 2012). Anneke and Marijn (2014) investigated the negative impact of open government data on citizens, while Juan et al. (2014) explored the evolution of open government data. On the other hands, the study of Julian et al. (2011) investigated effort for increasing the citizen's utilisation of open government data, thus, bringing about the trend of movement of open government data among the public. This raised the importance to increase the citizens' utilisation of open government data for their individual, research and business purposes. Which factors are helpful to increase the intentions of the citizens to use open government data and how they can be satisfied from the use of open government data is still discussed scarcely by the previous literature.

Available literature on open government data measures the continuity of data, whereas, satisfaction has been stressed as the substitute of efficiency and success of a system (John & Jeni, 2010; Harlan & David, 2012). Besides, very few requirements for measuring citizen's satisfaction from open government data have been discussed.

In fact, users are central part of information system and they serve as the determinant of both satisfaction and dissatisfaction of technology that could suggest the onward usage (Usha, et al., 2010). Researchers have cleared the distinction between use and satisfaction, where use is voluntary in the case of enforcing policy or rules, while satisfaction determines success and continuity of a system (Igbaria & Tan, 1997; Ives et al., 1983). Thus, citizen's satisfaction can be described as means of measuring information system success (Cho et al., 2009). The satisfaction and use of the citizen is remained as important success factor for any information system, including the open government data which is the subject of this work.

Most available models in explaining the performance of e-government services use from perspective of satisfaction of users from these services. Very little has known on intention to use open government data and satisfaction of the users in general and particular to Malaysia. some studies, Wirtz, Weyerer and Rösch (2018) assessed the antecedents of intention to use open government data. This research does not only identify the scarcity of studies on open government data from user perspective but extended the view of Wirtz et al and integrate it with expectation confirmation model (ECT) by Oliver (1977, 1980). Where ECT advocates the users satisfaction and intention come from fulfilment of expectation and perceived performance, which lead towards satisfaction and intentions. This depicts that

satisfaction act as measure of the performance of open government data in perspective of users. However, in case of open government data the users' intention to use can be more appropriate to assess the performance of open government data. Finn, Wang and Frank (2009) provided evidences shows that intention predicts performance better than customer satisfaction (Keiningham et al. 2007; Pingitore et al.2007). In the current research, open government data intention to use seems more appropriate as the users does not use the open government data as expected by the government. Thus, factor that affect the intention to use could be more suitable in context of Malaysian citizens.

The standard ECT theory has been widely applied in various contexts to assess the intentions of users through satisfaction. These factors (expectations, confirmation and perceived performance) found to indirectly influence the intention of the users. Nevertheless, some cases apart from indirect relationship with intention, researchers measures direct effect of factors on intention to use. For instance, Rana, Dwivedi and Williams (2013) assessed the impact of system quality, information quality and perceived usefulness on intention to use rather than through satisfaction of users from online public grievance redressal system. This system is part of open government data and this concepts can be applied to Malaysian open government data.

Lack of public interest towards using open government data can be lack of security and assurance provided by system to users. In the open government data portal there is no surety provided to the users that the data provided to them is error free and they can use it for strategic planning purposes. Rather, it has been stated that there is no guaranty from the open

institute (MaMPU) in case of any error or omission in the data. This indicates lack of privacy and transparency of data that is perceived risk in the terms previous literature. Siau and Shen (2003) pointed out that consumers have many doubts in perceiving transactions, which leads to an increase in perceived risks and decline in behavioural intention towards the use. Similar, could be the case where citizens feel risk of wrong information provided by the open government portal and/or loss of their own profile information while connecting to open government data portals. In order to increase the usage of the open systems, users should be motivated enough to use the open government data. Wirtz et al. (2018) identified motivation as factor that act as antecedent of intention to use open government data. Motivational approaches have been successfully applied recently to understand citizen participation in the context of open government, suggesting that citizens' motives or motivations play an essential role in determining their engagement in open government activities (Hutter et al., 2011;Wijnhoven et al., 2015). In this perceptive, Bélanger and Carter (2008) suggested that agencies could provide incentives to encourage citizens to try e-government services. Furthermore, Canares and Shekhar (2015) reported that incentive to use open government data act as most critical factors in open data usage. In a similar way, Susha (2015) reported that users must have an incentive to participate or use open government data that is available on open government data portals. The cited literature provide support in favour of increasing the intention to use open government data by providing incentive on usage. Incentive on open government data usage can be a potential factor that enhance the intention of citizens to use open government data.

The review of literature documented the factors such as expectation, perceived performance, confirmation significantly contribute in users' satisfaction and intention to use open

government data. In addition to that, perceived risk appears as a hindrance to the usage of open government data and reduce the intention to use open government data. Moreover, incentive on usage appear as significant factor that influence the intention to use open government data

Research Objectives

The objectives of this study are as follows:

1. To design the integrated ECT and TAM model in OGD context.

2. To examine the mediating role of citizens' behavioural intention between the expectations, confirmation, perceived performance, incentive on usage, perceived risk and citizen's satisfaction of open government data.

3. To test impact of incentives on usage and perceived risk in explaining new ECT model in OGD context.

Research Model
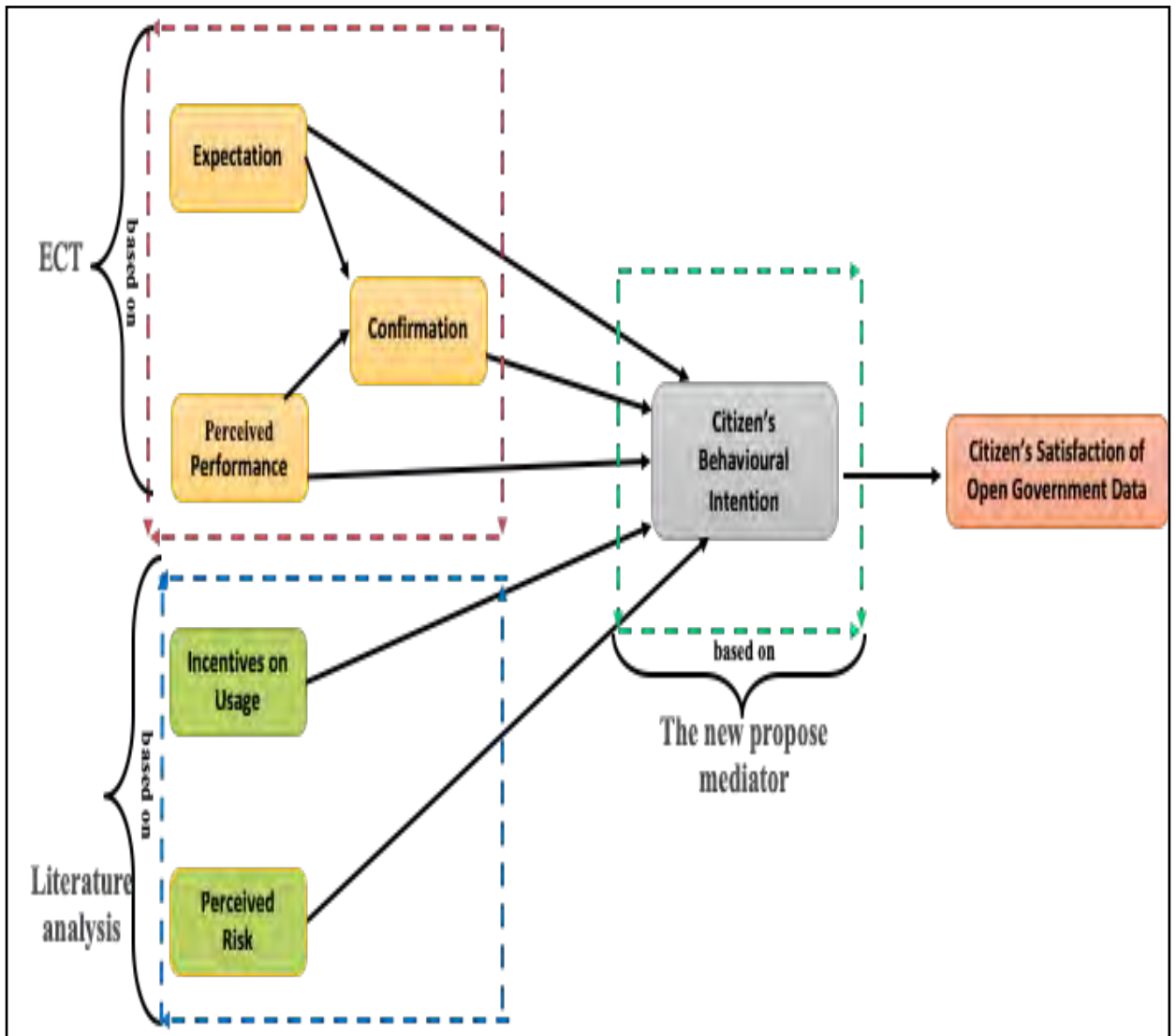
Figure 1.1 Research model

Hypotheses Development

No	Hypothesis
H_1	EXP has a significant relationship with CNF
H_2	PP has a significant relationship with CNF
H_3	CNF has a significant relationship with UBI
H_4	EXP has a significant relationship with UBI
H_5	PP has a significant relationship with UBI
H_6	IoU has a significant relationship with UBI
H_7	PR has a significant relationship with UBI
H_8	UBI has a significant relationship with S
H_9	UBI mediates the relationship between EXP and S
H_{10}	UBI mediates the relationship between CNF and S
H_{11}	UBI mediates the relationship between PP and S
H_{12}	UBI mediates the relationship between IoU and S
H_{13}	UBI mediates the relationship between PR and S

CNF= Confirmation, EXP= expectations, PP= Perceived Performance, IoU is incentive on usage, PR= Perceived Risk, UBI= Behavioural Intentions, S= Citizens' satisfaction from open government data.

USER SATISFACTION MODEL TO MEASURE OPEN GOVERNMENT DATA USAGE

This study focuses on the adoption and utilization of information and communication technologies to develop an open government data satisfaction model to help citizens participate in the open government data formulation process within the context of open government data. The emergence of ICT is one of the most important developments in governance over the past decade. Therefore, the key challenge to the government is to incorporate ICT into the structures and processes of the state and of governance. With these concerns, this study intends to focus on the adoption of open government data satisfaction in Malaysia.

The purpose of this survey is to examine your perceptions about open government data. Participation is a process that can be divided into sub-processes, specifically in public policy formulation. These sub-processes have been the focus on Northern Corridor Economic Region (NCER) that covers Kedah, Perlis, Perak and Penang states of Malaysia, and includes staff and students of universities in the region those are UTP, USM, UUM, UNIMAP. This survey is designed to obtain information that will assist to understanding how a citizen like you can become an effective adopter in the using open government data. Hence, your honest opinion and success of this survey depends on your participation and candid responses. We would therefore greatly appreciate your assistance in answering the questionnaire. Please be assured that your responses will be kept strictly confidential. The strict ethic guidelines of University Utara Malaysia (UUM) will ensure anonymity is maintained at all time. Hence, no names are required. Individual participants will not be identified in the analysis as only aggregated results will be analyzed and presented.
Thank you for your time and consideration. It is only with your generous help this study can be successful.

Sincerely Yours,

MOHAMMED SHIHAB AHMED.
PhD Candidate, University Utara Malaysia.
Email: memo.uum,@gmail.com

Code	Please encircle the number that indicates the extent to which you agree or disagree with the statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Exp1	I expect that open government data will enable me to accomplish my job tasks more quickly.	1	2	3	4	5
Exp2	I expect that open government data will improve the quality of the work I do.	1	2	3	4	5
Exp3	I expect that open government data will make it easier to do my job.	1	2	3	4	5
Exp4	I expect that open government data will enhance my effectiveness on the job.	1	2	3	4	5
Exp5	*I expect that open government data will give me greater control over my job.*	1	2	3	4	5
Exp6	*I expect that open government data will improve my productivity.*	1	2	3	4	5
Conf1	My experience with using the open government data approach was better than what I expected.	1	2	3	4	5
Conf2	The service level provided by the open government data provider was better than what I expected.	1	2	3	4	5
Conf3	*My experience of using open government data does not meet my expectations.*	1	2	3	4	5
Conf4	Open government data administrator generally good at handling questions or complaints.	1	2	3	4	5
Conf5	*Services provided by open government data administrators meet my expectations.*	1	2	3	4	5
Conf6	*I generally get the level of service I expect from open government data.*	1	2	3	4	5
Conf7	*Products and services recommended to me by open government data meet my expectations.*	1	2	3	4	5
Conf8	*Open government data direct marketing activities meet my expectations.*	1	2	3	4	5
Conf9	My experience with using the open government data approach was better than what I expected.	1	2	3	4	5
Conf10	Overall, most of my expectations from using open government data approach were confirmed.					
Perf1	*Using open government data approach improves my performance at my job.*	1	2	3	4	5
Perf2	*Using the open government data increases my productivity at my job.*	1	2	3	4	5
Perf3	*Using the open government data approach enhances my effectiveness at my job.*	1	2	3	4	5

Perf4	*Using open government data improves my learning at my job.*	1	2	3	4	5
Perf5	*Using open government data improves my skills.*	1	2	3	4	5
Perf6	*Using open government data enables me to access a lot of useful information.*	1	2	3	4	5
Perf7	*Overall, the open government data is useful in managing my job.*	1	2	3	4	5
Code	Please encircle the number that indicates the extent to which you agree or disagree with the statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Incen1	Open government data provides incentive schemes to engage citizens in open data usage.	1	2	3	4	5
Incen2	Government stimulates the development of specialised, open-data driven start-up incubators.	1	2	3	4	5
Incen3	Government stimulate the development of business models to allow enterprises to develop add-on services on top of open data platforms.	1	2	3	4	5
Incen4	Open Government data supports issue-oriented community building through participatory events.	1	2	3	4	5
Incen5	*Government arrange events, competitions and hackathons for increasing the awareness on the usage of government data.*	1	2	3	4	5
PR1	Using open government services and offerings are risky because of a lack of data security.	1	2	3	4	5
PR2	Data and information provided through open government are often inconsistent.	1	2	3	4	5
PR3	Government authorities will probably use my personal data for unknown purposes.	1	2	3	4	5
PR4	The underlying transaction processes of open government appear risky because of a lack of transparency.	1	2	3	4	5
PR5	*Government authorities will probably not respond to my open government related requests/inputs.*	1	2	3	4	5
Int1	I intend to continue using the open government.	1	2	3	4	5
Int2	My intentions are to continue using the open government data over using alternative data sources.	1	2	3	4	5
Int3	I am willing to use open government data.	1	2	3	4	5
Int4	It is very likely that I will use open government data in the future.	1	2	3	4	5
Int5	I am willing to use open government data continuously.	1	2	3	4	5

S1	I am satisfied with my decision on the use of the open government data approach.	1	2	3	4	5
S2	My choice to use open government data approach was a wise one.	1	2	3	4	5
S3	I think I did the right thing by deciding to use open government data approach.	1	2	3	4	5
S4	Using the open government data makes me feel very satisfied	1	2	3	4	5
S5	Using the open government data makes me feel very pleased	1	2	3	4	5
S6	Using the open government data makes me feel very contented	1	2	3	4	5
S7	Using the open government data makes me feel very delighted	1	2	3	4	5

<u>Demographics of Respondents</u>:

Gender

     1. Male   **2. Female**

Age Group

     1. Below 25 Years   **2. 25-35 Years**   **3. 36-45 Years**

     4. 46-55 Years   **5. 56 Years and Above**

Marital Status

     1. Unmarried   **2. Married**   **3. Divorced**

     4. Widow

Average Income (Per Month)

     1. Below RM. 2,000   **2. RM. 2,000 – RM. 4,000**

     3. RM. 4,000 – RM. 6,000   **4. RM. 6,000 – RM. 8,000**

     5. RM. 8,100 and Above

Academic Qualification

     1. Intermediate   **2. Graduate**   **3. Post Graduate**

     4. PhD   **5. Others**

Please feel free to write additional comments on open government data:

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Thank you for your kind Cooperation