



Regular Article

The transformation of government employees' behavioural intention towards the adoption of E-government services: An empirical study

Kit Yeng Iong^{a,*}, Jenny O.L. Phillips^b

^a PhD in Government Studies of Faculty of Business and Law of the University of Saint Joseph, Macao

^b Associate Professor of Faculty of Business and Law of the University of Saint Joseph, Macao

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ABSTRACT

Electronic government is increasingly dominant in the study of public administration. In analysing people's behavioural factors towards the adoption of e-services, most previous studies targeted the adult population, while those on government employees are minimal. Government employees have an essential function in the process of government operation; they can be regarded as the principal medium of communication between the service provider (government) and the end-users (citizens). This study was designed to understand the government employees' behavioural factors on their intentions towards adopting e-government services. A set of semi-structured interview questions was developed based on the prior literature on the Theory of Planned Behaviour (TPB) and e-government studies. Ten in-depth interviews were conducted in Macao SAR (Special Administrative Region). In addition to analysing the three primary constructs of TPB, the factor of *Trust* and some enablers and hindrances were identified. Significant findings were yielded while investigating how the government employees perceived the e-services and how they regarded the general public's perception of this issue. This contextualisation would help policymakers look at this issue from different perspectives and design feasible interventions according to group alignment strategies.

1. Introduction

Adopting information and communications technologies (ICTs) is becoming essential to people's daily lives in the 21st century (Jonathan & Rusu, 2019). With the widespread use of the Internet, governments worldwide have adopted e-government services, and their actual use has grown rapidly. Every government policy must consider both *policy* and *people*, so policymakers can gain insight into citizens' behaviour by understanding their attitudes towards e-government services adoption and non-adoption. As an extension of our previously published work which focused on the e-government adoption behaviour of hard-to-reach groups (see Iong & Phillips, 2022), this paper explores the behavioural intention of government employees.

Previous studies were mainly targeted at the general public behaviour towards e-government adoption; however, the point of view of government employees has rarely been considered, let alone those based on a well-researched theoretical framework (Amrouni et al., 2019; Rehouma & Hofmann, 2018). Government employees are crucial in changing the traditional face-to-face government operation into e-channels because they are both the implementers (delivering the

e-services from the government to the citizens) and the users (using the e-services to facilitate their daily work) of the e-services. Studying how government employees and citizens perceive e-services may yield significant findings. Thus, this paper focuses on the opinions of government employees. The main objective is to explore their opinion on the e-government implementation process while they act as both the implementers and users simultaneously. Their opinions enable policymakers to compare the effectiveness of traditional face-to-face and e-channel services.

Macao SAR, China, is the city of investigation in context. It is used as a typical example because it is a wealthy region with a very high population density (Data from DSEC, 2020). Its Internet Penetration Rate among adult citizens reached 91% in 2020 (Data from Macao Association for Internet Research, 2020). The adoption rate should be high with all these favourable factors for implementing e-government services. The Macao government initially launched the "e-pass account" for the general public in 2009 (see Iong, 2022). However, the actual scenario is that even though the e-government services have been implemented here for over two decades, its achievements in the first 16 years were unsatisfactory (Cai, 2002; see "E-government is," 2018; see

* Corresponding author.

E-mail address: iong.kit.yeng@usj.edu.mo (K.Y. Iong).

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“E-government is lagging,” 2018; Commission of Audit of Macao SAR, 2018), only within recent years that progress was achieved relatively faster. Many residents still do not use or do not intend to use e-government services for public administrative procedures.

The Macao SAR government aims to develop e-services as an alternative means of providing public services. This study contributes to the existing literature by adding to our knowledge of the perceptions of government employees. We intend to explore the research question: “What behavioural factors affect the Macao citizens’ adoption of e-government services through the lens of government employees?” From the perspective of government employees, our objective is to identify the changes in behavioural factors that affect the general public’s e-government services usage intentions.

2. Literature review

Most studies identified the findings using secondary data generated by evaluation rather than primary data through a descriptive methodology analysis. The evaluation of the outputs of using e-government is still in the mainstream studies, while the scenarios in the processes are lagging (Yildiz, 2007). Yildiz (2007) stressed the importance of collecting primary data from extensive fieldwork and multiple sites. Multi-method approaches are also needed.

Belanche et al. (2010) stated that, in a great deal of research, although citizens understood the importance of e-government initiatives, they were relatively ill-equipped with knowledge about the determinants contributing to their intention to use online public services. Many governments around the world focus their resources on advancing ICT tools. There is a common perception among the policymakers of governments that citizens will automatically adopt a specific type of e-service as long as it is provided. However, in many findings of empirical studies, the scholars pointed out the ever-existing problem of “no intention to use” a specific type of e-service even though the service is beneficial for citizens (Alarabiat et al., 2017; Nzaramyimana & Susanto, 2019). So, the question then becomes, what motivates citizens to use online public services? Though citizens’ intentions to support these initiatives have not yet been adequately evaluated, they may still represent some potent forces in persuading other citizens to enlist in these activities. Especially when the use of ICTs, as the term indicates: *information and communication technologies*, has brought forward a new domain in the study of e-government besides the general perception of using technology, that is, “communication” is involved.

2.1. The theories utilised in the E-government studies

While there is a trend towards integrating different factors and theories in one study, Jonathan and Rusu (2019) noted that many scholars commented that the factors of different theories are frequently intertwined. The integrated theories could not be consolidated easily with solid validations or justifications. Furthermore, among the studies on the investigation of the adoption of e-government by citizens, a significant gap emerged as the scholars tend to borrow theories from the Information Systems (I.S.) fields and use the same set of constructs to explain the citizens’ adoption and rejection intentions (Bélanger & Carter, 2008). Yet, a core concept has not been considered, which existed long before the action of “adopt” or “reject”; actually, many internal and external factors affecting the e-services users’ attitudes, intentions, psychology and thoughts (Kanat & Özkan, 2009; Rehouma & Hofmann, 2018).

Different theories were used as the theoretical framework for analysing the field of e-government studies (Rana et al., 2013, 2015). The Technology Acceptance Model (TAM) (Davis, 1989), the Theory of Reasoned Action (Fishbein & Ajzen, 1975) and the Theory of Planned Behaviour (Ajzen, 1991) are among the top theories in use. Rana et al. (2015) commented that one limitation of the previous studies is that the constructs were used dispersedly and were mainly borrowed from the

contemporary I.S. domain, with very few from the psychological studies.

TAM, Diffusion of Innovation theory or Unified Theory of Acceptance and Use of Technology only explain technology adoption. Researchers stated that even though these theories used different constructs under different names, many of them have similar core values, and their names are interchangeable in many studies (Rana et al., 2015). Whereas TPB, with its strong theoretical framework, has been considered a key tool in examining the psychological factors that lead to the intention to adopt a wide variety of human behaviours across a broad spectrum of academic fields, for example, tourism, e-commerce, ICT usage in classroom behaviour (Peng et al., 2012). Therefore, as TPB focuses on predicting human behaviours (Kanat & Özkan, 2009), the theory is suitable for investigating the behavioural intentions of e-service users. A surge in studies using the TPB to understand citizens’ behavioural intentions was found.

2.2. The Theory of Planned Behaviour

Among different theories, the Theory of Planned Behaviour (Ajzen, 1991) is regarded as a well-researched theory (Tan & Taeihagh, 2020; Venkatesh & Brown, 2001), which has been widely used in empirical research since the turn of this century (Baker & White, 2010; Hsieh et al., 2008; Taylor & Todd, 1995a, 1995b). In theoretical respect, TPB is a well-defined model for explaining I.S. acceptance behaviour (Hsieh et al., 2008), especially as this study aims to investigate human behavioural intentions in a small economy with closed human relationships.

According to TPB, acceptance behaviour is determined by behavioural intentions towards a specific e-system, where *Attitude*, *Subjective Norms (SN)*, and *Perceived Behavioural Control (PBC)* govern the intentions (Ajzen, 1991). One key advantage of using TPB is its ability to provide a framework that can be used to explore changes in the acceptance of e-systems based on external variables. In addition, the theoretical framework incorporates information regarding social and behavioural control factors (Mathieson, 1991; Taylor & Todd, 1995b). Several studies have pointed out that TPB can appropriately explain user-accepted I.S. services (Hsieh et al., 2008; Pavlou & Fygenon, 2006).

When analysing e-government policies with TPB, whenever a new policy is introduced into the market, the three constructs must be investigated to gain a better understanding of the public’s intentions and behaviour. In addition, Taylor and Todd (1995b) and Hung et al. (2009; 2013) adopted the Decomposed TPB (DTPB) in their studies to further dissect the three principal constructs of TPB into subfactors to delineate the issue.

2.3. The studies of E-government services in the Macao SAR context

When e-government services were first implemented in Macao SAR, the government’s vision was to provide information and services via one government portal connecting the public and internal networks. A noticeable trend of launching cell phone applications and installing self-service machines can be identified as ways to reach citizens anytime and anywhere. Another trend is the launching of the “unique e-account”¹ (previously called “e-pass”). The aim is to provide citizens with a single official e-account to execute public administrative transactions through different means of electronic channels.

Existing published works have called our attention to government employees’ crucial roles in developing e-government services (Amrouni

¹ “Macao Public Service Unique One Account” (“Unique e-Account”) is an updated version of “e-pass”. Citizens can access to various electronic services provided by the Government through this account on a uniformed website platform or mobile application, receive personalized notifications and make inquiries on the progress of applications. The aim is to provide the public with convenient electronic services.

et al., 2019; Rehouma & Hofmann, 2018). The scholars pointed out that this group’s impact is the core of success in implementing e-services. They act as a bridge between the government and the citizens. How they are trained in delivering e-services, how they are motivated to promote e-services actively to the general public, and at the same time, how they collect and return citizens’ feedback to the governing body are all crucial factors for success.

In a U.N. paper (Estevez et al., 2007), the researchers pointed out that training government employees were critical to improving e-service implementation. Besides training their skills in ICT, they were also required to switch their working mentality to become more active.

In the theoretical framework of Lai and Pires’s (2010) research, TAM and the End User Satisfaction Theory were integrated to evaluate the e-government portal website in Macao SAR. They concluded that what a web designer saw as a good portal might not be able to attract users. In comparison, timely information and Subjective Norms among the citizens were significant concerns for the users.

In the studies of Lee and Lei (2007, 2011), the independent variables Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) were not significant in predicting the citizens’ adoption of e-government services in Macao SAR too. However, Compatibility, derived from the DOI (Rogers, 2003) and Trust (Chan et al., 2010), could explain more than 60% of the variance. In their opinion, to increase the adoption rate of e-services, policymakers should consider integrating Trust into e-services, and making e-services more compatible with users’ personal lifestyles.

3. The proposed theoretical framework of this study

Based on the prior literature, it is obvious that studies conducted through a qualitative approach under the theoretical framework of TPB are lacking in e-government studies (see Yildiz, 2007; Hofmann et al., 2012; Tan & Tæihagh, 2020). Indeed, very few investigations have been done targeting government employees’ behavioural intentions. Hence, this paper fills these research gaps partially.

A theoretical framework was developed based on the prior literature investigating citizens’ behavioural intentions towards adopting e-government services (see Fig. 1). The factors were adopted from TPB (Ajzen, 1991) and DTPB (Hung et al., 2013; Taylor & Todd, 1995b), adding in factors such as Compatibility (Lee & Lei, 2007, 2011; Rogers, 2003) and Trust from e-commerce research (Kanat & Özkan, 2009; Rana et al., 2012). This framework is used as a basis for this research.

4. Methodology

The qualitative research method was selected in this study, and it aimed to extract empirical data from the actual implementors and users of the e-services. In-depth interviews with government employees directly involved in implementing e-government services were conducted. Before each interview, a written informed consent form was signed. All interviews were recorded and transcribed. The narratives were first deductively analysed using a preliminary codes list derived from previous literature. Afterwards, additional inductively identified codes emerged from the verbatim through adopting thematic analysis, which helped expand the factors in the TPB framework and formed a new conceptual framework. This research did not start with a set of hypotheses. Instead, it aimed to identify influential factors from the experience of government employees through direct interaction to understand how they assign meaning to this issue.

4.1. Casing data collection procedure

Rather than focusing on the sample size, qualitative research investigates the in-depth, complex, and ever-changing contexts. A verbatim analysis of the interviewees’ responses is more relevant than statistical analysis and generalisation (Flick, 2015; Jebbour, 2022).

Purposive sampling was adopted in this study with the specific target of government employees involved in implementing e-government services. This sample fits the study purpose, the research question and the resources for participant selection (Patton, 2002). Convenient sampling

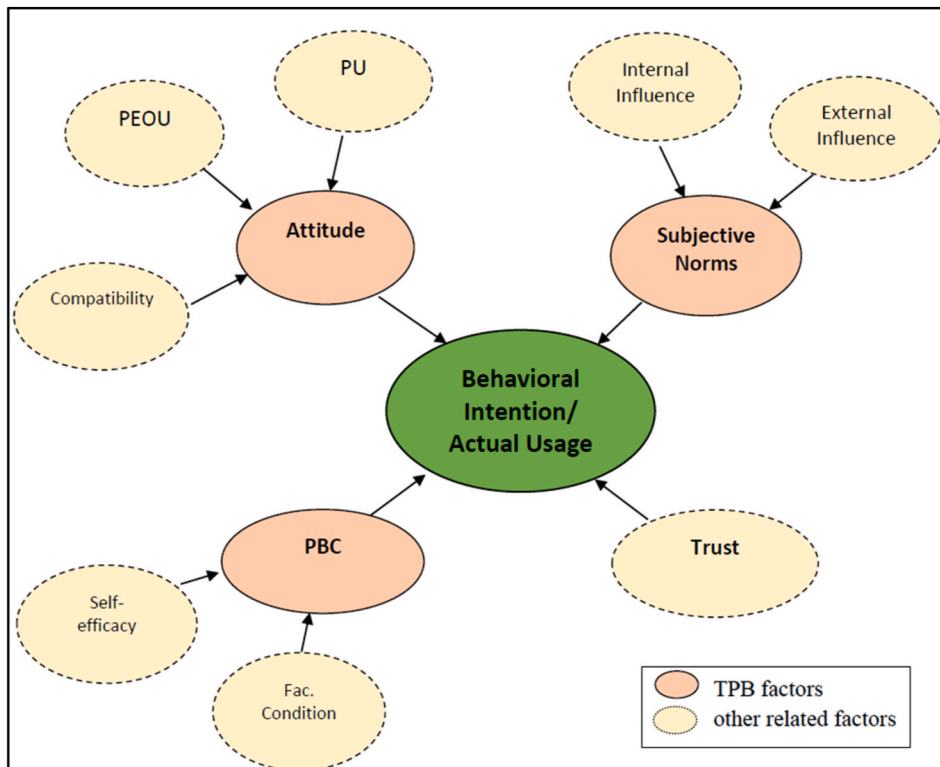


Fig. 1. A proposed Theoretical Framework for this Study.

was adopted primarily through the contacts of the authors. The interviewees all had to demonstrate that they used e-channels to deliver administrative procedures. A chain referral strategy was used to increase participation in the in-depth interviews. To achieve this, we asked participants already interviewed to refer others they knew who had experience with e-services in their network. After interviewing ten respondents, the data received were deemed saturated. The diversification of ideas among participants was identified under the foundation of the TPB theoretical framework.

A variety of government employees were invited to participate to ensure internal validity and maximum variations (Guba & Lincoln, 1989); for example, some work on the front-line dealing with the general public, some are website designers and cell phone app designers, while others are managers who promote e-services. Finally, ten government employees participated in this research, and the factors influencing their adoption of e-government in their daily work were recorded, analysed and discussed.

Interviewees answered a set of semi-structured interview questions constructed under the theoretical framework of TPB. It attempts to elicit the characteristics of their daily usage of e-services and their working environment (see Interview Questions in Appendix 1). To achieve a dual objective, they needed to address the questions from the perspectives of both an ordinary citizen and a government employee. The primary objective was to see how they perceived the e-government services as government employees and then how they perceived the general public's perception of this policy. Respondents were free to elaborate on the probing questions to investigate further unexplored patterns and relationships. All interviews were conducted between August and November 2021.

The sample size in qualitative research should be between 4 and 50 participants (Holloway and Wheeler, 2010), so this research targeted ten government employees directly involved in e-service implementation. Data obtained directly from ten interview transcripts and notes taken during and after the interviews were analysed. All interviews were conducted in Chinese, as well as the transcription of the interviews. The Chinese language was used for this research as it is the medium of communication for over 90% of residents in Macao (DSEC, 2020).

It is generally acknowledged that the transition from oral to written text involves a reconstruction rather than an exact replication (Kamali, 2018). Therefore, in order to clarify any ambiguities in the verbatim or missing points during the interviews, the member checks technique was adopted. After answering each question or topic, a summary and elaboration were made to consolidate the information.

4.2. Data analysis procedure

Thematic analysis was used in this research. Each statement from each interviewee was considered an element for the analysis. We used the data analysis tool *Atlas.ti version 9.0.15* and Excel spreadsheets. Line-by-line coding in English was made after obtaining an overall impression of the usage characteristics of the interviewees. Various themes were identified due to the extraction and categorisation of word fragments.

Initials consisted of "G", and a number was allocated to each interviewee for the anonymity of the participants when presenting the data. Numbers assigned to interviewees indicate the numerical order in which the interviews were conducted. For example, the first interviewee was signified as G1; and the second was G2.

5. Discussing the characteristics of behavioural factors of government employees

Six male and four female government employees were interviewed. A single subject could be explored from different angles by interviewing government employees. Firstly, they were regarded as on the supply side of delivering the services from the government to the general public. Simultaneously, they are also the users of e-government services, as the

ICTs could assist in strengthening the efficiency of their working performance or might hinder their work effectiveness. A thematic analysis of their verbatim was conducted regarding the TPB constructs, and new factors were also identified.

5.1. Attitude

All ten interviewees showed positive attitudes towards e-government services and used them as a necessity for daily work required by their superiors and macro-government policies. They believed it was a global trend to use the Internet and e-services. However, in their daily personal life, the frequency of usage was low.

They all "felt" in their working experience that the citizens' ability to use ICTs differed tremendously. Although most Macao citizens use smartphones, none perceived Macao people as having good digital literacy. Some government employees admitted that they would act according to the ages of their clients. If the clients were young people, they might have a higher chance of introducing e-services to them. For senior citizens, they might direct them to the counter and help them finish their requests as quickly as possible.

In terms of *PU*, 70% of the interviewees claimed they fully realised the advantages of using e-services in terms of convenience and time-saving without having to go to relevant departments for the services. Some said it could have saved some troubles for the citizens. However, e-services could not help much in enhancing speed and efficiency in their working environment.

Interviewee G1 emphasised: *yes, it is useful as there is no paper, just the electronic version is needed, but the frequent use of e-services is not equal to less usage of traditional manual channels according to my working experience, as not all the clients can use the e-account, some of them do not have Macao Identity cards, or they are travellers, we are still very busy in attending them.*

The comments were in two extremes in terms of *PEOU*. Half of them claimed that e-service adoption was more challenging than expected due to many obstacles. For instance, the information was scattered, and the formats of documents were not standardised. Finding useful information was difficult and time-consuming. In contrast, the other half faced no obstacles and found the interface user-friendly. Some pointed out that ease of use was strongly associated with other factors, e.g., *Self-efficacy*, *Facilitating Condition*, and *Trialability*. For instance, one claimed that it would be fairer to evaluate a certain e-service as user-friendly or not if the facilities and resources available of that bureau counted. Some admitted that e-government services were not citizen-centered, were not designed from the user's perspective, and the government structure's bureaucracy still had to be solved.

Interviewee G5 was the web designer of the apps in his bureau; he admitted that: *undoubtedly, I have no problem using the e-services, but as the different bureaus have their own style, the interfaces are not consistent, and all these elements have to be agreed firstly among different bureaus and different levels in each bureau before implementation, all are the reasons that caused non-user-friendliness of the e-services, especially to the elderly. For the general public, having no uniformity of the document formats is a bad experience for users.*

It is plausible that *PEOU* and *PU* are not that influential in adopting e-services. They were not very concerned with user experience and the citizens' perception. One plausible reason may be that they are government employees and are there to provide services to the clients. They are more concerned with improving efficiency to provide better services and finish tasks as efficiently as possible. Furthermore, successfully completing the client's request is their main duty, regardless of the channels. Therefore, when they change their role from a service provider to an ordinary citizen, their main concern is completing the service request. Compared to e-services, they prefer traditional face-to-face services because they believe they are still irreplaceable and have a higher chance of completion.

Regarding *Training*, it is generally thought that government

employees are not ready to provide e-services accurately, so more training is needed. Four government employees admitted they received no training and had no trial experience before promoting e-services to the general public. These led to an insufficiency of confidence levels in performing their jobs.

For those who had received training, it was noticeable that they were more confident in promoting the use of e-services at work. Interviewee G1 claimed: *all the front-line workers are trained in my department, and the e-services provided are simple and standardised. We will actively tell the clients that they can do certain procedures in the self-service machines next time; it saves them time. The clients are usually happy with our information, or even we will guide them to the self-machine and show them how to work it out with the machine. I think it is unnecessary to be very technically skilful in using the ICTs; the training is not focused on "how" to provide e-services; the primary knowledge we should have is "what" in the content! We feel confident as long as we know how to work with the machines and the apps.*

One also emphasised that *Training* is only a tool to assist them in providing better services. Ultimately, training had to be the key to increasing staff confidence and strengthening their willingness to innovate.

Compatibility, whether in terms of the relevance of usage or compatibility of data among bureaus, was rarely a concern to the interviewees. Only four interviewees agreed that the Internet was compatible with their daily lives; they immediately turned to it whenever they had questions. However, six said that e-government services would not be a must for them and the *unique e-account* was incompatible with transferring the data among bureaus, so the current function did not fulfil the intricate meaning of the name “一戶通” in itself (the liberal translation should be: *one account directs to all transactions*).

Interviewee G5 concluded the behavioural intention of the government employees with his lived experience: *the account data is not intelligent enough to be transferable, and the government provides no priority or guideline! Many cases of confusion occurred daily because of these types of data non-compatibility. The staff working in the information centres do not know how to solve these problems. The bureaucracy is still severe here, and I firmly believe that all government policies should be coordinated from a high level.*

5.2. Subjective Norms

In the study of [Rehouma and Hofmann \(2018\)](#) targeting experienced employees, researchers found that the intention of users to use ICT was influenced by variables such as *Interpersonal Influence* and *Self-efficacy*. After gaining direct experience, people evaluate behavioural consequences based on their own experiences and less on others' opinions. SN would diminish as the experience was gained, as individuals' attention would shift to outcome expectations ([Karahanna et al., 1999](#)). Thus, [Hsieh et al. \(2008\)](#) suggested that for individuals with usage experience, *Attitude* significantly impacts intention more than SN. After having direct experience using technology, *Attitudes* play a greater role than social norms in moulding the individuals' behavioural intention.

A similar finding of non-significance of *Internal Influence* was yielded in this study. The ten government employees with direct experience using ICTs at work only regarded the *Superior's Influence* as authoritative and ignored *Internal Influence* in their work and personal circumstances.

All ten interviewees agreed that their principal motivation for using e-services came from their superiors. Thus, *External Influence* was of great significance to them. *Superior Pressure* is classified as an *External Influence* factor because the superiors could not be considered peers among the government employees ([Susanto et al., 2017](#); [Taylor & Todd, 1995b](#)). Superiors exert more influence on front-line workers than family and friends.

Eight said they used it because their superiors informed (ordered) them to use it. Meanwhile, four also pointed out a significant obstacle created by their superior's rigidity and inconsistency in implementing e-services reforms. Three of them felt bad because they did not get

encouragement from superiors during the implementation process. Overall, only four interviewees in this group perceived they were fully equipped and would encourage citizens to use e-services actively.

5.3. Perceived Behavioural Control

Financial and human resources provided by the local government have a prominent impact on the construct of PBC. Based on the interviewees' opinions, the factor of *PEOU under Attitude* and *Self-efficacy, Facilitating Condition* and *Trialability under PBC* should be considered together to form a more comprehensive picture of the usage of e-services.

Self-efficacy has a two-folded meaning. The *Self-efficacy* of the government employees and that of the citizens should be considered together. The digital literacy of the citizens differed largely, especially among the senior generation. Six interviewees had the confidence to use e-services in their work. Two said they were very confident and suggested that transforming Macao into a smart city could go faster. In their opinions, initial experience in using e-services was crucial, and it would result from having an awareness of the e-services and a chance of initial use. This was the point that the government had to consider more thoroughly. Ensuring the staff's *Trialability* of the e-services is a crucial step. They confirmed that, in their daily work, they would recommend the citizens use e-services according to their age. However, age was one of the crucial factors but not the only factor. Meanwhile, it was undeniable that some young people prefer face-to-face counter services, as they just went to the bureaus and hoped that the staff would handle everything.

Heavy workload is also a hindrance for the staff. While discussing the situation of the front-line worker to see if they would act actively with the citizens through utilising self-service machines and apps, Interviewee G2 affirmed: *in my daily work, I seldom teach the citizens to use the apps because I do not have time. Too many clients wait at the counter; spending time teaching them how to use cell phone apps is not affordable. Some even do not understand how to operate their cell phone. Nevertheless, my primary duty was to help them finish the tasks they wanted to do, so I helped them at my counter. Therefore, Facilitating Conditions are not very favourable to government employees in their work experience.*

The *Facilitating Condition* was not favourably derived from the *Superior's Rigidity* and bureaucracy. In terms of the impact of the staff's digital literacy on their working performance, Interviewee G3 explained his perception: *most of us are competitive and capable, but the superiors are not resolute enough in carrying out the reforms. A common weakness is that starting a new project is easy, but no one has the resolution to continue, and the result is usually in vain.*

In conclusion, four admitted that their readiness to provide electronic services was unsatisfactory because they had no opportunity to try in advance, no time to learn, and no training. Under such poor available resources, three believed the Macao government employees had performed pretty well already.

5.4. Trust

For the factor of *Trust*, both *Trust in the Internet* and *Trust in the government* do not seem to influence government employees' behavioural intentions significantly. Half claimed they felt confident and secure when using the Internet, and two further explained that they could only trust and use the Internet. Otherwise, they would have no way to survive in this modern world. In terms of implementing e-government services, six of them admitted that it was a global trend, so they never thought of the question of non-adoption. There was no relevance between *Trust* and *Adoption*.

Interviewee G1 believed: that *the risks of using e-government services are not that high compared with using online banking*. Interviewee G3 affirmed: *in using the e-services, I do not perceive any risk. As long as the services can be done online, I will first choose to do it online.*

The I.T. technician Interviewee G5 assured us that: *I trust our government; I perceived that the government has done its best and carried out all measures to protect the security of the e-services. For example, it is true that the application of the health code² was attacked, everyone knows about it in the newspaper, but no data was actually lost. It is an event to show that e-services are secured.*

Interviewee G8, another I.T. technician at the managerial level, also assured us: *I trust the government, I have trust in the Internet, the (official) websites are secured with key recognitions, and the government has done all measures to ensure cyber-security. The main concern is citizens' perceived risks and behaviours in protecting their personal information.* He also pointed out that the use of blockchain could make websites more secure, and the government had to have more considerations on these advanced measures. I.T. technician Interviewee G5 got similar ideas.

A phenomenon revealed from their narratives is that the more knowledgeable persons in the I.T. field, the more trust and confidence they have in the e-services provided by the local government. They trust in their working responsibilities. Whereas for the users with general I.T. knowledge, the degree of relevance between *Trust* and adoption was low. *Trust* is not an influential factor.

5.5. New behavioural factors identified

In identifying behavioural factors on the usage of e-government services, employee morale and bureaucratic problems showed prominent significance. Interviewee G4 stated that she received sufficient training and believed she had high morale in her daily work. She commented: *the newly implemented face recognition function through cell phones is an example of improvement. The government can still ensure the confirmation of the user's identity while enhancing the convenience of use. In my daily work, all our staff on the counters will cooperate and recommend using new e-services to the clients, to let them know about the e-services and let them try and be aware of the benefits of using the self-machine next time.*

Some respondents suggested that the younger and more professional the staff in a bureau are, the more ideal for the implementation of e-services. Interviewee G6 mentioned that government employees' self-efficacy mainly depended on their P.C. knowledge. *He said: like in the bureau I work in, as most staff are relatively young, the bureau is young too as it was established only after 1999. We, staff in different hierarchy levels, have the ambition of moving faster, innovating and speeding up the promotion of e-services.*

The main hindrance was still lacking well-organised strategies and powerful leaders. Interviewee G7 commented: *one of the current weaknesses is the low morale of the government employees. We do not want to participate actively in this project. There are talented people in Macao, and advanced techniques are provided already; the point is on the coordination skill of the leader.*

While the *Standardisation of the Administrative Procedures and Document Formats* and the *Compatibility* of the data are crucial elements in enhancing their behavioural intention, four claimed that the e-services of Macao SAR were still in the elementary stage only, mostly for information searching, making appointments and processing applications online. Over half of them pointed out that simplifying administrative procedures was the primary and most crucial step. The formats and workflow had to be standardised.

Interviewee G6 summed up the enablers that led to the satisfactory performance of his bureau: *we made improvements in both the e-services (self-machines) and the counter services (one-window service). It is easier to manage our bureau as the nature of the services provided is simpler and more standardised. Therefore, we can improve efficiency relatively easily. We can also provide a one-stop window service (integrated all kinds of services in one counter/window). It is easier for citizens to choose which services they want*

to do. It is also easier to allocate human resources since all the staff know how to do all kinds of services provided in this bureau.

When the topic of substituting traditional brick-and-mortar services for e-services was discussed, all respondents strongly disagreed. They believed front-line government employees have a valuable role in the government's daily operations. They are the communication bridge between the service providers and the service users.

We analysed the factors affecting each construct in the TPB model from the transcripts of the ten interviews with government employees. Among these, *Superior Pressure* and the need for *Training* are prominent factors that can influence the intention of the interviewees in using e-service. New factors identified, such as the need for *Standardisation of the Administrative Procedures and Document Formats* to facilitate ease of use, the enhancement of *Government Employees' Morale* and addressing the problem caused by *Superiors' rigidity* are identified from the analysis. A conceptual model is drawn for illustration (see Fig. 2).

6. Theoretical contributions

This study contributed to the existing literature on the study of e-government adoption using the TPB by consolidating the existing factors and adding new ones to the TPB framework. A new theoretical framework specifically for this study of e-government is developed. It fills the gap in understanding behaviour towards e-government adoption by adding the point of view of government employees to existing knowledge. Furthermore, a vivid description of the implementation process is investigated. A process-oriented study was conducted rather than evaluating the outcome of e-government services in traditional practice.

7. Implications to practice

The government employees' perception of the implementation of e-services and their perception of the general public's attitude towards the adoption were delineated. Elicited from the employees' experience, the *Superior's Pressure* under *SN* is most influential, whereas *Trust* is not a concern. Their *Attitude* is positive, yet it should be evaluated together with *Self-efficacy*, *Facilitating Condition* and *Trialability* under *PBC*. Three new behavioural factors are identified. This kind of contextualisation helped policymakers look at this issue from different perspectives. In order to respond to the behavioural change experienced by the general public regarding the acceptance and adoption of e-government services, the results and findings from this analysis could be used as references for creating effective interventions.

There is also the significance of using Macao SAR as a sample for investigation. A region with a high Internet penetration rate but unsatisfactory awareness of the citizens of e-government services after two decades of implementation. One plausible explanation derived from the impact of the citizens' behavioural intentions rather than difficulty accessing ICT. This research can provide insight into the behaviour of government employees, which may be referential for other regions.

8. Limitations and future research

A qualitative research method was adopted to understand better the participants' behavioural intention and actual behaviour in using e-government services in Macao SAR. However, the internal and external validity could have been affected by the subjective nature of qualitative research (Fu et al., 2006). This study is also limited by its small sample size of ten, which provides an in-depth understanding of the research matter but does not allow for generalisation. So, a survey designed using this qualitative study's findings can be used for a quantitative approach, further generalising the significance of the behavioural factors identified in this study.

² It is a cell phone application used during COVID-19 in China to record and show citizens' health condition.

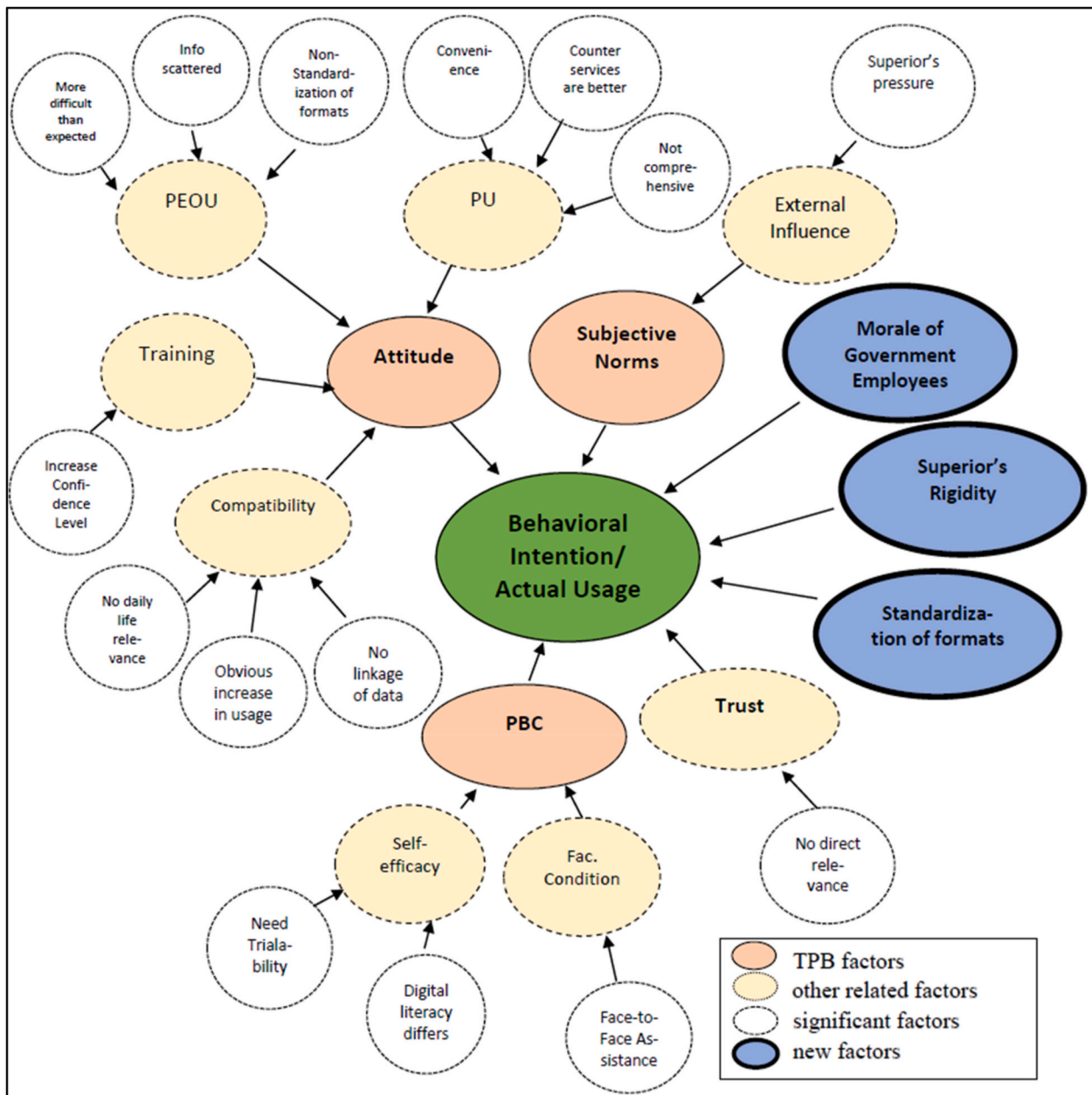


Fig. 2. The Behavioural Factors affecting Government Employees' Adoption of E-government Services identified from the Semi-structured Interviews.

9. Conclusion

Through the lens of government employees, we concluded that they regarded themselves as the principal communication medium between the service providers and the end-users. They perceived that they should not be replaced by machines in daily government operations as the general public regards the government body as a real person, not a machine.

The *Attitude* of government employees towards adopting e-government services is positive. However, the *Perceived Ease of Use* is low, and *Training* is believed to be needed to increase confidence rather than skills. One strong factor affecting the behaviour to adopt e-government services is *External Influence*, especially from superiors at work and government policy. Adding to the TPB framework, this study finds that the behaviour of government employees towards adopting e-government services is not significantly affected by the *Trust* in the government but by *the need for Standardisation*, the *Morale of Government Employees* in using ICT and the *Rigidity of Superiors* at work. Using the TPB framework

as a basis, this research mapped out the different factors affecting government employees' behaviour towards adopting e-government services.

CRediT authorship contribution statement

Kit Yeng Iong: Conceptualization, Methodology, Data curation, Writing – original draft, preparation, Investigation. **Jenny O. L. Phillips:** Conceptualization, Methodology, Supervision, Validation, Writing – review & editing.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssaho.2023.100485>.

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