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Recommended Citation

Ahsan, Atiqul; Chang, Vanessa; and Issa, Tomayess, "Community Perception of Mobile Payment in e-Government Services" (2012). *ACIS 2012 Proceedings*. 98.
https://aisel.aisnet.org/acis2012/98

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Community Perception of Mobile Payment in e-Government Services

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Abstract

Mobile payment and e-Government are emerging topics in the research area of Information Systems. This research addresses the preferred e-Government services for mobile payment, the suitable payment methods of mobile payment, and adoption factors of e-Government services. The research derives the notion of technology adoption and related constructs, however, as no particular Information Systems adoption theory was adequate to study emerging systems of electronic payment, the research did not utilise any specific theory. Rather, the research uses the characteristics of mobile payment as revealed in the contemporary research to develop an adoption model based on user perceptions regarding mobile payments in the context of e-Government services. A survey study on the use of mobile devices to pay for e-Government services was conducted in Western Australia. The findings of this research contribute conceptually and practically by recommending suitable services and mobile payment methods. This paper also addresses the positive and negative factors impacting the adoption of mobile payment for e-Government services.

Keywords (Heading – minor)

e-Government, e-Government Services, Mobile Payment, Mobile Devices

INTRODUCTION

The widespread adoptions of mobile and smart devices are driving the development of applications and services. New applications, services and businesses have emerged in the modern digital world and led to transactions including mobile commerce and mobile government. The number of mobile phones has exceeded other technical devices in the communication world; and it has been acknowledged as a useful and effective tool for conducting financial transactions. According to a Gartner Report (2012), there will be 212.2 million mobile payment (m-payment) users in 2012 (up from 160.5 million in 2011) and a prediction that m-payments will total about US$171 billion in 2012 (up 61.9% from $105.9 billion in 2011). Gartner also predicts that in 2016 there will be 448 million m-payment users, in a market worth $617 billion.

Payments carried out via mobile devices are usually for transactions involving commercial activities such as selling of digital goods such as music, games, tickets and physical goods such as gifts, books, and electronics. These transactions constitute the majority of mobile payments. Commercial organizations are trying to utilize the opportunity of this new electronic payment scheme to achieve competitive advantages in the environment of mobile commerce (Au and Kauffman 2008; Kim, Mirusmonov, and Lee 2010; Mallat 2007; Ondrus and Pigneur 2006). In the public sector, use of mobile technology is expanding gradually as a complementary channel of Internet-based service delivery known as e-Government.

Government provide numerous services to individual citizens and communities and e-Government services offer a variety of avenues for people to access, interact and transact with government departments by means of electronic channels. Major services include payment of taxes, utility bills, license fees, passport issuance and renewal, visa fees, vehicle parking, transport tickets, traffic infringement penalties, hospital payment, education, and training fees among others. Some services are well linked to electronic payment channels such as web-based online payment and electronic funds transfer. However, mobile payment for e-Government services is a new scheme of payment and yet little is known about it. Existing literature provides very little information regarding the types of e-Government services for which mobile payment is suitable. Therefore, investigation is required to ascertain the types of e-Government services for which mobile payment is more appropriate. This research investigates the use of mobile payment in the e-Government services in Western Australia based on opinion drawn from the population groups based on age, education, profession and experience of mobile usage.

E-GOVERNMENT SERVICES

Information and Communication Technologies (ICT) are recognized as creating a networked structure for interconnectivity, service delivery, efficiency, interactivity, transparency and accountability. For payments to be transmitted electronically, merchants rely on the effective infrastructure of ICT. E-Government is a popular term to cover these characteristics of government functionalities (Yildiz 2007). E-Government is considered as the

use of ICT such as web-based applications to provide better access to stakeholders for information and services (Brown and Brudney 2001). E-Government is also referred to as digital government that is organized in terms of virtual agencies based on public and private networks and dependent on the internet (Fountain 2001). In e-Government, the entire population regardless of income, health condition, age and gender have access to the services (Carter and Bélanger 2005). According to Gauld, Goldfinch, and Horsburgh (2010), e-Government is seen as promoting everything from greater interaction to efficient public service. When considering the provision of services to the public, Alford (2002) argues that governments ought to consider the services rendered to the public or citizens and a customer model that features the 'notion of exchange' must be highlighted.

According to the UN (2008), the e-Government service development and maturity model comprises five different stages starting with emerging, enhanced, interactive, transactional, and connected. In the *emerging* stage, information is published to citizens via simple web sites. In the *enhanced* stage, Government web-sites are further enhanced by providing links to other websites and incorporating other features such as current newsletters and archived information. The third stage is *interactive* where citizens can download and submit forms and queries for on-line data retrieval. Citizens are also facilitated with two-way correspondence such as email exchanges with government officials. In the fourth stage of *maturity*, called the 'transactional' stage, the citizens can make online payments using different methods of payment for government services. The fifth stage known as *connected* stage builds connectivity among various arms of the government, thereby forming a single platform of service. The government would integrate a back-end infrastructure enabling shared data processing capability to reduce administrative burdens and improve the government's efficiency in service delivery. Although such an integrated system is not yet fully established, many countries are progressing towards this connected approach. For example, Switzerland is implementing a common body to share and coordinate data processing based on an agreement between the federal and regional governments; and Australia has established a body to share information within the public sector (Andersen and Henriksen 2006; Schelin 2003; UN 2008).

The internet has become an indispensable means of accessing Government services for Australians as it is the most preferred channel for the majority to contact and interact with the government (Gershon 2008). In Australia, user acceptance of e-Government is sharply increasing with the use of the Internet as a channel for contacting government departments. The use of e-Government has risen from 19% in 2004-05 to 38% in 2008, meaning that e-Government activities have doubled in four years (AGIMO 2008). The awareness of the Australian government portal has risen from 59% in 2009 to 64% in 2011 (AGIMO 2011). Access of Government Services in Australia (AGIMO 2008) identifies thirteen categories of e-Government services that the Australian residents use. The categories are (i) community and social services (ii) transport (iii) business services (iv) land and property (v) health (vi) industry and natural resources (vii) employment (viii) international travel (ix) education and training (x) political system and elections (xi) environment (xii) law and justice and (xiii) emergency services (AGIMO 2008).

The above listed e-Government services may involve the exchange of goods or services with payment in the form of cash, credit or direct debit. This research deals with the use of mobile payment for the exchange of government goods and services. In recent times, the exchange of e-government goods or services such as the use of public transport or mass transit commuters, involve the use of payWave technology, the latest contactless technology (VISA PayWave, 2007). An example is public bus services in New York that uses payWave technology, where commuters would either use a mobile phone or a card with an embedded chip (Garud, 2010) to pay for the bus ride. The payWave technology communicates with a contactless reader to enable the purchase of a bus ticket.

MOBILE PAYMENT

A mobile payment or m-payment refers to monetary payment whereby a mobile device is used to start, approve and confirm an exchange of financial value in return for goods and services (Karnouskos 2004). Pousttchi (2008) defines mobile payment as a transaction where the payer uses mobile communication techniques in conjunction with mobile devices for initiation, authorization, or completion of payment. The European Commission Green Paper (2012) defines mobile payments as *'all payments made with a mobile device. These could either be remote payments, i.e. internet or premium sms-based payments, or payments at the point-of-sale, using technologies such as NFC (Near Field Communication) which require specifically equipped phones and readers.'*

Mobile devices include mobile phones, personal digital assistants and any other devices can be connected to mobile networks for the purpose of making payments (Herzberg 2003). The recent convergence of multiple services over the mobile network overlaps the idea of on-line payment and mobile payment. Computer users can connect to the internet using mobile broadband services to make online payments (Nam and Nam 2008). To clearly distinguish such overlapping, this research will focus on mobile payment via handheld mobile devices such as mobile phones and smart phones (e.g. iPhone), excluding devices such as laptops or PCs.

Mobile technology evolved in the 1980s and is still expanding (Qi, Zysman, and Menkes 2001). The data handling capacity of mobile devices has increased rapidly over the years which is creating scope for mobile value-added services such as mobile payment (De Vriendt et al. 2002). The technological advancements to support procedures and methods of mobile payment are constantly undergoing improvement and innovation (Valcourt, Robert, and Beaulieu 2005b; Schwiderski Grosche 2002; Chen 2008). However, in the existing research, little attention is given to the matter of methods of mobile payment.

The International Telecommunication Union (ITU 2009) estimates that over 61% of the world population use mobile phones, whereas around 19% use fixed phone. Fixed and mobile broadband service subscription remains steady compared to mobile phone subscriptions. The m-payment resulting from the wide distribution of mobile phones in the population, is suited to the characteristics of payment and behaviour of people (Pousttchi 2008).

Mobile Payment Technologies, Methods and Types

There have been different technological procedures and methods of mobile payment starting from the simple method of Short Message Service (SMS) to advanced methods of Near Field Communications (NFC). SMS is a text message service introduced into Global System for Mobile Communication (GSM) and later adopted by all digital mobile communication systems. SMS enables users to send a text message of 160 characters from the mobile which is transmitted over the mobile network to another mobile or short code via an SMS centre. For mobile payments, the user generally sends a SMS to a short code. A short code is a 4-6 digit code instead of a 10-12 digit mobile phone number, to which a text message is sent. Short codes are useful for mobile payment because the consumer sends a keyword to a specific short code to start a payment session. A short code is assigned to a particular merchant for a specific product or service by the mobile operator or by a regulatory authority (Valcourt, Robert, and Beaulieu 2005b).

Wireless Access protocol (WAP) is a global standard for providing access to internet contents and can be used by mobile phones, personal digital assistants (PDA) and other wireless terminals (Valcourt, Robert, and Beaulieu 2005a; Schwiderski Grosche 2002). Contactless technologies such as Radio Frequency Identification (RFID) and NFC have emerged as proximity payment methods. These technologies generally support the communication of the user's smartcard in the mobile device to the merchant's point of sale terminals (Chen 2008).

In term of mobile payment, a Mobile Network Operator (MNO) provides the infrastructure and the link to the customers. The role of the MNO is transformed from a voice-only service provider to a united service provider of Internet and data (Li 2002). The MNO has the ability to provide multiple options for mobile payment either through its own platform or by collaborating with traditional financial or payment service providers such as banks, VISA, Mastercard, PayPal and others. Banks, card companies and other payment service providers such as PayPal play the role of intermediaries for payment settlement between buyer and seller, whereas the MNO provides the infrastructure and connectivity service as a forefront interface. The intermediaries also provide their own mobile payment procedures for their customers. Mobile Equipment Manufacturers (MEPs) also play an important role in mobile payment in modern times as they manufacture Dual Subscriber Identity Module (SIM) and NFC capable devices (Pousttchi 2004).

The following methods of mobile payment are categorized on the basis of participants, technology and operation of the mobile payment process (Kreyer 2004).

(a) Mobile account-based payment operated by MNO using SMS or WAP
(b) Payment through web-site or e-commerce site using internet enabled mobile set such as accessing BPAY (BPay n.d.)
(c) Special application-based payment through specialized intermediaries such as PayPal
(d) Bank account-based payment
(e) Credit card and debit card-based payment
(f) Payment using NFC
(g) Payment using security enabled SIM such as WAP Identity Module (WIM)

MOBILE PAYMENT IN E-GOVERNMENT SERVICES

With the advent of web-based applications, governments worldwide are improving governments' fundamental functions. This includes supporting the expansion of e-Government services using mobile devices and mobile technologies. The features of mobile access such as 'anytime' and 'anywhere' are becoming a natural part of daily life. Almost a decade ago, Kushchu and Kuscu (2003) foreshadow a new direction of e-Government to emerge with the term 'mobile government' or 'm-Government'. Mobile Government is considered as value added features of e-Government with greater flexibility of data communications and information exchange such as location-based information for fire, natural disaster, medical emergency, traffic condition and weather.

According to Kushchu (2007), there are significant pressures on governments from the stakeholders to incorporate a mobile platform in e-Government services. The Victorian government in Australia experienced this with the 2009 Victorian 'Black Saturday' bushfire tragedy (Dobbin, 2009).

Rather than focusing on the information exchange between government and its citizens using mobile devices, this research focuses on financial transaction of the government services using the mobile device; and hence the broader view of mobile government is not included. As alluded to earlier, government in many countries are implementing mobile payment as new scheme of electronic payment for government services. The following cases are some examples of public sector initiatives solely for the e-Government services.

Sweden: In the City of Stockholm, Huddinge University Hospital and Airports run by the Swedish Civil Aviation Authority implemented mobile payment based on SMS technology for parking fees known as MParking. Registered drivers can use a parking space by logging in and out using a mobile phone. Parking fees are automatically charged to the account holder and a receipt is sent via SMS (Östberg 2003).

Finland: Mobile payment was introduced successfully in Helsinki public transport systems in 2001. Travellers send SMS to a pre-fixed number and get the confirmation of payment, identification data and validity of the travel ticket. The system is considered as one of the highly recognized e-Government initiatives due to its acceptability and popularity. In 2005, 50% of all passengers of Helsinki trains and trams bought at least one ticket per week and 33% bought monthly tickets using mobile phones (Suomi 2006).

United States of America (USA): Arkansas is the first state to offer mobile payments for e-Government services in the USA. The state government has incorporated special applications for mobile devices which can process transactions of VISA, MasterCard and Discover cards through Arkansas government secure on-line system for e-Government services such as a property tax payment (eGovernment Resource Centre 2010).

In New York, commuters can use mobile phones and contactless cards to pay for the city subway and bus services. The mobile payment system that uses a microSD chip embedded in a phone has also been installed in 10,000 New York City taxicabs (The City Fix, 2010).

Sri Lanka: The Sri Lankan government implemented mobile payment for their e-Government services called the 'Lanka Gate'. The project utilized a single platform comprising an integrated portal and infrastructure. In the project, the mobile provider links up with one or more banks. The customer links a bank account with a phone and authorizes a payment by sending a message to the mobile provider. The mobile provider initiates fund transfers from the bank (Ratnaweera et al. 2008).

Australia: There has been one successful trial of mobile payment in e-Government services in Australia. North Sydney Council introduced a scheme called 'mPARK' whereby motorists can pay for on-street parking using mobile phones connected to any mobile network (Teo et al. 2005). The use of mobile payments for e-Government services is still at the emerging stage in Australia. However, high demand has been noticed in various government reports. Gershon (2008) reveals that Australian citizens and users of e-Government services demand more convenient and easier delivery channels to interact with the government. Governments are also acknowledging the need for mobile-based payment in their e-Government framework. For example, the Western Australian government recommend the community to have access to a mobile payment system to pay bills, transfer funds and use credit cards through mobile devices to improve the interaction between citizens and the government (Government of Western Australia 2008).

RESEARCH OBJECTIVES AND METHODOLOGY

Contemporary studies indicate that there is a significant gap in the research on mobile payment from the consumers' perspective and little effort has been made to study their perceptions of need and influence on service providers (Dahlberg et al., 2008). The aim of this research is to identify the factors that influence the community use of mobile payment for e-Government services.

Research Questions

This first objective of the research is to investigate the literature of the positive and negative consumer behaviors and influencing factors in the adoption of mobile payment. Hence, the first research question is, "*What are the positive and negative user behaviours or influencing factors of the use of mobile payments?*"

The second objective is to identify the types e-Government services for which people would prefer to use mobile payment. This will take into account the influencing factors when a customer is given the option to pay for a service using mobile payment. As the scope of payment for e-Government services is wide and diversified, the research will limit its scope to services that are available for existing e-Government programs through electronic channels and will identify the most suitable services according to consumer preferences. The second research question is "*What methods of payments for e-Government services would be preferred by the*

community?" The final research question corresponds to the second objective of the research which asks *"Why do customers prefer to use mobile payments for selected e-Government services?"*

Research Method

A web-based or online survey was considered useful as the purpose of this research to ascertain the level of adoption of mobile technologies for payments of e-Government services. This mode has been used by researchers for similar research to capture users' perceptions of mobile payment (Chen 2008; Shin 2009). The use of the single method of a web-based survey may produce bias, and hence, an additional method to obtain more accurate results was considered. A face-to-face interview was also chosen in addition to the web-based survey to counteract the drawbacks. The same questionnaire was used for both methods.

As the types of mobile payment may generate technical questions, the design of the survey is extremely important for proper interpretation of the questions and to capture accurate answers from the respondents (Dillman 2000; Dillman and Smyth 2007). Thus, in designing the questionnaire for the research, important factors such as language and formats were carefully constructed to allow respondents to answer the questions easily and quickly. Highly technical terms are avoided as much as possible, although several technical terms were unavoidable due to the subject matter. To ensure the level of technical terms that were used and the length of time to complete the survey, the questionnaire was tested before finalising its format and content. Randomly selected respondents from a metropolitan area were asked to test the survey and provide informed responses. A similar test was conducted using a printed questionnaire for the face-to-face interviews. The outcomes of both tests indicated that the format and most of the questionnaire items were easy to understand with exception to two items regarding method of mobile payment for NFC and RFID. These methods were viewed difficult to understand. As a result, NFC and RFID were excluded from the questionnaire. NFC and RFID are also new many users and therefore the decision to remove the questions relating to NFC and RFID was deemed as reasonable.

Close-ended questions regarding demographic characteristics form Section A of the questionnaire. Section B asks questions about the respondent's awareness, experience and suitability of mobile payment. The section also explores the perceptions regarding the choice of e-Government services, choice of payment method and amount of mobile payment for e-Government services. The section asks questions on the factors that positively influence the decision to use the mobile payment method for e-Government services and negative factors such as perceived risks, security and other concerns, which may prevent its use. Section C allows respondents to comment on matters described in Section B in open-ended texts. The final section offers respondents the opportunity to furnish contact information to enable respondents to receive any feedback and outcomes of the research.

DATA ANALYSIS

Sixty two (62) responses to the web-based survey and fifty-two (52) to the face-to-face survey, with a total of one hundred and fourteen (114) surveys were collected. Missing data was found to be randomly distributed throughout the data file and this resulted in discarding seven (7) cases from the web-based survey and two (2) cases from the face-to-face survey. Fifty five (55) responses from the online survey and fifty (50) from face-to-face survey constituted the final valid cases of a total of one hundred and five (105) responses for data analysis. Of the 105 respondents, 59 were male and 46 were female.

Research Question 1: The Influencing Adoption Factors

To carry out this research, the first research objective is to investigate the literature on the factors influencing the adoption of mobile payment. Dahlberg et al. (2008) conducted a comprehensive research by reviewing 73 papers published between 1999 and 2006. The researchers found that research papers on mobile payment are presented mostly at conferences rather than being published in journals. The researchers are mainly interested in the technology associated with mobile payment, followed by a focus on consumers. Technological papers on mobile payments mostly represent conceptual ideas. Empirical research on mobile payment is yet to gain the attention of researchers. Most of the research on user adoption of mobile payment have focused mainly on commercial activities such as selling of digital goods such as music, games, tickets and physical goods such as gifts, books (Au and Kauffman 2008; Dahlberg et al. 2008; Kim, Mirusmonov, and Lee 2010; Mallat 2007).

Researchers have investigated the adoption of mobile payment based on different demographic traits in different geographical locations. Researchers have identified factors such as ease of use, availability and convenience that positively influences the adoption of mobile payment and factors such as perceived risks and security which causes concern that may prevent users from opting for mobile payment (Au and Kauffman 2008; Chen 2008). In terms of e-Government adoption, it is crucial that citizens have confidence in the reliability and capability of the Internet as a channel for providing accurate information and secure transactions (Belanger 2008).

The major features that affect positively and negatively on user acceptance regarding mobile payment as presented in relevant contemporary research are shown in Table 1. The positive and negative features identified in Table 1 are subsequently used in a survey questionnaire as items of investigation to observe whether the features influence users to use mobile payments in the context of e-Government services.

Table 1: Features of Positive and Negative Influencing Factors

	Positive Influencing Features	Reference
1	Ubiquitously available	(Au and Kauffman 2008)
2	Simple to use	(Au and Kauffman 2008; Mallat 2007)
3	Time-independent	(ACMA 2010; Schwiderski Grosche 2002)
4	Place-independent	(ACMA 2010; Heijden 2002; Schwiderski Grosche 2002)
5	Diversified services	(ACMA 2010)
6	Used in lieu of cash	(ACMA 2010)
7	Spent more time on mobile than PC	(ACMA 2010)
8	Credit facility	(ACMA 2010; Pousttchi 2004)
9	Instant confirmation of transaction	(ACMA 2010)
10	Less time to complete a transaction	(ACMA 2010)
11	Now technology	(Au and Kauffman 2008)
12	Access to internet service	(ITU 2009)
13	Savings on fixed cost	(Pousttchi 2004)
	Negative Influencing Features	**Reference**
1	Privacy	(Heijden 2002)
2	Confidentiality	(Linck, Pousttchi, and Wiedemann 2006; Schwiderski Grosche 2002)
3	Personal details	(ACMA 2010)
4	Transparency	(Linck, Pousttchi, and Wiedemann 2006)
5	Traceability	(Au and Kauffman 2008; Linck, Pousttchi, and Wiedemann 2006)
6	Authentication	(Linck, Pousttchi, and Wiedemann 2006; Schwiderski Grosche 2002),
7	Trustworthiness	(Heijden 2002)
8	Non-repudiation	(Linck, Pousttchi, and Wiedemann 2006)
9	Legal provision	(Au and Kauffman 2008)
10	Technical knowledge	(ACMA 2010)
11	Dispossession	(Schwiderski Grosche 2002)
12	Data interception	(Schwiderski Grosche 2002)
13	Hacking	(ACMA 2010)
14	Virus	(Dwan 2004)

The influencing factors on consumer behaviors on the use of mobile payment were subjected to the Cronbach alpha reliability testing. Cronbach alpha is the recognised measure of reliability and is applicable for Likert-type scale (Gliem and Gliem 2003). The lowest value of Cronbach alpha is 0.6 for acceptable reliability. The value of Cronbach alpha above 0.8 is considered as good reliability and the value above 0.9 represents excellent reliability (Hair et al. 1998; Manning and Munro 2006). Table 2 shows Cronbach alpha 0.91 and 0.90 measuring positive and negative influencing factors of mobile payment adoption, which represents excellent reliability.

Table 2: Reliability Statistics for Factor Measurement

Factors	Cronbach Alpha	No. of Items
Positive Influencing Factors	0.91	13
Negative Influencing Factors	0.90	14

Research Question 2: Preferred Methods of Payment for e-Government Services by the Community

The respondents were asked to select a maximum of 5 types of e-Government services that they would use mobile payment to pay for the services. The respondents' answers were analysed by Multiple Response Analysis using SPSS. Table 3 shows the top 3 services are payment for driver's license fees, utility charges and public transport tickets.

Table 3: Preferred e-Government Services for Mobile Payment

	e-Government Services	Count	Percentage
1	Driver's License Fees	59	62.1%
2	Utilities	53	55.8%
3	Public Transport Tickets	49	51.6%
4	Vehicle Parking Fees	46	48.4%
5	Council Rates	38	40.0%
6	Vehicle Registration/Transfer Fees	38	40.0%
7	Lottery Ticket	32	33.7%
8	Traffic or Parking Infringement	24	25.3%
9	Income Tax	18	18.9%
10	Hospital Charges	13	13.7%
11	Business Registration	11	11.6%
12	Passport Fees	8	8.4%
13	Tradesperson's License	6	6.3%
14	Visa Fees	2	2.1%
	Total	397	417.9%

Given the responses as shown in Table 3, research question 2 asks "*What methods of payments for e-Government services would be preferred by the community?"* The respondents chose their preferred methods from a selection as shown in Table 4. The frequency of 1st, 2nd and 3rd choices of the respondents was counted by using Multiple Response Analysis techniques of SPSS. Table 4 shows the counts of 1st, 2nd and 3rd choices in Columns A, B and C respectively. The weighted score of counts for each choice was calculated and is shown in column D. The weight of 1st choice is taken as 3, 2nd choice is 2 and the 3rd choice is 1. The weighted score indicates that payment-using BPAY is the most preferred method followed by special mobile application to use a credit card and then special mobile application to be loaded on the mobile device to a debit bank account.

Table 4: Preference of Methods of Mobile Payment

Method		Frequency 1st Choice	Frequency 2nd Choice	Frequency 3rd Choice	Weighted Score
		A	B	C	D=A*3+B*2 +C*1
1	BPAY on mobile	38	10	23	157
2	Special application to charge the credit card	12	19	18	92
3	Special application to debit a bank account	14	20	8	90
4	Mobile operator based payment	11	14	8	69
5	Third party (such as PayPal)	3	16	10	51
6	Utilization of unused mobile credit	7	3	11	38
7	Mobile operator and bank based payment	5	6	7	34
8	Payment using additional chip such as WIM	6	5	6	34
9	Transaction in WAP environment	2	4	4	18

The final research question corresponds to the second objective of the research which asks *"Why do customers prefer to use mobile payments for selected e-Government services?"* Principal Components Analysis (PCA) is a recognised and popular form of factor analysis to discover uncorrelated items from supposedly correlated items. PCA is widely used in exploratory research (Shaw 2003) and normal distribution of data is not essential for PCA (Tabachnick and Fidell 2007). Considering these aspects, PCA is selected as a suitable technique of factor analysis. Using the PCA process, the results of analysis of the positive and negative influencing factors that affect customer's preferences to use mobile payments for e-Government services are presented in Tables 5 and 6.

Table 5 shows the loadings for the positive influencing factors. Six items were in Component 1. The largest loading for Component 1 was item No. 3 "Time independent", a prominent feature of convenience. The other five items of Component 1 also relate to convenience of use. Thus, Component 1 was labelled "Convenience".

There were four items in Component 2 with the highest loading being for item No. 8 "More association with mobile than PC". This item indicates the effect of technological push in a social environment. Other items in Component 2 are also characteristic of this notion and thus the component was labelled "Technological Impulse".

There were three items in Component 3. The highest loading was for item No. 7 "Credit Facility". This item describes the feature of making payment by a mobile operator or third party instantly and billing the user later. The other items in the component relate to the similar concept of value-added service of mobile payment by allowing the consumers to use credit. Therefore, Component 3 was labelled "Credit Facility".

Table 5 Loadings of Components for Positive Factors

No.	Items	Component			Factor Label
		1	2	3	
3	Time-independent	.849			**Convenience**
1	Availability	.813			
2	Simple to use	.783			
4	Place-independent	.764			
9	Access to internet service	.598			
10	Less time to complete	.569			
8	Spent more time on mobile than PC		.816		**Technological Impulse**
12	New technology		.751		
13	Savings on fixed cost		.704		
11	Instant confirmation of transactions		.636		
7	Credit facility			.829	**Credit Facility**
5	Diversified services			.778	
6	Used in lieu of case			.657	

Table 6 shows the loadings for the negative influencing factors. There were seven items in Component 1. The largest loading within Component 1 was "Privacy", which shows the concern of users regarding the lack of protection against unwanted dissemination from the allied network. The other six items of Component 1 also concern similar risks, which may lead individuals to believe that the operation of a mobile payment system is not dependable and reliable. Thus, Component 1 was labelled as "Operational Reliability Risks".

Table 6: Loadings of Components for Negative Factors

No.	Items	Component			Factor Label
		1	2	3	
1	Privacy	.869			**Operational Reliability Risks**
4	Transparency	.829			
6	Authentication	.824			
2	Confidentiality	.816			
5	Traceability	.760			
7	Trustworthiness	.713			
3	Accessibility to personal information	.650			
13	Hacking		.893		**Technological Security Protection**
14	Virus		.870		
12	Data interception		.808		
11	Loss of possessions			.807	**Casual or Incidental Risks**
10	Technical knowledge			.672	
9	Legal provision			.653	
8	Non-repudiation			.616	

Three items were listed in Component 2. Item 3 "Hacking" was the item with the highest loading in Component 2. Other items of Component 2 also refer to security from the technical perspective regarding protection from illegal access by a third party. Component 2 was labelled as "Technological Security Protection".

There were four items in Component 3. Item 11 "Loss of possessions" had the highest loading in Component 3. Here, the item refers to the chance of losing a physical item such as the mobile device and the after-effects such as concerns about unauthorised payments being made by an unauthorised person when the owner is not in control of the device. The other items in Component 3 such as 'Legal provision' and 'Non-repudiation' reflect the concerns about the after-effects of accidental or unintentional payment and lack of provision for reversal of payment. The item 'Technical knowledge' also refers to the risk of making a mistake due to inadequate knowledge about the technical operation. Thus, Component 3 indicates and measures concerns about the consequences of unintentional and accidental acts of the user, which is different from operational risks and technical issues. Hence, Component 3 was labelled as "Casual or Incidental Risks".

CONCLUSION

The literature indicates that there are some factors which influence people to accept the mobile payment method. On the other hand, some factors impede acceptance. Thirteen (13) features of mobile payment was identified as being positive influences and fourteen (14) features as negative influences on the adoption of the mobile payment method. The findings of the research identify that the transportation service is the most suitable for utilising a mobile payment scheme in the e-Government environment. Internet-based payment system - BPAY is most preferred by the people. Three factors contribute to the acceptance of mobile payment in e-Government services, which are 'Convenience', 'Technological Impulse' and 'Credit Facility'. On the other hand, 3 negative factors namely 'Operational Reliability Risks', 'Technological Protection of Security' and 'Casual and Incidental Risks' impedes the acceptance. The major suggestion for future work is to conduct a wider survey to incorporate a greater number of participants and include stakeholders such as government officials, and representatives of the financial institutions. This would help to produce a normal distribution of data, which would allow further statistical analysis and empirical tests to be conducted. Moreover, important features such as impact of cost, mobile network coverage and recent development of NFC and RFID should be incorporated in future studies. Future research should also investigate a common standard and standardized platform for m-payments to give consumer flexibility to access interoperability and transferability when making m-payments.

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