

**AN EMPIRICAL STUDY ON THE  
APPLICABILITY OF  
AN AUGMENTED TECHNOLOGY  
ACCEPTANCE MODEL  
IN THE CONTEXT OF  
E-GOVERNMENT INITIATIVES  
IN THE HONG KONG SPECIAL  
ADMINISTRATIVE REGION  
GOVERNMENT**

By LEUNG Kai Pong Tony, PhD

June 2010

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By LEUNG Kai Pong Tony

June 2010

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The Award of Doctor of Philosophy

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## **AUTHORISATION**

I hereby declare that I am the sole author of the thesis.

I authorise the Edinburgh Napier University to lend this thesis to other institutions or individuals for the purpose of scholarly research.

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LEUNG Kai Pong Tony

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## LIST OF ABBREVIATIONS

Attached below is a list of abbreviations frequently used in the thesis for easy reference

| <u>Abbreviation</u> | <u>Meaning</u>  |
|---------------------|---|
| ATU                 | Attitude toward using                                     |
| AU                  | Actual system usage                                       |
| BI                  | Behavioural intention to use                              |
| CITB                | Commerce, Industry and Technology Bureau                  |
| CSB                 | Civil Service Bureau                                      |
| HKSARG              | The Government of Hong Kong Special Administrative Region |
| IT                  | Information, internet and communication technologies      |
| ITBB                | Information Technology and Broadcasting Bureau            |
| OGCIO               | Office of Government Chief Information Officer            |
| PEOU                | Perceived ease of use                                     |
| PU                  | Perceived usefulness                                      |
| PWCI Team           | Price Waterhouse Change Integration Team                  |
| RTC                 | Resistance to change                                      |
| TAM                 | Technology Acceptance Model                               |
| TPB                 | Theory of Planned Behaviour                               |
| TRA                 | Theory of Reasoned Action                                 |
| TTF                 | Task Technology Fit Model                                 |
| UK                  | United Kingdom  |
| US                  | United States of America                                  |



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**ABSTRACT**

The success of the Government of Hong Kong Special Administrative Region's (HKSARG) e-government initiatives is dependent on the government employees' acceptance and use of the underpinning information, internet and communication technologies (IT). Unfortunately, only a few empirical researches have been conducted to investigate the drivers of IT usage in government workplaces.

To predict IT usage, the Technology Acceptance Model (TAM) has been tested and demonstrated its predictive power in various contexts. But it does not provide guidance to managers because Davis grouped the antecedents to the TAM constructs as "external factors" so as to focus on the main part of the model and to keep it robust. Hence, these factors are the ultimate drivers that determine the users' behaviors.

This research aims to improve the explanatory power of TAM by identifying and including resistance to change (RTC) as a relevant external factor with the assistance from Max Weber's Theory of Bureaucracy (TB). To test the augmented TAM, an email

questionnaire survey to 700 randomly selected HKSARG IT users was conducted. Additional information was gathered from senior management to validate the survey results.

The results show that the IT users in HKSARG are not valuing usefulness and ease of use of IT in the same manner as employees in most other contexts. In addition, the results confirm that RTC is a relevant and strong external variable to TAM. In line with theories, HKSARG employees, as a whole, tend to have above average level of resistance to change. But statistical test results also revealed that there are heterogeneous behavioural groups within HKSARG. Specifically, younger or more educated users are more willing to change. The existence of these groups has both practical and managerial implications for implementing change.

In particular, it is argued that the government should not be viewed and understood monolithically. A better strategy for management to implement change is to target the younger or more educated users first for piloting and to build up sufficient user mass and exert peer pressure to older or less educated users for a more successful implementation of IT across all staff.

Because of the weaknesses of the established policies, the HKSARG has an undesirable structural composition (high percentage of older and less educated employees) in the face of change. To tackle the high level of resistance to change, it is suggested that continuous training is a must. Moreover, the training packages should be tailor-made for various groups in the civil service to suit their specific needs and to enhance their capabilities. In the long term, it is recommended that the human resources management policies should be reviewed and modified with an aim to adjust the structural composition of the civil service toward a more change ready workforce.

In addition, more research on the characteristics of the public sector is required for a better understanding of the real nature of these large bureaucratic organizations.

**Keywords: Resistance to change, bureaucracy, sub-culture, e-government, technology acceptance.**

# 1. INTRODUCTION AND BACKGROUND OF THE RESEARCH

Governments are facing challenges, e.g. more demanding citizens and financial constraints, that have not been experienced by them previously. In response, governments are seeking ways to meet the challenges posted by changing environment and to deliver higher quality services to their “customers”.

Similar to many other governments, the Government of Hong Kong Special Administrative Region (HKSARG) is trying to take advantages of enhancement in information, communication and internet technologies (IT)<sup>1</sup> to enhance efficiency and quality. The pioneering governments like US, UK, Australia, New Zealand and Singapore have been implementing their e-government initiatives since 1990s. In Hong Kong, the HKSARG first launched its formal e-government strategy in 2001 under the strategic paper named Digital 21 Strategy (ITBB, 2001). The e-government strategy has been fine-tuned in 2004 under the Digital 21 Strategy : Sustainability and Opportunities (CITB, 2004). An outline of the e-government development stages in Hong Kong (as per the Digital 21 Strategy 2001) as well as corresponding stages proposed by Deloitte Research is at Appendix I.

E-government development is underpinned, amongst other factors, by a series of IT investment projects. However, many researchers (e.g. Al-Kibsi et al., 2001; Turban et al., 2002) point out that the staff’s acceptance and use of the new technologies is critical to the successful implementation of e-government. Indeed, the HKSARG also recognizes promoting the extensive use of IT within the government (ITBB, 2001) is vital to realize

---

<sup>1</sup> IT when in the e-government discussion is restricted to its narrower meaning i.e. information, communication and internet technology; while in the literature review Chapters or elsewhere in this thesis IT can be generic term to represent technologies and information systems.



the most benefits the e-government.

Unfortunately, much of the researchers' and governments' attention and effort were directed to ensure the feasibility of the technical infrastructure; to create a favorable regulatory environment; to tackle the problems of privacy and security concerns and promote the e-government in the society, etc, relatively few empirical researches have been conducted to investigate the factors influencing the government employees' usage of technologies in workplace.

The lack of knowledge in the ultimate drivers of technology acceptance in the workplace initiated a search of relevant tools. The Technology Acceptance Model (TAM) was identified as the key theoretical basis for this. The Model has been tested and demonstrated its predictive power in various contexts, including the government contexts, to predict user acceptance and adoption of the technology. But the TAM does not provide guidance to managers to improve the rate of acceptance.

When Davis developed the model, the antecedents to the TAM constructs were generally grouped as "external factors", so as to focus on the main part of the model and to keep it robust. Hence, these factors are the ultimate drivers that determine the users' behaviors. Findings of the previous researches also suggested the inclusion of appropriate external variables is able to increase the explanatory power of the TAM (e.g. Teo, 2001; Chau, 1996).

Because the management and system designers are continuing to seek for a model that is able to explain why the users accept a technology or not and to provide them with practical guidelines, the aims of this research are therefore: (i) to identify relevant external variable to TAM; (ii) to test empirically the augmented TAM in the HKSARG

context; and (iii) to devise pragmatic recommendations for management and system designers and alike to better implement the IT projects. In the process, assistance from Max Weber's Theory of Bureaucracy (TB) will be sought. The TB is believed to be relevant because government is a bureaucratic organisation and bears the characteristics of a typical bureaucrat as stipulated in the TB. By examining the government context through the lens of TB, it should enable the researcher to include strong and relevant identified factor(s) to the TAM. It is therefore expected the augmented TAM will have the power in explaining the IT usage in the e-government initiatives and contributes to the success of these multi-million projects because the system designers and management could know what are the factoring influencing the users' behaviors and corresponding actions could be taken accordingly.

Because the context of this research is the Government of the Hong Kong Special Administrative Region (HKSARG), the following aims to give a general picture of the context. However, it is necessary to clearly define what the term "government" means in this research first. The term can either be used to refer to the political apex, i.e. the political leader (prime minister, governor, president), the legislature and executive councils, which makes the highest level political decisions; or the term can be used to refer to the administrative machine under the political apex mentioned above. This administration machine is responsible for executing the decisions of the apex and to deliver the services to citizens. In this research, the term "government" refers to the administration machine, unless specified otherwise.

Historically, Hong Kong had been a colony of the United Kingdom for more than 100 years after the Chinese troops were defeated in the Opium Wars. The city was handed back to China on 1 July 1997.

Currently, Hong Kong Special Administrative Region (“Hong Kong” or HKSAR) is one of the two special administrative regions of the People's Republic of China; the other is Macau, which was handed over to China by the Portuguese in 1999. Hong Kong enjoys its Special Administrative Region status through the pledge by the Chinese government in the Sino-British Joint Declaration and the "one country, two systems" policy. Hong Kong has a high degree of autonomy in all areas except matters relating to defence and foreign affairs. The Sino-British Joint Declaration guarantees these for at least 50 years beyond the 1997 handover. The Chinese National People's Congress approved the Basic Law in 1990 and it is the highest law in Hong Kong, although the right to interpret Basic Law is held by the Chinese Central Government.

Because of the special status of Hong Kong, it runs different economic and political systems from those of Mainland China. Hong Kong adopted the capitalist economy and English common law systems during the ruling by the British. Hong Kong is regarded as a place where "East meets West", reflecting the culture's mix of the territory's Chinese roots with the culture brought to it during its time as a British colony. During the ruling of British, the British government sent governors to Hong Kong to act as the superior head and the political apex was tightly controlled by British and local elites who were also friends of London. All the senior officials in the government were also British. The interaction between these ruling elites and ordinary citizens was limited.

Since the 1970s, Hong Kong's economy boomed and the city enjoyed thirty years of prosperous growth and wealth. The per capita income of Hong Kong people has been high in the global rankings for many years. The situation was affected by the Asian financial crisis in 1998 and the SARS crisis in 2003. It took a few years for the city to recover from this deflationary period.

Since the late transition period of Hong Kong's ruling from Britain to China in the mid-1980s, Hong Kong people started to demand democracy and there were a number of political parties formed in Hong Kong and started to build up their influence. However, the actual political influence powers of these parties are still very limited.

After the handing over, the Chief Executive of Hong Kong is elected by an Election Committee of 400 members and approved by the Chinese central government. He is assisted by the Chief Secretary for Administration and the Financial Secretary, and other secretaries who head policy bureaux in the government secretariat. The Secretary for Justice is responsible for legal matters of the government and prosecution for criminal cases in the territory. These most senior officials are appointed by the Chief Executive and endorsed by the Chinese central government. Together with the Executive Council and Legislature, they form the political apex of Hong Kong. But the focus of this research is on behaviours of the employees in the executing body under this political apex, i.e. the administration machine or commonly referred to as “civil service”.

The administrative and executive functions of the HKSARG are carried out by the bureaux and departments and agencies (bureaux and departments) under the political apex. These bureaux and departments are mostly staffed by civil servants. According to the Civil Service Bureau (CSB), these civil servants are appointed based on the principle of merit. The civil service has the following core values:

- commitment to the rule of law;
  - honesty and integrity;
  - objectivity and impartiality;
  - political neutrality;
  - accountability for decisions and actions; and
  - dedication, professionalism and diligence.
- Source: CSB (2009)

The responsibilities of the government are distributed across the bureaux and departments which have their specialised areas of responsibilities. The establishment of the civil service kept expanding until early 2000 when it arrived at the peak of about 180,000. Because of the series of incidents as briefly mentioned above, the change of social expectations and financial constraints faced by the HKSARG during the early years of 2000s, it set the target to reduce the establishment to around 160,000 by 2006/07. Through the measures like voluntary retirement schemes, salary cuts, frozen or strict control of recruitment of civil servants, freezing of salaries rise and reducing the entry salary of new recruits later, the HKSARG managed to contain its size to around 160,000 (this amounts to about 4% of Hong Kong's labour force) as expected and its operation expenditure to around 20% of GDP. In terms of government expenditure as a percentage of GDP, HKSARG is on the low side globally.

The bureaucratic nature, permanent recruitment system and performance management systems in HKSARG have been frequently cited as the root causes of civil service complacency and poorly motivated staff (e.g. Scott, 2005). This view of the HKSARG civil service needs to be more formally tested and that is the ultimate aim of this present thesis, particularly in the context of the Weberian bureaucratic paradigm and the fundamental concept of Resistance to Change.

The thesis is structured as follows: Chapters 2 and 3 will review relevant literature on e-government, the Technology Acceptance Model (TAM), the Theory of Bureaucracy (TB) and resistance to change (RTC); Chapter 4 will present the research method used with justifications; Chapters 5 and 6 will present the findings of this research and discussion of the findings; and Chapter 7 will present the conclusion, limitations of the research and the recommended future research directions for both research and policy.

## 2. LITERATURE REVIEW (I)

### 2.1 e-Government

#### 2.1.1 The definition

E-government is sweeping through the governments worldwide. In general, it is expected that e-government can improve the quality of government services; and the government employees should be able to work as easily, efficiently and effectively as their counterparts in the commercial world (OMB, 2002). Different institutions and researchers use different e-government definitions. Without copying all the texts, Table 2.1 tabulates the components included in some definitions.

**Table 2.1: Basic components stated in e-government definitions**

| Definition proposed by        | Components                   |   |                          |             |
|-------------------------------|------------------------------|---|--------------------------|-------------|
|                               | Use of internet technologies | To achieve more efficient internal business process | Increase service quality | Reduce cost |
| World Bank Group (2003)       | Y                            | Y   | Y                        | Y           |
| United Nations (2002)         | Y                            | X   | Y                        | X           |
| US Government (McClure, 2000) | Y                            | Y   | Y                        | Y           |
| Australian Government (2003)  | Y                            | Y   | Y                        | X           |
| Koga (2003)                   | Y                            | Y   | Y                        | X           |
| Cordella (2007)               | Y                            | Y   | Y                        | Y           |

Legend : Y denotes the definition included this element

X denotes the definition does not include that element

Generally, e-government is related to use of technology, in particular internet and communication technology (IT) to enhance the operations of government and to deliver quality services to the public. Except the United Nations (UN), all the other definitions suggest explicitly that e-government initiatives will enhance the internal business processes and efficiency of government.

Bovaird (2005) presented a collection of e-government definitions adopted by OECD, the World Bank and the governments of UK, New Zealand and Italy. A comparison of these definitions with those in Table 2.1 further strengthens the view that e-government is consistently defined by related parties across the globe.

In Hong Kong, the officially named e-government initiative appeared as late as 2001 in the policy paper “2001 Digital 21 Strategy Hong Kong: Connecting the World” (ITBB, 2001). This 2001 Strategy contained the following five Key Result Areas (KRA) and e-government was embedded in KRA 2.

#### **The five KRAs**

- i. KRA 1 : To enhance the world class e-business environment in Hong Kong
- ii. KRA 2 : To ensure that the Hong Kong Government leads by example
- iii. KRA 3 : To develop Hong Kong’s workforce for the information economy
- iv. KRA 4 : To strengthen the Hong Kong community for digital exploitation
- v. KRA 5 : To leverage Hong Kong’s strengths in exploitation of enabling technologies

Source : ITBB (2001, p. 21)

In the 2001 Strategy paper, HKSARG defined e-government as:

“e-Government is an on-going process of transformation of government towards the conduct of internal operations and provision of government services to the public (including the access to government information and the completion of government transactions) via electronic means on an “anywhere and anytime” basis”. (ITBB, 2001, p.18)

The above brief revision of e-government definitions provides a clear idea of the scope of e-government. In short, it relates to the use of IT to improve efficiency and service quality of the governments. These potentials are widely recognized so far (e.g. The Council for Excellence in Government, 2001; Layne and Lee, 2001; McIvor, et al, 2002; Teicher, et al, 2002; Ebrahim and Irani, 2005; Cordella, 2007).

### **2.1.2 The development and implementation of e-government**

However, the e-government development and implementation process is a multi-year process. This long process can be divided into and viewed as stages. HKSARG's development scheme is at Appendix I. Of the different schemes used to breakdown the process, Atkinson and Leigh's (2003) three stages model may be the simplest scheme. They broke down the whole process into three stages, i.e. the using of internet to share information; the online transactions and service provision; and the integration stages. These researchers pointed out that many of the developed countries' e-government initiatives have been going beyond the first two stages and in the last stage. To achieve the ultimate goals, the government must ensure the successful transition between the stages of development, with each stage is significantly more complex and complicated than the proceeding ones. Devadoss, et al (2002) opined that “implementing e-government projects can be complicated and difficult because of the vast size and bureaucratic nature of a government” (p.256). In addition, most governments are slow



or even unprepared for the transformation which involves the adoption of new technology and re-engineering process (Devadoss, et al, 2002). Jupp (2003) and Atkinson and Leigh (2003) argued that in the early stage of e-government, there is little impact on cost and benefits to citizens. They argued that if the real benefits of e-government are to be realized, a true integration of front-end web presence and back-end office operations is necessary and the process of implementation will be far more complex than the tasks in earlier stages because more fundamental organisational change and resistance to the same are expected.

Atkinson and Leigh (2003) added that the last stage is the most important as well as the most difficult stage to proceed, even though most of the necessary foundations have been laid down and the technologies that underpin the integration are available. They explained that because the earlier steps involve an extension of the current bureaucratic framework and put it online, most of the problems can be solved by employing a web master. In stage 3, however, it involves organisational changes and affects what the staff actually do and how they do. The change also necessitates new behaviors and attitudes. All of these are fundamental changes to the bureaucracy and will lead to a series of problems and uncertainties on issues like power, turf and funding. In the end, the government staff will simply tend to maintain the status quo.

Jian (2004) viewed the relationship between e-government and the government as interactive and dynamic. The researcher systematically discussed the two somewhat contradictory themes of the relationship. On one hand, researchers insisted that e-government is a tool to transform the government; on the other hand, researchers trusted the bureaucratic character of government will render e-government failure. Both arguments can be sustained by a number of real life cases. While some governments were able to assimilate the IT successfully, Jian's (2004) list of failure stories suggested

that many of them were resulted from the staff's reluctance to accept and use the IT which underpins the necessary changes.

The change brought by e-government initiatives is transformational and it will affect every aspect of the organisation (e.g. Roy, 2001; Jian, 2004; Dunleavy, et al, 2006; Irani, et al, 2007; Esteves and Joseph, 2008; Vathanophas, et al, 2008). Researchers try to illustrate the idea and present in more concrete terms as follow.

Roy (2001) explained that the challenges of implementing e-government go far beyond technology per se because the change will call for new organisational structure, new skill, new forms of innovation and learning and even a redefinition of purpose (p.846). Because of these uncertainties, Roy (2001) pointed out that the process will face resistance and the digitally connected way of working in the IT world may simply be incompatible and be blocked by the culture of the government. The researcher went on to state that the IT has placed pressures to the civil servants to acquire new skills (on top of the required IT skills) like inter personal skills, negotiation skills, facilitation and consultation skills and to adapt new attitudes to deal with the new job requirements and become "new public servants" (pp.850-51). This is a very big and rare challenge to the civil servants.

Esteves and Joseph (2008) held the view that e-government will shift the government nature from hierarchical command-and-control to an interactive collaboration among stakeholders. Moreover, as with Roy (2001), they opined that e-government is not just about technology but a change of culture and other adaptation issues.

Vathanophas, et al (2008) made reference to Ho (2002) and opined that e-government initiative will cause the government a paradigm shift in terms of orientation, process

organisation, management principal, leadership style, internal and external communication, mode of service and its delivery. Burn and Robins (2003) and Vathanophas, et al (2008) shared the same view that the government will shift from paper-based work to internet-based work.

Dunleavy, et al (2006) reviewed the cases of e-government initiatives of US, UK, New Zealand, Japan, Canada, Netherlands and Australia and concluded that the internet and web-based technologies are radically changing the societal behaviors of government employees and these will exert continual pressure on government organisations of all kinds to innovate (pp. 250-252).

Bovaird (2005b) suggested that the use of e-government technology will result in improved decision-making, more intensive and productive use of database and better communications. Moreover, Bovaird (2005b) pointed out that IT has two key functions in the organisation, i.e. to act as a channel for knowledge flow and to become one of the main archives for stocks of knowledge. In more practical terms, the improved use of databases is the access and cross-reference of knowledge in the organisation's database, it is thus the searching and downloading of information. For communication, email is obvious related. To improve the decision making process, it is a result of better flow of information and convenient access to stored knowledge. These changes in processes will require corresponding adjustments in the behaviors and work routines in the government to a large extent.

Boisot (2006) argued the most important change happens in information and knowledge ownership and sharing. Boisot (2006) suggested that bureaucracy is a structure organized to deliver order, stability and predictability. Much of the authority and power of bureaucracy comes from the asymmetric information it holds. The emergency of IT

makes government more transparent and the power is being eroded as the asymmetry decreases.

Judging from the multi-perspective discussion on the likely impacts of e-government to the government, it is seen that e-government will transform the government thoroughly. In the course of implementation, one of the most challenging tasks is to address the human issues, which will be examined in more depth in the next Sections.

### **2.1.3 Acceptance and adoption of IT by government staff**

The last Section reviewed the stages and difficulties in the development and implementation process of e-government. This Section focuses on the vital role of government employees' acceptance and adoption of the e-government enabling IT.

The failure rate of e-government projects is high. Esteves and Joseph (2008) reported that the failure rate can be as high as 85%. Through the years, many researchers (e.g. Appelbaum, et al, 1998; The Council for Excellence in Government, 2001; Al-Kibsi et al, 2001; Teicher, et al, 2002; Jupp, 2003; Kamal, 2006; Vathanophas, et al, 2008) emphasised that staff acceptance of IT is key to success. Some findings related to this issue are presented below.

Lehaney, et al (2002) pointed out that if the concentration of the development process of the information system is on technical rather than human issues and if the effort is used to ensure technically possible rather than organisational desirable, then the possibility of failure is high.

Devadoss, et al (2002) analysed the Singaporean e-government initiative and found that

e-government structure, developer knowledge and the civil servants' participation (i.e. accept and use the IT) are three necessary factors for a rewarding e-government investment. Similarly, Esteves and Joseph (2008) underscored the acceptance of IT by government employees by including them as one of the three primary e-government stakeholders in their e-government framework.

Chircu and Lee (2005) revealed that staff acceptance and use of IT is a critical success factor of e-government projects and is vital for the realization of the potential benefits of IT. However, they also pointed out that the government is extreme risk aversion and the staff will avoid using IT for various reasons.

Henriksen and Damsgaard (2007) reiterated that e-government objective is to take advantage of IT to improve the use and reuse of data generated, handled and stored within the government. They admitted the essentiality of IT acceptance and go on to point out that the research on government employees' acceptance and use of IT is by far attracting insufficient attention. They state:

“... many e-government initiatives are subject to an iceberg phenomenon. The top of berg represents the government to citizen and business interaction, which is very visible and evident whereas the government's internal effectiveness and efficiency is largely disregarded because it is hidden below the surface and therefore, much less visible. We concur with his observation and add that only with an effective internal processing of information can the citizen and business be better serviced.”  
(pp.13-14)

A clear message evolves from the above review of literature – to be a successful e-government, the government employees must accept and use the IT. To validate this, a

line of real life cases should be self-explanatory.

During the period from 1980s and 1990s, a number of new technological change projects in the US and UK government departments were subject to huge resistance from the staff side and rendered many projects to failure (Margetts, 1999).

Jian (2004) investigated 13 failure cases of e-government projects and concluded that at least six of them were resulted from the resistance of change by the employees.

Kubo and Shimada (2007) investigated the Japan's push of local governments to implement e-government initiative. The e-government project started in 2000 but was observed to have dissatisfactory progress in as late as 2007. The researchers described the project's progress as:

“regarding the actual situation of local governments, the computerization of fundamental parts, such as PCs and LANs, continues. However, use of the application for issues such as ... are not in progress” (p.316)

Vathanosphas, et al (2008) surveyed the Thai Navy and agreed that e-government's potential benefits are promising. But these researchers directly pointed out that the whole project cannot be implemented and the benefits cannot be realized if the IT is not accepted by staff.

Titah and Barki (2008) referred to a 2007 World Bank Report on e-government and revealed that the realised benefits of e-government are only a small portion of the full potential. Figurewise, Titah and Barki (2008) quoted the World Bank's estimate that only 20% of the real saving potential was captured by even the most advanced

e-government countries. This essentially reinforces the point raised by researchers in Section 2.1.2 that most of the potential benefits of e-government dependent on successful sailing in the final integration stage. In order to explore the reasons, Titah and Barki (2008) selected 99 articles from leading journals and conference proceedings and revealed that the desired outcomes of e-government – a customer-oriented and flexible service provider are incompatible with the government employees' existing values. This constitutes to reluctance to use the IT and hinders the realization of the benefits from e-government.

In conclusion, these real life examples confirm that government employees' adoption and acceptance of IT is determinant of e-government success as theorised. Both theories and past experience of e-government implementation suggest that e-government cannot be successful by pouring money into the projects and putting hardware in place. The government employees must use the e-government underpinning IT. Furthermore, the literature review in this Section shows that as the implementation goes through the earlier stages into the final integration, human factors, in particular government employees' reaction to the IT is having more and more determining effects on the projects' destiny. Unfortunately, an extensive literature review reveals that researchers and governments' attentions are primarily on issues such as privacy and security issues, technological feasibility, system interoperability and promoting public awareness and use. The empirical research of the factors influencing the acceptance of IT by government employees is very limited.

## **2.2 The Technology Acceptance Model (TAM)**

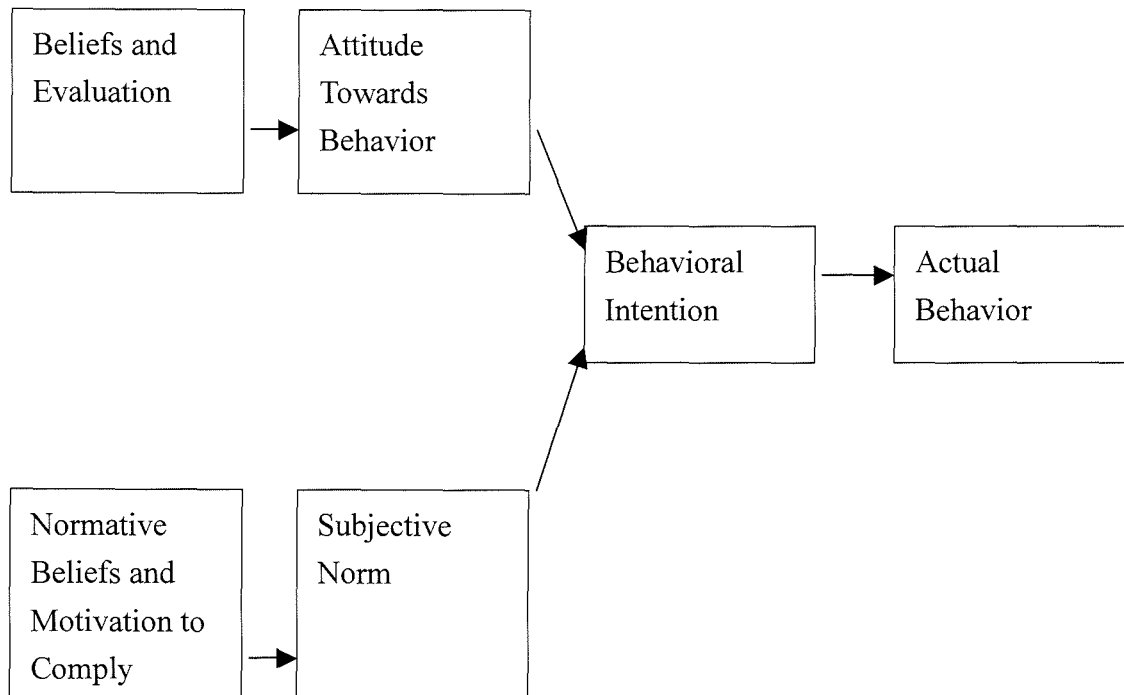
The TAM aims to predict computer usage behavior ( Davis, 1989 and Davis, et al, 1989). It is based heavily on the Theory of Reasoned Action (TRA) and has been described as “the most influential” and “empirically proven to have high validity” (Chau, 1996), “the most robust, parsimonious, and influential” (Lu, 2003), and “the dominant model” (Jensen and Aanestad, 2007) in this area. It is a popular model and there is a large pool of researches and literatures pertaining to it. This Section consists of four parts, focusing on (i) the theoretical background; (ii) the development of TAM through the years, and its recent development; (iii) previous findings in relation to the model and the constructs and (iv) the weaknesses and limitations of TAM.

### **2.2.1 The theoretical background of TAM**

A brief description of the Theory of Reasoned Action (TRA) is required for the reason that it is the root of TAM. The TRA suggests that a person's intention to do a behavior is guided by the person's attitude toward the behavior and subjective norm. If the person intends to do a behavior, he/she is likely to do it. The attitude comprises of the person's beliefs about the consequences brought by doing the behavior and the person's values assigned to the consequences. The subjective norm is the person's perception that what people important to him/her will think he/she should or should not perform the behavior (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980). The TAM adapts the chain of relationships from beliefs to attitude to intention to behavior in TRA in an attempt to explain user acceptance and behavior in relation to technology. Figure 2.1 is the graphical representation of TRA.



**Figure 2.1: The TRA**



Source : Adopted from Davis, et al, 1989, p.984.

In TRA, all the factors that may influence the target's behavior and are not integral part of the TRA are defined as external factors. The external variable may influence the beliefs a person holds; or the relative importance he attaches to attitudinal and normative (i.e. Subjective Norm, SN) considerations. Since TAM does not include SN, it does not consider the dynamic relationship between the weights of attitude and SN. It should be pointed out that Ajzen and Fishbein (1980) opined that different people may attach different weights to the attitude and SN respectively. Therefore, the exclusion of SN in TAM may result in missing of essential information. Ajzen and Fishbein (1980) explain the dynamic between attitude and subjective norm as:

“For some behaviors, normative considerations (the perceived prescriptions of important others) are more important in determining behavioral intentions than

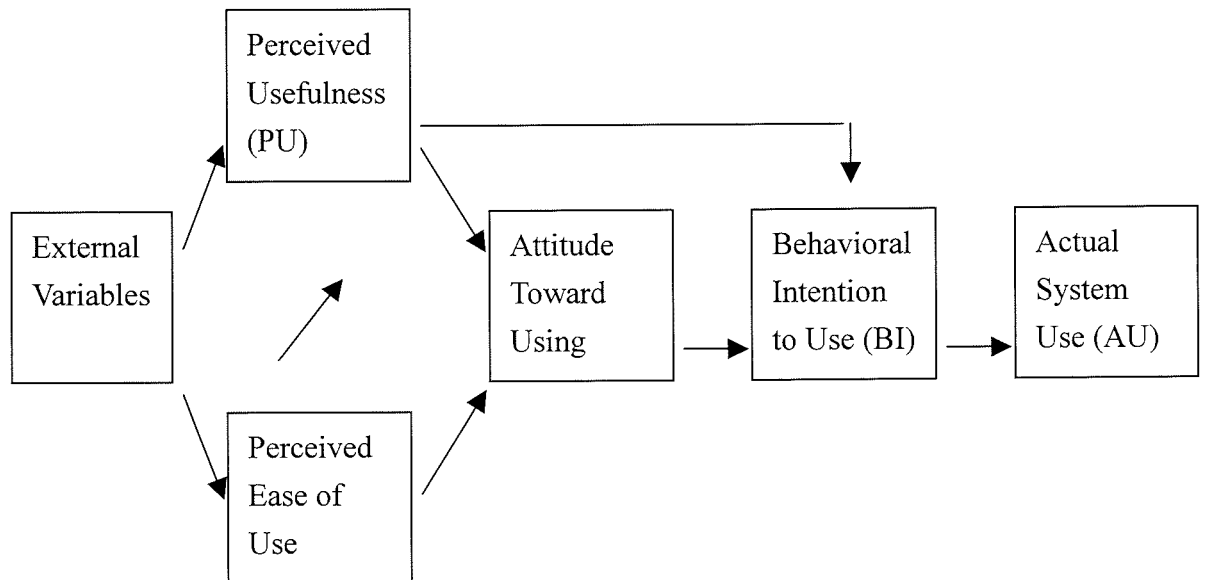
are attitudinal considerations (the person's favorable or unfavorable evaluation of his performing the behavior). For other behaviors, the reverse may be true. In fact, variations in any of the four elements defining the behavior (i.e. action, target, context, and time) may influence the relative importance of the attitudinal and normative components. For example, there is some evidence that attitudinal considerations are more important for competitive behaviors than for cooperative behaviors while normative considerations are more important for cooperative than for competitive actions. Similarly, there is evidence that subjective norms are important determinants of intentions to buy some products but not others...

The relative importance of the two components can also be influenced by demographic variables (e.g. age, sex, status), personal traits (e.g. authoritarianism, introversion-extraversion), and other individual differences. For example, for some behavioral intentions, women may place more emphasis on attitudinal considerations than men do while the reverse may be true for other behavioral intentions. In a similar fashion, individual high in authoritarianism may place more weight on the subjective norm than individuals low in this trait." (Ajzen and Fishbein, 1980, pp. 57-58)

Since TRA is a general model, "researchers using TRA must first identify the beliefs that are salient for subjects regarding the behavior under investigation" (Davis, et al, 1989, p.984). Davis (1989) and Davis, et al (1989) considered the expectancy theory, self-efficiency theory, lost-benefit paradigm, adoption of innovations and channel dispassion model and findings of previous studies and concluded that users' perceptions on usefulness and ease of use on a particular technology or system are most relevant to the studies of information system implementation. Based on these findings, the TRA

was modified to become TAM, of which the graphical representation is shown in Figure 2.2.

**Figure 2.2 : The TAM**



Source : Adopted from Davis et. al, 1989, p.985.

Since its introduction, researches and extensive empirical tests on the predictive power of the model have been done. The model is confirmed to be valid and applicable in nearly all the contexts studied (e.g. Davis, 1989; Davis, et al, 1989; Mathieson, 1991; Adams, et al, 1992; Horton et al, 2001).

The TAM differs from the TRA in two respects. Firstly, TAM excludes the subjective norm (SN). This is based on Davis, et al's (1989) finding that the SN construct is not significant in their study. But as explained by Taylor and Todd (1995b) and Dishaw and Strong (1999), one of the possible reasons for finding a non significant SN may be the use of students in many of the TAM tests. These researchers expect that the SN is more important in organisational settings. Controversially, the studies in organisation contexts

by these researchers show that SN is not an important component in understanding individual IT usage, too.

Regarding SN, Fishbein and Ajzen (1975) admitted that it is one of the least understood aspects of TRA. Sun and Zhang (2006) shared this view on SN. However, other models explaining user behaviors like Theory of Planned Behavior (TPB) and a later variation of TAM, i.e. the TAM 2 all include SN as a core construct.

In a research by Vankatesh, et al (2003), the researchers discussed in detail the role of subjective norm again and finally decided to include it in the Unified Theory of Acceptance and Use of Technology. Therefore, SN is treated unequally by different researchers, the majority of whom would include SN in their models.

Secondly, TAM theorises a direct causal link between perceived usefulness (PU) and behavioral intention (BI) – the PU-BI relationship, which is inconsistent with TRA. TRA theorises people form an intention to perform a behavior toward which they have positive attitude, thus the ATU-BI relationship. But Davis, et al (1989) theorised the PU will have direct influence on BI as well because:

“within organisational settings, people form intentions towards behaviors they believe that will increase their job performance, over and above whatever positive or negative feelings may be evoked toward the behavior per se. This is because enhanced performance is instrumental to achieving various rewards that are extrinsic to the content of the work itself, such as pay increases and promotion”  
(p.986)

However, according to Morris and Venkatesh (2000), users in different ages will attach

different weights to job performance. Specifically, they argued that younger IT users would value promotion and work performance more than older users. This casts doubt to Davis, et al's (1989) argument just cited above.

In TRA, it is theorised that the influence of external factors is mediated sequentially in the chain of reactions. Therefore, if adhering strictly to TRA, the influence of PU should go through attitude (ATU) which in turn affects BI.

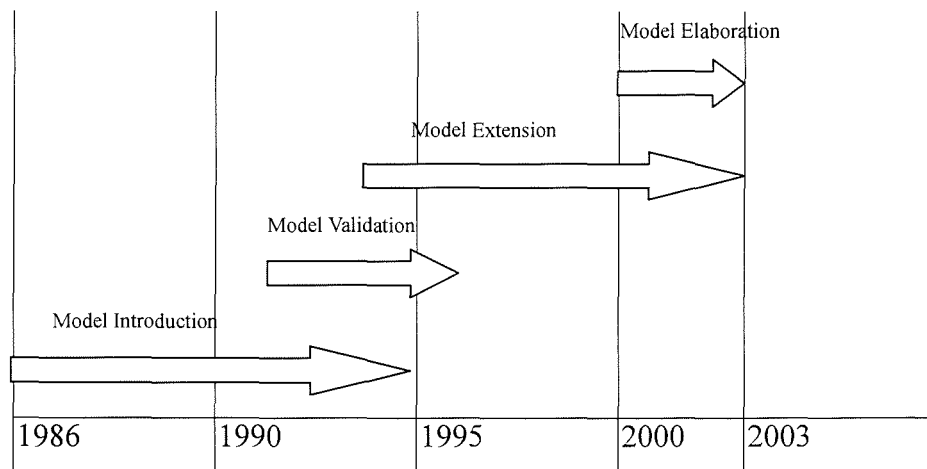
Regarding this direct PU-BI link, the mainstream findings reinforce this direct relationship (a counting of relationships proved by previous researches will be reported in later Sections) However, Davis, et al (1989) themselves and other studies by Taylor and Todd (1995); Jackson, et al (1997) and Dishaw and Strong (1999) recorded a non significant PU-BI relationship. These findings are strong evidence that the PU-BI link is not stable. Moreover, most of the researches where significant PU-BI links are found ignored the attitude construct. This will be discussed further in sub Sections of ATU and BI later.

### **2.2.2 The development of TAM through the years**

After more than 20 years, the pool of TAM research is large and is still growing. But in different periods, researchers have focused on different aspects of TAM. To visualize the change holistically, a timeline model is at Figure 2.3. The figure is based on and modified from Lee, et al (2003), who analyzed 101 TAM research articles published in major IS journals during the period from 1986 to 2003.

In accordance with Lee, et al (2003), the development of TAM can be divided into four periods, namely (i) the model introduction (1986-1995); (ii) the model validation (1992 – 1996), (iii) the model extension (1994-2003) and (iv) the model elaboration

(2000-2003). It should be noted that the process does not end at 2003 and some phases are overlapping..



**Figure 2.3: The chronological progress of TAM research**

Source: Lee, et al. (2003)

After the appearance of the model, a number of researches were conducted to test it with different technologies and in different contexts in the model introduction period. Examples of this are Adams, et al (1992) and Davis (1993).

Davis, et al (1989), Hubona and Cheney (1994) and Taylor and Todd (1995b) compare TAM with TRA, TPB and decomposed TPB respectively. It was showed that TAM was better than TRA and TPB in explaining the usage and intention. However, Taylor and Todd (1995b) found that the decomposed TPB was having a few percentage point advantage over TAM in explaining the variances in intention and system usage. Instead of concluding the decomposed TPB is better, Taylor and Todd (1995b) reminded that the marginal advantage of decomposed TPB was at the expense of having seven more variables in the model than TAM.

In short, the researches done in this period confirmed that TAM is applicable in various

contexts and in different technologies. In addition, it is simpler and more powerful than TRA and TPB to account for the usage and intention to use.

During the validation period, the measurement instruments in TAM were subject to vigorous and extensive testing. The majority of the published literature indicated that the measurement instruments are valid and reliable but a number of mixed and contrary comments are recorded.

Adams, et al (1992), Hendrickson, et al (1993) and Davis and Venkatesh (1996) examined the measurement instruments, in particular the two belief constructs, i.e. PU and PEOU. They confirmed these constructs are valid and reliable. Szajna (1994) investigated and confirmed that the instruments can be used to predict future behaviors. Chin and Todd (1995) empirically showed that PU is having reasonable psychometric properties and should not be splitted.

Lee, et al (2003) defined the model extension period as the time when researchers try to introduce new variables to TAM and to search for external variables (i.e. the antecedents). Many TAM researches fall within this category.

For example, Segars and Grover (1993) proposed that the perceived effectiveness should be included as a third determinant in addition to the PU and PEOU in TAM.

Other researches done by Straub (1994); Igbaria, et al (1995); Agarwal and Prasad (1999); Gefen and Straub (1997) and Moon and Kim (2001) were of this nature. However, these proposals usually did not attract much attention and no follow up study was done to verify the appropriateness of them.

Hence, the findings of these researches provided many hints on the antecedents and greater understanding on the causal relationships in TAM (Lee, et al, 2003). It is seen that the efforts to extend TAM has not stopped. In fact, the present research is also an attempt to identify suitable external variable.

The model elaboration period starts from 2000 and is still undergoing. The elaborative researches aim to develop a next generation TAM which can take into account and integrate the findings of previous studies.

The benchmarking studies of this period are Venkatesh and Davis (2000) and Venkatesh (2000). These studies proposed TAM 2, an augmented version of TAM. In Venkatesh and Davis (2000), subjective norm, cognitive instruments (i.e. job relevance, image, quality and result demonstrability) were defined as the external variables of PU.

In Venkatesh (2000), computer self-efficacy, perceptions of external control, computer anxiety, computer playfulness, perceived enjoyment and objective usability were defined as external variables of PEOU. The net result was that TAM 2 becomes more complicated than TAM. But TAM2 has not attracted much attention by other researchers.

The above chronological development of TAM prepared by Lee, et al (2003) gives a brief yet comprehensive review of the evolution of TAM research through the years. Apparently, the first two stages have been completed but the extension and elaboration of the model are still undergoing.



### **2.2.3 Recent Development of TAM**

The last section presented a holistic review of TAM research basing on Lee, et al's (2003) work. This section continues to report the more recent development of the model.

As mentioned in Section 2.2.1, TAM does not include subjective norm (SN). Fishbein and Ajzen admitted that subjective norm (SN) is one of the least understood aspects of TRA (1975, p.304).

This leads to the continued elaboration process. For instance, Venkatesh, et al (2003) sought to unify the results and findings of previous researches pertaining to the user acceptance of IT in a unified model. These researchers reviewed the role of subjective norm and decided to include it in their proposed Unified Theory of Acceptance and Use of Technology.

Venkatesh, et al's (2003) decision reinforced Venkatesh and Davis (2000) empirical finding in their research of TAM 2 that SN is the most influential determinant of PU. Later, Sun and Zhang (2006) cited and agreed the above proposition.

These circumstances should trigger the need for researchers to re-consider the original assumptions of TAM.

Apart from the groups of researchers busy integrating previous findings into TAM, some researchers keep trying extending the model. Looking backward, Davis, et al (1992) with a view to modeling the intrinsic motivation in and enhancing the power of the TAM, introduced the new construct of "Perceived Enjoyment" to the TAM. The

“Perceived Enjoyment” is defined as “the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated.” However, it does not attract much attention from others.

Supplement to Lee, et al's (2003) development roadmap of TAM presented in Section 2.2.2 (Figure 2.3), Davis, et al's (1992) trial triggers mass efforts to extend the model, efforts to split or modify the existing constructs of the TAM are also noted. For instance, Chau (1996 ), with the support of psychologists and other IS researchers, proposed to divide the construct “perceived usefulness” into long-term and short-term usefulness claiming that it is more powerful to explain and predict user acceptance of a given system.

Heijden (2003) introduced a new construct perceived visual attractiveness to TAM for investigating and explaining the usage of a website in the Netherlands; Lu, et al (2005) introduced the perceived risk as the third determinant of attitude and intention to use the anti-virus application in their research and Lallmahamood (2007) proposed the perceived security and privacy are additional determinants of e-commerce usage in Malaysia context.

While these suggestions to extend TAM often have empirical support in their own settings, no follow-up examination of these models in other contexts is recorded. As a result, to date, the original form of TAM is still the most widely accepted one.

Moreover, some of these modifications have been criticised by other researchers for their effectiveness to improve the model. For instance, Heijden (2003) criticised the construct “perceived playfulness” proposed by other researchers for the reason that from

the literature survey, the construct is typically at betas around 0.10 and the gain by adding this extra construct to the model may not be significant.

In fact, only very few of the proposed amendments or modifications to TAM (e.g. TAM 2) attract meaningful attention from other researchers. In recent years, researchers are seen to have had no major breakthroughs or insights on the TAM that are so significant that researcher groups are interested in discussing or following up.

A more meaningful development of TAM in recent years is the enlargement of its applicable contexts. Most of the early TAM studies were conducted in the context of large private organisations (e.g. IBM, Banks, etc) and universities. At the turn of millennium, Roberts and Henderson (2000) and Spacey, et al (2004) have brought the TAM's application to the government and public sector contexts. In this respect, the application of TAM is moved into an area is normally associated with the concept of bureaucracy.

Supported by years of testing, TAM is undoubtedly of value in predicting user acceptance of IT in various contexts. More concretely, the model is reported to routinely explain up to 40% of usage intentions and 30% of systems usage (quoted in Burton Jones and Hubona, 2003).

The enthusiasm on studies pertaining to TAM continues. According to Lee, et al (2003), a total of 19 TAM studies were published in MIS Quarterly for the period from 1989 to 2003, i.e. at least one TAM study was published in every issue of the leading journal in the area. The researchers pointed out that the TAM studies occupy nearly 10% of the publication. To make up the numbers for 2004 to 2007, we read the abstracts of articles published in MIS Quarterly and found that there are 2,1,3 and 2 TAM studies published

in MIS Quarterly. It is crystal clear that TAM continues attracting much attention from researchers in the field.

In the TAM development process, it is noted that the focus is frequently on the part starting from the two belief constructs, i.e. perceived usefulness (PU) and perceived ease of use (PEOU) and the model's applicability in different contexts. However, the belief constructs are influenced by external variables which are the ultimate drivers of user behaviours. As such, a proper understanding on the external variables is essential to explain why the IT users hold their perceptions and adoption decisions so as to devise proper policy to facilitate system usage.

#### **2.2.4 The Constructs of TAM**

As shown in Figure 2.2, there are six constructs in the TAM. Definitions and characteristics of these constructs would be discussed in the following sections.

##### **2.2.4.1 Perceived Usefulness (PU) and Perceived Ease of Use (PEOU)**

Davis (1989) and Davis, et al (1989) concluded that the users' perceived usefulness (PU) and perceived ease of use (PEOU) will influence the attitude (ATU) which, in turn, influence behavioral intention to use (BI) and finally the actual system use (AU). Moreover, PEOU will influence ATU indirectly through PU; and PU will have direct influence on BI.

##### **2.2.4.2 Perceived Usefulness (PU)**

In TAM, perceived usefulness (PU) refers to "the degree to which a person believes that

using a particular system would enhance his or her job performance” where “useful” refers to “capable of being used advantageously” (Davis, 1989, p.320). Venkatesh, et al (2003) classified PU as a performance expectancy construct.

It is hypothesized that the perceived usefulness will affect the system usage indirectly through the attitude and behavioral intention constructs. In addition, PU will have direct impact on behavioral intention to use the system. Many studies (e.g. Davis, 1989; Davis, et al, 1989; Adam et al, 1992 and Straub et al, 1995) reported that user acceptance of the technology is driven to a very large extent by PU. Davis (1993) argued that the perceived usefulness is the most influential determinant of system acceptance. Chau and Hu (2002) compared and found that PU is a more significant predictor than PEOU and ATU of BI. And PU is more important than PEOU to determine use or not.

#### **2.2.4.3 Perceived Ease of Use (PEOU)**

Perceived ease of use (PEOU) is defined as “the degree to which a person believes that using a particular system would be free of effort.”; where “ease” refers to “freedom from difficulty or great effort” (Davis, 1989, p.320). Venkatesh, et al (2003) classified PEOU as an effort expectancy construct in their model.

It is postulated in the model that the perceived ease of use is a determinant of attitude toward using the system.

In addition, it is found that a portion of PEOU's effect will be mediated by PU (Davis, et al, 1989). Davis (1993) in a study found evidence that the perceived ease of use may be a prime causal antecedent of perceived usefulness. In fact, these findings are totally in line with Goodwin’s argument that “the effective functionality of a system, (i.e.

perceived usefulness) depends on its usability (i.e. perceived ease of use).” (Goodwin, 1987, p.229).

Most of the previous researches found that the influence of PEOU on users’ attitude, intentions and actual usage, while significant, is lesser than that of PU (e.g. Davis, et al, 1989; Adam et al, 1992).

Davis (1989, p.333) clearly pointed out the comparison of the relationships of useful-usage and ease of use-usage that “in both studies [of this research], usefulness was significantly more strongly linked to usage than was ease of use.”

#### **2.2.4.4 Attitude Toward Using (ATU)**

TAM is an adaptation of the TRA. In TRA, Fishbein and Ajzen (1975) defined attitude as “an individual’s positive or negative feelings (evaluative effect) about performing the target behavior” (p.216). Ajzen (1989) defined attitude as:

“An attitude is an individual’s disposition to respond favorably or unfavorably to an object, person, institution, or event, or to any other discriminable aspect of the individual’s world.” (p.241)

Moreover, he commented that :

“although formal definitions of attitude vary, most contemporary social psychologists seem to agree that the characteristic attribute of attitude is evaluative (pro-con, positive-negative).” (p.241)

A more specific definition for attitude for use in information technology and information system researches is as follows:

“A disposition to respond favorably or unfavorably to a computer system, application, system staff member, or a process related to the use of that system or application.” (Melone, 1990)

Apparently, this definition is an adaptation of psychologist’s definition (see Ajzen’s (1989) definition cited above for comparison).

In TAM, attitude toward using is defined as “the degree of evaluative effect that an individual associates with using the target system in his job.” (Davis, 1993)

The attitude toward using (ATU) is theorised to mediate between the two belief constructs and behavioral intention to use (BI) which, in turn, exert its influence on the system acceptance (and usage). Hence, Davis, et al (1989) found that ATU is not mediating between the constructs and is not significant as expected.

As a way to “simplify the model” (Chau, 1996, p.190), many researches (e.g. Adams, et al, 1992; Bagozzi, et al, 1992 and Lu and Gustafson, 1994; Szajna, 1996; Chau, 1996; Venkatesh, 2000; Venkatesh and Davis, 2000; Sun and Zhang, 2006; ) removed the construct “Attitude Toward Using” from their research models.

Comparatively, only a small group of researchers retained ATU. Jackson, et al (1997) explained that, in addition to the rationales to include ATU in TAM as stated by Davis (1989) and Davis, et al (1989), a series of literature before TAM had empirically supported the ATU-BI link (see pp. 362-364 of Jackson, et al, 1997 for more details).

Because of the shown importance of ATU's role, Jackson, et al (1997) retained ATU in their model. They maintained that the dropping of ATU may be problematic and their results suggested that ATU seems to play a mediating role between PU, PEOU and behavioral intention to use the IT as predicted by Davis, et al (1989). Therefore, they argued that ATU is central to TAM. Similarly, Chau and Hu (2002) empirically showed that ATU appears to be the second most important determinant (the first is PU) of BI and is critical in TAM. To this end, Melone (1990) also emphasised the importance of ATU in TAM and urged to pay more attention to explore its mediating role in information system development.

In the Hong Kong context, Cheng, et al (2006) included both ATU and BI in their research model to test the internet banking adoption in the city but, similar to Davis, et al (1989), they found ATU is not mediating between the belief constructs (PU and PEOU) and BI.

In short, the role of ATU is puzzling and the evidence is mixed. Some researchers ignore it but others emphasise its vital role in TAM and both camps were able to support their assertions by evidences in their researches.

#### **2.2.4.5 Behavioral Intention to Use (BI)**

According to TRA (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980), a person's performance of a specified behavior is determined by the behavioral intention to perform the behavior. In addition, behavioral intention is jointly determined by a person's attitude (toward the behavior) and the person's subjective norm.

In TAM, behavioral intention (BI) is influencing actual behavior (system use) as in the



TRA. Unlike in TRA, BI is jointly determined by ATU and PU; and subjective norm (SN) is indeed not included in TAM. Davis, et al (1989) explained the exclusion of SN is due to the fact that it is “one of the least understood aspects of TRA” and “previous IS research contains empirical evidence in favor of the usefulness-behavioral intention relationship”.

It should, however, note that because many researchers omitted the construct ATU from their research models, BI is, for many occasions, hypothesized to mediate between PU and PEOU and the actual system use; or even a representative of actual system usage, which will not be measured. In general, the results indicated that BI is mediating the effects of PU and PEOU to system usage.

According to the literature, be it relating to TRA or TAM, BI is a very good predictor of actual behaviors (Azjen and Fishbein, 1980; Vankatesh, et al, 2003).

#### **2.2.4.6 Actual System Use (AU)**

The construct “ Actual system use (AU)” is theorised to be the end result of the model. A high system usage is said to be a reflection of high user acceptance and a critical indicator of success implementation of the system in question.

Several indicators for system success have been proposed by researchers in the studies of information system implementation. For example, Rivard and Huff (1988); Igbaria (1990) and Amoroso and Cheney (1992) proposed to use the “User Satisfaction”. Researchers including Davis, et al (1989), Thompson, et al (1991), Adams, et al (1992), Straub, et al (1995) and Igbaria, et al (1997) proposed to use “System Usage” as the indicator. In fact, both indicators have been widely used in information system studies

as a measure of success.

In this research, the “system usage” is selected as an indicator of system acceptance because it is considered that satisfaction will be more difficult to be measured and accurately when compared to “system usage” which can be reported by the users rather directly and precisely. Also, it is common for TAM researches to use system usage instead of user satisfaction.

Al-Gahtani and King (1999, p.291) commented that “satisfaction should be used as a complement to usage when evaluating end-users’ acceptance of computer technologies.” Clearly, the “system usage” is considered as a more important and better indicator of system acceptance. Thus, it is confident that “system usage” is an appropriate choice of system acceptance indicator in this research.

Since researchers drop some or all of ATU, BI and AU in their research models from time to time, it has been seen that ATU, BI and AU is used as the dependent variable interchangeably in prior studies (Sun and Zhang, 2006, p. 59).

#### **2.2.4.7 External Variables**

TAM theorises that external variables will exert influence on technology adoption through perceived ease of use (PEOU) and perceived usefulness (PU) (Szajna, 1996). When Davis (1989) and Davis, et al (1989) formulated TAM, they suggested that future research should test various external factors to understand why people accept or reject technology with a view to enhancing the explanatory power of TAM (Kulviwat, et al, 2005).

Unfortunately, Venkatesh (2000) and Legris, et al (2003) opined that external variables only gained relatively little attentions. These authors argued that it is important to study the external variables because they are the ultimate drivers of system usage. Table 2.2 below summarises some external variables identified in some previous TAM studies:

**Table 2.2: A list of external variables identified in previous researches (Legris, et al, 2003)**

| <b>Author</b>  | <b>External variable</b>   |
|--|--|
| Davis, et al (1989)                                      | Output quality, computer self efficacy, objective usability, direct experience   |
| Taylor and Todd (1995)                                   | Affect of experience   |
| Chau (1996b)   | Implementation gap, transitional support   |
| Jackson, et al (1997)                                    | Situational involvement, intrinsic involvement, prior use, argument of change  |
| Igbaria, et al. (1997)                                   | Internal computing support, internal computing training, management support, external computing support, external computing training |
| Gefen and Keil (1998)                                    | Perceived developer responsiveness   |
| Agarwal and Prasad (1997)<br>Agarwal and Prasad (1999)   | Role with regard to technology, tenure in workforce, level of education, prior similar experience, participating in training         |
| Lucas and Spitler (1999)                                 | Quality perceived subjectiveness   |
| Karahanna, et al (1999)                                  | Compatibility, trainability, visibility, result demonstrability  |
| Dishaw and Strong (1999)                                 | Tool functionality, tool experience, task technology fit, task characteristics   |
| Venkatesh and Davis (1996)<br>Venkatesh and Davis (2000) | Subjective norm, voluntariness, image, job relevance, self-efficacy, objective usability, output quality, result demonstrability     |
| Venkatesh and Morris (2000)                              | Gender, experience   |

Source : Legris, et al (2003, p.196) with modifications.

Legris, et al (2003) further pointed out that “it may be difficult to increase the predictive capability of TAM if it is not integrated into a broader model that includes organisational and social factors” (p. 202). The potential of external variables can be demonstrated by Venkatesh's (2000) longitudinal study. He validated that control (i.e. Computer self-efficacy and facilitating conditions) and computer playfulness and emotion are related external variables (Note that Venkatesh calls these anchors in the study) and these external variables explained up to 60% of the variance in perceived ease of use.

Lee, et al (2003) concluded and argued that “the majority of the studies with lower variance explanations did not consider external variables other than original TAM variables” ( p. 762). These researchers reviewed 101 TAM studies published by leading IS journals and conferences and summarised the findings of previous researchers as in Table 2.3 below.

**Table 2.3: A list of external variables identified in previous research (Lee, et al, 2003)**

| <b>External variable</b>           | <b>Definition</b>  |
|------------------------------------|--|
| Voluntariness                      | The degree to which use of the innovation is perceived as being voluntary, or of free will   |
| Relative advantage                 | The degree to which an innovation is perceived as being better than its precursor  |
| Compatibility                      | The degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters |
| Complexity                         | The degree to which an innovation is perceived as being difficult to use   |
| Observability                      | The degree to which the result of an innovation are observable to others   |
| Trialability                       | The degree to which an innovation may be experimented with before adoption   |
| Image                              | The degree to which use of an innovation is perceived to enhance one's image or status in one's social system                                  |
| Self efficacy                      | The belief that one has the capability to perform a particular behavior  |
| End user support                   | High levels of support that promotes more favorable beliefs about the system among users as well as MIS staffs                                 |
| Objective usability                | A constructs that allows for a comparison of systems on the actual level of effect regarding to complete specific tasks                        |
| Personal innovativeness            | An individual trait reflecting a willingness to try out any new technology   |
| Computer playfulness               | The degree of cognitive spontaneity in microcomputer interactions  |
| Social presence                    | The degree to which a medium permits users to experience others as being psychologically present   |
| Subjective norms/ social influence | Person's perception that most people who are important to him think he should or should not perform the behavior in question                   |

| <b>External variable</b>               | <b>Definition</b>  |
|--|--|
| Visibility                             | The degree to which the innovation is visible in the organisation  |
| Job relevance                          | The capabilities of a system to enhance and (sic) individual's job performance   |
| Computer attitude                      | The degree to which a person likes or dislikes the object  |
| Accessibility                          | <ul style="list-style-type: none"> <li>● Physical accessibility : the extent to which someone has physical access to the hardware needed to use the system</li> <li>● Information accessibility : the ability to retrieve the desired information from the system</li> </ul> |
| Result demonstrability                 | The degree to which the results of adopting/using the IS innovation are observable and communicatable to others  |
| Management support                     | The degree of support from managers to ensure sufficient allocation of resources and act as change agent to create a more conducive environment for IS success   |
| Computer anxiety                       | An individual's apprehension, or even fear, when she/he is faced with the possibility of using computers   |
| Perceived enjoyment                    | The extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system usage   |
| System (output or information) quality | The perception how well the system performs tasks that match with job goals  |
| Facilitating conditions                | The control beliefs relating to resource factors such as time and money and IT compatibility issues that may constrain usage   |
| Prior experience                       | Experience gained  |

Source: Lee, et al, 2003, pp. 761-763.

Note: The magnitude of effects of each variable tested are not reported because different subjects, systems and statistical methods are used in the studies under review.

We must be cautious when reading Tables 2.2 and 2.3. It is because not all the

researches empirically tested the external variables stated in the Tables. For example, Davis, et al (1989) proposed a few external variables in their paper for other researchers to consider and test later.

Because of the publication date of the meta-analyses by Legris, et al (2003) and Lee, et al (2003) were both 2003, there are some studies not included in Legris, et al (2003) and Lee, et al (2003). Ndubisi and Jantan (2003) empirically showed that computing skills and technical backing are antecedents of the belief constructs in the Malaysian small and medium sized firms context. Moreover, Hwang (2005) empirically verified that uncertainty avoidance cultural control and intrinsic motivation as self-control are two important antecedents of the belief constructs.

Burton-Jones and Hubona (2003, pp.9-10) summarised from previous studies that some user's characteristics (like the education level and age) do play roles in determining the user's anxiety and willingness to adopt IT, from which the PEOU and PU are in turn affected.

As proposed in TAM, the users' acceptance of IT will ultimately be affected by the external variables which are contextual. These external variables link TAM to the context and they can be related to individual, technological or organisational characteristics.

After reviewing several meta-analyses of TAM researches (Lee, et al, 2003; Legris, et al, 2003; Sun and Zhang, 2006; King and He, 2006), it can be seen that the external variables can contribute to the model in a number of ways. First, an understanding of these variables may be helpful in explaining the inconsistencies found in previous

studies by the contextual differences. Second, researchers' attention can be diverted towards the less researched areas like cultural issues. Third, it is pointed out that individual characteristics have been researched relatively more than organisational and technological related factors. Therefore, a proper investigation of all the contextual factors should give researchers more chances to investigate the less explored areas. Fourth, only after an understanding of the external variables has been obtained, the more important issue of the interactions between these factors can be explored.

Therefore, while the TAM is predicting the usage behaviours of users, the ultimate question of why the users accept a technology or not is still unanswerable because the answers are hidden in the external variables. An understanding of these variables is essential to enhance technology adoption. For example, as shown by a number of researches, in general, men value usefulness and women value ease of use and peer influence more when deciding to use an IT. This implies that the training designer should tailor make different training packages with different emphases for men and women users to boost the adoption rate. It is hoped that a systematic understanding in this area can provide more information to the management, IT managers and system designers and alike to implement the new technologies.

Another frequently mentioned issue relating to the TAM's externality is impact of the voluntary and mandatory usage setting on the model. Jackson, et al (1997) and Dishaw and Strong (1999) raised the concern that because TRA and TAM were designed to explain voluntary IT use, the applicability of these models in mandated system use is not verified. In mandatory settings the users are required to use no matter what they feel and no matter what their intention.



Lucas and Spittler (1999) commented that if the usage exhibits both voluntary and mandatory usage, then it will be very difficult to separate in conducting research on use. For this, they considered it is more desirable to apply other models (e.g. TPB) to supplement TAM in certain circumstances where support for TAM is found to be weak.

Brown, et al (2002) challenged the applicability of TAM in a mandated use environment. Brown, et al (2002) defined a mandatory use environment as one in which users are required to use a specific technology or system to keep and perform in their jobs (p. 283). For a voluntary use environment, the users perceive the adoption of the technology as a willful choice (p.284). The definitions are simple and easy to understand but, in practice, to distinguish a voluntary environment from mandated one is far from easy. As quoted by Brown, et al (2002), some previous researches suggested that there is a continuum of voluntariness. The researchers further elaborated that the mandatoriness is composed of multiple components and necessity to perform one's job and interdependence of system use are two of the components.

In a mandated environment, TAM is unable to explain usage. In a mandated context, given that the relationship between the attitude and behavioral intention is not significant, it indicates that the feelings employees have about using the systems are not influencing their intention to continue using it.

In volitional settings, perceived usefulness is the key antecedent of behavioral intention. In mandatory usage settings, perceived usefulness continues to be important but for a different reason: to encourage positive attitude about use. (Brown, et al, 2002, p. 290)

Brown et al's (2002) results showed that in mandatory settings, the perceived usefulness is related with attitude and the relationship between attitude and behavioral intention is

not significant.

Although Brown, et al's (2002) critical discussion on the setting's influence on TAM was well argued it is also the case that Venkatesh, et al's (2003) analysis and findings confirmed that TAM is indeed equally applicable in voluntary and mandatory settings to explain the variances in intentions.

### **2.2.5 Previous Testing of TAM Relationships**

Subsequent to the review of TAM constructs individually in preceding Section, this Section reviews the findings relating to the inter constructs relationships in TAM.

Undoubtedly, TAM has been empirically tested in various contexts. Hence, as briefly mentioned in Sections 2.2.4.4 to 2.2.4.6, most of the previous researches used incomplete TAM models. Straub, et al (1997, pp.6-7) even pointed out that despite the increasing number of studies on TAM, no previous studies included all the relationships in their tests. In Legris, et al's (2003) meta-analysis, 22 TAM research articles (containing 28 tests) for the period up to 2001 were reviewed and none of the tests tested all the relationships theorised in TAM in one go. Despite these partial testings, a number of meta-analyses (e.g. King and He, 2006; Legria, et al, 2003 and Lee, et al, 2003) have concluded that the model is applicable in various contexts and the relationships hypothesized within it are valid.

For individual constructs, researchers (e.g. Davis, et al, 1989; Davis, 1993; Igbaria, 1993; Venkatesh, et al, 2003) generally accepted that PU is always significant and more important than PEOU in the relationships (larger beta coefficients). PEOU is considered an important determinant of BI in the early adoption period but its effect becomes less

important in the post-adoption period (Davis, et al, 1989; Adams, et al, 1992; Lu and Gustafson, 1994; Chau, 1996; Teo, et al, 1999).

To account for the above proposition, Davis, et al (1989) argued that users may be willing to cope with some difficulty in using a 'new' system if it has potential to enhance their work performance. Chau (1996) and Cheng, et al (2006) argued that as systems become more user-friendly and easier to use, learning to use them becomes much easier and hence PEOU becomes less of a barrier.

Morris and Venkatesh (2000) provided another insight on PEOU that younger users may be more value the promotion and career prospect while older users will value security more. Furthermore, the younger users should have better chance to encounter IT in schools. Together, younger users will not mind PEOU much but the older users will value PEOU a lot.

The more important PU than PEOU relationship is not universal. For example, Igarria, et al (1997) found PEOU is more important than PU for IT users in small firms in New Zealand. In addition, Venkatesh (2000) pointed out that the effects of external variables are on PEOU are in fact influence attitude and intention both directly and indirectly through PU.

Chau and Hu (2002) also explained that the non significant PEOU-PU and PEOU-ATU relationships found in some researches, including their own, may be because many professionals are highly competent to use the technologies and they may have good staff support, the PEOU becomes not important in these contexts. This can be treated as a reinforcement to the findings of Igarria, et al's (1997) research cited above. The PU-ATU, PU-BI and PU-AU relationships are more robust than the corresponding

PEOU relationships in previous studies. Of them, the PU-ATU relationship is found to be significant in most of the 72 studies revealed by Sun and Zhang (2006) with only a few exceptions, far lesser than the corresponding PEOU-ATU link. Cross referencing the observations from other meta analyses, e.g. Legris, et al (2003), the patterns found are consistent. It should be added that many of the literatures reviewed by different meta analyses are overlapping, which contributes a lot to the similar observations across the studies.

But PEOU's role in the TAM should not be underrated or even ignored on the ground that it has comparatively less direct effect on ATU or BI than PU. Sun and Zhang (2006) pointed out that PEOU has been shown to have a significant effect on PU in the majority of studies (i.e. 43 of 50 studies). That is PEOU has both direct and indirect effects on subsequent constructs.

As mentioned in Section 2.2.4.4, researchers tend to omit ATU frequently in order to simplify the research model (e.g. Adams, et al, 1992; Bagozzi, et al, 1992; Lu and Gustafson, 1994; Szajna, 1996; Chau, 1996; Sun and Zhang, 2006; McCoy, et al, 2007). According to the figures of Legris, et al (2003), 14 and 15 out of the 28 tests ignored the PU-ATU and PEOU-ATU links, respectively. In fact, all relationships involving ATU recorded a high rate of not tested (see ATU-BI and ATU-AU in the Table 2.4 for more details). Once tested, 12 of 14 PU-ATU and 10 of 13 PEOU-ATU links were significant. 7 of the 11 tested ATU-BI links were significant and all the ATU-AU links were significant. These results justify and validate Jackson, et al's (1997) argument that ATU is a central feature of TAM and Melone's (1990) suggestion that ATU is important in TAM and should pay more attention to explore its mediating role in information system development. Without ATU, however many of the previously found significant PU-BI links are vulnerable to the challenge of spurious statistical results.

Research by Sun and Zhang (2006) highlighted the PEOU-BI relationship. In 30 studies that tested the relationship, 18 are significant and 12 are non significant. In TAM, there should be no direct PEOU-BI link. It is a consequence of omitting ATU. Apart from the instable PEOU-BI relationship, the researchers' consider the ATU-BI relationship is not consistent too. In recent years, it is not uncommon to see researchers omit ATU and BI altogether (e.g. Ndubisi and Jantan, 2003; Srite, et al, 2008).

It can be derived from the above paragraphs that the omission of original construct from TAM leads to a catastrophic consequence that the research findings and conclusions become not conclusive and subject to likely attacks by other researchers.

In Section 2.2.4.7, researchers proposed a wide range of possible factors that are significantly affecting the PU and PEOU in their respective contexts. Because of the diversity of the proposals and no follow up verifications by other researchers of any factors that has good applicability in various contexts, the most reasonable conclusion in this regard is suitable external variables are enhancing the explanatory power of TAM. But the literature is too fragmented to form any systematic views or conclusions. Indeed, the studies in relation to external variables is far from being conclusive (Sun and Zhang, 2006).

**Table 2.4: Counting of relationships**

|     | PEOU<br>-PU | PU<br>-ATU | PEOU-<br>ATU | PU-<br>BI | PEOU-<br>BI | ATU-<br>BI | ATU<br>-AU | BI-AU | PEOU-<br>AU | PU-AU |
|-----|-------------|------------|--------------|-----------|-------------|------------|------------|-------|-------------|-------|
| +ve | 21          | 12         | 10           | 16        | 10          | 7          | 3          | 10    | 4           | 8     |
| NS  | 5           | 1          | 3            | 3         | 3           | 4          | 0          | 1     | 5           | 5     |
| -ve | 0           | 1          | 0            | 0         | 0           | 0          | 0          | 0     | 0           | 0     |
| NT  | 2           | 14         | 15           | 9         | 15          | 17         | 25         | 17    | 19          | 15    |

Source: Table 4 of Legris, et al (2003, p.196)

Note: +ve and -ve denote significant positive or negative correlation relationship respectively. NS denotes non-significant relationship and NT denotes not tested at all.

In short, the figures in Table 2.4 above provide evidence that TAM is valid in most contexts. In Legris, et al's (2003) terms, the relationships "have a high proportion of positive results" but "with a number of inconsistencies" (p.193).

Although TAM is praised and adopted, a number of points must be noted. Jackson, et al. (1997) used a full TAM model for testing in two phases, firstly a cross-sectional study followed by a longitudinal study. They found non significant PU-BI and PU-ATU relationships. Jackson, et al (1997) described their finding of a non significant PU-BI relationship as "surprising" (p.379). But this result may actually be accounted for by Davis, et al's (1989) argument which will be discussed in the coming paragraphs. Lucas and Spitler (1999) referred to the findings of non significant relationships by Jackson, et al (1997) just cited above and propose the following possible explanations:

1. Poor data and/or responses
2. The nature of the system
3. Not enough voluntary use of the system
4. A field versus laboratory setting
5. A poor or incomplete model

Source : Lucas and Spitler (1999, p.304)

Unfortunately, Lucas and Spitler (1999) found non significant relationships between PEOU, PU and AU. Lucas and Spitler (1999) also found a non significant PU-BI link in their research, noting that their research model does not include ATU. Overall, their field study of broker's workstation adoption in the private client group of a major investment bank suggests that TAM fails in that context. Rather, they found subjective norm and job requirement are much more important than PU and PEOU. Similarly, Dishaw and Strong (1999) used the full TAM model for testing and find a non significant PU-BI link.

Davis, et al (1989) recorded a non significant PU-BI relationship in one of their studies and explained the non significant relationship may be due to the IT users are difficult to evaluate the IT usefulness before the implementation, therefore, the PU will have little influence on the behavioral intention at the beginning of system development. But it is expected that the influence of PU will increase as time goes by. Davis, et al's (1989) argument is supported by the non significant PU-BI relationship found by Jackson, et al (1997) cited a few paragraphs above because these researchers also looked at systems that were developing or under revision and therefore the users were also have no opportunity to evaluate the usefulness of the system in these circumstances.

However, it is argued that the explanation fails to apply to explain the non significant PU-BI link found by Lucas and Spitler (1999) and Dishaw and Strong (1999) cited above because the users in those contexts had been using the systems in question for some time before the studies. Therefore, the most convincing conclusion may be the PU-BI link is unstable and requires more research to confirm its characters.

Moreover, Davis, et al (1989) argued that the PU-BI link is more important than

ATU-BI link for if the users perceive an IT is useful, the users may have high BI even though they do not have a positive ATU on the IT. Also, they argued that ATU is a complex construct with multiple components, which is essentially the same opinions as Azjen and Fishbein (1980) and Fishbein and Azjen (1975).



### **2.2.6 Weakness and limitation of TAM**

There are several salient weaknesses and limitations of TAM.

The suitability of applying TAM across cultures raises some concerns amongst researchers in the field. A number of researchers try to test TAM in cultures outside north America.

Straub, et al (1997) explicitly stated that TAM may not be as successful in some cases, e.g. in explaining Japanese IT usage (in their case it is email) as in US and Switzerland contexts. They opine that it is likely because of the “more uncertainty avoidance, greater power distances between managers and workers, collectivist sentiments, and assertiveness may limit email use and disassociate usefulness from use” (p.9). Likewise, Calantone, et al (2006) queried the capability of TAM beyond the boundaries of western countries. It can be seen these researchers approached the cultural issue on a national basis.

Lippert and Volkmar (2007) revealed that while US and Canadian users are always treated as a unitary homogenous culture unit, their research suggested that there are significant differences in the attitude towards the technology between subgroups of users classified by nationality and gender. This indicates that, when approaching the cultural issues, country or geographical locations may not be an appropriate and accurate tool to act as a divider.

McCoy, et al (2007) conducted a survey by obtaining a large sample (N=3904) of university students from 39 universities and 24 universities in US and abroad, with a

view to dissecting the cultural influence on TAM. McCoy, et al (2007) divided the characters of a culture by the four factors in Hofstede's framework, i.e. the uncertainty avoidance (UA), power distance (PD), masculinity/femininity (MF) and individualism/collectivism (IC). A clear finding by these researchers was that for individuals low in uncertainty avoidance, the TAM fails completely. As mentioned by these researchers, this piece of information suggests that only certain group of people (obviously the high UA group) is sensitive to perceived usefulness and perceived ease of use.

McCoy et al (2007) added that the way that low UA interferes TAM relationships and makes them all be invalid because the low UA individuals do not need the added assurance of usefulness and ease of use exhibited by high UA individuals. In addition, when people are not seeking to avoid uncertainty, ease of use will not assist usefulness too.

As revealed by McCoy, et al (2007), TAM is expected to be valid in context with high uncertainty avoidance (UA). If HKSARG is shown to be bureaucratic and has high UA in later Chapters, the applicability of TAM in HKSARG is a natural result.

Based on McCoy, et al (2007), the issues pertaining to TAM's applicability across cultures should be elaborated a bit. Referees of McCoy et al (2007) described and define culture as "collective programming of the mind" (Hofstede, 1984); "patterned ways of thinking, feeling and reacting,...of human groups" (Kluckhohn, 1951) and "shared system of meanings; relative; learned; and about group" (Hoecklin, 1995). Only Clark (1990) referred culture as patterns of personality characteristics found among people within the same nation. It is apparent that the main stream views on culture refer to grouping people by some shared characteristics of mind, rather than nation. Therefore,

people should be grouped into different cultural groups by characteristics of mind instead of nationality or geographical locations. In fact, McCoy, et al (2007) also discuss the system users by four characters mentioned above rather than any nationality or location of the users.

Similarly, Merchant (2007) pointed out that companies need to develop favorable culture to maximize the system use. She opined that classifying cultures by nations may be problematic and too general because cultures can be different for nations, regions, social classes, generations and organisations, etc. This is reinforcing the views presented in paragraphs immediately above. Combining these researchers' views, it is shown that workplace culture is more concerned and more appropriate to be considered when studying behaviours of an organisation. National culture may be more appropriate for describing behaviours of citizens as a whole and roughly only. Researchers like Hofstede (1993) recommended it is more appropriate to distinguish the national and organisational culture. In addition, Hummel (1994) described the people working in bureaucracy, no matter their background, will be assimilated by the bureaucratic personality which is totally different from other people outside the bureaucracy, despite the fact that they are in the same nation.

Because of the concerns on the cross-cultural application of TAM, caution on this area will be paid. As discussed, we concern the workplace culture more than the national culture for the purpose of this research. In the context of this research, although most HKSARG's employees are Chinese, it is argued that it is more relevant to investigate the bureaucratic working culture instead of Chinese culture. Because many previous TAM studies were conducted in typical bureaucratic organisations like university, government, hospital and other types of public sector organisations, and very formalized private organisations like banks, its ability in bureaucratic organisations should have been

proved. We shall test whether HKSARG is really bureaucratic as most people expecting in later Chapters.

Apart from the cultural issues, researchers concern with the completeness of TAM as well. Segars and Grover (1993) raised the following concerns after Adams, et al's (1992) replication of Davis' 1989 research:

“inconsistencies within and across the two studies regarding the strength of causal influence of Davis' constructs [PU and PEOU] on usage seem to suggest that these relationships may be more complex than previous thought” (p.517)

On that footing, Segars and Grover (1993) went on to suggest that an understanding on how PU and PEOU behave in different sets of users and technologies is of critical importance in accurately explaining levels of usage. Their discussion reveals the impacts brought by the characteristics of users and technology have not been fully considered in TAM. Segars and Grover's (1993) comments underscore the handicap of TAM resulted from the ignorance of the dynamic between constructs (Section 2.2.1 refers). In Section 2.2.1, TAM drops subjective norm (SN) and thus misses the dynamic between SN and ATU inherently. Segars and Grover's (1993) discovery may cry out the possibility of important dynamic between PU and PEOU researchers need to consider.

Dishaw and Strong (1999) argued that TAM's weakness for understanding system usage may be primarily attributable to not including the task characteristics and how well the system can meet the task requirements (p.17). They recommended that apart from PU and PEOU, how well the system's functions match the needs of the task at hand is another key point to explore so as to understand the actual system usage.

Segars and Grover (1993) and Dishaw and Strong (1999) provided suggestions for modifying the model. Jackson, et al (1997) were more general and commented that “we believe TAM to be incomplete” (p.362) in that many factors have been left out. These researchers suggested that involvement and some other psychological constructs are relevant.

Venkatesh and Davis (1996) and Venkatesh (2000) raised that while parsimony is TAM's strength, it is also its limitation since TAM is predictive but does not provide sufficient understanding and necessary information to system designers and managers to create user acceptance. More recently, Venkatesk, et al (2007) raised again this limitation of TAM, that is despite its predictive power, there is not enough systematic practical guidance how system managers can enhance adoption and use by influencing perceptions. To address this issue, these researchers recorded some previous researches which explore the antecedents, constructs as training (Venkatesh, 1999) and trust (Gefen, et al, 2003) are found to be relevant.

As may be seen in subsequent Chapters of this research, the above mentioned factors are indeed components that determine the level of the proposed external variable, RTC, in this research. Therefore, their effects on the perceptions found earlier may be spurious and mediated by RTC.

Lastly, Venkatesh, et al (2007) and Venkatesh, et al (2003) suggested that there are several competing models in the literature (e.g. TPB) to explain system acceptance and adoption. These models helped discover theoretical depth and identify new constructs and contribute to scientific progress in the area. Therefore, it may be a better approach to supplement each model with other competing models for a more informative picture.

In practice, TAM predicts IT usage by the users, but an understanding of the drivers of the belief constructs, i.e. the external variables, will give more assistance and guidances to system managers.

### **3. LITERATURE REVIEW (II)**

This Chapter will examine the nature of the Government of Hong Kong Special Administrative Region (HKSARG) and accordingly identify relevant contextual characteristics as external variables. In Section 3.1, the New Public Management (NPM) and its applicability in the HKSARG context will first be reviewed.

#### **3.1 New Public Management (NPM) and the Government of Hong Kong Special Administrative Region (HKSARG)**

Organisational performance management is not only important to profit making organisations. As revealed by Mackie (2008), it is essential to governments as well. Because government should be accountable for all its activities and every penny it spends, the requirements on it may be even more strict (Drucker, 1992; 2002). Indeed, it is seen that researchers consider the scope of organisational performance management in government basically embraces all:

“Organisational performance management in a government context is therefore the activities of government or its agencies in planning, implementing, reviewing, evaluating and reporting, the effectiveness of its policies, programmes and projects.” (Mackie, 2008, p.3)

To effect and achieve the above-mentioned goals, Mackie (2008) suggested that there are many tools being used in the private sector that the public sector can make use of.

For more than two decades, the ideology of New Public Management (NPM) has been a

very hot topic to be reviewed and considered in the public sector management domain. New Public Management (NPM) refers to a series of themes relating to reforming the organisation and procedures of the public sector in order to make it more competitive and efficient in resource use and service delivery (Hood, 1995).

NPM is not new a thing, it has been around for decades. NPM is well established in countries like the UK and Netherlands, but it can be still new to some other countries. Osborne and Gaebler (1992) considered that NPM is a part of “entrepreneurial government” and they considered there is only one NPM model. They opined that government should change its role from rowing to steering under the NPM. They considered NPM is not a fad but trend to be applied by different governments worldwide. According to Sozen and Shaw (2002), even the OECD believes that NPM is universally applicable to all countries.

Unlike Osborne and Gaebler (1992), researchers include Hood (1995), Ferlie, et al (1996), Pollitt and Summa (1997), Sarker (2006) and Siddiquee (2010) argued there will be a range of alternative future patterns of NPM to adjust to different contexts. The differences can be caused by culture, history, political and administrative systems and managerial leadership. In the end, the reform toward NPM can be different in terms of scope, process and speed.

Sozena and Shaw (2002) tested the applicability of NPM in Turkey and found NPM was not successful in Turkey. They argued that a weak middle class, deep-seated respect for authority, lack of demand for accountability, centralised and highly bureaucratic administration can be factors that impede the emergency of changes relating to NPM. Furthermore, since NPM incorporates the importation of private sector management systems and techniques into the public services, a bias for action, flexibility, innovation,



the right to manage and delegation are promoted as valued behaviours by NPM. Such principles require administrators to become managers.

However, the main administrative values in the Turkish government are “authoritative-benevolent interpersonal relations” and “action avoidance” (Ozen, 1993, p.29). These characteristics present a fundamental cultural difference from the underlying principles of NPM. Moreover, the prevailing administrative practices and procedures in Turkish government also clash with the NPM principles. The centralised decision-making structure, the seniority system, political loyalty-based recruitment, promotion and reward, as well as low-oriented administration hamper the introduction of delegated authority, output-oriented and performance-related appraisals promoted by NPM (Sozen and Shaw, 2002).

Similarly, Sarker (2006) reviewed the cases in Singapore and Bangladesh and concluded that there were a number of critical factors which should be fulfilled before the ideology of NPM can be successfully adopted in a country. Siddiquee (2010) studied the case of Malaysia and pointed out that the implementation in the country was far from satisfactory because of the constraints and challenges caused by the cultural conflict and inherent systems in the Malaysian public service.

These cases suggest that although many researchers expect NPM to be applicable across governments, there is evidence to the contrary. NPM was initiated in Western developed economies as ways to tackle their public sector efficiency problems, the above-mentioned cases study show that the ideology may not be universally applicable.

Since the 1980s, HKSARG (or the then HK Government before 1997) has been adopting a number of public sector reforms such as setting up of self-accounting trading

funds; the rationalisation of public sector agencies; redefinition of the power and responsibilities of policy bureaux and line departments; the devolution of human resources and financial management authorities; and introduction of customer-oriented and business-like practices. Following the UK government, HKSARG in 1992 announced the adoption of “performance pledge” too. But Cheung (1996) argued that while these measures are similar to those advocated by NPM, “Hong Kong's public sector reform does not lie within the NPM lineage sharing the same set of institutional reform logic” (p. 37). He revealed that for NPM to have fruitful results and lasting effects, the commitments of the bureaucrats are essential. Unfortunately, it is not the case in Hong Kong so far. According to Cheung the reforms and developments seen in Hong Kong are only:

“administrative and managerial substitutes for political solutions in times of 'crises' caused by political changes. The impetus to administrative change had rested with the dominant administrative elite within the government bureaucracy ... to restore its legitimacy and paramountcy in the system of governance” (Cheung, 1996, p.38).

In addition, Cheung (1996) considered that the NPM-reformers were facing inefficiency, serious and prolonged economic or fiscal crises or governmental oversizing before adopting NPM in these countries. These factors are largely absent from the Hong Kong scene.

Considering also the case and arguments put forward by Sozen and Shaw (2002) as reviewed above, the reforms observed in Hong Kong may only be NPM-like reforms instead of a sincere and thorough application of the ideology of NPM in the Hong Kong context.

Factors like culture, inherent systems, a weak middle class, deep-seated respect for authority, lack of demand for accountability, centralised and highly bureaucratic administration can impede the emergency of changes relating to NPM (Sozen and Shaw, 2002; Sarker, 2006 and Siddiquee, 2010). Because Hong Kong's general public are still strongly compliant compared to citizens in other developed liberal democratic countries; civil servants are used to respecting their seniors; the permanent recruitment and performance management systems in the civil service does not favour the introduction of NPM. In accordance with Cheung (1996), if the HKSARG (in particular the senior management) does not have a will to implement the change, it will have many excuses and measures to defer the actions. Therefore, the attitude and commitment by civil servants to change is more relevant and this is the focus of this research - the resistance to change behaviours of HKSARG employees.

### **3.2 Max Weber's Theory of Bureaucracy**

Because government and public sector organisations are often regarded as bureaucratic organisations, this Section reviews the relevant theory and test the nature of HKSARG empirically. The Theory of Bureaucracy (TB) was proposed by a German sociologist Max Weber. Unfortunately, his work was only published more than twenty years after his death.

Weber was specially interested in the efficiency of different kinds of administrative arrangements. Wagner and Hollenbeck (1992, p.32) commented that Weber "had a major effect on twentieth-century management thought". Burnes (2000) pointed out that "there is a considerable affinity between Weber's work on bureaucracy and Fayol's work on the principles of management. Both were concerned with the overall

structuring of organisations, and the principles which guide senior managers in this task” (p.44). After observing and analyzing the administrative structures in his time and their respective effectiveness, Weber (1947, p. 328) identified three types of legitimate authority tabulated in Table 3.1.

Weber considered legitimacy is central to almost all systems of authority. With a view to enhancing administrative efficiency, he proposed a more ideal form of organisation, bureaucracy. In his opinion, a bureaucracy will have the characteristics in Table 3.2.

**Table 3.1: Three pure types of legitimate authority**

| Type           | Elaboration  |
|----------------|--|
| Rational-Legal | Resting on a belief in “legality” of patterns of normative rule, and the right of those elevated to authority under such rules to issue commands   |
| Traditional    | Resting on an established belief in the sanctity of immemorial traditions and the legitimacy of those exercising authority under them  |
| Charismatic    | Resting on devotion to the specific and exceptional sanctity, heroism or exemplary character of an individual person, and of the normative patterns and order revealed or ordained by them |

Source: Weber (1947, p.328) and Burnes (2000, p.45)

Weber stressed that bureaucracy is a rational-legal form and is the most stable system for both superiors and subordinates because it is more reliable and clear, yet allows the subordinate more independence and discretion. Ideally, subordinates can challenge the decisions of their superiors by referring to the stated rules. In addition, charisma, which was influential in traditional forms will become less important. As a result, bureaucratic systems can handle more complex operations than traditional systems.

**Table 3.2: Weber's ideology of bureaucracy**

| <b>Characteristics</b>                      | <b>Weber's view</b>  | <b>Compared to the more traditional forms</b>   |
|---|--|---|
| Division of labor                           | people would become proficient when they perform standardized tasks repeatedly   | duties delegated by leader and can be changed at any time   |
| A hierarchy of authority                    | a formal chain of command would ensure coordination and accountability   | in contrast to more diffuse structure in traditional authority  |
| A framework or set of rules and regulations | carefully formulated and strictly enforced rules and regulation would ensure predictable behaviors   | in traditional forms, there are few explicit rules or written records   |
| Administrative impersonality                | the hiring and promotion of staff based on competence. Officials are selected on basis of technical qualifications, appointed not elected, and compensated by salary | Officers are selected, dependent on the leader and remuneration very often in the form of benefices granted to the individual. Officials serve at pressure of leader, no clear expectations |
| Written documentation                       | Records provide consistency and a basis for evaluation of bureaucratic performance   | No attempt to keep permanent records of transactions  |
| Separate ownership                          | Members cannot gain unfair or undeserved advantage through ownership of office   | No separation of personal and public households or properties, leaders can grant benefices to individuals   |

Sources : Burnes (2000, pp. 44-48)

In Weber's opinion, the operation within the bureaucracy is standardized and behaviors and people are pre-determined by detailed rules and regulations. The bureaucracy can maximize efficiency because the bureaucracy is a technically efficient instrument of administration where the detailed and clear rules and regulations are predefined and not subject to the vagaries of individual preferences. The employees' job is broken down to

simple and routine tasks and so they can learn to perform their duties optimally. Burnes describes the process as “mechanizes the process of administration in the same way that machines automate the production process in factories” (2000, p.45).

Weber (1948) argued that bureaucracy would be “more perfect the more bureaucracy is ‘dehumanized’, the more completely it succeeds in eliminating from official business, love, hatred, and all purely personal, irrational and emotional elements which escape calculation.” (p.215).

As a note, Allinson (1984) pointed out that Weber identified the three types of authorities as in Table 3.1 but never defined bureaucracy. Instead, Weber only described the features of a bureaucratic structure. After all, it must be borne in mind that Weber's bureaucracy reflects a hypothetical and ideal model rather than a description of any real organisation.

Regarding bureaucracy, Wagner and Hollenbeck (1992) opined that it belongs to the administrative principles school; and Robbins (1990), from organisation theory perspective, categorised the bureaucracy as closed and rational oriented organisation. The aim of this type of organisation is primarily mechanical efficiency.

### **3.1.1 HKSARG as a bureaucratic organisation**

Having looked at the ideology of bureaucracy in last Section, this Section validates the nature of HKSARG against the Theory of Bureaucracy (TB). Many researchers readily classify governments and public sector organisations (collectively refer to “government” hereunder for better discussion) as bureaucracies without questions (e.g. Osborne and Gaebler, 1992; Drucker, 1999; Leung and Clegg, 2001; Muczyk, and Saber,

2001; Devadoss, et al, 2002; Trader-Leigh, 2002; Sotirakou and Zeppou, 2006; Heracleous and Johnston, 2009).

The father of modern management Drucker (1995; 1999; 2002) also considered government as bureaucratic and explained that because of the need and uniqueness of the government, it is inherently bureaucratic. He elaborated that because the government has to be accountable for every penny of the public money spent, it has to be bureaucratic. The perceptions revealed in the literature review of Davidson, et al (2005) were quite representative of the common views. These researchers opined that it is the stereotypical image of a government is of a slow-moving bureaucracy, unwilling or unable to change and years behind other industry sectors in its use of new technology and new business models.

Some researchers (e.g. Harris, 1988) when referring to “the government” they are actually talking about the top level of political power, i.e. “Governor, Executive and Legislative Councils, and a form of judiciary” (p.27), instead of the “government machine” which is the bureaux and departments where the administration of government functions are actually carried out. In this research, the term “government” will mean the latter, that is the bureaux and departments.

In the local context, researchers also classify HKSARG (or formerly the colonial government) as bureaucratic (e.g. Scott and Burns, 1984, 1988; Lam and Lee, 1994; Cheung, 1996).

Scott and Burns (1984, pp.4-5) described HKSARG as “approximate to classical management or Weberian theories of bureaucracy”. They emphasised that HKSARG is having a hierarchical structure; division of labour; task description; recruitment and

selection based on technical qualifications and examination; remuneration by salary and formal prohibition of the use of public office for private gain and strict and systematic discipline and control in the conduct of the civil servants. These characteristics fit the HKSARG to Weberian bureaucracy perfectly.

Lui (1988) also described the Hong Kong government as “founded on the classical Weberian model. Functions are rationally specialized; authority is centralized; and tasks are performed according to impersonal rules and procedures to ensure consistency and impartiality.” (p.137).

The following sections examine the nature of HKSARG by looking at the prevalent characteristics and practices in more details.

#### **3.1.1.1 Division of labour and a hierarchical structure**

The organisation chart showing the structure of HKSARG can be found in the HKSARG website ([www.gov.hk](http://www.gov.hk)) for reference. Although it is highly abstract and cuts off all the lower levels, it is still clear that the responsibilities of the government have been divided and distributed to a range of specialized policy bureaux and departments to deal with. Running down from the policy bureaux, there is a tall hierarchy within each responsibility area down to their respective executor departments to divisions and units or to their district offices. These layers form a clear line of command and tall hierarchy.

#### **3.1.1.2 Detailed regulations and rules**

Detailed and extensive rules and regulations are prevailing characteristics of



bureaucracy. In HKSARG, all behaviors of civil servants are bound by the civil service regulations (CSR). Scott (2005) described the CSR as:

“the regulations evolved over many years and eventually became so voluminous that it would have been unreasonable to expect civil servants to be acquainted with all their provisions. In 1997, they were consolidated in a summary form for ease of access” (p.121)

Scott's (2005) above description is the best illustration of the extensiveness of rules and regulations in HKSARG. Bearing in mind that CSR is only one of the many service-wide regulations in force. With all these for compliance, the government employees are used to work in a environment that following rules and procedures. As a result, rigidity, stability, predictability, etc become the building blocks of the government working culture.

Apart from CSR, the following regulations are other commonly referred regulations in the HKSARG workplace:

**Names of regulations :**

- Accommodation Regulations
- Financial and Accounting Regulations
- General Regulations
- Security Regulations
- Standing Accounting Instructions
- Stores and Procurement Regulations
- Summary Guide on CSR

On top of these regulations, departments may have other additional rules for staff to comply with. In short, there are extensive regulations and rules in HKSARG for civil

servants to follow.

### **3.1.1.3 Recruitment and selection**

Lui (1984) pointed out that the recruitment and selection process of HKSARG is founded on two principles, namely merit and localization<sup>2</sup> (p.61).

Merit means the “best” ones are selected for appointment. Lui (1984) further elaborated that there is a set of clearly defined qualifications, experience and other requirements attached to each post in the government. The initial recruitment and selection are always made on the basis of these requirements. To test for the suitability of the applicants, there are a variety of selection methods, including examinations and interviews. This process focuses on competence and qualifications and is closely assembling typical bureaucracy.

### **3.1.1.4 Performance appraisal**

In addition to salary, there is an established system in place to promote suitable and competent officers as a reward for good performance. The reporting system requires the assessment of all civil servants by using prescribed forms at regular intervals. To make the system more fair and to adjust for possible inconsistency amongst different reporting officers (either over-assessment or under-assessment) , the reporting system includes interviews and a countersigning officer to ensure the fairness of the system. The whole system is designed to be fair and open.

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<sup>2</sup> The localization principle was founded on the recommendations of the Report of the Salaries Commission, 1947 and the Colonial White Paper No. 197. These reports argued that the civil service should, as far as possible, be composed of local people. Hence this principle has only been put into practice with effect from the mid/late 1980s after the signing of Joint Declaration between the Chinese and British Governments. This is a special case to tackle the historical problems left during the transition of HK's control from Britain back to China.

### **3.1.1.5 Separate of public office and private life**

The HKSARG emphasises corruption free civil service very much. Any activities to solicit advantages by the official capability is strictly prohibited. The most obvious law that separate the public office from private is the Prevention of Bribery Ordinance (Chapter 201 of HK laws) which forbids the civil servant from using his power for private gain. Furthermore, it is also a violation to CSR if the civil servant use any office resources or assets to accomplish personal goals. So, the HKSARG draws a very clear dividing line between public office and personal life and expects its employees to separate his official dealings from personal life as much as possible.

### **3.1.1.6 Detailed documentation and records**

It is a basic requirement and procedure for every action and decision of the government employees to be recorded in files for future reference and checking. Requests and approvals are always in writing. Even though verbal approval can be granted in exceptional or urgent cases, covering written records like forms, minutes, memos etc are still required to be made for record keeping purpose. The HKSARG has specific department (i.e. the Government Records Services) to look after the creation, keeping and disposal of records. It has also warehouses to keep the important files permanently or until the end of required keeping periods, depending on the types and values of the records concerned.

Although brief, Section 3.1.1 shows the organisation, operations and systems in HKSARG are following closely the Weberian bureaucratic model.

### 3.2 Criticisms of Weber's Bureaucracy Model

Section 3.1 reported some possible superior aspects of bureaucracy over traditional organisation forms. But bureaucracy does not receive much praises from people for long and it has been under serious and constant criticisms soon after its appearance for decades.

In short, bureaucracy is considered to be slow, inward looking, low productivity and reluctant to change (Heacleous and Johnston, 2009). Styhre (2007) pointed out that bureaucracy has long been having many detractors and few friends. And, the anti-bureaucratic sentiment is not a recent one. Management gurus like Drucker and Bennis are anti-bureaucracy as well.

As quoted by Styhre (2007), Bennis in as early as 1970 forecasted the end of bureaucracy for its pyramidal, centralized, functionally specialized and impersonal mechanisms are not getting up with the realities. Rather, a new form of organisation will appear – more flexible, adaptive and strangers with professional skills will group together for problem solving.

How bad bureaucracy is perceived?

“bureaucracy in many cases plays the role of the yardstick against which new organisation forms are compared and evaluated....bureaucracy as what is, at best, slightly inefficient and, at worst, a wholly perverted organisation form”(Styhre, 2007, p.5)

Furthermore, after the bureaucracy had been found likely to have some problems in the

1950s to 1970s, researchers' attention turns to other management fads. Since then “Everybody knew bureaucracy was bad and ineffective, virtually nobody cared to articulate a defense for bureaucracy” (Styhre, 2007, p.23). The following paragraphs briefly summarise the major criticisms on bureaucracy.

Although Weber believed that the bureaucracy is superior to the traditional forms of structures in many aspects and could bring about many advantages, he was not blindly optimistic about the bureaucracy. He warned that the risk of the tendency to impose excessive controls on employees would make the organisation become an “iron cage”.

Selznick (1949) identified “sub-optimization” as a possible problem of bureaucracy . This is the situation that after the delegation of authority and power to lower levels and different units in the organisation, the units (or sub-units) would pursue their own goals which are different from the organisation’s overall goal. This was an early pre-cursor of Principal-Agent theory.

Blau (1956) was concerned about the possibility that some employees in the organisation would know how to “play by rules”. By doing this, Blau worried that the power would be shifted from the official leaders to the employee who plays by rules. If this happens, the employee in question would become more powerful.

Other frequently cited weaknesses of bureaucracy are “goal displacement”, a situation where excessive adherence to rules and regulations would mean the organisation cannot achieve the real goal. Also, the rigid application of rules in unique and special situations would result in dysfunctional outcomes (e.g. Merton, 1940 and Robbins, 1990). According to Sotirakou and Zeppou (2006), dysfunctioning is also the reason for many recorded failure cases in the public sector improvement and reform projects.

Merton (1940, p.563) added that the danger of conformation to an organisation's rules rigidly would lead the means to become an end in itself. There occurs the familiar process of displacement of goals whereby " an instrumental value becomes a terminal value". For example, formalism, even ritualism, ensues with an unchallenged insistence upon punctilious adherence to formalized procedures. This may be exaggerated to the point that primary concern with conformity to the rules interferes with the achievement of the purposes of the organisation, in which case we have the familiar phenomenon of the technicism or red tape of the official.

Burnes (2000, pp.51-52) expanded the results which can be caused by the problem of goal displacement:

- Rules become ends in themselves rather than means to the ends they were designed to achieve;
- Specialization and differentiation create sub-units with different goals which then become primary to the sub-unit members. Not only does this lead to conflict between sub-units, but the accomplishment of sub-unit goals become more important than achieving the organisation's overall goals;
- Rules and regulations become interpreted as setting minimum standards of performance rather than identifying unacceptable behavior. Staff can become apathetic and merely perform the bare minimum of work; and
- The unthinking and rigid applications of standardized rules and procedures can lead to their being applied in inappropriate situations, with dysfunctional

consequences.

More generally, researchers keep expressing their beliefs on the prospect of bureaucracy. Robbins and Barnwell (1998, p.227) pointed out that because Weber wrote the theory of bureaucracy when the world was “making adjustment to industrialization”, it is reasonable to expect some of Weber’s work will not fit well with the information age. Muczyk and Saber (2001) argued that bureaucracy is “one of the impediments to efficiency”, they point out that Weber “could not have anticipated the many dysfunctions” that would arise. These opinions paint a very negative picture of bureaucracy, i.e. an outdated and inefficient organisational structure that is not relevant to the new age of economy.

Concerning the assertion that bureaucracy equals to inefficiency, Robbins (1990) pointed out that there are findings of the lack of relationship between organisation structure and effectiveness. As such, the blame on bureaucratic organisation’s inefficiency may not be sustainable indeed (pp. 177-178).

Robbins (1990) is not optimistic on bureaucracy indeed. Robbins (1990) quoted the results of Burns and Stalker’s study on some English and Scottish industrial firms and their comparisons between the mechanistic and organic structures :

**Table 3.3: Characteristics of mechanistic and organic organisations**

| <b>Characteristics</b> | <b>Mechanistic</b> | <b>Organic</b> |
|------------------------|--------------------|----------------|
| Task definition        | Rigid              | Flexible       |
| Communication          | Vertical           | Lateral        |
| Formalization          | High               | Low            |
| Influence              | Authority          | Expertise      |
| Control                | Centralized        | Diverse        |

Source : Robbins (1990, p.211)

Obviously, the characteristics of bureaucratic organisations fit the category of mechanistic organisations very much. Based on Robbins' (1990) arguments, mechanistic design fits stable and certain environment; and organic form suits the turbulent environment very much (1990, p.211). It implies that the bureaucratic organisations are not capable to deal with the current changing environment.

This leads to another criticism of bureaucracy, i.e. the resistance to change (RTC), which is the focus of this research and Section 3.3.



### **3.3 Resistance to Change (RTC)**

Including resistance to change (RTC) to TAM as external variable is one of the main objectives of this research. This Section investigates the issues pertaining to resistance to change (RTC) in more depth. In the end of this section, the expected relationships between RTC and the two determinants in TAM, i.e. PU and PEOU, will be discussed.

In simplest terms, RTC can be thought of a fundamental human nature. Whenever the individual or group values are threatened or the status quo is to be disturbed, people resist change (Yardley, 2002). Rashid, et al (2004, p.161) propose a general statement that “people are generally resistant to change” and there will be resistance whenever change happens.

King and Anderson (2002) summarised their observation on resistance to change researches through the years and state:

“Resistance has been seen at best as disruptive and troublesome and at worst as a coordinated process of radical militancy designed to undermine the very fabric of managerial control....Resistance has almost always been characterized as irrational, counter-productive behavior engaged by a minority of workers to the inevitable detriment of the organisation and, in the long term, to the disbenefit of those employees themselves.” (p.195)

del Val and Fuentes (2003) revealed that RTC is frequently blame for making organisations to incur additional time and costs; project delays or even failure.

Ford, et al (2008) revealed that the bias toward the “change agent centric” view (p.362)

in which change agents are presumed doing right things while change recipients are unreasonable and trouble makers is limiting, overly simplistic and even misleading. It is because if resistance is assumed as necessarily bad, the potential contribution and counteroffers from recipients when resistance is dealt with properly will be missed.

Ford and Ford (2009) held similar views that blaming resistance to change is pointless and can be a destructive managerial behavior because if managers perceive resistance as a threat, they may become competitive, defensive or uncommunicative. Even resistance can be irrational or self-serving and costs extra time or efforts, it can be an important form of feedback too. It can tell the management whether their original assumptions are right. As such, managers should pay attention to the causes of resistance and to improve the change initiatives if necessary.

Bauer (1993) reiterated Lawrence's decades long pain analogy to resistance to change. According to Lawrence, resistance is like pain that it is an alarm there might be something goes wrong in the change process. Because the organisation is responding to the warning signals, if the management treat the resistance properly, it can provide useful information and feedback to the change program in place.

### **3.3.1 Bureaucracy and its staff are (highly) resistant to change**

It has been a decades long proposition that bureaucratic organisation and the employees therein are highly resistant to change. Thompson (1969) discussed at length the relationship between bureaucracy and innovation and opines that bureaucratic organisations are poor innovators because innovation and change are more risky for bureaucrats than to entrepreneur. Thompson (1969) argued that in bureaucracy the uncertainties will be controlled by rules, orders and other administrative arrangements.

All new initiatives will be unwelcomed. Thompson (1969) argued that bureaucratic organisation relies heavily on extrinsic motivations like salary and bonus which can easily be administered by hierarchy of authority; but innovation requires internal commitment and intrinsic rewards. The bureaucratic systems will stimulate conformation only. Drucker (1995; 1999; 2002) and Adair (2007) also considered that bureaucratic organisations are incapable to change. It seems that bureaucratic organisations are incompatible with change at all.

But Styhre (2007, p.167) opined that “a substantial number of industries and companies are organized in accordance with Weberian principles of bureaucracy. The idea that large bureaucratic firms are incapable of innovating is one of the persistent themes in contemporary management thinking as well as in common sense thinking, but little empirical evidence supports such claims.”

With reference to the nature of RTC mentioned at the beginning of this Section, it should be emphasised that RTC is not unique to bureaucratic organisations. Rather, it happens whenever there is change simply because “people are generally resistant to change” (Rashid, et al, 2004, p. 161). However, bureaucratic organisations are often regarded as the most resistant to change. For decades, it is widely accepted that bureaucratic organisations are less ready to change and cannot adapt to a new environment well, when compared to other types of organisation (Heracleous and Johnston, 2009; Styhre, 2007).

What ties a bureaucratic organisation to a high level of RTC so tightly? Burns and Stalker (1994) devised a list of distinctive characteristics of a formal or mechanistic organisation as listed below:

1. The organisation operates according to a body of laws or rules, which are consistent and have normally been intentionally established;
2. Every official is subject to an impersonal order by which he guides his actions. In turn his instructions have authority only insofar as they conform with this generally understood body of rules; obedience is due to his office, not to him as an individual;
3. Each incumbent of an office has a specified sphere of competence, with obligations, authority, and powers to compel obedience strictly defined;
4. The organisation of offices follows the principle of hierarchy; that is, each lower office is under the control and supervision of a higher one;
5. The supreme head of the organisation, and only he, occupies his position by appropriation, by election, or by being designated as successor. Other offices are filled, in principle, by free selection, and candidates are selected on the basis of “technical” qualifications. They are appointed, not elected;
6. The system also serves as a career ladder. There is promotion according to seniority or achievement. Promotion is dependent on the judgment of superiors; and
7. The official who, in principle, is excluded from any ownership rights in the concern, or his position, is subject to discipline and control in the conduct of his office.

Source : Burns and Stalker (1994, pp. 105-106)

Both the summary characteristics by Robbins (1990) in Section 3.2 and the elaborated descriptions by Burns and Stalker (1994) above showed Weber's bureaucracy bears all these characteristics of mechanistic organisation. This could infer that the structural characteristics of bureaucracy are the causes of a high RTC level and incapability to change. It is because Burns and Stalker (1994) argued that organically structure organisations are more effective than mechanistic ones in responding to changing environments. Much of the merits go to the structural characteristics that enable the readiness to change and adapt to the turbulent environment (pp. 119-125). Kotter (1996) pinpointed "a flat hierarchy is in a far superior position to maneuver than one with a big, change-resistant lump in the middle" (p.169). Therefore, the tall hierarchy structure is causing the organisation reluctant to change.

Burns and Stalker (1994) pointed out that the hierarchy, controls, efficiency and predictability of almost everything would make the staff members in mechanistic organisations favor self-continuity and feel threatened by change. In turn, mechanistic organisations will become poor at innovating or at least poor at adopting new ideas.

Mintzberg (1979) opined that the embedded formalized roles and routines, "functional silos" and the separating of organisation from changing realities by bureaucratic layers make these organisations difficult to change and to respond to the environment. In Mintzberg's (1979) terms, bureaucracy is "non-adaptive" (p.346) and "inflexible" (p.347) structure. Drafke and Kossen (1998, p.146) also pointed out that the hierarchies will lead to a tendency not to be creative and strict adherence to rules.

Burnes (2000) stated "the unchanging rigidity of bureaucracy, as portrayed by Weber, leaves little scope for the continuous search for improvement in methods and

productivity” (p.52).

Johnson and Scholes (2002) argued from the purpose of the organisation and opined that unlike other types of organisations, bureaucracies are set up to achieve order and maintain control by the management. Because the structure is built for stability rather than change, it is not ready to adapt to change and “the conception of the organisation is not suited for the dynamic conditions for change in the 21<sup>st</sup> century”.(p.583). The focus of discussion shifts gradually from the incapable structural configuration to the employee's behaviours.

For example Merton (1940) elaborated the relationship between the type of organisation and the character of people working in it:

“As a result of their routines, people develop special preferences, antipathies, discriminations and emphases...These psychoses develop through demands put upon the individual by the particular organisation of his occupational role” (p.562).

Drucker commented that for government employees, loyalty is more important than performance because the bureaucratic structure protects them from distortion and political pressure and also protects them from the demands of performance. As a result, the government is resistant to change (Drucker, 1992; 1995).

Ostroff (2006, p.142) also pointed out that government (bureaucratic structure) is less feasible than private sector as “rules governing such areas as procurement, personnel,... were originally adopted to prevent public-sector wrongdoing, have created workplaces that are satisfactorily less feasible than those in the private sector...inhibit initiative”. He further added that because of “issues of skills and will” employees in the

government are expected to be “lack of change readiness” or “on the fence” and not eager to change (p.144).

Heracleous and Johnston (2009) commented that the data in general support the perception that bureaucracy is not ready to change and specifically point out that the traditional government human resources management system relies on seniority instead of a performance-based approach. This tilt encourages continuity rather than innovation and change because it is the safest way for the civil servants.

These theories suggest that there are very strong associations between the type of organisation and the employees' behaviors. For bureaucratic organisation, Hummel (1994) opined that the people in the bureaucratic organisations differ from others in six ways: socially, culturally, psychologically, linguistically, cognitively and politically. Hummel's (1994) proposed ways to understand bureaucracy correctly are tabulated in Table 3.4 below.

Hummel (1994) labeled the group of people who work in the bureaucratic organisation the “bureaucratic personality”. Furthermore, he agreed that bureaucrats are unwilling to change.

**Table 3.4: Misunderstandings and understandings of bureaucracy**

| <b>Aspects</b> | <b>Misunderstandings</b>  | <b>Understanding</b>   |
|----------------|---|--|
| Social         | Bureaucrats deal with people  | Bureaucrats deal with cases  |
| Cultural       | Bureaucrats care about the same things ordinary people do: justice, freedom, illness, death, love, hate, etc. | Bureaucrats aim at control and efficiency  |
| Psychological  | Bureaucrats are ordinary people   | Bureaucrats are a new personality type, headless and soulless                            |
| Linguistic     | Can communicate with bureaucrats using the same language and think the same way ordinary people do            | Bureaucrats shape and inform rather than communicate                                     |
| Cognitive      | Bureaucrats think the way ordinary people do : logically and sensibly   | Bureaucrats use logic only: they are trained to think the way computers think            |
| Political      | Bureaucrats are service institutions accountable to society and rules by politics and government              | Bureaucrats are control institutions increasingly ruling society politics and government |

Source: Hummel (1994)

Allinson (1984) conducted a research study and pointed out that the results suggest that approximately 20%, a significant portion, of the variation in bureaucratic personality explained by the set of independent variables was attributable to organisation structure (p.95). Also, even the organisations may recruit employees selectively, the development of bureaucratic personality does occur through socialization in bureaucratic settings.

After all, there is evidence that the organisational characteristics will influence the



people's behaviour. In bureaucracy, the employees will be assimilated and cultivate a special "bureaucratic personality" as Hummel (1994) described. Finally, the bureaucracy and the individuals within are reluctant to change.

The brief revision in paragraphs above suggests that it is a widely accepted proposition that bureaucratic organisation is closely associated with a high level of resistance to change.

Lastly, Branson (2008) pointed out that, as in society there are culture and many subcultures, teams and organisations will develop their cultures and subcultures.

Likewise, Greasley, et al (2009) opined that there is a special culture in the public sector. The researcher call that the public sector ethos. But the public sector ethos is not necessarily bad. Moreover, Greasley, et al (2009) agreed that the government is bureaucratic and they reveal that there are culture and many subcultures in the government.

Because organisation is made up of people. The first step in any change process is to change the people within the organisation. After bringing about the appropriate change to people, other non human parts of the organisation, e.g. structure, process, preferred practice etc can then be changed relatively easily (Branson, 2008).

This Section validates that bureaucracy is rigid, inflexible and reluctant to change. Styhre (2007) pointed out that bureaucracy has been largely criticised for inefficiency and incapable of responding to external change. He conducted two empirical studies in Volvo Car Corporation and AstraZeneca Pharmaceutical, both are large bureaucratic companies, to show that bureaucracies are not necessarily inferior to the other structures.

Armed with the empirical findings in his two years long studies in Volvo and AstraZeneca, Styhre (2007) argued that bureaucracy is not a fixed, immutable structure. The structure can also be efficient, continuously modifying and changing to adapt to the external challenges. Styhre (2007) discovered that although the two companies studied by Styhre are organized along the bureaucratic principles and with formal functional and structural divisions, there are very frequent informal interactions and cooperations amongst units. Nevertheless, they tend to the bureaucratic end more.

Furthermore, Styhre (2007) reminded not to relate bureaucracy only to public administration, without looking carefully of the case. He opined that the bureaucracy should not be understood as a strictly mechanistic organisation. Instead, bureaucracy should be looked as a set of organisation principles as stipulated by Weber. Thinking bureaucracy this way will expand the scope of bureaucratic organisations not only to cover public administration but also companies and corporations – the bureaucratic principles will present in these entities in various degrees. In addition, the larger the organisation, the more likely the tendency to be bureaucratic. Sharma (1999) shares this view and considers most large organisations are governed and configured along bureaucracy.

### **3.3.4 Hong Kong Civil Servants**

According to the theories revealed in the literature, both HKSARG and its employees should be severely resistant to change. In reality, how the HKSARG civil servants behave? Are they highly reluctant to change in the manner postulated by the literature? Are the civil servants of HKSARG change-phobic?

Concerning the inherent culture, most employees of HKSARG are Chinese. Selmer and

Corinna de Leon (1992) argued that the Hong Kong Chinese are influenced by “Confucian Dynamism”, which denotes the emphases on, amongst others, persistence and personal steadiness and stability, respect of tradition, protection of one’s face and respect of hierarchical positions. Based on these characteristics, the Hong Kong Chinese are not aggressive to change and innovate.

Although the cultural heritage of HKSARG employees is Chinese, as stipulated in Sections 2.2.6 and 3.3.3, the working culture is more relevant than national culture and bureaucracy is having a specially different culture. HKSARG employees are described as “complacency, defensiveness, formalism and legalism, inflexibility” (Lau, 1982, p.25); and preserve the old bureaucratic values and “incrementalism and conservatism” (Lui, 1988, p.156). Moreover, the government employees will not welcome any change because of the strong “ preference for doing things the way they have always been done, and a fear of the unforeseen dangers in new organisational objectives – tends to reinforce the existing system” (Lau, 1982, p.20). Lui (1988) revealed that the implicit ethical norms are major factors that make the government cannot change and respond rapidly to changes (p. 136). After an extensive review of the civil servants’ values, Lui (1988) summarised that the civil servants in Hong Kong are “bureaucratic culture” (p.142) meaning that they have been assimilated to the HKSARG culture. As an illustration, the researcher tabulated their attitudes towards change as appended below:

- Concerning their disposition towards bureaucratic reform : “As far as possible, the administrative organisation should remain stable. What has worked well in the past is likely to work well in the future. Furthermore, the introduction of changes tends to destabilize the system and disrupt the routine pattern of events. This may cause uncertainties or confusion which may hamper efficiency.”; and

- Concerning their response to external pressures for organisational changes: “If changes are inevitable, the bureaucracy should adopt a reactive attitude. Changes should only be made when necessary and only to the extent that a crisis can be averted.”

Source : Lui (1988, p.145)

Years later, Lee (1996) observed the mentality of civil servants and she described these people as “fundamental status quo-oriented” and “were reluctant to see any major changes affecting their social status and fringe benefits that they have been enjoying” (p.40).

It is no surprise to conclude from these observations that HKSARG civil servants are conservative, inflexible, tend to keep status quo and not ready to accept changes, including those brought by technology. If the change is really unavoidable, keep the pace and scope to the minimal is the golden rule.

Scott's (2005) discussion on the appointment terms of HKSARG civil servants may shed light on what constitutes the complacency. Scott (2005) opined that the majority of the employees in HKSARG are employed under the permanent terms and the new recruits usually enter the service at a relatively young age and unless they commit an offence serious enough to warrant dismissal, they would normally expect to be permanently employed in the service until retirement. This well protected job environment may lead to some civil servant “being less than fully motivated” (Scott, 2005, p. 106). When it is a group of not motivated civil servants, it will be irrational to expect them to be innovative, welcome change and seek ways to improve.

Scott's (2005) remarks are equally enlightening:

“However, routine ways of conducting public business and the ingrained habits of a lifetime of public service are not changed overnight. As the changes to the civil service take effect and the older civil servants retire and new ones are employed on the more flexible contract conditions which the reform support, there may be increasing managerialism within the Hong Kong civil service.” (p.128)

Based on the researcher's observations, there may be cure for the unwillingness to change in HKSARG but the process and measures are incremental and gradual. So, the characteristics of HKSARG civil servants may persist for a long period of time.

### **3.4 E-government and resistance to change (RTC)**

The preceding Sections proved government is bureaucratic and is highly resistant to change, so do the employees working in it. It has witnessed how the high level of RTC hindered changes in HKSARG. Local news report that change programs like the service-wise pay and fringe benefits reviews and reform; and the outsourcing of public services introduced in late 1990s and early 2000s were slowly and reluctantly implemented with great resistance and criticise from the government employees.

Because e-government is a paradigm shifting transformation in government (OMB, 2002) which unroots a lot of deep-rooted values and routines (Section 2.1 for more details), severe RTC is expected. In the 13 failure cases reported in Jain's work, at least seven of them were directly related to "resistance to change" by the government employees. Table 3.5 below summarises the relevant findings.

To further strengthen the link between e-government success and RTC, other researchers' findings are also referenced.

**Table 3.5: Failure stories of e-government**

| <b>Research done by</b>   | <b>Context</b>   | <b>Findings</b>   |
|---------------------------|--|---|
| Olivier, 2002             | The computerization program of procurement services in the Ministry of Foreign Affairs in a West African State               | Failed because “some aspects of the application threatened the privileges of diplomats: promoting videoconferences meant reducing overseas travel”.   |
| No specified author, 2002 | The Nigerian universities’ MIS failed  | Because “ there was resistance to the project and to new ways of working within the individual universities...”   |
| No specified author, 2002 | A project to develop an integrated personnel information system for the employees of South African Government failed         | Because the system attempted to change the bureaucratic processes too radically, when most senior staff were unsympathetic to such changes  |
| No specified author, 2003 | An effort to create an integrated information system for the defense forces of a middle-eastern country failed in large part | Because the system tried to introduce “a fundamentally different set of working practices” and “conflicted directly with both the traditional culture and self-interests of at least some senior figures” |
| Olivier, 2003             | A system to integrate port operation in Cameroon has partially failed  | One of the reasons was the system “ has met with resistance from many of the public servants involved”.   |
| Ghalib, 2002              | A project to computerize public sector banks partially failed  | One of the reasons was “objectives and values of many bank staff were out of synch with those implicit within the design as required for effective functioning of the system”.                            |
| Olivier, 2003b            | A system to provide a web presence to Cameroon’s Tax Department partially failed   | One of the reasons was the staff in the department “were reluctant to alter their working patterns to incorporate the Web”.   |

Source : Adapted from Jain, 2004, p.6 with slight modifications.

As outlined in the OMB report, resistance to change is one of the four problems the US federal government faced in the e-government implementation and in the process of

realizing the “commensurate improvements in productivity, quality and customer service” (OMB, 2002, p.6). The report further elaborates:

“A fundamental barrier to getting productivity from federal government IT is government's inherent resistance to change. E-government uses IT to improve federal productivity by enabling better interactions and coordination. But each opportunity requires substantial changes in current bureaucratic procedures. Success will depend on breaking down the resistance to such change” (OMB, 2002, p. 6).

Burn and Robins (2003) found that the resistance (to change) is one of the inhibitors of the success of e-government projects of Western Australian government.

More recently, Ebrahim and Irani (2005) reviewed a number of e-government cases and pointed out an important reason for the delay or failure of e-government is that the e-government initiatives significantly change the organisation, which engenders huge resistance.

Approaching the relationship from a different perspective, to be successful, Boyle and Nicholson (2003) revealed that the willingness of the employees of New Zealand government to rapidly uptake new technologies is the key for the satisfactory e-government progress.

In the Hong Kong context, Martinsons (1997) concluded the reasons for the lengthy but not yet successful implementation of automation systems in the Immigration Department, which took more than 15 years as at the time of writing by Martinsons as follow:



“there are resistance to change because of the following perceptions among staff:

- reduced opportunities for career advancement;
- need to rapidly learn new skills;
- limited belief in the need of change;
- concern over personal accountability.”

Martinsons (1997, p.235)

Conclusively, it is not the technological sophistication or leading edge but rather technology use the key to survive in technological change (Heraclesous and Johnston, 2009). E-government is of no exception. The literature clearly shows that RTC is a strong determinant of e-government success.

### **3.5 Sources of resistance to change**

Given the demonstrated importance of RTC in e-government implementation, the identification of the sources of RTC is a mandate. Attention will be concentrated on the causes of RTC, pertaining to technological change in particular, in bureaucratic organisation so as to operate the concept in this research.

It is seen that, when addressing this question, researchers either take a general approach or a detailed approach. In the general approach, researchers try to include a general and sometimes partial description of the categories of source items they deem important. In the detailed approach, researchers try to devise an exhaustive list; breakdown and discuss in-depth the source items; and sometimes these researchers may make use of the list from general approach researchers as their foundations. Therefore, these two approaches are not mutually exclusive.

#### **The general approach**

Researchers in this group do not attempt to uncover an exhaustive or comprehensive list of sources of unwilling to accept the technological change. Their discussions are sometimes partial and piece-meal.

In Section 3.3.1, Rashid, et al (2004) made a brief and general statement that “people are generally resistant to change” (p.161). But this is helpless to the discussion of RTC sources. Adair (2007) argued that people need both continuity and change but would like to have these two in a homeostatical balance. People are more likely to respond positively to change if it is gradual and not too unfamiliar or strange. Instead, if the change is very great or sudden, it will alert people and they will tend to resist it. Adair

(2007) pointed out that the responses to change can be very different for different people. He suggested that there are sub-cultures in organisations and society. Therefore, people react to change differently but big and sudden change should encounter great resistance.

In preceding sections, much blames of resistance to change go to bureaucratic structure. Hence, as revealed by Adair (2007), the bureaucratic structure is not the sole source of resistance to change. He states:

“Systems and structures are important, but they are only half of the matter. The other half is the people who use the systems” (Adair, 2007, p. 108)

Adair (2007) opined that training and education can enhance the ability of innovation of employees. Likewise, Branson (2008) highlighted that staff's attitude and perception are essential to prepare for change and the hard issues like structure, rules, systems are relatively easy to adjust afterwards. So, when bureaucratic structure is an inherent need for government (Drucker, 1995; 1999; 2002), we should focus on the ways to make the employees more readily to change.

Lazer (2002) compared the differences in the diffusion of innovation and information between the public and private sectors and argued that “with survival less of an issue, and relative performance more difficult to measure, bureaucratic inertia is likely a greater barrier to adopting successful innovations in the public sector than in the private.” Thus, the absence of pressing needs and clear performance measures are likely causes of high level of unwillingness to change.

Gilbert (2005) in his award winning article<sup>3</sup>, unbundled structure of the inertia into two different categories : resource rigidity and routine rigidity. Gilbert explained resource rigidity means the failure to change resource investment patterns; and routine rigidity means the failure to change organisational process that use those resources (p.741). Therefore, the adopted policies and routines are the underlying causes of inertia.

Bunker, et al (2007) identified the importance of the compatibility of the values between the IT innovation concerned and the adopter's existing one. They tested and confirmed the incompatibility is a source of resistance. Branson (2008) also concluded that a major cause of resistance is value incompatibility between the existing values and the ones caused by the desired changes.

Margetts (1999) suggested that if the employees are unclear as to why the senior management of the government suddenly saw the need to implement many new technology related initiatives in the organisation and are not persuaded that the technologies can cure the ills of administration, high level of resistance is expected. Moreover, the technology may reduce the number of staff necessary to carry out operations, it will be perceived to directly threaten the job security of civil servants. As a result, serious resistance from the civil servants can lead to projects failure finally. Margetts' (1999) arguments mainly identify communication and job security as the causes. It is related to Lazer's (2002) point on the absence of pressing need indeed. Even there are needs, if the communication work is not carried out effectively, the civil servants will not be convinced.

Burn and Robins (2003) selected the Australian e-government initiative as a case for

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<sup>3</sup> This article has been chosen as the Article of the year 2005 by Academy of Management Journal 2006, vol. 49, No. 6.

study. They found that, among other factors, cultural readiness is a critical success factor. They decomposed the culture into three elements, namely the belief, value and norm for discussion. They pointed out that the user's belief will shape the interpretations of information; value system will affect the user group's behaviors and have a propensity to resist change; and norm can either on the courage or discourage side to change. The overall determinant whether the staff will use the IT is how risk aversion the organisation is. For these purposes, the change agents or leaders should do many things to enable a ready to change culture in the organisation. This argument reveals the culture factor affects the staff's readiness to change, which is in turn determines the outcomes of an e-government project.

Hedge and Pulake (2002) reviewed a number of previous researches and concluded that the resistance to change is resulted from a number of reasons, namely, vested interests on organisational members, fear of uncertainty, misunderstanding, social disruption, inconvenience, organisational incompatibility, lack of top level support and commitment and rejection of outsiders.

Sometimes, researchers relate resistance to change to demographic characters. Morris and Venkatesh (2000) suggested that younger people react more positively than older one and are more readily to adopt IT. They provided a number of explanations to support their arguments, which are insightful.

As cited by Morris and Venkatesh (2000), a series of researches provide support that older workers are more difficult to adapt to change and take refuge in methods familiar to them. Furthermore, they expect that age will have negative influence on attitude. They reveal that the workers in organisation can be divided into younger and older groups because they have different characteristics and behaviors when approaching new

technology. Therefore, these researchers opined there are heterogeneous groups in organisation. Viewing the organisation as a monolithic entity is bound to fail.

Morris and Venkatesh (2000) argued that, generally, in the organisational environment, older workers are found to be more concerned with pleasing others and are more likely to conform to majority opinions. On the other hand, younger workers like autonomy more. In addition, younger workers are more driven by their attitude and older workers are more driven by social and process factors, like subjective norm. Moreover, these researchers suggested that age and education level have complicated relationships. Their elaborations are summarised below.

According to Morris and Venkatesh (2000), the younger users may have been exposed to the information technology at their early age, e.g. in their elementary school. On the contrary, the older users may not have this opportunity when they were in schools. This difference in prior experience in interacting with the technology will make the older workers seek and apply traditional solutions to task whereas younger workers will be reliant on technology to accomplish the job. Morris and Venkatesh (2000) also opined that older workers will be relying heavily on support resources in order to accept and use new technology. Although training is expected to be important for all users, older workers will need training much more.

Another explanation provided by Morris and Venkatesh (2000) for younger workers more willing to use technology was related to the promotion prospects in career. It is argued that younger workers are more concerned about the promotion opportunity and income and thus willing to put effort to learn and use new technology. For older workers, they may be more focusing on security and pleasant social relationship.

Since the backgrounds and benefits expecting from the technology for younger and older workers are not the same, Morris and Venkatesh (2000) proposed that training for younger workers should emphasised the new technology can bring about productivity gain and more effective work; while for older workers, training should emphasise new technology's ease of use so as to get them “buy-in”.

Morris and Venkatesh (2000) also agreed that public opinion (closely assemble peer pressure) is important in technology adoption.

In fact, the argument of Morris and Venkatesh (2000) can be distilled and presented as because the younger workers have more prior experience and interaction with information technology, they are more confident in their ability to use the technology in accomplishing the tasks, i.e. a narrower capability gap perceived.

Rumelt (1995) grouped of sources of resistance into five categories as follows :

- i.) Distorted perception, interpretation barriers and vague strategic priorities;
- ii.) Low motivation;
- iii.) Lack of creative response;
- iv.) Political and cultural deadlocks; and
- v.) Other sources.

He tried to embrace all sources but his elaborations are too vague compared to del Val and Fuentes (2003) who are classified as detailed approach researchers despite the fact that they were making use of Rumelt's (1995) five sources as the starting point in their argument (subsection below for more details).

Kotter with Schlesinger grouped the sources of RTC into four, namely parochial self-interest, misunderstanding and lack of trust, different assessments and low tolerance for change (Kotter and Schlesinger, 2008). These views were shared by Ford, et al (2008). Again, these researchers only aimed at providing brief discussion on the sources.

A step further in RTC discussion is seen by Kotter and Cohen (2002, p.3) who reveal that too much complacency, fear, or anger are hurdles for change to move ahead are sources of RTC. They proposed eight steps to make the change more successful. The eight steps are as follows :

1. Increase urgency
2. Build the guiding team
3. Get the vision right
4. Communicate for buy-in
5. Empower action
6. Create short-term wins
7. Don't let up
8. Make change stick

Source : Kotter and Cohen (2002, p.7)

In summary, the general approach researchers provide a rough framework and scope of the possible sources of resistance. They provide a general understanding of the overall picture but the assistance rendered to operate the RTC construct is limited.



## **The detailed approach**

Unlike the general approach researchers, detailed approach researchers like del Val and Fuentes (2003) adopted the five sources from Rumelt (1995) and expanded them into components for detailed discussion.

The researchers opined that the five groups of sources from Rumelt (1995) can be broken down into components and should be elaborated as in Table 3.6 below. They propose that the first three groups of source are specifically related to the formulation stage while the last two groups correspond to the implementation stage of a change process. Hence, Rumelt (1995) suggested these groups are relevant to both stages. But there is no empirical evidence on the correctness of either case up to the moment.

**Table 3.6: Sources of RTC**

| <i>Rumelt's (1995) five sources</i>  | <i>del Val and Fuentes' (2003) elaboration</i>  |
|--|---|
| (i) Distorted perception, interpretation barriers and vague strategic priorities | <ul style="list-style-type: none"> <li>● Myopia</li> <li>● Denial</li> <li>● Perpetuation of ideas</li> <li>● Implicit assumptions</li> <li>● Communication barriers</li> <li>● Organisational silence</li> </ul>   |
| (ii) Low motivation  | <ul style="list-style-type: none"> <li>● Direct costs of change</li> <li>● Cannibalization costs</li> <li>● Cross subsidy comforts</li> <li>● Past failures</li> <li>● Different interests among employees and management</li> </ul>  |
| (iii) Lack of a creative response  | <ul style="list-style-type: none"> <li>● Fast and complex environmental changes</li> <li>● Resignation</li> <li>● Inadequate strategic vision</li> </ul>  |
| (iv) Political and cultural deadlocks  | <ul style="list-style-type: none"> <li>● Implementation climate and relation between change values and organisational values</li> <li>● Departmental politics</li> <li>● Incommensurable beliefs</li> <li>● Deep rooted values</li> <li>● Forgetfulness of the social dimension of changes</li> </ul> |
| (v) Other sources  | <ul style="list-style-type: none"> <li>● Leadership inaction</li> <li>● Embedded routines</li> <li>● Collective action problems</li> <li>● Capabilities gap</li> <li>● Cynicism</li> </ul>  |

Source : del val and Fuentes, 2003, p. 150

The contribution by del val and Fuentes' (2003) empirical study was not limited to the detailed itemization of the five sources. They empirically tested the relative weight of each source item of RTC in Spanish companies that have more than 50 employees and undergone change recently. Table 3.7 below tabulates the results of the weights:

**Table 3.7: Results of the sources of resistances, ordered by means**

| Sources of resistance or inertia to change                                     | Mean |
|--|------|
| Deep-rooted values   | 2.70 |
| Capabilities gap   | 2.42 |
| Departmental politics  | 2.42 |
| Low motivation due to cannibalization costs and cross subsidy comforts         | 2.31 |
| Incommensurable beliefs  | 2.31 |
| Different interests among employees and management                             | 2.27 |
| Communication barriers   | 2.23 |
| Organisational silence   | 2.20 |
| Low motivation due to direct costs of change                                   | 2.15 |
| Myopia, denial, perpetuation of ideas, implicit assumptions                    | 2.11 |
| Lack of a creative response due to fast and complex environmental changes      | 2.05 |
| Lack of a creative response due to inadequate strategic vision                 | 2.04 |
| Change values opposite to organisational values                                | 2.04 |
| Forgetfulness of the social dimension of changes due to obsession of promoter  | 2.01 |
| Lack of a creative response due to resignation                                 | 1.96 |
| Leadership inaction, embedded routines, collective action problems             | 1.94 |
| Cynicism   | 1.84 |
| Forgetfulness of the social dimension of changes due to forgetting supervisors | 1.67 |
| Low motivation due to past failures  | 1.65 |

Source : del val and Fuentes, 2003, p. 152

Note: 1 means that the item is not a source of resistance at all; and 5 means such source of resistance is so powerful that it forces the organisation to rethink the change strategy.

Drafke and Kossen (1998, pp. 346-351) also tried to devise a comprehensive list of reasons why people resist change. Unlike del Val and Fuentes (2003), they did not rank

the items by weights. The items with brief descriptions are reported for easy reference.

- (i) Personal attitude and personal impact – because people operate in a state of equilibrium, when the equilibrium is upset, there is a tendency to resist the change. Also, individuals may balk at change because they do not want to exert what they feel to be the extra effort necessary to learn new things.
- (ii) Financial reasons – a major cause of resistance to change is the fear of losing their jobs, the primary source of income. For instance, when a more efficiency process and restructuring are introduced, workers sometimes perceive the change as a threat to their jobs.
- (iii) Alterations in the informal organisation – a result of change that is easily overlooked by managers is its effect on the social life of employees. It may also related to a perceived reduction in the social status of the employees after the change.
- (iv) Inertia – work habits policies and procedures have their inertia. People would tend to continue in the manner to which they have become accustomed.
- (v) Lack of recognition of need –it is a preoccupation that prevents people from noticing a gradual deterioration of conditions.
- (vi) Fear of unknown – one of humanity’s greatest fears and is a basic cause of resistance to change. Because change begets uncertainty which is an uncomfortable situation to say the least; the past is known and familiar and the change is strange. It is a fear from not knowing what the future will bring.

- (vii) Lack of trust – the resistance to change will likely to be significant in environment where employees do not trust their managers. Further in classical management, the writers point out that it is inherently that employees do not trust their managers and believe that managers do not want to be involved, routinely make decisions themselves and will increase the resistance to change.
- (viii) Revenge –if the employees perceive that managers has wronged them in the past or the managers have not trusted or supported them, then they may feel that resisting change is a justified form of payback.
- (ix) Surprise –if the change is sudden, abrupt or without warning, employees will usually resist it more.
- (x) Poor timing – if the change is coinciding, but is the reciprocal of, other events, employees may resistant more to the change.
- (xi) Poor approach – the approach used to present the change can increase resistance to the change if the employees dislike the approach.
- (xii) Misunderstanding – when people do not understand the change or its explanation, the resistance is expected to be high.
- (xiii) Absent benefits – when employees resist change because of absent benefits, they are really saying that there is nothing in the change for them. When a change is absent benefits, it means that the change has provided no incentive for the employees to change.

(xiv) Insufficient need – if employees feel that there is insufficient need, the need may or may not be evident in these situations, they will resist change.

(xv) Phariseeism – a situation where the hypocritical adherence to the letter of the law while missing the spirit of the law. People are told to change or that the change is beneficial, but the reality of the change has not been revealed.

Despite these researcher groups using their own sets of labels to present the lists of RTC sources, a contrast of and comparison between the two lists devised by del Val and Fuentes (2003) and Drafke and Kossen (1998) reveals that they were actually generating their lists from the same pool of underlying ideas. For example, item (i) of Drafke and Kossen (1998) is indeed related to several items of del Val and Fuentes (2003). According to Drafke and Kossen's (1998) description, item (i) is related to the user's "implicit assumptions" and "incommensurable beliefs" that the change will require them to put in extra efforts to learn new things; to amplify this fear, it may be resulted from a wrong judgement on the "capabilities gap" and "cynicism" as well. Therefore, item (i) of Drafke and Kossen (1998) at least corresponds to some of the concepts embedded in sources (i), (iv) and (v) of Rumelt (1995) in Table 3.6, which have been elaborated by del Val and Fuentes (2003). By doing similar matching between the groups of researchers, Table 3.8 tabulates the matching results.

**Table 3.8: Matching ideas of del Val and Fuentes (2003) and Drafke and Kossen (1998)**

| <b>Five source groups identified by Rumelt (1995) and adopted by del val and Fuentes (2003)</b> | <b>Corresponds to item(s) in Drafke and Kossen's (1998)</b> |
|---|---|
| (i). Distorted perception, interpretation barriers and vague strategic priorities               | (i), (v), (xii), (xiv) and (xi)                             |
| (ii). Low motivation  | (vii), (viii), (xiii) and (xi)                              |
| (iii). Lack of a creative response  | (ix), (x), (xv) and (xi)                                    |
| (iv). Political and cultural deadlock   | (i), (iii) and (xi)   |
| (v). Other sources (an important source here is "capabilities gap")                             | (i), (iii), (iv), (xv) and (xi)                             |

Item (xi), that is the "poor approach", of Drafke and Kossen (1998) is a very vague and blurred item which corresponds to all groups of del Val and Fuentes (2003). It is because this item is a general description of the approach used by the change initiative. Reasonably and naturally, adopting a poor approach will result in producing all the problems.

Item (ii), "financial reasons", and item (vi), "fear of unknown", have no direct one-to-one corresponding item in del Val and Fuentes' list. However, they may still be implicitly included. Arguably, financial reasons can be related to "direct costs to change" perceived by the affected parties and fear of unknown is tightly linked with "communication barrier" or other items of self-assessment.

This matching exercise aims to prove that different researchers may actually use different labels to represent the same set of underlying concepts. Conceptually, they devise similar lists as shown above. Consequently, either list is comprehensive enough to embrace all the concepts covered by the other.

If more recent detailed lists of RTC sources are desirable, Greasley, et al (2009) and Palmer, et al (2009) are appended. Greasley, et al (2009) opined that the UK government employees tend to remain the ways how they do things in the workplace. They find that the increasing pace of change, the more radical nature of change, the lack of permanency and constant switching of initiatives are causing a cynical attitude of the employees on the change. This attitude in turn will create a very high resistance to change by the employees.

Apart from their attitude components, Greasley, et al (2009) proposed that in public sector, poor communication, lack of transformational leadership, lack of individual “buy in” of change initiatives, under staffing and under resourcing, limited or unavailability of training and development opportunities to all staff, previous experience and attitude toward change, lack of trust, the exclusion of floor staff in formulating the change initiatives, etc. can also be barriers.

Last but not least, Greasley, et al (2009) pointed out that the bureaucratic culture and public sector ethos will create problems and difficulties when the public sector organisation faces change since the employees may perceive that the change is challenging their culture and values. The views on this aspect is quite similar to the suggested sources of RTC by Branson (2008), i.e. value incompatibility.

Greasley, et al (2009) explained the traditional culture of bureaucracy is risk aversion.



In addition, most organisation change models are designed for private sector where profits and enterprise goals are concerned. Therefore, it is more challenging to introduce change in the public sector. As a footnote, Greasley, et al (2009) reported that even the changes in private sector are not smooth and successful frequently. The failure rate is as high as half to two-thirds. The researcher opined that these figures are not dissimilar to those public sector experiences.

Apart from the suggestions of RTC sources, Greasley, et al's (2009) study showed that in UK government, there are heterogeneous groups. Some groups are ready to change and some groups are still reluctant to change. For the employees, the perceived necessity and benefits of the change are important determinants of acceptance of the change. Similar list of sources of RTC can be found from Palmer, et al (2009). They devised a list of 13 sources as follow:

- (1)discomfort with uncertainty
- (2)perceived negative effect on interests
- (3)attachment to the established culture/identity
- (4)perceived breach of psychological contract
- (5)lack of conviction that change is needed
- (6)lack of clarity as to what is expected
- (7)belief that the specific change being proposed is inappropriate
- (8)belief that the timing is wrong
- (9)excessive change
- (10)cumulative effect of other changes in one's life
- (11)perceived clash with ethics
- (12)reaction to the experience of previous changes
- (13)disagreement with the way the change is being managed

It can be seen that, again and again, researchers are presenting very similar lists of RTC sources. As a wrap up of the discussion on the sources of resistance to change in this Section, researchers from general and detailed approach assess the sources of RTC differently. The general approach researchers focus on general discussion of the scope or on a portion of the sources they deem important only; while the detailed approach researchers try to elaborate and devise comprehensive lists.

It is seen that the items from the comprehensive lists devised by the detailed approach researchers embrace all the generalists' categories. In particular, del Val and Fuentes' (2003) list was developed from and an expansion of Rumelt's (1995) groups.

Also, these comprehensive lists are essentially coming out from the same set of underlying concepts. This conclusion sets a framework for RTC sources, and would be used for operating the new construct, RTC, in this research.

In the course of exploring the sources of resistance, some researchers propose strategies to fight against it as well. To name a few, Kotter and Cohen's (2002) eight steps quoted above is an example. Ford, et al (2008) mentioned that treating the change recipients fairly, building up trust relationships, communicating and keeping those affected by change informed of the change progress are possible ways and indeed the necessary steps to be taken by the change agents.

Kotter and Schlesinger (2008) took a more strategic approach. They pointed out the whole process should begin with determining what kind of resistance to expect and the relative positions between CAs and those affected. Then, a suitable change pace should be determined. Depending on the assessments of the change agents and their judgments,

the researchers divide the potential approaches into six categories as follows:

- Education and communication
- Participation and involvement
- Facilitation and support
- Negotiation and agreement
- Manipulation and cooperation
- Explicit and implicit coercion

Source: Exhibit I of Kotter and Schlesinger (2008, p.136)

Since Section 2.1, the materials presented show that the resistance of IT users to adopt the e-government underpinning IT could be prohibiting the success of the projects. On this issue, management theorists (e.g. Drucker, 1992; 1995; 1999; 2002) and industrial leaders (e.g. Xie Qin of Shanghai Mobile – see Wang, 2009) consider a more feasible way to ride the change initiatives is by using piloting for the reason to minimize the impact to current business activities and limit the risk. Although these are at the theoretical discussion stages, they may be promising paths to research further.

Being a final note on the intervening relationships between the need of change and reactions of government, Greasley, et al (2009) reminded that a balance between the need of innovation and continuity in the government should be maintained. Du Gay (2005) opined that at least some of the values in government culture should be defended and preserved. If the business ideals are to be applied to the government, the impartiality of the bureaucracy will be threatened.

Likewise, Hoggett (2005) argued that people should appreciate that the public sector is unique. If the government simply copy the business focused values, it is bound to fail.

For decades, Drucker (1992; 1995; 1999; 2002) indeed also recognized the uniqueness of government or public sector, e.g. they are inherently bureaucratic, they need to account for every penny of expenditure, etc. albeit he is obviously inclining to the business world's values and practices a lot.

### **3.6 Resistance to change's (RTC's) relationships with perceived usefulness (PU) and perceived ease of use (PEOU)**

In this research, RTC is theorised as a relevant external variable that influences PU and PEOU. Despite this research is the first to test RTC as an antecedent in TAM, this Section seeks to present the views and comments held by other researchers doing studies on similar issues.

Heinssen and Glass (1987) found anxious college students will have lower self-confidence in their abilities (similar to PEOU) and poorer performance outcomes (similar to PU) than those students with lower computer anxiety.

Harrison and Rainer (1993) adopted these ideas and define computer anxiety as “the tendency for an individual to be apprehensive regarding the use of computers” (p.97). After their study, they concluded that a decreased anxiety can lead to a greater readiness for and acceptance of change. These researchers thus suggested that (i) anxiety is a source of RTC (this is agreeable to other researchers' findings in Section 3.5 above) and (ii) a high level of RTC will hinder the acceptance of change.

Instead of using some violent measures like damaging the machines, Bauer (1995) pointed out that the nature of RTC against IT “is mostly local and a matter of intellectuals” (p.19), it is mainly informal, individual and passive such as refusal to work with computers. Accordingly, if the staff resists the IT, it is reasonable to theorise that the users will accord negative perceptions on the usefulness and ease of use of a given IT. Finally, the users will refuse or avoid to use the IT.

Integrating the findings in these researches, a higher resistance level should cause worse

perceptions on the ease of use and usefulness of the IT.

Summarizing the literature reviewed so far, it is seen that TAM should be applicable in the HKSARG, being a bureaucracy (Section 2.2.3 refers). In the context, RTC is a common criticism and there are evidences that it should be a relevant antecedent to PU and PEOU.

To validate these theories, the following research questions (RQs) are proposed to verify the augmented TAM:

RQ1 : Is the Technology Acceptance Model (TAM) applicable in the HKSARG context within the implementation of e-government initiatives?

RQ2 : Is resistance to change (RTC) a relevant external factor for the two determinants of the TAM, namely perceived usefulness (PU) and perceived ease of use (PEOU)?

RQ3 : Does RTC manifest itself with in the self-reported system usage by HK civil servants?

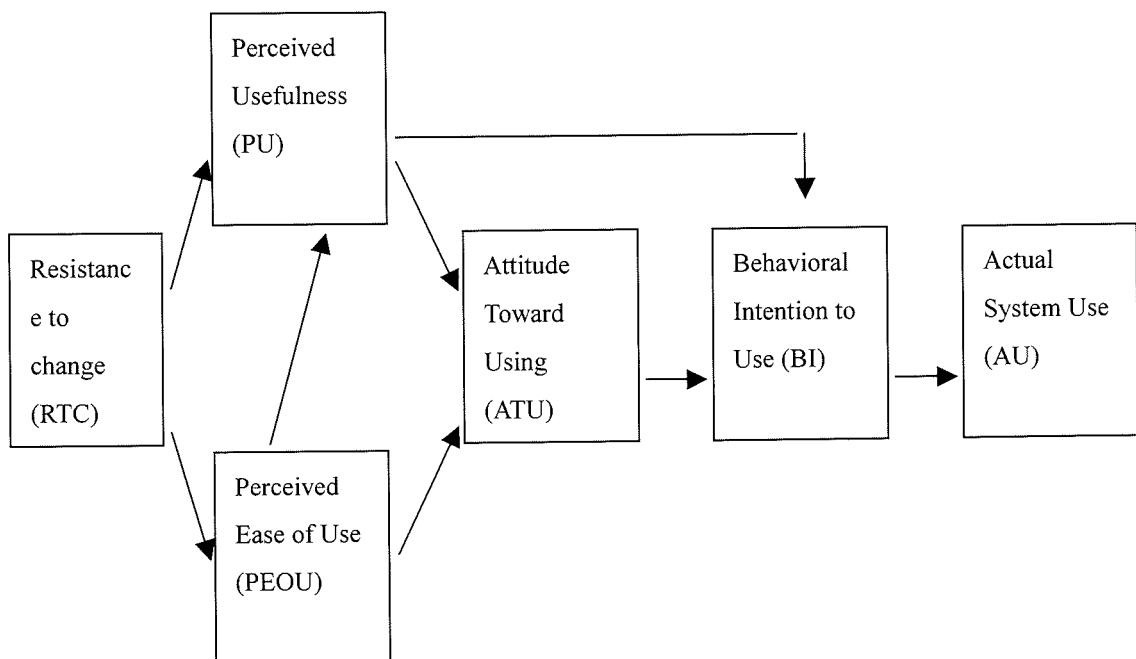
These three key RQs will be answered through testing the specific hypotheses in Section 4.2.

## 4. RESEARCH METHOD

This Chapter presents the research method and hypotheses used to answer the research questions (i.e. RQs 1 to 3) posted in the last Chapter. In addition, the issues pertaining to research design, data collection, sampling, survey instrument development and matters related to the research's validity and reliability will be discussed. The responses received and respondents profile will also be presented at the end of the Chapter.

### 4.1 The research model

Based on the theories revealed in the literature review Chapters, it is theorised that a new construct “resistance to change (RTC)” can be added to the Technology Acceptance Model (TAM) as an external factor and antecedent to the constructs “perceived usefulness (PU)” and “perceived ease of use (PEOU)”. Correspondingly, the research model will be:



**Figure 4.1: The research model**

## 4.2 Research hypotheses

The aim of this research is to empirically examine the relevance of RTC as an external factor in the augmented TAM in the context of the Government of Hong Kong Special Administrative Region (HKSARG). In Section 3.6, it is suggested that a higher level of resistance to change (RTC) will adversely affect the change, i.e. IT usage. Following the proven TAM relationships and expected relationships between the RTC and other TAM constructs newly theorised in this research, the corresponding hypotheses are proposed as follows:

H1. The level of resistance to change is negatively associated with perceived usefulness;

H2. The level of Resistance to change is negatively associated with perceived ease of use;

H3. Perceived usefulness is significantly and positively associated with attitude toward using;

H4. Perceived usefulness is significantly and positively associated with behavioral intention to use;

H5. Perceived ease of use is significantly and positively associated with attitude toward using;

H6. Perceived ease of use is significantly and positively associated with perceived usefulness;



H7. Attitude toward using is significantly and positively associated with behavioral intention to use;

H8. Behavioral intention to use is significantly and positively associated with actual system use; and

H9. Overall, the level of resistance to change is negatively and significantly associated with actual system use.

### **4.3 Research Design**

The research design is essential and determining for it provides a framework for the collection and analysis of data. The choice of research design greatly influences the whole research process. The research method is simply a technique for collecting data. It can involve a specific instrument, such as a self-completion questionnaire, a structured interview schedule or participant observation (Bryman, 2004).

A credible research design is reliant upon three key “pre-requisites”, i.e. (i) the design addresses the question; (ii) it is suited to the researcher’s capability and interest and (iii) the researcher should have the resources, enough time and access necessary to accomplish the tasks (i.e. practical and doable) (O’Leary, 2004, pp.85-101). The research could only be conducted successfully and be able to lead to the answers when these conditions are met.

After reviewing the analyses of different research designs by various researchers (e.g. Bouma and Atkinson, 1995; Bryman, 2004), the cross-sectional design is considered to

be a proper choice for the type of research model and research questions outlined in Sections 4.1 and 4.2 above. The reasons are given below.

The cross-sectional design represents a snapshot of one point in time and longitudinal design is to research the dynamics of a problem by investigating the same sample several times, or continuously, over the period in which the problem runs its course. The specialty or advantage of a longitudinal study is that it can track changes over time (Bryman, 2004). Hence, it is not the purpose of this research to study the sample over a period of time.

Researchers (e.g. Cooper and Schindler, 2003; Bryman and Bell, 2003; Collis and Hussey, 2003) agree that cross-sectional design is frequently conducted when there are constraints of time and resources. In particular, cross-sectional research is often inexpensive. More importantly, as highlighted by Cooper and Schindler (2003), the ability to collect data a second time from the same person without the risk of bias should be considered when deciding to use longitudinal study.

To encourage the respondents to fill in and return the questionnaire form, it is promised that the respondents' identities will be kept in strict confidence. Therefore, to approach the same group of respondents a second time would not be desirable.

The popularity and suitability of adopting a cross-sectional research design to handle similar nature of RQs and hypotheses in TAM researches is strengthened by the findings of Lee, et al's (2003) recent meta-analysis of TAM studies that in most of the 101 articles reviewed used a one-shot cross-sectional method and only 13 adopted longitudinal researches. Furthermore, the researchers observed that the "majority of research incorporated questionnaire-based field study" (p.764).

A cross-sectional research can either be a qualitative or quantitative research. In general, quantitative research is strongly associated with survey techniques like structured interviewing, self-administered questionnaires, experiments, structured observation, and analysis of official statistics. Qualitative research is associated with participant observation, semi/unstructured interviewing, focus groups and conversation.

It goes without saying that there are pros and cons for each kind of research. Because of the nature of qualitative research, it is criticised for subjectivity, difficult to replicate, difficult to generalize (Bryman, 2004, pp. 284-286). Criticisms on quantitative research include that it fails to distinguish people and social institution from the world of nature; the measurement process possesses an artificial and spurious sense of precision and accuracy (e.g. the connection between the measures and the concepts in question is only assumed and different respondents may interpret the questions differently); the reliance on instruments and procedures hinders the connection between research and everyday life; the analysis of relationships between variables creates only a static view of social life that is independent of people's lives (Bryman, 2004).

Moreover, quantitative research strategy emphasises quantification in the collection and analysis of data and the account is placed on the testing of theories; but qualitative research emphasises words in the collection and analysis of data and the emphasis is placed on the possible generation of theories.

Because the research questions (RQs) and hypotheses devised in this research can best be tested and validated by statistical tests and most of the previous TAM studies used quantitative strategy -- Lee, et al's (2003) meta analysis revealed that out of the 101 articles reviewed, "only three studies used qualitative data, such as participatory

observation and content analysis” (p.764) – the quantitative approach is chosen.

#### **4.4 Primary Data Collection**

##### **4.4.1 The Approach**

This research requires the collection of primary data to test the theories. Researchers can “observe” or “communicate” for collecting necessary primary data (Cooper and Schindler, 2003, p.401). It is considered that observation is more suitable for study that only behavioural data is needed, a real-time record of the event when it happens and natural setting is imperative. However, this approach requires skilled observers; is slow and expensive; subject to observers’ bias; only surface indicators can be observed, hard to control research environment and unable to gather information on targets’ intention, attitudes, opinions and preferences (Cooper and Schindler, 2003, p.406).

On the contrary, the communication approach is more versatile and can gather abstract information by questioning others. It is considered to be more efficient and economical than observation. Moreover, this approach is able to ensure the anonymity of the target respondents and to access widely distributed respondents, which make it more attractive and advantageous to be selected for this study (Cooper and Schindler, 2003; Zikmund, 2003).

Since this research involves the gathering of perceptions, attitudes, behavioral intention and opinion of IT from civil servants from different departments in HKSARG; and the constraints on time and funds; and the requirement of anonymity of respondents, communication approach is considered more appropriate.

#### **4.4.2 The Method**

There are different communication methods, including personal interviews, telephone interview, mailing of self-administered questionnaire survey (postal survey) and the emerging internet survey (e.g. web survey and sending out self-administered questionnaire by emails) (Cooper and Schindler, 2003; Zikmund, 2003; Bryman, 2004).

Survey by internet becomes more popular in recent years. May (2001, p.97) also considered the internet survey by sending a self-completion questionnaire to respondents for completion a relatively cheap method for data collection compared with the personal interview.

However, May (2001) and Bryman (2004) both agreed that one of the drawbacks of using the internet as survey medium may be that the researcher has little control over the completion of the survey after the pilot work. In addition, unless the respondents have an incentive, either an interest in the subject covered or other basis, a low response rate is not uncommon; and it depends on the nature of the target population very much.

To address the possible low response rate, they proposed that a cover letter explaining why the research is important, the purpose of the research, stress the need of cooperation and anonymity of replies is required. Bryman (2004) further suggested ways like contacting the potential respondents before sending out questionnaires and reminders to non-respondents in order to enhance the response rate.

To increase the response rate of a survey among Singaporeans, Teo, et al (1999) proposed some ways to increase the response rate of their survey questionnaire posted on the internet (i.e. web survey) :

1. Keep the questionnaire short to reduce the effort of respondents and offer 100 (later 150) \$2 phone cards to the first 100 (150) respondents as incentives;
2. Promise to give an executive summary of the results to respondents;
3. Advertise on major local newsgroups in Singapore;
4. Advertise the survey in main local English newspapers in Singapore; and
5. Establish hyperlinks on Singnet, a popular internet service provider in Singapore.

Source : Teo, et al (1999, p.28)

Because using incentives like monetary (gifts) rewards and advertisement have financial implications; and the giving out of executive summary of findings to respondents infers the researchers will keep information of the respondents' identities, this jeopardises the promise of anonymity. In addition, the use of monetary rewards or gifts as incentives to the civil servants is very sensitive and inappropriate in the HKSARG context because of the strict regulations and controls over the receipt of advantages by civil servants. As required by the regulations, the civil servants will need to obtain an approval from senior management before they can accept any advantages. This will indeed affect many potential respondents to not responding so as to avoid trouble. After careful consideration, it was decided not to adopt incentives in this research.

Online surveys can be conducted by (i) email survey where questionnaire is sent to the respondents via email for their answering and (ii) web survey where survey is

administered via the web, i.e. respondents are directed to a website in order to answer a questionnaire.

The main advantages of web survey over email survey are the more appealing appearance of the questionnaire, the ability to use filtering questions with automatic skipping to appropriate questions and the answers can be fed to database automatically.

Problems with web survey may include the requirement of sophisticated staff to produce the questionnaire with all the good features appeal to respondents. But this may be solved since there are templates and easy to use online facilities to develop and host the survey instruments available recently.

No matter what types of surveys via internet, the low response rate relates tightly to the question of how to make the respondents believe that their identities are confidential because the respondents need to return their replies and it is difficult for them to believe that their replies are confidential and will be treated anonymously (Bryman, 2004, p.485).

It is also found that the response rate for email survey in early years is encouraging but the response rate is declining recently to a level that is lower than most postal questionnaire surveys. The reasons for this may be the novelty of earlier year's email survey and the growing antipathy of unsolicited emails (Sheehan and Hoy, 1999; Sheehan, 2001).

Sheehan and Hoy (1999) suggested that the general distrust may account for the low response rate. The researchers quoted an example that a respondent wrote "if you are a student then I am the Emperor of Japan" as a reply of study. In addition, system's

filtering functions and automatic deletion by respondents' email facilities may be other reasons for low response rate.

After considering the pros and cons of the methods and constraints of this research, sending out self-administered questionnaire form by email is chosen as the data collection method of this study. Its superiority to web survey is also considered. The reasons are listed below:

1. Comparing to other data collection methods, the cost of this method is low;
2. The questionnaire forms can reach target respondents' email accounts directly and quickly although they are working in different departments and bureaux of the HKSARG. If mail survey is used, it may take much longer for the layers of internal receipt and dispatch services to deliver the letter to the target respondents;
3. Survey by internet (either attaching self-administered questionnaire form or web survey) does not require use of a skilled interviewer; and
4. Both a self-administered questionnaire form and web survey need to convince the respondents to take the initiative to complete the form. However, it may be easier to convince the respondents to open an attached document file than to click on a link and enter information online. Hong Kong people severely distrust any request to click on links and enter information to websites nowadays. It is because there have been incidents publicised by mass media that people lose their personal or sensitive information; their computers were controlled by spyware; hacked or remotely controlled after clicking on an embedded link in emails to them. The situation is expected to be more serious in the civil service as this group of people



are more careful and conservative. In addition, they know if their computers are attacked or infected as a result of their clicking on a link, they will be accountable to the management. Therefore, it was believed that to do the survey by attaching a self-administered questionnaire form would generate a better response rate than sending out a web survey.

To tackle the low response rate, a covering letter explaining the purpose and need of the survey will form the content of the email to solicit the cooperation of the target respondents. As suggested by Futrell (1994) and Bryman (2004), follow-up with some non-respondents by the publicly disclosed telephone numbers to see if they are willing to share any important views are overlooked is a way to minimize and overcome the drawbacks. However, the scale of this group will be small because their identities are promised to be kept secret. Contacting too many non-respondents is undesirable. Of course, the target non-respondents will be explained why they are being contacted and where their numbers are known to the researcher. It is also a step to remove the worry of non-response bias.

In the local context, there is no available reference information on the general level of response rate of email surveys. However, even though to use the more accepted, more expensive and slower postal survey, the response rate is not encouraging, too. A few examples in the Asian countries and Hong Kong local contexts may be self-explanatory. Lu, et al (2005) employed the online email survey to collect responses from subject on a TAM research in Taiwan. The response rate turned out to be 8.7% (1,259 out of 14,519). It should be noted that the researchers provided some coupons in a lucky draw as incentives to enhance the response rate. In Hong Kong, a postal survey done by a recognized organisation, the Institute of Human Resource Management, only recorded a response rate of 15.7% (Cheung, 1998); another postal survey done by the renowned

HK University Public Opinion Program (HKU POP) in 2004 to survey the opinion of accountants on the constitutional reform in HK only recorded a response rate of 1% (HKU POP, 2004). A mail survey conducted in late October to early November 2006 to its members by the Hong Kong General Chamber of Commerce regarding the prospects for the local economy (a relevant and insensitive topic for the members) only recorded a response rate of 6.5% (HKGCC, 2006) . Another telephone survey conducted by the Hong Kong Polytechnic University in March 2007 pertaining to a local hot topic, the property market, recorded only 12% response rate, too (HKPU, 2007). Therefore, the response rate is not related to the popularity of the researchers or the topics. The main message may be an estimation of the response rate in advance is extremely difficult, if not impossible.

In order to get the best possible information for analysis and to triangulate the data from the questionnaire survey, selected senior officials in HKSARG will be invited for a personal interview. In this regard, Huque and Vyas (2004) conducted a survey relating to trends in training in HKSARG and reported that it is difficult to persuade the government employees for an interview. Due to the expressed reluctance to be interviewed, only 21 interviews (out of the approached 317 questionnaire respondents) were conducted.

Regarding the interview, the researchers noted that these interviewees only provided limited quantity of information and did not wish to elaborate on specific matters. Moreover, the responses of the trainers of the Hong Kong institute “consisted mostly of standard information found in the brochures of CSTD [the training institute of HKSARG] and resembled a publicity campaign to promote the Institute, rather than critical insight on its activities” (Huque and Vyas, 2004, p. 109).

Their observations on the successful rate and interviewees' behaviors are of reference value to the current research.

## 4.5 Population and sample

### 4.5.1 Population and Sample Frame

By definition, a population is the total collection of elements about which we wish to make some inferences (Cooper and Schindler, 2003, p.179). Therefore, all the staff who have access to the e-government IT (IT users) are the population.

According to HKSARG's IT coordinator, the Office of Government Chief Information Officer (OGCIO), there are 91,021 staff in the HKSARG with access to internet and email facilities as at May 2006.

From the same confirmation, OGCIO also advises that individual bureaux and departments determine (1) which staff members have the operational need to be assigned with an individual email address, and (2) which email addresses of their respective staff members are published. Because of these discretions, not all the email addresses for the 91,021 staff members are disclosed. If they are disclosed, the information will be published in standard format in the online government telephone directory (GTD) which is grouped under individual bureau and department. The original reply letter from OGCIO is attached in Appendix II for reference.

After downloading all the available telephone directories of the 83 bureaux and departments from HKSARG website, a list with 36,854 entries is obtained. Each entry has the following format:

| Full Name | Post Title | Office Tel | Email |
|-----------|------------|------------|-------|
| :         | :          | :          | :     |

However, a large part of the entries are unusable because of the following discoveries:

(i) some staff's email addresses are not disclosed;

(ii) some bureaux/departments use one general email address for the staff in their telephone list (e.g. the Commerce, Industry and Technology Bureau);

(iii) some departments do not disclose email address for the staff in the telephone list at all (e.g. Fire Services Department and Independent Commission on Anti-Corruption);  
and

(iv) some departments use a few emails or section or divisional emails for all the staff in the telephone directory.

Since the questionnaire is designed for completion by individual target staff member to solicit their views on the IT, sending of the questionnaire to group email addresses like the ones in (ii) and (iv) above is considered inappropriate. If the name of the target staff is specified in the email, the pledged anonymity will be jeopardized. These entries are thus deleted. After the above editing process, a final list of 20,405 entries is obtained. According to Vogt (1993, p.202), "a list or other record of the population from which all the sampling units are drawn" is the sampling frame. Thus this list of 20,405 email addresses is the sampling frame of this study.

#### **4.5.2 Sample**

An appropriate sampling process ensures researchers to draw conclusions about the

entire population by selecting some of the elements in the population. In general, the compelling reasons for sampling include (i) lower cost; (ii) greater accuracy of results; (iii) greater speed of data collection and (iv) availability of population elements (Saunders, et al, 2000; Cooper and Schindler, 2003).

On the issue of suitable sample size, Collis and Hussey (2003) revealed that the question of the appropriate number of subjects to include in a sample is complex because there is trade-off between costs and degree of uncertainty (p.159). Bartlett, et al (2001) also shared this view. To determine the sample size of this research, the numbers of sample sizes in previous TAM researches; the theoretical required size and sample sizes in similar attitudinal surveys will be considered.

The numbers of samples in some frequently cited and Asia/Hong Kong TAM researches are summarised:

- The numbers of participants in Davis' (1989) laboratory research were 120 IBM staff and 40 graduate students;
- The number of participants in Davis, et al's (1989) longitudinal study was 107;
- There were 118 students participated in Adams, et al's (1992) laboratory research;
- There were 156 participants in Venkatesh and Davis' (2000) research;
- Chau (1996) contacted 330 subjects and 285 participated (86.4% response rate);
- Cheung, et al (2000) contacted 290 and 241 responded (83% response rate);
- There were 30 (Study 1) and 1172 (Study 2) people participated in Mathieson, et al 's(2001) studies;

- Cheung, et al (2006) in Hong Kong contacted 1,000 subjects and 203 responded (response rate 20.3%).

According to Sudman (1983, pp180-181), the most common sample sizes<sup>4</sup> needed for national and regional studies (in US) in the subject matter of “attitudes” are as follow:

| Mode of<br>sample size | <u>National</u>   |                   | Mode of<br>sample size | <u>Regional</u>   |                   |
|------------------------|-------------------|-------------------|------------------------|-------------------|-------------------|
|                        | Third<br>quartile | First<br>quartile |                        | Third<br>quartile | First<br>quartile |
| 1000+                  | 1000+             | 500               | 700                    | 1000              | 400               |

The theoretical required sample size can be obtained by following the calculation steps stipulated in Bartlett, et al (2001), taking RTC as the variable concerned, and the usual alpha level (i.e. 5%) and acceptable margin of error (i.e. 3%), the required sample size will be 118.

It is unknown why previous TAM researches select particular sample size; the population sizes; the methods and rationales used to determine the sample sizes. On the contrary, the US attitudinal surveys use sample sizes range from several hundreds to more than a thousand. Because of the theoretical required size stands at 118 and the most similar, i.e. Cheng, et al's (2006) TAM research conducted in Hong Kong recorded a 20.3% return rate, as such, a proposed sample size of 500 is considered reasonable and suitable for this research. This is also within the normal range of attitudinal surveys in US.

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<sup>4</sup> These sample size numbers were the numbers of respondents who were successfully approached and participated in the survey e.g. completed the questionnaire

### 4.5.3 Sampling Procedures

Regarding the sampling procedures, Bouma and Atkinson (1995) opined very plainly that “a random sampling procedure provides the greatest assurance that those selected are a representative sample of the larger group. If a non-random sampling procedure is used, one can only hope that those selected for study bear some likeness to the larger group” (p.140). Other researchers (e.g. Cooper and Schindler, 2003; Collis and Hussey, 2003; Bryman and Bell, 2003) share these views on this issue, too. This study would adopt the random sampling procedure accordingly.

In Section 4.5.1, a sampling frame comprises of 20,405 entries is prepared. Usually, researchers will use the random number tables for selecting the sample from the population or sampling frame for the subsequent data collection procedures. Unfortunately, the available random number tables are not suitable for use in this research to select the 500 respondents. It is because these tables are either in 4 digits format or insufficient random numbers are published (e.g. Wall, 1986, p.T135; Bouma and Atkinson, 1995; Beyer, 1968; and Rohlf and Sokal, 1995).

An alternative to published tables is to use a random number generator to generate 500 random numbers in the range from 1 to 20,405. For this purpose, the built-in function of Microsoft Excel can be made use of (Cheng, et al, 2006). Operationally, the random numbers should be integers in the range of 1 to 20,405. As such, the formula, " $=INT(20405 * RAND()) + 1$  ", is used to generate the 500 numbers. If there is repetition of some random numbers generated, additional random numbers in the range are generated by the above formula until a list of 500 unrepeated random numbers is generated.



To ensure the randomness of the numbers generated by the formula, the same formula has been run several times and it is confirmed that the generated numbers are different and no pattern is observed. Therefore, it is confident that the method is suitable for use and will not have adverse effect on the sampling process.

Basing on these random numbers, the corresponding email addresses from the sampling frame are extracted to form the mailing list for the questionnaire survey form.

## **4.6 The Survey Instrument – the Questionnaire**

This section describes the development steps of the questionnaire form used in this research.

With the exception on the newly added construct, RTC, for which research questions will be formulated in accordance with the relevant theoretical background, this research will make use of the available items used to measure other TAM variables. They have been tested in many past researches with good validity and reliability recorded. Only slight amendments to wordings will be needed to suit the context of this study and the Likert scales used in previous studies will be unified to five-points Likert scales, where appropriate. As a general principle, number of questions will be kept to a minimal to improve the response rate by a robust questionnaire form.

The draft questionnaire form was tested by government employees in a small scale pilot test to ensure suitability and understandability of the questions. Their comments were used to modify the questionnaire before the finalized questionnaire be sent to the respondents.

### **4.6.1 Questionnaire Development**

There are three parts in the questionnaire to collect data on (i) the TAM constructs (including the newly included RTC), (ii) the actual system use and (iii) the demographic data of the respondents, respectively.

The purpose of collecting demographic data in part (iii) is to have a collective view of the respondents. Only non-identifiable information like gender, age, education level and

rank of the respondents will be asked. No further personal data will be asked to avoid breaching of personal data regulations in HK and to increase the response rate because some respondents may refuse to complete the questionnaire form if they believe the information sought is sufficient to disclose their identities.

Regarding the measurements for constructs in parts (i) and (ii), Davis (1989) pointed out that it is very important that the validity of a measurement scale is built from the outset. That is, if it is to achieve content validity of the scales, the questions asked must represent the concept underlying. It is therefore advisable to adopt questions/items for various constructs which have been verified by previous studies and recorded good validity in the questionnaire for this research. The use of the same measurement instruments may also be desirable to facilitate a direct comparison of the results in this study against the previous findings.

The statement sets used to operate the constructs “perceived usefulness” and “perceived ease of use” are adapted from the ones used by Davis (1989, Appendix). There are six statements for each construct.

The items used for the construct “attitude toward using” are adapted from Al-Gahtani and King (1999, pp. 293-297). There are five questions for this construct.

The items for measuring “behavioral intention” are adapted from Chau (1996). There are only two statements for this construct.

The items for reporting the “actual system use” are adapted from Teo (2001). The items in this construct are further divided into two categories to measure frequency and duration of system use respectively. As pointed out by Teo (2001), although the use of

individual applications can be measured individually, it would be very confusing and, sometimes, impractical for respondents to report the usages on an application basis. In addition, this will make the questionnaire unnecessarily long and clumsy and hinder the response rate. Thus, it is considered that a measure of respondents' IT usage in a collective sense is sufficient and better choice for this research. The collective measurement of IT usage will be specified in the cover letter.

#### **4.6.2 Research Questions for the new Construct – RTC and Actual System Usage**

We cannot ask abstract questions like “how resistant are you to the change?” or ask the respondents to assign a score to his resistance level directly. To measure the RTC level, suitable items should be identified and be formulated into concrete statements for respondents' comment, as in the case of other constructs. In accordance with the discussion in Section 3.5, it can be seen that different researchers groups are interested in exploring the sources of RTC and they group the sources into comprehensive lists.

In particular, the lists of del Val and Fuentes (2003) and Drafke and Kossen (1998) provided good grounds and concrete items for formulating the questions to measure the level of RTC of the HKSARG IT users.

The basic criteria of a well-designed questionnaire should (a) meet the objective of the research; (b) obtain the most complete and accurate information possible and (c) do the above within the limits of available time and resources (Sheatsley, 1983, pp.200-202). More concretely, Fowler (1995) proposed five basic characteristics of a questionnaire as summarised below:

1. Questions need to be consistently understood;
2. Questions need to be consistently administered or communicated to respondents;
3. What constitutes an adequate answer should be consistently communicated;
4. Unless measuring knowledge is the goal of the questions, all respondents should have access to the information needed to answer the question accurately; and
5. Respondents must be willing to provide the answers called for in the question.

Furthermore, Sheatsley (1983) and Converse and Presser (1990) both reminded that standard formulated and constant wording questions can ensure easy understanding of most respondents if lists of items are to be asked.

#### **4.6.2.1 Research Questions for RTC**

Section 3.5 provided general categorization as well as detailed listing of RTC sources. In particular, lists from del Val and Fuentes (2003) and Drafke and Kossen (1998) are good references of the source items.

These lists can be treated as a summary of the findings so far by the academic researchers. The appropriateness of the above proposed list of items is further supported by contrasting to the findings from a commercial consultancy, the Price Waterhouse Change Integration Team (PWCI Team), a consultancy team under the leading accounting and related services company, Price Waterhouse.

In their publication, the PWCI Team devises a checklist of situations from where the degree of RTC could be estimated (PWCI Team, 1995, pp. 23-24). This commercial world's checklist is congruent with the academic world's on the possible sources of RTC. For ease of reference, the original list of the Team is at Appendix III.

To decide a suitable style to put the items to respondents for comment, reference has been made to sources like the attitudinal surveys done by National Opinion Research Centre and University of Chicago (1993) and website of the Hong Kong University Public Opinion Program (HKU POP, 2006) for guidance on the style and wording of the questions but little assistance could be drawn from these sources for the reasons that researchers have very diverse styles in this aspect.

In view of the above and to have a more congruent style throughout the questionnaire survey form, it is decided to adopt the question style in other TAM constructs, that is the researchers make some statements in the questionnaire and ask the respondents to indicate their attitude or agreement as the answers. The following statements are used:

1. there is no need for the change in HKSARG
2. I do not know or understand why the change is needed
3. there will be costs for me (e.g. I will need to sacrifice other things) to adopt the change
4. the change is not to my benefit
5. the change is to the management's benefit
6. the change will make my department/team/myself suffer
7. the change does not tally with the values or culture or routines in HKSARG
8. I believe "the way we do things here" is the best way to do the work
9. Even the change is needed, I do not want to be the "first mover"
10. I am afraid I do not have the necessary capabilities to implement the change
11. there are too many uncertainties about the change
12. there may be a threat to my job if the change is implemented

These statements are trying to reflect the meanings of the RTC sources in plain English for the respondents to consider. When drafting these statements, the guidelines from Sheatsley (1983), Converse and Presser (1990) and Fowler (1995) have been followed. In particular, examples and familiar terms (instead of more academic and abstract terms like distorted perceptions, myopia, et cetera) are used. In addition, constant wording are adopted as far as possible. These measures are expected to enhance the readability and understandability of the questionnaire by the respondents, hoping to improve the response rate.

#### **4.6.2.2 Research Questions for Actual System Usage – Use of IT in HKSARG**

For the purpose of measuring the self-reported e-government underpinning system

usage, it is necessary to identify specific systems/applications relating to e-government initiatives to operate the construct – Actual System Usage in the HKSARG workplace. There is no available list of all the systems/applications underpinning the HKSARG e-government. As such, we devise the list of common IT usages in HKSARG e-government from fragmented information.

The popularity and advancements of IT open up opportunity for organisations to take advantage of it and to gain competitive advantage by suitable deployment of IT in the organisation. Since organisations in private sector are aggressively pioneering and exploiting the IT and trying to get the most from it. The applications of the IT have been growing at a rapid pace and are very diversified.

**Table 4.1: The common uses of IT**

|  | <b>Most Common Uses</b>  |                       |                                    |                      |                                   |
|--|--|-----------------------|------------------------------------|----------------------|-----------------------------------|
| <b>Researchers</b>                           | <b>Browsing<br/>(including<br/>internet and<br/>intranet<br/>browsing)</b> | <b>Communications</b> | <b>Downloading<br/>Information</b> | <b>Entertainment</b> | <b>Procurement<br/>(Shopping)</b> |
| Lederer et al<br>(2000)                      | Y  | Y                     | Y                                  | Y                    | Y                                 |
| Lightner et al<br>(1996)                     | Y  | Y                     | Y                                  | X                    | X                                 |
| Teo (2001)                                   | Y  | Y                     | Y                                  | X                    | Y                                 |
| Ana Rosa del<br>Aguila Obra,<br>et al (2002) | Y  | Y                     | Y                                  | Y                    | X                                 |
| Teicher, et al<br>(2002)                     | Y  | Y                     | Y                                  | X                    | X                                 |

Legend : Y denotes the application is included in the research findings

X denotes the application is not included in the research findings



Table 4.1 summarises the findings of some studies of common applications and uses of IT in organisations. It is noted that “browsing”, “communication” and “downloading” are the most common IT applications while “entertainment” and “procurement” are also frequently mentioned usages.

When interpreting the above table, it should be noted that the term “communication” covers a range of activities, viz messaging (Teo, 2001); newsletter and bulletin boards (Teicher, et al, 2002) and email, newsgroup, remote access and file transfer (Ana Rosa del Aguila Obra, et al, 2002). Thus, this term is used in a very general sense here.

Obviously, some of these applications are irrelevant to and are not underpinning the e-government context, at least at the time being. Particularly, “entertainment” is irrelevant to the government workplace. Moreover, although HKSARG does have online procurement facilities nowadays, since the function “procurement” is an application launched relatively recent and the function is limited to the use of a very small group of civil servants who are responsible for the procurement duties in the government, it is not a function that the ordinary IT users to have information. Applying the principles of Fowler (1995) as set out in Section 4.6.2 when considering the questions for the RTC, the item is considered not suitable to be included as one of the common applications of IT in the government for this research.

The booklet from the Information Technology Services Department (ITSD) of HKSARG (2000, pp.9-12) mentioned communication, email and browser applications, download programs and files in the “Use of Internet” section. A more recent newsletter published by the Civil Service Bureau (CSB) of HKSARG confirmed the importance of email communication. Figurewise, the monthly communication volume increased from

125,000 to over 3 millions during the period from December 2000 to December 2006 (CSB, 2007).

Among the selected popular applications, email has a superior status in researchers' mind. Apart from the fact that email has diffused all over the workplaces of organisations, including HKSARG, Straub, et al (1997, p.6) pointed out that email is expected to have major organisational impact. They suggested that email is a suitable choice for testing of IT usage because of the findings by Culman and Markus (1987) and McKenney, et al (1986) that email could streamline organisational communication, improve coordination and dramatically increase productivity.

Evans (2003) discussed the enabling technologies which enhance and underpin the e-government. The researcher opined that broadband, public key infrastructure (PKI), the mobile and wireless application protocols (WAP), the wireless systems, the Bluetooth technology, the XML language and internet (indeed Evans is talking about the browser), the e-form and e-process, customer relationship management system (CRM), knowledge/content management system (KM), electronic document and record management system (EDRM) are related. But technologies like the broadband, PKI, WAP, XML language and internet etc. are laying down the infrastructure; and others like e-process, CRM and KM are wider systems embracing many aspects. These are not and cannot be put to the respondents for indicating their usage because of the confusion will likely involved. This study aims to survey the acceptance of e-government technologies by the end users. Therefore, they should have the chance to encounter and to use the identified technologies in their workplace.

Rather, Evans (2003) opined that the target of e-government initiatives is a more efficient and paperless office. Therefore, IT that facilitates the collection, transmission,

storage and retrieval of information are most relevant.

Integrating the discussion so far, it is considered “browsing”, “communication”, “email” and “downloading” are the most appropriate examples of common applications in the HKSARG workplace and these would be specified as the essential e-government IT for respondents to report usage.

#### **4.6.3 Pilot Test and Finalization of the Questionnaire Form**

Sections 4.6.1 and 4.6.2 presented the development process of the questionnaire survey form used in this research. As stated at the beginning of Section 4.6, the questionnaire survey form consists of three parts and the number of questions were kept to minimum. Because the target IT users are civil servants, they are expected to bear the same characters of civil servants in general. These characteristics have been described in Section 3.3 by Hammel (1994) in general and by Lui (1988), Lau (1992) and Lee (1996) specific in the HKSARG context. Concerning the response to survey or interview requests, it was expected the IT users will respond similarly as those civil servants in Huque and Vyas' (2004) survey conducted in the Training Institute of HKSARG a few years ago.

In short, Hong Kong civil servants are conservative, not out-spoken and try to protect themselves by not sharing their views and feelings with others as far as possible, in particular when their identities can be traced or “guessed” by others. They will fear their supervisors or peers to know what they are actually thinking or planning to do (the worst is when they do not share the same views as the majority and supervisors). These observations have been validated and reinforced by Huque and Vyas' (2004) experience cited above and the researcher's personal experience, too.

Because of the above mentioned reasons, although it is desirable to obtain more information for data analysis, the trade-off between the possible gains and expected extremely low response rate should be weighed carefully. As such, in this research, since it is not the objective to measure and compare the bureaucratic intensity of various departments in HKSARG, the questionnaire survey form does not contain questions on the size of the department the respondent is working in. If the researcher includes this question, the respondents will have an impression that the researcher is trying to guess or to identify who he is or in which department he is working indirectly and, in response and the safest way for him, he will not respond to the survey.

The impression given to the respondents is essential. This is also the reason why the survey form was sent to the respondents by email but the respondents were given the fax number of the researcher for returning the completed questionnaire form by fax. Unlike the worry of respondents that the researcher can trace their identity by email address or IP number, the respondents can easily hide away their fax numbers and this can encourage the respondents to reply.

Although most of the elements in the questionnaire form have been empirically tested for construct validity by previous researchers and the results were impressive, it would be necessary and prudent to test the suitability and understandability of the questionnaire in this specific context by a small scale pilot test.

On 30 November 2006, six staff members from a small unit of the HKSARG were invited to complete the draft full questionnaire form and provide comments and views on the form for improvement. The staff were able to complete the questionnaire form in 15 minutes (the actual time used ranged from 7 minutes to 15 minutes) without

assistance from the researcher. During the follow up discussion, the following specific questions have been asked :

- (i) if there are questions not there but should be there;
- (ii) if there are any questions that do not need to be there; and
- (iii) if there are any confidentiality or political issues that they are concerned about

All the six respondents considered the questions in the questionnaire are appropriate and the wording used in the questions are clear enough for them to understand what is being asked.

However, they suggested to change the wordings in the examples of IT usage. The opinion was that the terms “communication” and “email” were too similar ideas to them, albeit these terms may be different strictly by definitions. The consensus in the discussion was that the term “email” is more familiar to them and they would infer that other “communication” activities are included. After considering their views and comments, the questionnaire form was slightly amended by removing the term “communication” from the example list in part (ii). The finalised questionnaire form is at Appendix V.

#### **4.6.4 Distribution of Questionnaire**

The finalised questionnaire (Appendix V) was sent to the 500 randomly selected target respondents by email (the cover letter at Appendix IV as content) on 6.1.2007. Three weeks’ time was allowed for the respondents to complete and return the questionnaire

forms either by email or by fax.

A reminding email has been sent to all the 500 respondents on 17.1.2007 appealing for their assistance to complete and return the questionnaire form by 27.1.2007.

Upon 27.1.2007, only 55 questionnaire forms were received. In view of the response, another set of 200 unrepeated random numbers (different from the first 500) were generated and corresponding emails were extracted from the email list. On 29.1.2007, emails attaching the cover letter and the questionnaire forms were sent to another 200 respondents for their reply by 12.2.2007.

After these two batches of emails, a total of 64 questionnaire forms (out of a total sample of 700) were received for data analysis. Because one respondent only completed the demographic section of the questionnaire form, a total of 63 usable questionnaire forms were obtained by the email survey.

#### **4.6.5 Non-response Bias and More Responses**

As revealed in Section 4.4.2, it is not uncommon to record a low response rate for email survey (Sheehan and Hoy, 1999; Sheehan, 2001).

A risk is the non response bias which occurs when the responses of participants differ in some systematic way from the responses of non-participants (Cooper and Schindler, 2003). They suggest that callbacks, weighting the results from the non response sample and substitution are possible ways to reduce the bias. Hence, it should be borne in mind that callbacks may be difficult and expensive; the weighting and substitution have respective risks (pp. 332-333).

The response rate of the email survey is relatively low, around 9% (64 out of 700), though it is believed it is normal in the context (Section 4.4.2 for more local examples quoted). Thus, the following steps were taken to investigate whether there is any systematic difference between the respondents and non respondents in the survey.

Letters (see Appendix VI) were sent by email to 5% of the non-respondents (32 nos) trying to solicit their assistance for a short face to face interview for the purposes of : (i) go through and complete the questionnaire form and (ii) investigate the reasons why they did not respond to the emails delivered to them by the researcher earlier. To increase the successful case number, another 20 letters were sent to the non-respondents. After one week, the non respondents were called at to explain the purpose of the survey; the importance of their participation and the anonymity of their identity. Moreover, the request of a personal interview was repeated.

Only one of the above 52 non respondents agreed to the interview. Two other respondents only agreed to fill in and to fax back the questionnaire forms to the researcher. Therefore, the total number of usable questionnaire forms received is 66. As a recap, the 66 usable responses were obtained by (i) 63 from respondents after the 700 emails were sent; (ii) two from the non-respondents after the researcher's follow-up telephone calls to the 52 non-respondents and (iii) one from the non-respondent who agreed to have a personal interview to discuss why he was not responding at first and to complete the questionnaire form during the interview.

In the course of contacting the non respondents via telephone calls, no matter they agreed to participate in the interview or only agreed to fill in the questionnaire forms or opted to quit altogether, the non respondents were asked to shed light on why he/she

was not responding to the previous emails sent to them. 13 of them were willing to give some reasons on the issue. The following reasons for non response to the first contact were recorded:

**Table 4.2: Reasons for not responding to survey**

| <b>The reason stated</b>                   | <b>Number of times mentioned by the non respondents</b> |
|--|---|
| Too busy                                   | 2   |
| Not interested in doing the survey         | 3   |
| Do not know the University/researcher      | 1   |
| Do not notice such emails                  | 1   |
| Not related to job                         | 2   |
| Believe the emails are spam/advertisements | 4   |

Since only three additional usable questionnaire forms were obtained in the process of contacting the non-respondents, no suitable statistical tests could be done to check if there is significant differences on the responses between the responding and non-responding groups. However, according to the information gathered, there is no overwhelming and systematic reason for the non respondents to not respond to the survey. Therefore, it is believed that there is no non-response bias exists in this research.

Apart from the above questionnaire survey, separate letters were sent to senior management and IT managers of randomly selected departments/bureaux in the HKSARG for an interview to go through an questionnaire form and some discussions on the change (i.e. the introduction of the IT to the government workplace) from the perspective of a “change agent (CA)” in the HKSARG.

The use of this kind of multiple data sources could allow a triangulation of the data. Researchers like Kirk and Miller (1986) and Miles and Huberman (1994) reveal that



this kind of triangulation in fact provides a better degree of internal validity.

#### **4.7 Validity and Reliability**

Reliability, replicability and validity are three of the most prominent criteria for evaluating social research (Bryman, 2004; Bryman and Cramer, 1997). By replicability, Bryman means that the researcher should spell out the procedures in great details for others can replicate the study and assess the reliability (2004, p.28).

In this research, the details and rationales of choices on the design, method and analysis techniques are reported and sufficient to ensure the replicability.

The choices of cross-sectional research and survey by questionnaire have been adopted and validated by many researchers. The issue has also been discussed in Section 4.6. The proposed extension of augmented parts are supported by strong theoretical background, the reliability and validity of the research should be sufficient.

Cooper and Schindler (2003, p.231) stated that there are some major criteria for evaluating a measurement tool, i.e. validity, reliability and practicability. The following sections discuss these issues relating to the constructs in the questionnaire.

In this research, most of the instruments used to measure the TAM constructs are adopted from previous studies, in which the validity and reliability of these instruments have been verified empirically.

Because the belief constructs proposed by Davis (1989), i.e. the perceived usefulness and perceived ease of use, are the core of the TAM model, they attracted the most

attention. The reliability and validity of these constructs have been verified by many researchers. For instance, Segar and Grover (1993) and Hendrickson, et al (1994) used different hardware and software to test the validity and reliability of the construct measuring instruments. In particular, the results of the study exhibit that the instruments to measure perceived usefulness and perceived ease of use are having very high degree of test-retest reliability. Chau (1996) reviewed a number of studies and concludes the validity and reliability of the measurement scales of the two constructs in TAM are both of very high degree (pp. 187-188).

#### **4.7.1 Validity**

Cooper and Schindler (2003, p.231) defined validity as “the extent to which a test measures what are actually wish to measure”.

Factor analysis methods have been widely adopted to test and verify the validity of the survey instruments. In addition, it is considered factor loadings of greater than 0.5 are needed to confirm the items intend to measure the same construct are really doing the work (e.g. Selim, 2003; Heijden, 2003; Teo, 2001). Cheung, et al (2000) suggested that if the items have factor loadings greater than 0.5 on their expected factors (i.e. the constructs) and less than 0.4 on other factors, then the construct validity can be demonstrated.

The reported factor loadings for PU and PEOU in previous researches are appended at Table 4.3 for easy reference.

**Table 4.3: Summary of reported factor loadings for constructs PU and PEOU**

| Study           | Reported factor loadings for items in the construct of |                       |
|-----------------|--|-----------------------|
|                 | Perceived Usefulness                                   | Perceived Ease of Use |
| Davis (1989)    | 0.88 – 0.98  | 0.63-0.97             |
| Teo (2001)      | 0.62-0.87  | 0.79-0.84             |
| Heijden (2003)* | 0.72-0.81  | 0.74-0.83             |
| Selim (2003)    | 0.607-0.835  | 0.686-0.895           |

Note : (1) Heijden (2003) uses only part of the items in the six-item constructs for the perceived usefulness and ease of use constructs; (2) Only Selim (2003) reported figures to three decimal places.

These results confirm that the constructs PU and PEOU are valid.

Bryman (2004, p.43) raised the concern of the use of research instruments like self-completion questionnaire and structured observation schedules would jeopardize the ecological validity because the instruments may disrupt the respondent's natural habitat when he is discussing cross-sectional research design.

By ecological validity, the researcher means the concern with whether the findings from the research are applicable to people's everyday and natural settings. Quoting a passage from Cicourel (1982, p.15) "Do your instruments capture the daily life conditions, opinions, values attitudes, and knowledge base of those we study as expressed in their natural habitat?" (Bryman, 2004, p.29).

Apparently, Bryman (2004) is concerned about whether the findings whilst technically valid but with little to do with what happens in the respondent's daily lives. He warns that the more a researcher intervenes in natural settings or even creates unnatural ones (e.g. laboratory or interview room), the more likely the findings will be ecological

invalid. This warning is not closely associated with the present research because there will be no personal contacts between the researcher and the respondents in the questionnaire survey. The cause of interfere to them is believed minimal.

#### **4.7.2 Reliability**

According to Nunnally (1978) and Kerlinger (1992), reliability measures the accuracy and stability of a measurement instrument. Cooper and Schindler (2003, p. 231) stated that reliability is related to the “accuracy and precision of a measurement procedure”. If a measure is reliable, it will supply constant results. More importantly, reliability is a necessary contributor to validity but, by itself, is not a sufficient condition for validity (p.236).

Bryman and Cramer (1997, p.64) provided some rules for reference in relation to the value of Cronbach’s alpha for testing the internal reliability, i.e.  $>0.8$ . According to Teo, et al (1999), a construct with a value of 0.7 or above in the Cronbach’s alpha test is deemed reliable. Cronbach’s alpha is the most commonly used measure in assessing the reliability by previous researches. A generally acceptable value of Cronbach’s alpha is 0.7 or above (Nunnally, 1978). Hair, et. al. (1998) also suggested that the acceptable value of alpha is at least 0.7. Therefore, rules used by Bryman and Cramer (1997) are strict. Some of the values of Cronbach’s alpha of the constructs reported by researchers are shown in Table 4.4 below.

**Table 4.4: The reported Cronbach's alpha values of previous studies**

| Previous Studies         | Values of Cronbach's alpha reported for the Construct of |                       |                       |                             |                   |
|--------------------------|--|-----------------------|-----------------------|-----------------------------|-------------------|
|                          | Perceived Usefulness                                     | Perceived Ease of Use | Attitude Toward Using | Behavioral Intention to Use | Actual System Use |
| Davis (1989)             | Y(0.98)  | Y(0.94)               | N                     | N                           | N                 |
| Selim (2003)             | Y(0.91)  | Y(0.91)               | N                     | N                           | N                 |
| Heijden (2003)           | Y(0.83)  | Y(0.81)               | N                     | N                           | N                 |
| Chau (1996)<br>For Word  | Y(0.93) for<br>NT<br>Y(0.85) for LT                      | Y (0.93)              | N                     | Y (0.82)                    | N                 |
| Chau (1996)<br>For Excel | Y (0.92) for<br>NT<br>Y (0.86) for<br>LT                 | Y (0.94)              | N                     | Y ( 0.88)                   | N                 |

Legend :

- “Y” denotes the Cronbach's alpha reported
- “N” denotes not reported
- Figures in brackets are the values of Cronbach's alpha
- “NT” means near term
- “LT” means long term
- As some researches reported figures in three decimal places and some in two decimal places, all figures are rounded to two decimal places in this Table.

Table 4.4 reveals that the reported Cronbach's alpha values range from 0.81 to 0.98 which are all well above the recommended level of 0.7 and also pass the stricter criteria of Bryman and Cramer (1997). Therefore, it is confident that the constructs used in this study are having very good reliability.

Legris, et al (2003) summarised the reliability of the measurement tools used to measure the TAM constructs in their meta-analysis and is reproduced in Table 4.5 below.

**Table 4.5: Reported reliability of TAM constructs**

|                                     | <b>Constructs</b>           |                              |  |
|-------------------------------------|-----------------------------|------------------------------|--|
|                                     | <b>Perceived Usefulness</b> | <b>Perceived Ease of Use</b> | <b>Attitude Toward Using and Behavioral Intention to Use</b> |
| Reliability Cronbach's alpha values | >0.83 (18)                  | >0.79 (12)                   | >0.80 (16)   |

Note : Numbers in brackets represent number of studies that reported the alpha values.

A total of 22 studies were revealed by Legris et al (2003)

King and He (2006), also found in their meta-analysis that since a reliability of 0.8 is considered to be high by researchers, all constructs (in the TAM) are deemed highly reliable (p.743). They further pointed out that the TAM constructs may be used in a variety of contexts.

In a nutshell, the track record of the reliability of the TAM constructs is very good.

While Bouma and Atkinson (1995, p.18) considered that a clear and detail record of what was done is important because it enables other person to repeat the research and confirm the reliability of the original study, Bryman (2004) also highlighted the importance of "replicability" as a separate criteria for good research. He mentioned "a study must be capable of replication – it must be replicable"(p.28). Accordingly, Bryman opined that researcher should spell out the procedures (including the procedures that constitute the measure) in great details, otherwise replication is

impossible. The reason for why replicability is so vital is that it enables other researchers to assess the reliability of a measure of a concept. No matter researchers treat the ability to repeat a research a separate or an implicit element of reliability, its concern is clear. Bearing this in mind, the steps taken in this study are thus reported in detail for achieving a higher level of replicability.

For completeness, a reliability analysis will be done in the data analysis Chapters.

## 4.8 Responses Received

Section 4.6 mentioned that 66 questionnaire forms are usable for data analysis, representing a roughly 9.5% response rate. Contrasting to the examples quoted in Section 4.4.2, this percentage appears to be in the normal range.

The responses received were coded and typed into the statistical package SPSS version 10.0 for doing the various statistical analyses. To ensure the accuracy of the inputting, the inputting was done by double entry by two persons and the resulting computer files were then compared for any discrepancy.

The respondents' feelings on the constructs were measured by multiple statements in each construct. In the process of coding and creating the constructs from the items, the scores of these items were summed up to create the constructs.

Table 4.6 below tabulates the coding and meaning of the constructs in the questionnaire for reference to the analysis sections that follow. Because the subsequent data analysis Sections will make use of the scores of the constructs to do statistical tests, it is necessary to discuss briefly the meanings of the scores (the “Remarks” column in Table 4.6 is relevant). For resistance to change (RTC), the possible range of score is 12 to 60 with mid-point at 36. Since the design of the 12 statements in that construct is that when the respondents agree to them, it will imply a higher level of resistance. Therefore, if the score is low, the resistance level is high. In the “Remarks” column, it shows that “The higher score, the lower resistance” to remind readers. For perceived usefulness, perceived ease of use, attitude toward usage and behavioural intention to use, the design of the statements in these constructs is that when the respondents agree to them (i.e. lower score), it implies a more positive feeling on usefulness, ease of use, attitude



toward the usage and behavioural intention to use the IT. Thus, corresponding remarks have been included in Table 4.6 as a reminder. For actual usage rate, the design of the answer statement is that when the respondents score low in the construct this means a lower IT usage. It is very important to refer to Table 4.6 when interpreting the statistical results in subsequent Chapters.

**Table 4.6: Coding and meaning of constructs in questionnaire**

| Construct                         | No. of items | Scales used in the questionnaire   | Range of the construct's score | Remarks                                |
|-----------------------------------|--------------|--|--------------------------------|--|
| Resistance to change (RTC)        | 12           | "1" to "5" corresponds to "Strongly agree/Very likely" to "Strongly disagree/Very unlikely"  | 12 to 60                       | The higher score, the lower resistance |
| Perceived usefulness (PU)         | 6            | Same as above  | 6 to 30                        | The higher score, the lower PU         |
| Perceived ease of use (PEOU)      | 6            | Same as above  | 6 to 30                        | The higher score, the lower PEOU       |
| Attitude toward usage (ATU)       | 5            | Same as above  | 5 to 25                        | The higher score, the lower ATU        |
| Behavioural intention to use (BI) | 2            | Same as above  | 2 to 10                        | The higher score, the lower BI         |
| Actual IT usage (AU)              | 2            | On frequency:<br>"1" to "6" corresponds to "Never" to "Several times a day"<br><br>On duration:<br>"1" to "6" corresponds to "Never" to "More than 3 hours" in a day | 2 to 12                        | The higher score, the higher usage     |
| Rank                              | 1            | "1" to "3" corresponds to rankings of "Junior or middle" to "Directorate"  | 1 to 3                         | The higher score, the more senior      |
| Age                               | 1            | "1" to "6" corresponds to age groups of "18-25" to "46 or above"   | 1 to 6                         | The higher score, the older            |
| Gender                            | 1            | "1" for male and "2" for female  | 1 or 2                         | NA                                     |
| Education level                   | 1            | "1" to "4" corresponds to groups of "Secondary School (Form 5) or below" to "Postgraduate level"   | 1 to 4                         | The higher score, the more educated    |

Note: For the full copy of the questionnaire form, please refer to Appendix V.

## 4.9 Respondents Profile

**Table 4.7: Descriptive profile of respondents (N=66)**

| Demographic Characteristics |                           | Frequency | Cumulative Percent | Service wide figures (if available) |
|-----------------------------|---------------------------|-----------|--------------------|-------------------------------------|
| Gender                      | Male                      | 31        | 47.0               | 65.80%                              |
|                             | Female                    | 35        | 100                | 34.20%                              |
| Rank                        | Junior or middle          | 47        | 71.2               | 99.20%                              |
|                             | Senior                    | 18        | 98.5               |                                     |
|                             | Directorate               | 1         | 100.0              | 0.80%                               |
| Age                         | 18 – 25                   | 2         | 3.0                | 2.20%                               |
|                             | 26 – 30                   | 5         | 10.6               | 17.20%                              |
|                             | 31- 35                    | 8         | 22.7               |                                     |
|                             | 36 – 40                   | 12        | 40.9               | 29.50%                              |
|                             | 41- 45                    | 27        | 81.8               |                                     |
|                             | 46 or above               | 12        | 100.0              | 51.10%                              |
| Education level             | Secondary School (Form 5) | 21        | 31.8               |                                     |
|                             | Matriculation (Form 7)    | 22        | 65.2               |                                     |
|                             | Bachelor degree           | 19        | 93.9               |                                     |
|                             | Postgraduate level        | 4         | 100.0              |                                     |
| Actual usage (Frequency)    | Never                     | 0         | 0                  |                                     |
|                             | Less than once a month    | 8         | 12.1               |                                     |
|                             | A few times a month       | 28        | 54.5               |                                     |
|                             | A few times a week        | 3         | 59.1               |                                     |
|                             | At least once a day       | 12        | 77.3               |                                     |
|                             | Several times a day       | 15        | 100                |                                     |
|                             |                           |           |                    |                                     |

| Demographic Characteristics |                    | Frequency | Cumulative Percent | Service wide figures (if available) |
|-----------------------------|--------------------|-----------|--------------------|-------------------------------------|
| Actual usage (Duration)     | Never              | 2         | 3                  |                                     |
|                             | Less than 0.5 hour | 23        | 37.9               |                                     |
|                             | From 0.5 to 1 hour | 18        | 65.2               |                                     |
|                             | From 1 to 2 hours  | 8         | 77.3               |                                     |
|                             | From 2 to 3 hours  | 4         | 83.3               |                                     |
|                             | More than 3 hours  | 11        | 100                |                                     |

Source: Service wide figures from CSB (2009)

Table 4.7 is a descriptive profile of the respondents. The demographic information (i.e. gender, rank, age and education level) is collected in Part III of the questionnaire form. Unfortunately, a contrast between these characteristics and those of HKSARG IT users as a whole is infeasible because HKSARG keeps no statistics in this area. The reply from the OGCIIO at Appendix II confirms that there is no central database hosting these statistical figures. However, some publicly available figures on the demographic characteristics of HKSARG employees will be quoted along with the respondents' profiles in the following discussion.

By gender, 47% of the respondents are male and 53% are female; and the proportion of male to female civil servants are 65.8% to 34.2%.

In terms of ranking, the results show that 71.2% of the respondents are at the level of "Junior or middle" and 27.3% of the respondents are senior staff and only 1.5%, that is, one, respondent is at the directorate level. Directorate officers account for 0.8% of the service, suggesting that 99.2% of the civil servants are at the rank of senior or below. Therefore, the IT users responding to the survey and the service share similar ranking

combinations (an overwhelming majority is senior or below).

40.9% of the respondents are aged from 41-45; followed by the groups aged 36-40 and 46 or above which are both 18.2%. The percentages of age groups of 31-35, 26-30 and 18-25 are 12.1%, 7.6% and 3%, respectively. Thus, 77.3% of the respondents are aged 36 or above. Comparing to the service, 80.6% are aged 36 or above. However, there are only 18.2% of the IT users are aged 46 or above whereas the service wide figure suggests that 51.1% are aged 46 or above. As such, the government employees in general has a significantly higher portion of staff aged 46 or above, the oldest tier of employees.

31.8% of the respondents' education background are Form 5 or below, 33.3% of them are Form 7 or below and 28.8% and 6.1% of them are bachelor degree and postgraduate qualifications, respectively. Again, there is no available figure on this aspect for comparison.

It is unfortunate that the authority could not provide breakdown details of the IT users in HKSARG and the direct comparison between the population and sample becomes impossible. Hence, the ranks and age distribution are roughly assembling to the publicized figures.

The service has only 0.8% directorate grade staff, which is comparable to the pool. Dividing the IT users into older and younger groups at 36 years old, the pool and the service are comparable, too. Hence, the service as a whole has a significantly higher portion of staff aged 46 or above. The gender distribution is reversed in the service and the respondent pool and there is no information to compare the education level.

In the Table 4.7, the descriptive information of actual IT usage reported by the respondents are also included. It is prudent to see if all respondents are really IT users who used the e-government IT by looking at this information. There are no respondents who reported “never” in both the frequency and duration section in the actual usage construct. There are two respondents who indicated that they never use e-government IT in daily work; but these two respondents also indicated that they used the e-government IT “less than once a month” but not “never”. Therefore, these two respondents are indeed infrequent e-government IT users – they seldom used e-government IT in the workplace in their daily work – and thus all the 66 respondents were using the e-government IT although the usage rates vary.

#### **Cross-tabulation by rank**

After looking at the respondent profile by individual demographic characteristics, a cross tabulation amongst various demographic characteristics of the respondents is at Table 4.8 and it will give more information of the sample.

**Table 4.8: Crosstab of respondents' demographic characteristics**

**Table 4.8(a): Rank vs age**

|       |                  |               | Age     |         |        |         |        |             | Total  |
|-------|------------------|---------------|---------|---------|--------|---------|--------|-------------|--------|
|       |                  |               | 18 – 25 | 26 – 30 | 31- 35 | 36 – 40 | 41- 45 | 46 or above |        |
| Rank  | Junior or middle | Count         | 2       | 5       | 7      | 7       | 18     | 8           | 47     |
|       |                  | % within Rank | 4.3%    | 10.6%   | 14.9%  | 14.9%   | 38.3%  | 17.0%       | 100.0% |
|       | Senior           | Count         |         |         | 1      | 5       | 9      | 3           | 18     |
|       |                  | % within Rank |         |         | 5.6%   | 27.8%   | 50.0%  | 16.7%       | 100.0% |
|       | Directorate      | Count         |         |         |        |         |        | 1           | 1      |
|       |                  | % within Rank |         |         |        |         |        | 100.0%      | 100.0% |
| Total | Count            | 2             | 5       | 8       | 12     | 27      | 12     | 66          |        |
|       | % within Rank    | 3.0%          | 7.6%    | 12.1%   | 18.2%  | 40.9%   | 18.2%  | 100.0%      |        |

In accordance with the information shown in Table 4.8(a), it can be seen that nearly 40% of junior or middle ranked civil servants are in the age group of 41-45 and the staff members in these ranks spread over the whole age range. For senior officers, none of them is younger than the age of 31; and the only directorate respondent in the survey is older than 46. Therefore, for more senior staff, they are all relatively older.

The distribution of education levels in various ranks is in line with most readers would expect. 74.5% of the junior or middle ranked staff are having senior secondary school, i.e. matriculation level or Form 7 (F.7) of study or below. For more senior ranked staff, they are having more enhanced education background. In fact, no senior or directorate ranked staff is holding junior secondary school, i.e. Form 5 (F.5) education level or below. The observations here and in Table 4.8(a) make sense because to attain the senior level, it will require either seniority or higher qualifications or both. And, it is seen that the senior rank staff are relatively older and more educated.

**Table 4.8(b): Rank vs education level**

|       |                  |               | Education level |        |                 |                     | Total  |
|-------|------------------|---------------|-----------------|--------|-----------------|---------------------|--------|
|       |                  |               | Form 5          | Form 7 | Bachelor degree | Post-graduate level |        |
| Rank  | Junior or middle | Count         | 21              | 14     | 11              | 1                   | 47     |
|       |                  | % within Rank | 44.7%           | 29.8%  | 23.4%           | 2.1%                | 100.0% |
|       | Senior           | Count         |                 | 8      | 8               | 2                   | 18     |
|       |                  | % within Rank |                 | 44.4%  | 44.4%           | 11.1%               | 100.0% |
|       | Directorate      | Count         |                 |        |                 | 1                   | 1      |
|       |                  | % within Rank |                 |        |                 | 100.0%              | 100.0% |
| Total | Count            | 21            | 22              | 19     | 4               | 66                  |        |
|       | % within Rank    | 31.8%         | 33.3%           | 28.8%  | 6.1%            | 100.0%              |        |



**Table 4.8(c): Rank vs gender**

|       |                  |               | Gender |        | Total  |
|-------|------------------|---------------|--------|--------|--------|
|       |                  |               | Male   | Female |        |
| Rank  | Junior or middle | Count         | 15     | 32     | 47     |
|       |                  | % within Rank | 31.9%  | 68.1%  | 100.0% |
|       | Senior           | Count         | 16     | 2      | 18     |
|       |                  | % within Rank | 88.9%  | 11.1%  | 100.0% |
|       | Directorate      | Count         |        | 1      | 1      |
|       |                  | % within Rank |        | 100.0% | 100.0% |
| Total | Count            | 31            | 35     | 66     |        |
|       | % within Rank    | 47.0%         | 53.0%  | 100.0% |        |

Table 4.8(c) suggests that over two thirds (68%) of the junior or middle ranked respondents are female and the majority (89%) of the senior ranked respondents are male.

As a wrap up of these cross-tabulation tests, it is showed that, in the respondent pool, (i) higher ranked staff are relatively older; (ii) higher ranked staff are having better education background; and (iii) female and male respondents dominate the junior or middle and senior groups, respectively.

## 5. DATA ANALYSIS (I)

The information collected in Parts I and II of the questionnaire is related to the newly included external variable resistance to change (RTC) and other original constructs. These parts try to extract the rather abstract perceptions, attitudes and intentions of the respondents as well as the self-reported usage of IT. Descriptive statistics including mean, standard deviation and median of the responses will be presented in Section 5.1. Afterwards, statistical tests including correlation, regression and t-test will be used in the remaining sections of this Chapter 5 and the subsequent Chapter 6 to examine the relationships more thoroughly.

### 5.1 Descriptive statistics

The descriptive statistics of the responses are tabulated in Table 5.1 below.

**Table 5.1: Descriptive statistics**

| <b>Construct</b>                   | <b>Mid-point of answering scale</b> | <b>Mean</b> | <b>Standard deviation</b> | <b>Median</b> |
|------------------------------------|-------------------------------------|-------------|---------------------------|---------------|
| Resistance to change (RTC)         | 36                                  | 31.349      | 10.524                    | 28.500        |
| Perceived usefulness (PU)          | 18                                  | 17.621      | 6.442                     | 19.000        |
| Perceived ease of use (PEOU)       | 18                                  | 19.273      | 6.494                     | 21.000        |
| Attitude toward using the IT (ATU) | 15                                  | 15.394      | 5.689                     | 16.000        |
| Behavioural intention to use (BI)  | 6                                   | 6.636       | 2.278                     | 7.500         |
| Actual IT usage (AU)               | 7                                   | 7.303       | 2.844                     | 6.000         |

Note: For the meanings of the scores of each construct, please refer to Section 4.8 and Table 4.6 for details.

## 5.2 Correlation matrix

The nine hypotheses in Section 4.1 are related to the associations (or relationships) among the TAM constructs. To test these hypotheses, there is a need to look at the correlations between variables.

Before proceeding, a recap of the hypotheses is as follows:

- H1 The level of resistance to change (RTC) is negatively associated with perceived usefulness (PU)
- H2 The level of resistance to change is negatively associated with perceived ease of use (PEOU)
- H3 Perceived usefulness is significantly and positively associated with attitude toward using (ATU)
- H4 Perceived usefulness is significantly and positively associated with behavioral intention to use (BI)
- H5 Perceived ease of use is significantly and positively associated with attitude toward using
- H6 Perceived ease of use is significantly and positively associated with perceived usefulness

H7 Attitude toward using is significantly and positively associated with behavioral intention to use

H8 Behavioral intention to use is significantly and positively associated with actual system use (AU)

H9 Overall, the level of resistance to change is negatively and significantly associated with actual system use.

The correlation matrix generated by SPSS is in Table 5.2. When reading the table it should be reminded that the matrix is a result of analyzing the scores of the constructs.

Table 4.6 should be referred to for meanings of construct scores.

**Table 5.2: Correlation Matrix for all the constructs in the research model**

|   | RTC       | PU        | PEOU      | ATU       | BI        | AU        |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| RTC   | 1.000     | -.872(**) | -.869(**) | -.880(**) | -.886(**) | .759(**)  |
| PU  | -.872(**) | 1.000     | .891(**)  | .948(**)  | .885(**)  | -.826(**) |
| PEOU  | -.869(**) | .891(**)  | 1.000     | .931(**)  | .895(**)  | -.817(**) |
| AT  | -.880(**) | .948(**)  | .931(**)  | 1.000     | .913(**)  | -.831(**) |
| BI  | -.886(**) | .885(**)  | .895(**)  | .913(**)  | 1.000     | -.833(**) |
| AU  | .759(**)  | -.826(**) | -.817(**) | -.831(**) | -.833(**) | 1         |
| <b>Note : ** Correlation is significant at the 0.01 level (2-tailed).</b> |           |           |           |           |           |           |

In hypotheses H1 and H2, it is theorised that the level of resistance to change (RTC) will be negatively associated with perceived usefulness (PU) and perceived ease of use (PEOU), respectively. According to the correlation matrix, RTC is significantly and negatively correlated with PU ( $r=-0.872$ ,  $p<0.01$ ) and RTC is significantly and negatively correlated with PEOU ( $r=-0.869$ ,  $p<0.01$ ). Therefore, when the score of RTC increases, scores of PU and PEOU would decrease. Because high RTC score means a lower level of resistance to change and low scores in PU and PEOU mean high level of PU and PEOU. Therefore, the correlation results suggest that lower level of resistance is associated with higher perceived usefulness and ease of use. Hence, H1 and H2 are supported.

H3 hypothesises that perceived usefulness is positively associated with attitude toward the system. In Table 5.2, PU is significantly correlated with ATU ( $r=0.948$ ,  $p<0.01$ ), implying the scores of these two constructs go in the same direction. Because high PU score means bad perception on usefulness and high ATU score means poor attitudes, H3 is supported.

H4 hypothesises that perceived usefulness is positively associated with intention to use. The correlation matrix shows that PU is significantly correlated with BI ( $r=0.885$ ,  $p<0.01$ ). Since high BI score indicates low intention to use, H4 is supported.

H5 hypothesises that PEOU is positively associated with ATU. Based on the information in the correlation matrix, PEOU is significantly correlated with ATU ( $r=0.931$ ,  $p<0.01$ ). Therefore, H5 is supported.

H6 hypothesises that PEOU is positively associated with PU. The correlation matrix

shows that PEOU is significantly correlated with PU ( $r=0.891$ ,  $p<0.01$ ). It reveals that a good perception on ease of use is associated with good perception on usefulness. Thus, H6 is supported.

H7 hypothesises that ATU is positively associated with BI. The matrix shows that ATU is significantly correlated with BI ( $r=0.913$ ,  $p<0.01$ ). High scores in these two constructs infer poor attitudes and lower intention to use the IT concerned. Therefore, H7 is supported.

H8 hypothesises that BI is positively associated with AU. The matrix shows BI is significantly and negatively correlated with AU ( $r=-0.833$ ,  $p<0.01$ ). The minus sign is a result of the arrangements in the scale used to measure AU, where a higher score in AU means higher usage but higher score in BI means lower intention (Table 4.6 refers). That is, the minus sign means that when BI increases, the AU will increase. Therefore, H8 is supported.

H9 hypothesises that RTC is negatively associated with AU. The matrix shows that RTC is significantly correlated with AU ( $r=0.759$ ,  $p<0.01$ ). The positive sign means that a higher score in RTC is correlated with higher score in AU. Because higher score in RTC means lower resistance and higher score in AU means higher usage, the positive correlation coefficient infers that when resistance is higher, the usage will be lower. Therefore, H9 is supported.

In short, the correlation test results support all the nine hypotheses devised in Section 4.1. The associations among the constructs are in line with the expectations in theories developed so far.

A contrast of the findings in this research with previous researches will give more insight. To begin with, Davis' (1989, Study 2<sup>5</sup>) and Davis, et al's (1989) findings in respect of correlation are tabulated in Table 5.3.

**Table 5.3: Findings of correlations between PU, PEOU and AU**

|                                | <b>PU-AU</b> | <b>PEOU-AU</b> | <b>PEOU-PU</b> |
|--------------------------------|--------------|----------------|----------------|
| Davis (1989)<br>(Study 2)      | 0.850***     | 0.590***       | 0.560***       |
| Davis et al (1989)<br>(Wave 1) | 0.650***     | 0.270**        | 0.100*         |
| Davis et al (1989)<br>(Wave 2) | 0.700***     | 0.120*         | 0.230**        |

Source : Davis (1989, Study 2, p. 331); Davis, et al (1989)

Note : \*\*\*  $p < 0.001$  \*\*  $p < 0.01$  \*  $p < 0.05$ ; these researchers only reported results to two decimal places

In accordance with the findings, the PU-AU correlation is greater than that of PEOU-AU correlation. This research finds similar results that PU-AU ( $r = -0.826$ ,  $p < 0.01$ ) correlates greater than that of PEOU-AU ( $r = -0.817$ ,  $p < 0.01$ ) but not as dramatic as Davis' findings. However, the PEOU-PU correlation ( $r = 0.891$ ,  $p < 0.01$ ) is greater than that of Davis'.

To compare other findings of this research with previous researches', the summary of the findings on correlations between the TAM constructs from a meta-analysis of 88 relevant TAM researches by King and He (2006) are tabulated in Table 5.4.

<sup>5</sup> Davis (1989) uses the six item construct instrument since Study 2.

**Table 5.4: Findings of selected correlations between TAM constructs by King and He (2006)**

| <b>Summary of zero-order correlations between TAM constructs</b> |                 |               |                 |
|--|-----------------|---------------|-----------------|
|  | <b>PEOU- BI</b> | <b>PU- BI</b> | <b>PEOU- PU</b> |
| No. of samples   | 56              | 59            | 77              |
| Total sample size  | 12205           | 12667         | 16123           |
| Average r  | 0.429           | 0.589         | 0.491           |

Source : King and He (2006, p.744)

These reported figures reveal that out of the significantly correlated PEOU-BI, PU-BI and PEOU-PU relationships, the link between PU and BI is particularly strong. The findings of this research are not entirely tally with King and He's (2006) observations as reported in Table 5.4 above, while PEOU-BI ( $r=0.895$ ,  $p=0.01$ ); PU-BI ( $r=0.885$ ,  $p=0.01$ ) as tested in H4 above; and PEOU-PU ( $r=0.891$ ,  $p=0.01$ ) as tested in H6 above are significantly correlated as expected, the PEOU-BI correlation is stronger than PU-BI. This is deviated from the main stream findings.

Section 2.5.5 pointed out that the PEOU-BI relationship in previous researches is inconsistent. But researchers tend to emphasise more on PU. King and He (2006) bluntly conclude, after examining the path coefficients reported in previous researches, that "the major effect of [PEOU] is through [PU] rather than directly on [BI]. This indicates the importance of perceived usefulness as a predictive variable. If one could measure only one independent variable, perceived usefulness would clearly be the one to choose" (p.746).



To investigate this assertion, partial correlation techniques will be used to examine the relationships revealed in the correlation matrix further since it allows researchers to examine the correlation between two variables when the effect of other variable(s) has been partialled out (Foster, 1998, p.187).

In order to have clearer pictures of the relationships between the perceptions and attitude<sup>6</sup>, partial correlation tests for (i) PU-ATU, controlled for PEOU and (ii) PEOU-ATU, controlled for PU have been conducted. The results are summarised in Table 5.5.

The correlation coefficient for PU-ATU when PEOU's effect is partialled out drops from 0.948 to 0.7129 while the correlation coefficient for PEOU-ATU when PU's effect is partialled out drops from 0.931 to 0.5939. The bigger drop in correlation coefficient of the PEOU-ATU relationship when PU's effect is controlled for suggests that a large portion of PEOU's effect on ATU may be mediated by PU. This is in support of the main stream findings. More discussion on the weights of PEOU and PU will be provided in Section 5.3 where regression analysis is done.

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<sup>6</sup> Note : Unlike many previous researches, this research includes ATU

**Table 5.5: Summary of selected correlation and partial correlation results**

| Relationship                        | Correlation      |
|-------------------------------------|------------------|
| PU-ATU                              | 0.948            |
| PEOU-ATU                            | 0.931            |
| PU-PEOU                             | 0.891            |
| ATU-BI                              | 0.913            |
| PU-ATU, controlled for PEOU         | 0.713            |
| PEOU-ATU, controlled for PU         | 0.594            |
| RTC-PU, controlled for PEOU         | -0.432           |
| RTC-ATU, controlled for PU and PEOU | -0.137 (p=0.281) |
| PU-BI, controlled for ATU           | 0.146 (p=0.245)  |
| ATU-BI, controlled for PU           | 0.500            |

Note : All the correlations are significant at  $p < 0.001$ , except specified in brackets

Table 5.5 also reports the result of partial correlation test for RTC-ATU with PU and PEOU's effects controlled for. The result reveals that when the belief constructs are controlled for, RTC is not significantly correlated with ATU. It shows that RTC has no direct association with ATU and its effect on ATU has been fully mediated by PU and PEOU. In TAM, the influences of external variables on the system usage are mediated through the chains of reaction, that is, indirectly by influencing PEOU and PU (Davis, et al, 1989; Legris, et al, 2003). Because RTC is theorised as an external variable, this finding validates the theory and serves as an important evidence that RTC is antecedent of PU and PEOU instead of having parallel effect with these belief constructs on the attitudes.

In the model, PU and ATU influence BI jointly. The results of partial correlation test for the PU-BI with ATU's effect controlled for suggests that the correlation between PU and BI becomes non significant when ATU's effect is partialled out. Conversely, ATU is still significantly correlated with BI, albeit the coefficient does drop. This is not expected in

TAM and not consistent with most previous researches. This will be further tested and explored in regression analysis part.

In Sections 2.5.3 and 2.5.5, Davis, et al (1989) argued that PU will have direct effect on BI for the reason that in an organisation, the usefulness of a system is more important than the user's attitudes towards the system. However, there are a handful of researches that prove the otherwise (Section 2.5.5 refers). In TRA, the origin of TAM, BI is affected by ATU, which in turn has its own antecedents (Fishbein and Ajzen, 1975; Azjen and Fishbein, 1980); not directly influenced by the beliefs.

### 5.3 Regression analysis

The last section established the associations between constructs and raised new issues between the construct PU and BI. In order to examine the causal relationships to address the issues and to answer the research questions, different regression analysis techniques as detailed in Table 5.6 below are used:

**Table 5.6: Regression analyses for testing the hypotheses**

| <b>Regression number</b> | <b>Regression analysis type</b> | <b>Related Hypothesis</b> | <b>Independent variable (s)</b> | <b>Dependent variable</b> |
|--------------------------|---------------------------------|---------------------------|---------------------------------|---------------------------|
| 1                        | Simple linear regression        | H1                        | RTC                             | PU                        |
| 2                        | Simple linear regression        | H2                        | RTC                             | PEOU                      |
| 3                        | Simple linear regression        | H3                        | PU                              | ATU                       |
| 4                        | Simple linear regression        | H4                        | PU                              | BI                        |
| 5                        | Simple linear regression        | H5                        | PEOU                            | ATU                       |
| 6                        | Simple linear regression        | H6                        | PEOU                            | PU                        |
| 7                        | Simple linear regression        | H7                        | ATU                             | BI                        |
| 8                        | Simple linear regression        | H8                        | BI                              | AU                        |
| 9                        | Simple linear regression        | H9                        | RTC                             | AU                        |
| 10                       | Multiple linear regression      | H1, H6                    | RTC, PEOU                       | PU                        |
| 11                       | Multiple linear regression      | H3, H5                    | PU, PEOU                        | ATU                       |
| 12                       | Multiple linear regression      | H4, H7                    | PU, ATU                         | BI                        |

In terms of regression equations, the following equations for testing the hypotheses are obtained:

1. For H1,  $PU = B_0 + B_1RTC + e$
2. For H2,  $PEOU = B_0 + B_1RTC + e$

3. For H3,  $ATU = B_0 + B_1PU + e$
4. For H4,  $BI = B_0 + B_1PU + e$
5. For H5,  $ATU = B_0 + B_1PEOU + e$
6. For H6,  $PU = B_0 + B_1PEOU + e$
7. For H7,  $BI = B_0 + B_1ATU + e$
8. For H8,  $AU = B_0 + B_1BI + e$
9. For H9,  $AU = B_0 + B_1RTC + e$

To test those relationships with more than one independent variable in the model, the following regression equations are devised:

10. For H1 and H6,  $PU = B_0 + B_1RTC + B_2PEOU + e$
11. For H3 and H5,  $ATU = B_0 + B_1PU + B_2PEOU + e$
12. For H4 and H7,  $BI = B_0 + B_1PU + B_2ATU + e$

Where  $B_0$  is a constant,  $B_1$  and  $B_2$  are the equation coefficients and  $e$  is the random error in the respective equation.

In recent years, structural equation model (SEM) and path analysis techniques have been employed in a number of TAM researches (e.g. Chau, 1996; Teo, et al, 1999; Cheng, et al, 2006 and Seyal and Rahman, 2007). While these techniques are useful and convenient for subsequent discussion based on the sizes of the path coefficients, certain strict criteria have to be met before these techniques are appropriate.

One basic requirement is a sufficiently large sample size. Hair, et al, (1998) recommended that a sample size of 200 is needed for SEM. Some researchers (e.g. Seyal and Rahman, 2007) employ SEM with only 105 respondents in the sample. Given the small sample size in this research (N=66), we use regression analysis to verify the causal links instead.

Bryman and Cramer (1997) reminded that establishing causality would involve the following three things:

1. Establish relationship between the two variables;
2. The relationship is non-spurious; and
3. Show that cause precedes the effect.

Unlike in an experiment, variables in a cross-sectional questionnaire survey cannot be manipulated and data are collected at the same time. This limitation makes the proof of (3) above extremely difficult. Lucas and Spitler (1999) used regression analysis in their study. As noted by them, in cross-sectional research, although the research model implies causality, the research design itself can only indicate support for the associations in the model. To supplement the statistical test results, the theoretical backgrounds

developed in the literature review provide the other support of non-spuriousness. On the issue of generalisability, Cheng, et al (2006) argued that the rapid change of technologies will make cross sectional survey not be perfectly generalisable.

### 5.3.1 Normality

As a prudent step, the appropriateness of using regression analysis is checked first. Hair, et al (1998) considered normality the most basic assumption for regression. If the violation is sufficiently large, it could make all the statistical tests invalid.

#### Distribution

A normal distribution is a bell shape distribution:

- (mean +/- 1 s.d) approximately 68%;
- (mean +/- 2 s.d.) approximately 95%; and
- (mean +/- 3 s.d.) approximately all or almost all.

**Table 5.7: Distribution of data**

|                        | RTC                        | PU                         | PEOU                       | ATU                       | BI                        | AU                        |
|------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|
| <b>Mean</b>            | 31.349                     | 17.621                     | 19.273                     | 15.394                    | 6.636                     | 7.303                     |
| <b>Std. Deviation</b>  | 10.524                     | 6.442                      | 6.494                      | 5.689                     | 2.278                     | 2.845                     |
| <b>Minimum</b>         | 15.000                     | 6.000                      | 6.000                      | 5.000                     | 2.000                     | 3.000                     |
| <b>Maximum</b>         | 60.000                     | 29.000                     | 30.000                     | 25.000                    | 10.000                    | 12.000                    |
| <b>Mean +/- 1 s.d.</b> | 20.825-41.873<br>(62.121%) | 11.179-20.063<br>(37.879%) | 12.779-25.767<br>(66.667%) | 9.705-21.083<br>(78.788%) | 4.358-8.914<br>(48.484%)  | 4.458-10.148<br>(68.182%) |
| <b>Mean +/- 2 s.d.</b> | 10.301-52.397<br>(98.484%) | 4.737-30.505<br>(100%)     | 6.285-32.261<br>(98.484%)  | 4.016-26.772<br>(100%)    | 2.080-11.192<br>(98.484%) | 1.613-12.993<br>(100%)    |
| <b>Mean +/- 3 s.d.</b> | (100%)                     |                            | (100%)                     |                           | (100%)                    |                           |

Note: (1) N=66; (2) s.d. denotes standard deviation

Table 5.7 presents the distributions of data for the six constructs. The distributions are close to the rules stipulated by Mendenhall, et al (1993) above, with the exceptions observed in PU and BI where seriously less than 68% of the distribution is enclosed by the +/- one s.d. range. However, all the distributions were within three s.d. as theorised. As such, it is believed that the distributions of the data are roughly normal.

Histogram, the Skewness and Kurtosis tests, the Kolmogorov-Smirnov and Normal Q-Q plots are other ways to judge normality. Hence, the reading of histogram is considered to be too subjective (Field, 2005; Hair, et al,1998).

### **Skewness and Kurtosis tests**

**Table 5.8: Summary of Skewness and Kurtosis tests**

|             |          | <b>Statistic</b> | <b>Std. Error</b> | <b>Z-score</b> |
|-------------|----------|------------------|-------------------|----------------|
| <b>RTC</b>  | Skewness | 0.492            | 0.295             | 1.670          |
|             | Kurtosis | -0.814           | 0.582             | 1.400          |
| <b>PU</b>   | Skewness | -0.375           | 0.295             | 1.270          |
|             | Kurtosis | -1.162           | 0.582             | 2.000          |
| <b>PEOU</b> | Skewness | -0.144           | 0.295             | 0.490          |
|             | Kurtosis | -1.204           | 0.582             | 2.070          |
| <b>ATU</b>  | Skewness | -0.135           | 0.295             | 0.460          |
|             | Kurtosis | -1.239           | 0.582             | 2.130          |
| <b>BI</b>   | Skewness | -0.203           | 0.295             | 0.690          |
|             | Kurtosis | -1.285           | 0.582             | 2.210          |
| <b>AU</b>   | Skewness | 0.523            | 0.295             | 1.770          |
|             | Kurtosis | -1.113           | 0.582             | 1.910          |

Note:  $Z(\text{skewness}) = \text{skewness} / \text{standard error of skewness}$

$Z(\text{kurtosis}) = \text{kurtosis} / \text{standard error of kurtosis}$

Table 5.8 reports the Skewness and Kurtosis test results. Field defined 200 as a large



sample (2005, p.72) and suggests the criterion of an absolute value of the z-score  $>3.29$  at significance level of 0.001 could be used. He further points out that for a very large sample (200 or more), looking at the distribution visually is more important than applying the tests and calculating the significances. For small samples, he suggests an absolute number of greater than 2.58 at significant at  $p < 0.01$  as a threshold is reasonable. Field does not define small samples though. With a sample of only 66 responses, it is considered the 2.58 ( $p < 0.01$ ) criterion is appropriate for this research. Accordingly, all the z-scores are within the 2.58 cutoff line and the distributions are normal.

### **Kolmogorov-Smirnov test**

The Kolmogorov-Smirnov (Lilliefors) (the K-S test) checks against normality (Cooper and Schindler, 2003 and Field, 2005). The calculated K-S statistics for the constructs are reported in Table 5.9 below. Because a significant K-S statistic means the distribution is not normal, the K-S statistics in Table 5.9 suggest that all the distributions are not normal.

**Table 5.9: K-S statistics for constructs (a Lilliefors Significance Correction)**

|             | <b>Kolmogorov-Smirnov(a)</b> |           |             |
|-------------|------------------------------|-----------|-------------|
|             | <b>Statistic</b>             | <b>df</b> | <b>Sig.</b> |
| <b>RTC</b>  | 0.197                        | 66        | 0.000       |
| <b>PU</b>   | 0.155                        | 66        | 0.000       |
| <b>PEOU</b> | 0.206                        | 66        | 0.000       |
| <b>AT</b>   | 0.176                        | 66        | 0.000       |
| <b>BI</b>   | 0.225                        | 66        | 0.000       |
| <b>AU</b>   | 0.222                        | 66        | 0.000       |

### **Normal probability plot**

One visual test, i.e. the normal probability plot (Field calls this normal Q-Q plot) will be used to check the normality. In the normal probability plot, the expected values form a diagonal line and the actual observed values distribute along the line. If the distribution is strictly normal, the observed values should fall exactly along the straight line and any deviation of the dots from the diagonal line represents a deviation from normality. If the observed data values in the plot looks like a wiggly snake wrapped around the line, there is some deviation from normality. It is a helpful visual judgment of normality (Field, 2005 and Hair, et al, 1998).

The normal probability plots for the constructs are examined and it is seen that the distributions of the observed values are not strictly normal as none of the graphs is observed to have all the dots fall exactly on the straight line. There is certain degree of deviation from strict normality.

The results of these commonly used normality tests conclude that the distributions are having some degrees of deviations from the ideal situation. Hence, except the K-S test, other test results suggest that the deviations are not serious enough to compromise the assumption. Therefore, the data collected pass the single most important criteria for doing regression analysis.

### **5.3.2 Collinearity**

Another big threat to the regression analysis is collinearity. The terms “collinearity” and “multicollinearity” will be used interchangeably in this research. The concept expresses the relationships between two (collinear) or more (multicollinear) independent variables.

Two variables are said to have complete collinearity if their correlation coefficient is 1 or -1 and a complete lack of collinearity if the correlation coefficient is 0. Multicollinearity occurs when a variable is correlated with a set of other variables (Hair, et al, 1998).

The simplest and most obvious means of identifying collinearity is by examining the correlation matrix for the independent variables. If a high correlation of 0.9 or above is observed, it is the first indication that substantial collinearity may exist.

Other methods such as tolerance, VIF (variance inflation factor), a reverse of the tolerance value, are available for examining the collinearity. Simply speaking, these measures tell us the degree to which each independent variable is explained by the other variables. Tolerance is the amount of variability of any independent variable not explained by the other variables. Thus, a very small tolerance value denotes high collinearity. A common cutoff value for tolerance may be  $<0.1$  where the corresponding VIF value is  $>10$  (Hair, et al, 1998, p.48; Bowerman and O'Connell, 1990, p.445; Cheng, et al, 2006). However, each analyst could have his/her own discretion on the values. For software like SPSS, the default tolerance value is set at as low as 0.0001. On this issue, it should be noted that de Vaus (2002), argued the cutoffs of tolerance and VIF should be  $\leq 0.2$  and  $\geq 5$ , respectively (p.345). That is, de Vaus is adopting a more stringent standard on this matter. In previous TAM researches, Lederer, et al. (2000) reported that they adopt 10 as the cut-off level of VIF in their research.

## Tolerance and VIF

Some of the equations in Table 5.10 involve more than one independent variable is involved. A table tabulating the tolerance and VIF figures extracted from relevant regression equations is given below.

Applying the rules of Hair, et al (1998) and Bowerman and O'Connell (1990), the above tolerance and VIF statistics are acceptable and no serious problem of collinearity is found. If adopting de Vaus' (2002) more stringent rules as the criterion, regression numbers 11 and 12 could be of concern.

**Table 5.10: Tolerance and VIF**

| Regression number | Hypotheses    | Equation                          | Variables | Tolerance | VIF   |
|-------------------|---------------|-----------------------------------|-----------|-----------|-------|
| 10                | For H1 and H6 | $PU = B_0 + B_1RTC + B_2PEOU + e$ | RTC       | 0.244     | 4.091 |
|                   |               |                                   | PEOU      | 0.244     | 4.091 |
| 11                | For H3 and H5 | $ATU = B_0 + B_1PU + B_2PEOU + e$ | PU        | 0.205     | 4.867 |
|                   |               |                                   | PEOU      | 0.205     | 4.867 |
| 12                | For H4 and H7 | $BI = B_0 + B_1PU + B_2ATU + e$   | PU        | 0.102     | 9.83  |
|                   |               |                                   | ATU       | 0.102     | 9.83  |

However, in accordance with the frequently referred standards by most of the researchers, there is no serious problem of collinearity in the data.

## Eigenvalues

Apart from the tolerance and VIF values, Field (2005) revealed that an examination of the eigenvalues and variance proportions ( ranging from 0 to 1) is a possible way to identify the problem of multicollinearity. The aim is to look for large variance proportions on the same small eigenvalue. Should any predictor variables have high variance proportions for that eigenvalue, a potential problem of multicollinearity exists.

In the present research, the regression numbers 10 to 12 have more than one independent variable and thus should be tested. For convenience, the related collinearity diagnoses are also given :

**Table 5.11(a): Eigenvalue for  $PU = B_0 + B_1RTC + B_2PEOU + e$  (regression number 10)**

| Collinearity Diagnostics(a) |           |            |                 |                      |       |       |
|-----------------------------|-----------|------------|-----------------|----------------------|-------|-------|
| Model                       | Dimension | Eigenvalue | Condition Index | Variance Proportions |       |       |
|                             |           |            |                 | (Constant)           | RTC   | PEOU  |
| 1                           | 1         | 2.808      | 1.000           | 0.000                | 0.000 | 0.000 |
|                             | 2         | 0.190      | 3.871           | 0.000                | 0.070 | 0.070 |
|                             | 3         | 4.668E-03  | 24.526          | 1.000                | 0.930 | 0.930 |
| A Dependent Variable: PU    |           |            |                 |                      |       |       |

**Table 5.11(b): Eigenvalue for  $ATU = B_0 + B_1PU + B_2PEOU + e$  (regression number 11)**

| Collinearity Diagnostics(a) |           |            |                 |                      |       |       |
|-----------------------------|-----------|------------|-----------------|----------------------|-------|-------|
| Model                       | Dimension | Eigenvalue | Condition Index | Variance Proportions |       |       |
|                             |           |            |                 | (Constant)           | PEOU  | PU    |
| 1                           | 1         | 2.918      | 1.000           | 0.010                | 0.000 | 0.000 |
|                             | 2         | 7.061E-02  | 6.428           | 0.950                | 0.030 | 0.070 |
|                             | 3         | 1.167E-02  | 15.814          | 0.040                | 0.960 | 0.930 |
| a Dependent Variable: ATU   |           |            |                 |                      |       |       |

**Table 5.11(c): Eigenvalue for  $BI = B_0 + B_1PU + B_2ATU + e$  (regression number 12)**

| Collinearity Diagnostics(a) |           |            |                 |                      |       |       |
|-----------------------------|-----------|------------|-----------------|----------------------|-------|-------|
| Model                       | Dimension | Eigenvalue | Condition Index | Variance Proportions |       |       |
|                             |           |            |                 | (Constant)           | PU    | ATU   |
| 1                           | 1         | 2.915      | 1.000           | 0.010                | 0.000 | 0.000 |
|                             | 2         | 7.847E-02  | 6.095           | 0.990                | 0.020 | 0.030 |
|                             | 3         | 6.130E-03  | 21.808          | 0.000                | 0.970 | 0.970 |
| a Dependent Variable: BI    |           |            |                 |                      |       |       |

With reference to Table 5.11, there may be collinearity problem between the independent variables in these equations because the independent variables are having high variance proportions, range from 0.93 to 0.97, in the smallest eigenvalue at dimension 3.

The condition indexes for these three regression equations are 24.526, 15.814 and 21.808, respectively. They are at least 3 times the other indexes in the same model. Although there is no hard and fast rule to judge how large an index could be said to be

large (Field, 2005, p.261), these differences are considered large in this research.

Moreover, the correlation matrix between the constructs in Section 5.2 (Table 5.2 refers) show high correlation coefficients between these constructs.

Specifically, RTC and PEOU are significantly negatively correlated at  $r = -0.869$ ,  $p < 0.01$ ; PEOU and PU are significantly positively correlated at  $r = 0.891$ ,  $p < 0.01$  and PU and ATU are significantly positively correlated at  $r = 0.948$ ,  $p < 0.01$ . These are also additional indicators of the potential problem of multicollinearity in these regression equations.

It is acknowledged that in practice there will be some degree of multicollinearity in social research, but severe multicollinearity can have substantive effects on the regression results including the coefficient estimates and signs (Hair, et al, 1998, pp. 187-195).

To tackle the problem, Bowerman and O'Connell (1990) recommended to replace one of the highly correlated predictors with an equally important predictor or to collect more data to see whether the problem of multicollinearity could be lessened. de Vaus (2002) opined that dropping the most problematic variable from the analysis should cause no problem because only one of the highly correlated variables should help to explain the variance in the dependent variable. Furthermore, de Vaus (2002) suggested to combine the highly correlated variables into a single variable (pp. 348-350). Finally, Field (2005) pointed out that although the tests show two predictors are correlated highly, it is still unclear which of them predicts the dependent variable in the regression.

Unfortunately, the findings of collinearity tests are mixed -- the results of tolerance and VIF tests confirm that there should be no problem of collinearity. The safest remedy may be to acknowledge the unreliability of the model in view of the possible bias caused by the multicollinearity because removal of any variable is “arbitrary” (Field, 2005, p.642). After all, Hair, et al (1998) pointed out it is the nature of social research (i.e. will have some degree of multicollinearity). In this research, all the constructs have a theoretical basis to support their presence, therefore removal of any would be an arbitrary decision. Hence, they must remain intact in the model. At the same time, we acknowledge the possible problems of collinearity.

The following sections move on to verify the reliability and validity of the constructs in the research model.

### **5.3.3 Reliability of constructs**

The most widely used test for construct reliability is Cronbach’s alpha (e.g. Davis, et al, 1989; Laderer, et al, 2000; Teo, 2001; Mathieson, et al, 2001; Kulviwat, et al, 2006). Researchers consent that an overall alpha value of 0.7 is acceptable and if the value goes up to 0.8 or above, it would be a strong indicator of reliability (e.g. Bryman and Cramer, 1990; Hair, et al, 1998 and Field, 2005).

Apart from the alpha value, it is also necessary to examine the column of “Alpha if item deleted” to see if any value is significantly greater than the overall alpha. If so, that means the construct structure needs to be modified.

The values in the column “corrected item-total correlation” should show the items



correlate with the total score in the construct. An item that does not sufficiently correlate with the total (i.e.  $<0.3$ ) will attract attention for further investigation (Field, 2005; Hair, et al, 1998). The statistical test results are summarised in Table 5.12.

**Table 5.12: Cronbach's alpha for constructs**

| <b>Construct</b> | <b>No. of items</b> | <b>Alpha (overall)</b> | <b>Range of "Alpha if item deleted"</b> | <b>Range of "Corrected item-total correlation"</b> |
|------------------|---------------------|------------------------|---|--|
| RTC              | 12                  | 0.960                  | 0.953 – 0.962 (1)                       | 0.570 – 0.898                                      |
| PU               | 6                   | 0.977                  | 0.971 – 0.974                           | 0.906 – 0.939                                      |
| PEOU             | 6                   | 0.973                  | 0.964 – 0.970                           | 0.893 – 0.948                                      |
| ATU              | 5                   | 0.983                  | 0.977 – 0.983 (1)                       | 0.922 – 0.961                                      |
| BI               | 2                   | 0.874                  | --                                      | 0.777  |
| AU               | 2                   | 0.941                  | --                                      | 0.889  |

Note : For all constructs, N=66

Numbers in bracket indicate number of items that exceeds the overall alpha

Firstly, the above results confirm that the constructs are having very strong reliability with alpha values ranging from 0.874 to 0.983, all are well above the threshold of 0.7.

In the column "Alpha if item deleted", there is only one item that exceeds the overall alpha in constructs RTC and ATU, respectively. Hence, because the differences are both slight, it is believed that the structures of these constructs should be maintained.

In the column "Corrected item-total correlation", all the values are above the suggested threshold of 0.3, hence no issue arises from this test.

#### **5.3.4 Factor analysis for new construct – validity of RTC**

Since the RTC is a new construct proposed by this research and it is one of the

objectives of this research to examine the relevance of the RTC to TAM, the validity of this construct should be assessed.

Bryman and Cramer (1990) pointed out that factor analysis could be used for three purposes, namely (i) to assess the degree of items are tapping the same concept, this also enables the researcher to assess the factorial validity; (ii) factor analysis could assist to reduce a large number of variables to a smaller set and (iii) to try to make sense of the bewildering complexity of social behavior, that is some people try to use factor analysis as a tool for bringing order to the way we see things by determining which of them are related and which of them are not.

Bryman and Cramer (1990) and Hair, et al (1998) classified the factor analysis techniques into two kinds, namely the exploratory and confirmatory techniques. Hence, Hair, et al (1998) further revealed that there is continued debate on the appropriate use of these kinds of factor analytic techniques. The researchers elaborated that while the exploratory perspective is useful in searching for structure among a set of variables or as a data reduction method; in cases where the researchers have preconceived thoughts on the actual structure of the data in accordance with prior researches or theories, the confirmatory factor analysis approach is more appropriate (pp. 90-91).

Within the scope of TAM research, Davis (1989) used principal component analysis with oblique rotation to check the validity and confirm that usefulness and ease of use are two distinct constructs when he develops the TAM model.

Adams, et al (1992) employed the factor analysis with varimax rotation techniques to assess the factorial validity of the constructs; Teo (2001) employed factor analysis with

varimax rotation to test the construct validity; Burton-Jones and Hubona (2003) used the principal components factor analysis with promax rotation to investigate the factor loadings of the constructs and the validity and Kiraz and Ozdemir (2006) employed the principal component analysis (rotation method used is not reported) to assess the validity.

Various rotation methods can be used to see whether some items are not loaded sufficiently on the factor (Foster, 1998) or reveal that if some items “belong” to more than one factor (de Vaus, 2002). However, because all the items in RTC are supported by theories and we are going to test one factor (i.e. RTC) only, no rotation is required.

Strictly speaking, factor analysis assumes the sample used is actually the population. Therefore, the conclusions from factor analysis techniques are restricted to the sample collected and generalization of the results can only be achieved if the analysis using different samples reveals the same factor structure.

In addition, as a record of possible concerns to be considered, Foster (1998) pointed out that factor analysis is suitable if the number of respondents is more than 100; and should be at least as twice as the number of variables. In addition, the respondents should be heterogeneous. Based on these criteria, the present research could not meet the requirement of 100 respondents.

### **The correlation matrix of RTC items**

Hair, et al (1998, p.99) opined that a correlation of  $r > 0.3$  between the items is required before any factor analysis can be appropriate.

The results in the correlation matrix in Table 5.13 confirm that all the correlations are greater than 0.3 and are significant. Therefore, these data are appropriate for testing in factor analysis.

Because the determinant reported in the correlation matrix is 0.000002271 which is smaller than the minimum value of 0.00001 proposed by Field (2005, p.648), the multicollinearity may cause a problem in factor analysis. While it may be a potential problem, Field (2005) also pointed out that, strictly speaking, the determinant is irrelevant to principal components analysis. Even though it is contradictory, no other researchers gives any related discussion on this issue.

Moreover, Field (2005) pointed out that, normally, one of the highly correlated items (i.e.  $r > 0.9$ ) should be dropped to avoid the problem of multicollinearity. As there is no correlation coefficient in the matrix reported in Table 5.13 exceeds the value of 0.9, no dropping is required. We continue to use the Kaiser-Meyer-Olkin (KMO) test to check the RTC construct.

**Table 5.13: Correlation matrix of items in RTC construct**

| Correlation Matrix(a) |       |       |       |       |       |       |       |       |       |       |       |       |       |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                       |       | rtc1  | rtc2  | rtc3  | rtc4  | rtc5  | rtc6  | rtc7  | rtc8  | rtc9  | rtc10 | rtc11 | rtc12 |
| Correlation           | Rtc1  | 1.000 | .841  | .545  | .830  | .697  | .645  | .804  | .785  | .827  | .708  | .723  | .660  |
|                       | Rtc2  | .841  | 1.000 | .481  | .791  | .507  | .682  | .735  | .777  | .789  | .696  | .677  | .663  |
|                       | Rtc3  | .545  | .481  | 1.000 | .502  | .475  | .347  | .555  | .484  | .437  | .483  | .602  | .421  |
|                       | Rtc4  | .830  | .791  | .502  | 1.000 | .706  | .670  | .734  | .725  | .836  | .671  | .654  | .565  |
|                       | Rtc5  | .697  | .507  | .475  | .706  | 1.000 | .567  | .693  | .656  | .687  | .686  | .650  | .624  |
|                       | Rtc6  | .645  | .682  | .347  | .670  | .567  | 1.000 | .627  | .672  | .626  | .615  | .545  | .615  |
|                       | Rtc7  | .804  | .735  | .555  | .734  | .693  | .627  | 1.000 | .828  | .796  | .712  | .647  | .605  |
|                       | Rtc8  | .785  | .777  | .484  | .725  | .656  | .672  | .828  | 1.000 | .849  | .713  | .726  | .670  |
|                       | Rtc9  | .827  | .789  | .437  | .836  | .687  | .626  | .796  | .849  | 1.000 | .797  | .781  | .688  |
|                       | Rtc10 | .708  | .696  | .483  | .671  | .686  | .615  | .712  | .713  | .797  | 1.000 | .596  | .694  |
|                       | Rtc11 | .723  | .677  | .602  | .654  | .650  | .545  | .647  | .726  | .781  | .596  | 1.000 | .695  |
|                       | Rtc12 | .660  | .663  | .421  | .565  | .624  | .615  | .605  | .670  | .688  | .694  | .695  | 1.000 |
| Sig.<br>(1-tailed)    | Rtc1  |       | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  |
|                       | Rtc2  | .000  |       | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  |
|                       | Rtc3  | .000  | .000  |       | .000  | .000  | .002  | .000  | .000  | .000  | .000  | .000  | .000  |
|                       | Rtc4  | .000  | .000  | .000  |       | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  |
|                       | Rtc5  | .000  | .000  | .000  | .000  |       | .000  | .000  | .000  | .000  | .000  | .000  | .000  |
|                       | Rtc6  | .000  | .000  | .002  | .000  | .000  |       | .000  | .000  | .000  | .000  | .000  | .000  |
|                       | Rtc7  | .000  | .000  | .000  | .000  | .000  | .000  |       | .000  | .000  | .000  | .000  | .000  |
|                       | Rtc8  | .000  | .000  | .000  | .000  | .000  | .000  | .000  |       | .000  | .000  | .000  | .000  |
|                       | Rtc9  | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  |       | .000  | .000  | .000  |
|                       | Rtc10 | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  |       | .000  | .000  |
|                       | Rtc11 | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  |       | .000  |
|                       | Rtc12 | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  | .000  |       |

a Determinant = 2.271E-06

## **KMO test**

Table 5.14 reports the KMO test results.

**Table 5.14: KMO test results for construct RTC**

| KMO Test   |       |
|--|-------|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | 0.867 |

Because the KMO value is as high as 0.867, these data are appropriate for factor analysis. De Vaus (2002) described this level (i.e. >0.8) of KMO value as “meritorious” and Field (2005) described it as “great”! Using the SPSS, the results of the principal components analysis are presented and discussed in the paragraphs below.

## **Communalities**

Communality is a measure of the proportion of common variance present in the variables. Researchers do not suggest a cutoff for this item (e.g. Bryman and Cramer, 1990; Foster, 1998; Hair, et al, 1998; de Vaus, 2002 and Field, 2005). Hence, de Vaus (2002) described the communality value of 0.39 as low and further suggests to drop the corresponding items (pp. 137-138).

Except for item rtc3 (with extraction of 38.2%), the other 11 items are sufficiently associated with the RTC construct. Table 5.15 shows the variances explained range from 57.9% to as high as 84.6%. rtc3 may be an item worthy to pay attention to but a decision to remove it after this first test is immature. Other indicators will be used to assist the examination if rtc3 is appropriate in RTC. Except for rtc3, the items used in

the questionnaire to measure the level of RTC are loaded with the construct and hence the validity of the construct is considered satisfactory.

**Table 5.15: Communalities of items in RTC construct**

| Communalities                                    |         |            |
|--|---------|------------|
|  | Initial | Extraction |
| rte1   | 1.000   | .831       |
| rte2   | 1.000   | .756       |
| rte3   | 1.000   | .382       |
| rte4   | 1.000   | .763       |
| rte5   | 1.000   | .630       |
| rte6   | 1.000   | .579       |
| rte7   | 1.000   | .770       |
| rte8   | 1.000   | .800       |
| rte9   | 1.000   | .846       |
| rte10  | 1.000   | .704       |
| rte11  | 1.000   | .686       |
| rte12  | 1.000   | .623       |
| Extraction Method: Principal Component Analysis. |         |            |

### **Eigenvalue**

Table 5.16 tabulates the results of eigenvalue and total variance explained tests. It is seen that only the first factor has an eigenvalue greater than 1, which means that there is only one factor in the construct, and this factor accounts for 69.755% of the variance. Therefore, it is shown that there is only one factor here.

**Table 5.16: Total variance explained**

| Total Variance Explained                         |                     |               |              |                                     |               |              |
|--|---------------------|---------------|--------------|-------------------------------------|---------------|--------------|
| Component  | Initial Eigenvalues |               |              | Extraction Sums of Squared Loadings |               |              |
|  | Total               | % of Variance | Cumulative % | Total                               | % of Variance | Cumulative % |
| 1  | 8.371               | 69.755        | 69.755       | 8.371                               | 69.755        | 69.755       |
| 2  | .755                | 6.292         | 76.046       |                                     |               |              |
| 3  | .558                | 4.649         | 80.695       |                                     |               |              |
| 4  | .496                | 4.134         | 84.830       |                                     |               |              |
| 5  | .442                | 3.684         | 88.514       |                                     |               |              |
| 6  | .377                | 3.145         | 91.658       |                                     |               |              |
| 7  | .319                | 2.662         | 94.320       |                                     |               |              |
| 8  | .242                | 2.020         | 96.340       |                                     |               |              |
| 9  | .152                | 1.264         | 97.604       |                                     |               |              |
| 10   | .135                | 1.128         | 98.732       |                                     |               |              |
| 11   | .106                | .883          | 99.615       |                                     |               |              |
| 12   | 4.621E-02           | .385          | 100.000      |                                     |               |              |
| Extraction Method: Principal Component Analysis. |                     |               |              |                                     |               |              |

**Factor loadings**

Most researchers (e.g. Hair, et al., 1998; Foster, 1998; de Vaus, 2002; Field, 2005) agree that a factor loading of 0.3 or above is desirable to show the item is loaded sufficiently with the factor.



**Table 5.17: Component matrix**

| Component Matrix(a)                              |           |
|--|-----------|
|  | Component |
|  | 1         |
| rte1   | .912      |
| rte2   | .870      |
| rte3   | .618      |
| rte4   | .873      |
| rte5   | .794      |
| rte6   | .761      |
| rte7   | .877      |
| rte8   | .894      |
| rte9   | .920      |
| rte10  | .839      |
| rte11  | .828      |
| rte12  | .789      |
| Extraction Method: Principal Component Analysis. |           |
| a 1 components extracted.                        |           |

The results in Table 5.17 indicate that the 12 items loaded with the factor from 0.618 to 0.92. This ensures that all the 12 items are sufficiently loaded with the underlying concept, that is RTC.

Since the reported factor loadings of usefulness (PU) (ranged from 0.607 to 0.98) and ease of use (PEOU) (ranged from 0.63 to 0.97) are always regarded by researchers in the stream as with good validity (Table 4.5 refers). Applying the same criteria, it is considered that the new construct RTC is valid because the 12 items merit factor loadings from 0.618 to 0.92, which are comparable to PU and PEOU's.

### **Reproduced correlations**

Field (2005) suggested an absolute value of the residual value of 0.05 and if more than 50% of the residuals are greater than 0.05, the researcher probably has grounds for concern. Applying these rules to check the construct resistance to change (RTC), because there are only 28% of the residuals are with absolute values greater than 0.05, the extracted factor model is considered fit and no concern raised.

Various tests have been done in this section to critically check the reliability of the constructs and in particular the validity of the new construct, RTC. Even though the responses are relatively few in this research (N=66), the test results show that (i) the constructs are reliable and (ii) the questions used to operate RTC construct are appropriate such that the construct is having satisfactory validity.

#### **5.4 Results of regression analysis**

The checking done in Sections 5.3.1 to 5.3.4 confirms that the regression analysis is appropriate for this research. This Section does the regression analysis and tries to establish causal links between constructs.

There are various methods to enter the independent variables into a regression model. De Vaus (2002) discussed the methods briefly (pp. 357 – 367). The standard method of entering the variables into the model in a single step is suitable when researchers wish to know how much variance the model explains (i.e.  $R^2$ ); how much is the impact of each independent variable on dependent variable (regression coefficient) net of the influence of other independent variables and the relative importance of the independent variables. This method is most appropriate when a simple description is needed.

Other methods like stepwise regression computes and includes the variables that are significantly linked to the dependent variable only. Entering the independent variables one by one, the extra  $R^2$  in each step can be calculated. The goal of using this method would be to create a parsimonious model that best predict the independent variable. Since it is not the intention to create a new parsimonious model from a set of potential variables, the “enter” method suffices the purposes and is considered suitable.

Hair, et al (1998) suggested to use the standardized beta coefficient in the course of interpreting the regression results because if the independent variables have been standardized, the problem of dealing with different units in measurement could be eliminated and the relative importance of the independent variables included in the equation could be obtained directly. Bryman and Cramer (1990) held similar view and point out that the standardized coefficient is a better choice if the measurement scale or

the ranges of scale differ largely (pp. 236-239).

However, as the issue of largely different measurement units does not exist in this research, this research presents the unstandardized coefficients as in some previous researches (e.g. Malhotra and Galletta, 1999).

#### **5.4.1 The regression equations obtained**

Following the above methods, the results of regression analysis from the SPSS software are obtained and summarised in Table 5.18.

**Table 5.18: A summary of regression results**

| Reg No. | Related hypotheses | Regression equation   | R-square statistics   |
|---------|--------------------|---|---|
| 1       | For H1             | PU = 34.348 - 0.534RTC<br>S.E. (1.239) (0.037)                                  | R <sup>2</sup> =0.760,<br>adjusted<br>R <sup>2</sup> =0.756 |
| 2       | For H2             | PEOU = 36.087 - 0.536RTC<br>S.E. (1.260) (0.038)                                | R <sup>2</sup> =0.756,<br>adjusted<br>R <sup>2</sup> =0.752 |
| 3       | For H3             | ATU = 0.645(0.332) + 0.837 PU<br>S.E. (0.660) (0.035)                           | R <sup>2</sup> =0.898,<br>adjusted<br>R <sup>2</sup> =0.897 |
| 4       | For H4             | BI = 1.124 (0.005) + 0.313 PU<br>S.E. (0.386) (0.021)                           | R <sup>2</sup> =0.783,<br>adjusted<br>R <sup>2</sup> =0.779 |
| 5       | For H5             | ATU = -0.32 (0.696) + 0.815 PEOU<br>S.E. (0.814) (0.04)                         | R <sup>2</sup> =0.866,<br>adjusted<br>R <sup>2</sup> =0.864 |
| 6       | For H6             | PU = 0.579 (0.614) + 0.884 PEOU<br>S.E. (1.142) (0.056)                         | R <sup>2</sup> =0.795,<br>adjusted<br>R <sup>2</sup> =0.791 |
| 7       | For H7             | BI = 1.006 (0.04) + 0.366 ATU<br>S.E. (0.334) (0.020)                           | R <sup>2</sup> =0.834,<br>adjusted<br>R <sup>2</sup> =0.832 |
| 8       | For H8             | AU = 14.204 - 1.04 BI<br>S.E. (0.606) (0.086)                                   | R <sup>2</sup> =0.693,<br>adjusted<br>R <sup>2</sup> =0.689 |
| 9       | For H9             | AU = 0.876 (0.233) + 0.205 RTC<br>S.E. (0.727) (0.022)                          | R <sup>2</sup> =0.575,<br>adjusted<br>R <sup>2</sup> =0.569 |
| 10      | For H1 and H6      | PU = 14.772 - 0.243 RTC + 0.542 PEOU<br>S.E. (3.871) (0.064) (0.103)            | R <sup>2</sup> =0.833,<br>adjusted<br>R <sup>2</sup> =0.828 |
| 11      | For H3 and H5      | ATU = -0.614 (0.291) + 0.508 PU + 0.366 PEOU<br>S.E. (0.577) (0.063) (0.062)    | R <sup>2</sup> =0.934,<br>adjusted<br>R <sup>2</sup> =0.932 |
| 12      | For H4 and H7      | BI = 0.933 (0.008) + 0.066 (0.245)PU + 0.295ATU<br>S.E. (0.339) (0.064) (0.056) | R <sup>2</sup> =0.838,<br>adjusted<br>R <sup>2</sup> =0.833 |

Note :

1. All the coefficients are significant at  $p < 0.001$  level except those coefficients that have a bracket in which case the number in the bracket is the significance level.
2. Before interpreting the information in Table 5.18 above, it should be remembered that the scores of the constructs are used in the regression analysis. For the meanings of the scores, see Table 4.6.
3. The line "S.E." under the regression equation reports the standard errors in brackets under the corresponding coefficients

The results are interpreted against the hypotheses set out in Section 4.2.

(i) Regression number 1 is related to H1. The results can be represented by :

$$PU = 34.348 - 0.534RTC$$

The results suggest that at a significance level of  $p < 0.001$ , score of RTC is having a negative relationship with that of PU. That is, a higher score in RTC will cause a lower score in PU. Therefore, a lower level of RTC will cause a higher level of PU. Thus, H1 is supported.

A higher score in RTC means a lower level of resistance to change and a lower score in PU means better or more positive perception on usefulness. In Section 3.6, it is theorised that when the users are resistance to change, they will have more negative perceptions on the IT. Therefore, the result in this regression is in line with the theories as expected in Section 3.6.

(ii) Regression number 2 is related to H2. The results can be represented by :

$$PEOU = 36.087 - 0.536RTC$$

The regression results suggest that at a significance level of  $p < 0.001$ , score of RTC is having a negative relationship with that of PEOU. That is, a higher score in RTC will cause a lower score in PEOU. Therefore, a lower level of RTC will cause a higher level of PEOU. Thus, H2 is supported.

As a higher score in RTC means lower level of resistance to change and a lower score in PEOU means better and more positive perception on the IT's ease of use, the regression result is consistent with theory set out in Section 3.6 and what is hypothesized in H2 (Section 4.2).

(iii) Regression number 3 is related to H3. The results can be represented by :

$$ATU = 0.645 + 0.837 PU$$

It is suggested that at a significance level of  $p < 0.001$ , a higher score in PU will cause a higher score in ATU. Therefore, a higher level of PU will cause a higher level of ATU. Thus, H3 is supported.

It should be noted that the significance level for the constant is  $p = 0.332$ . As pointed out by Field (2005, pp. 192-193), and a significance level of  $p < 0.05$  is a signal of making a significant contribution to the model, the researcher considers that the constant could be removed from the equation, leaving an equation of  $ATU = 0.837PU$ .

In Section 2.5, TAM theorises that the perceptions (i.e. PU and PEOU) on the IT will influence the user's attitude towards the IT. Therefore, the equation obtained above is consistent with what the theory says.

(iv) Regression number 4 is related to H4. The regression equation obtained is :

$$BI = 1.124 + 0.313 PU$$

The equation shows that at a significance level of  $p < 0.001$ , score of PU is having a

positive relationship with that of BI. That is, a higher score in PU will cause a higher score in BI. Therefore, a higher level of PU will cause a higher level of BI. Thus, H4 is supported. Although the significance level for the constant is at  $p=0.005$ , it is still better than the desired  $p<0.05$  level.

As revealed in Section 2.5, this PU-BI relationship, which is not in TRA but included in TAM by Davis, attracts more attention than the PU-ATU relationships (results of meta-analyses in Section 2.5.5 can be of reference value). It is theorised that the perceived usefulness will influence the user's behavioral intention to use the IT directly (Davis, 1989; Davis, et al, 1989). So, the regression result obtained is in agreement with the relevant theoretical background.

(v) Regression number 5 is related to H5. The results can be represented by :

$$ATU = 0.32 + 0.815 PEOU$$

At significance level of  $p<0.001$ , PEOU is positively related to ATU. The regression equation reveals that a higher score in PEOU will cause a higher score in ATU. Therefore, a higher level of PEOU will cause a higher level of ATU. This relationship between PEOU and ATU supports what is proposed in H5.

Because the significance level for the constant is at  $p=0.696$ , much worse than the desired  $p<0.05$  level (Field, 2005, pp. 192-193), the constant is removed, leaving an equation of  $ATU=0.815PEOU$ .

Basing on the same theoretical background as in regression number 3, the regression equation in this part is in line with the theory in Section 2.5 too.



(vi) H6 is tested by regression number 6. The results can be represented by :

$$PU = 0.579 + 0.884 PEOU$$

It is suggested that at a significance level of  $p < 0.001$ , PEOU is having a positive relationship with PU. That is, a higher score in PEOU will cause a higher score in PU. Therefore, a higher level of PEOU will cause a higher level of PU. Thus, H6 is supported.

Similar to reasons set out in regression numbers 3 and 5 above, the significance level of the constant is worse than desired and it is removed from the final equation which stands as  $PU = 0.884PEOU$ .

As discussed in Section 2.5, TAM theorises PEOU will have its effect on ATU both directly (regression number 5 is related) and indirectly through PU. Findings from meta-analyses also confirm that the PEOU-PU link is significant in most previous researches ( see Lee, et al, 2003). Therefore, the result confirms again the existence of PEOU-PU relationship, which has been proved by the mainstream findings as well.

(vii) Regression number 7 is related to H7. The results can be represented by :

$$BI = 1.006 + 0.366 ATU$$

It is suggested that at significance level of  $p < 0.001$ , ATU is having a positive relationship with BI. That is, a higher score in ATU will cause a higher score in BI. Therefore, a higher level of ATU will cause a higher level of BI. Thus, H7 is supported.

For the same reason as in regression number 4 above, the constant in this model is retained because there is reason to believe it significantly contributes to the model.

According to TAM, the user's attitude towards the IT will influence the behavioral intention. The equation proves that the theory is valid in the context of this research.

(viii) Regression number 8 verifies the link between BI and AU spelt out in H8.

Regressing the scores between BI and AU gives :

$$AU = 14.204 - 1.04 BI$$

At significance level of  $p < 0.001$ , score of BI is having a negative relationship with score of AU. That is, a higher score in BI will cause a lower score in AU. With reference to the explanations in Table 4.6, it infers that a higher level of BI will cause a higher level of AU. Thus, H8 is supported.

In the end of TRA and TAM, the user's behavioral intention will finally impact the actual system usage. As such, the regression results are in line with TAM.

(ix) Regression number 9 is related to H9. The results can be represented by :

$$AU = 0.876 + 0.205 RTC$$

It is suggested that at a significance level of  $p < 0.001$ , RTC is having a positive relationship with AU. That is, a higher score in RTC will cause a higher score in AU. Therefore, a lower level of RTC (resistance) will cause a higher level of AU (system

usage). Thus, H9 is supported.

Because the significance level of the constant cannot achieve the desirable  $p < 0.05$  level, the constant is removed, leaving an equation of  $AU = 0.205RTC$ .

After testing the chain of reactions proposed in TAM step by step in the above tests, this regression tries to see the overall effect of the newly identified external variable, RTC, on AU. As expected, the regression equation suggests that a lower level of RTC in the starting point of the research model will lead to a higher level of system usage in the end. It reiterates the suitability of including the RTC to the model as an external variable.

The results of regression number 1 to 9 validate the links between the constructs. In Section 5.2, the correlation matrix already confirmed all the proposed relationships in these nine hypotheses. The findings in this section re-assure this point and with the power of regression test, causal relationships between the respective independent and dependent variables can also be established.

Some of the TAM variables are influenced by more than one independent variables jointly. The following regression tests are done for these links.

(x) Regression number 10 is related to H1 and H6. it tries to test the joint impact of RTC and PEOU on PU. The results can be represented by :

$$PU = 14.772 - 0.243 RTC + 0.542 PEOU$$

It is suggested that at a significance level of  $p < 0.001$ , RTC is having a negative

relationship with PU; while PEOU is having a positive relationship with PU. That is, a higher score in RTC will cause a lower score in PU; while a higher score in PEOU will cause a higher score in PU.

The discussions in Sections 2.5 and 3.6 suggest that the level of RTC is negatively related to PU and PEOU and PEOU is positively related to PU. Therefore, a lower level of resistance will cause a higher level of perceived usefulness and a higher level of perceived ease of use will cause a higher level of perceived usefulness at the same time. Thus, H1 and H6 are supported.

Indeed, from regression numbers 1 and 2, it is shown that a lower level of resistance will cause a higher level of perceived usefulness and ease of use when tested separately. Therefore, the result in this part confirm the joint influence of the two constructs on PU in one go.

(xi) Regression number 11 is related to H3 and H5. in this test, ATU is the dependent variable and PU and PEOU are the independent variables. The results can be represented by :

$$ATU = -0.614 (0.291) + 0.508 PU + 0.366 PEOU$$

It is suggested that at a significance level of  $p < 0.001$ , PU and PEOU are having positive influences on ATU jointly. That is, higher scores in PU and PEOU will cause a higher score in ATU.

Therefore, a higher level of perceived usefulness will cause a higher level of (better) attitude towards the system and a higher level of perceived ease of use will cause a

higher level (better) of attitude towards the system at the same time. Thus, H3 and H5 are supported. The two belief constructs both have impacts on ATU.

The constant is removed from the model because of non significance. The resulting equation is thus :  $ATU = 0.508PU + 0.366 PEOU$ .

Many researchers opine that PEOU is more important in exploration and early adoption stages (e.g. Davis, et al, 1989; Adams, et al, 1992; Lu and Gustafson, 1994; Chau, 1996; Teo, et al, 1999, Venkatesh, et al, 2003), and PU is more important than PEOU in determining system usage. Moreover, it is believed that PEOU's effect on IT usage is mediated through PU (Davis, et al, 1989).

The regression coefficients indicate that the effect of PU on ATU is greater than PEOU's effect on ATU. When considering also the results of partial correlation tests in Table 5.5, it could reasonably conclude that the relative effect of PU on ATU is greater than PEOU's and PEOU's effect on ATU may be mediated by PU. These findings are consistent with previous researchers' (e.g. Davis, et al, 1989).

(xii) Regression number 12 is related to H4 and H7. This last test verifies the proposed joint influence of PU and ATU on BI. The equation obtained is :

$$BI = 0.933 + 0.066PU(0.245) + 0.295ATU$$

The equation points out that ATU is having a significant and positive relationship with BI ( $p < 0.001$ ); but PU does not have a significant relationship with BI ( $p = 0.245$ ). That is, a higher score in ATU will cause a higher score in BI but PU is not significantly contributing to the intention.

The inference is a better attitude will cause a higher level of behavioral intention to use the system. Thus, when both PU and ATU are in place, only ATU is significant and PU should be removed as it is not contributing to the model significantly.

The finalized equation becomes :  $BI = 0.933 + 0.295ATU$

The findings of an insignificant relationship between PU and BI in H12 may suggest that PU does not have a significant influence on BI when ATU is present, although PU is having a significant influence on BI when it is tested alone in H4.

This is not expected by Davis, et al (1989) and is inconsistent with the findings of many previous TAM researches. Davis, et al (1989) found that while both PU and ATU correlate significantly with BI. In regression analysis, PU's influence on BI increases from Time 1 to Time 2 but ATU's influence on BI is only significant at Time 1, which are totally opposite to the findings in regression number 12.

To investigate the reasons, it should be noted that the PU-BI relationship in TAM is not consistent with TRA, the origin and theoretical background of TAM. TRA theorises people form intention to perform a behavior toward which they have positive affect, thus the ATU-BI relationship. However, Davis, et al (1989) theorised the PU will directly influence BI as well because they were of the opinion :

“within organisational settings, people form intentions towards behaviors they believe that will increase their job performance, over and above whatever positive or negative feelings may be evoked toward the behavior per se. This is because enhanced performance is instrumental to achieving various rewards that are

extrinsic to the content of the work itself, such as pay increases and promotion”  
(p.986)

Implicitly, Davis, et al (1989) assumed IT users will value performance very much, if not the most. But the result of regression number 12 suggests that this assumption may have failed in the HKSARG context. While most of the previous researches confirm Davis, et al's (1989) above argument, Section 2.5.6 of the literature review in this research tells that most of the early studies were conducted in private organisations and universities. Hence, it is argued that the same may not hold true in the context of HKSARG workplace where performance of a staff and the reward of pay increase and promotion are not likely affected significantly by the use of IT. At last, it may be the seniority counts the most. It may be the reason why the PU is not having direct and significant effect on BI for civil servants in HKSARG.

Going back to Section 2.5.5, it is seen that various researchers (e.g. Adams, et al, 1992; Bagozzi, et al, 1992; Lu and Gustafson, 1994; Szajna, 1996; Chau, 1996; Sun and Zhang, 2006) and figures from meta-analyses, e.g. the figures in Table 2.4 which are adapted from Legris, et al (2003) revealed that ATU is frequently omitted in many early studies. Therefore, many of the significant PU-BI link found may be occurred in the absence of ATU and makes the findings uncertain, non-conclusive and subject to challenges of spurious.

Another possible explanation for the non significant PU-BI link may be drawn from Davis, et al (1989), too.

Concerning the non significant PU-BI relationship, Davis, et al (1989) recorded a non significant PU-BI relationship in one of their studies and explained the non significant

relationship may be due to the IT users are difficult to evaluate the IT usefulness before the implementation, therefore, the PU will have little influence on the behavioral intention at the beginning of system development. But it is expected that the influence of PU will increase as time goes by.

Moreover, Davis, et al (1989) commented that the PU-BI link is more important than ATU-BI link if the users perceive an IT is useful, the users may have high BI even though they do not have a positive ATU on the IT. Also, they argue that ATU is a complex construct with multiple components. This could be seen as an echo to the opinions of Azjen and Fishbein (1980) and Fishbein and Azjen (1975).

Although the correlations between PU-BI and ATU-BI are significant (Section 5.2 refers), partial correlation test result in Table 5.5 reveals that the effect of PU on BI may be mediated by ATU in the research model.

Further discussion on this PU-BI link can be found in Taylor and Todd (1995). The instability of the PU-BI relationship when ATU is in place has been observed by Taylor and Todd (1995). After their reviewing of relevant literatures, these researchers originally expected that “beliefs and attitude correlate more strongly with behavior for people who have direct experience with an object” (p.563). Hence, their large scale survey (with 786 respondents) results showed the contrary. The survey results suggested that “the perceived usefulness is the strongest predictor of intention for the inexperienced group” (p.566).

Their findings complicated the issue further because it adds more uncertainties on the factors that may affect the PU-BI link, on top of the implementation status of IT as proposed by Davis, et al (1989). Furthermore, it will be very difficult to have an



objective categorization of experienced and inexperienced users. Many factors like the user's own prior experience, length of time the IT introduced to the workplace and the actual usage of the IT will affect the grouping. Unfortunately, these factors are by themselves hard to measure objectively and accurately.

According to Davis, et al (1989), an early stage of implementation could result in non significant PU-BI link. But HKSARG has been putting e-government in place for years. As least, the voluminous email communication reported by CSB (2007) in Section 4.6.2.2 suggests that it is not proper to classify HKSARG e-government is still in an early stage. Davis, et al's (1989) argument seems not applicable here. Instead, the user characteristics or the presence of ATU in our research model which mediates Pus effects to BI may be the causes of the observed non significant PU-BI link in this research.

A conclusion on the issue requires more evidences from future research. The apparent point at the moment is the PU-BI link is not stable and effects of other factors like user characteristics and the role of ATU seem to be promising paths to explore the link more. As the exact relationship is still to be explored and confirmed by more researches, accordingly, the findings in this part should not be treated wrong.

### **Contrasting this research's findings with previous results**

After obtaining the regression equations in this research, it should give more insights if these are compared with other TAM researches.

Numerous TAM researches have been done before this research, to avoid unduly lengthy and clumsy comparisons, to compare the results of this research with the aggregated results gathered in other meta-analyses is a practical and viable option. In

Chapter 2, it is seen that previous TAM researches confirmed that the relationships theorised in the original TAM are valid in most contexts tested. A counting of the 10 potential relationships in original TAM has also been reproduced in Table 2.4.

The theorised relationships between the new construct RTC and the constructs PU and PEOU devised in this research are presented in Section 3.6. In short, it is expected that a higher level of resistance to change will cause a lower level of perceived usefulness and ease of use.

From the research model, it is seen that hypotheses H3 to H8 are simply replications of the relationships proposed in the original TAM model by Davis, et al (1989).

As discussed in Section 2.5.5, it should be noted that while the figures can give some ideas on the general picture of the relationships, very few studies included all the relationships (in the TAM) in a test because of dropping of construct(s) by researchers.

Contrasting the regression equations obtained from this research with the above summary from meta-analyses, it is seen that the findings in hypotheses H3 to H8 of the present research tally with previous researches, and the original TAM.

Hypotheses 1 and 2 test the relationships between RTC and PU and PEOU, respectively. In accordance with the regression equations obtained in regression numbers 1 and 2, it is shown that a higher level of resistance to change will lead to poor perceptions on the usefulness and ease of use of the IT. Hypotheses H1 and H2 are therefore accepted.

Regression numbers 10 to 12 try to test the more complicated relationships in one go. In these regression tests, the respective dependent variable is jointly influenced by two

independent variables. Indeed, the individual pair in these relationships have been tested and confirmed in H1 to H8.

For example, regression number 10 is a test of the joint influence of RTC and PEOU on PU while the individual influences of RTC and PEOU on PU have been confirmed by H1 and H6 respectively.

Results reveal that regressions 10 and 11 are supported wholly. An exception happens in regression number 12 where only one of the independent variables, that is the attitude ATU, is having a significant influence on the behavioral intention, BI, but the PU does not have a significant influence on BI.

Although PU is having significant influence on BI in most of the contexts, it is not an absolute finding. Taylor and Todd (1995) described the link instable. In addition, King and He (2006) pointed out that non-significant research results are seldom published and may lead to possible source of bias. Therefore, it should not be surprised by the findings in regression number 12.

As a brief conclusion for the discussion on regression results so far, support was found for all the individual hypotheses. When the joint effects of two independent variables on a dependent variable, as depicted in the research model, were tested, support was also found for most of the hypotheses. The only exception was observed in regression number 12 where PU became a non significant variable when its joint influence with ATU on BI was tested.

One possible reason for the above observation may be the effect of PU on BI has been mediated through ATU. Therefore, when ATU is in place, PU has no direct impact on BI.

It indicates that in HKSARG context, usefulness cannot override the role of attitude the user holds toward the IT in question.

### **The findings in relation to $R^2$**

Apart from the regression equations obtained in the above section, the  $R^2$  tells important information, too. From Table 5.18, it is seen that the values of  $R^2$  range from 0.575 in regression number 9 to 0.934 in regression number 11. Regarding the adjusted  $R^2$ , the values range from 0.569 in regression number 5 to 0.932 in regression number 11.

Researchers (e.g. Field, 2005; Mendenhall, et al, 1993) outline the relationship between and interpretation for the  $R^2$  and adjusted  $R^2$ .  $R^2$  is a measure of how much of the variability of the outcome in the dependent variable is accounted for or explained by the independent variable(s). The adjusted  $R^2$  provides an idea of how well the regression model generalizes. When the values of  $R^2$  and adjusted  $R^2$  are very close, then the cross validity of the regression model is ensured.

In this research, the differences in the values of the  $R^2$  and adjusted  $R^2$  are small, ranging from 0.001 in regression number 3 to 0.006 in regression number 9, an approximate 1% difference. Therefore, it is clear that the results derived from the population will be very close to the results derived from the sample used in the research, a good sign of generalisability.

#### **5.4.2 A re-visit of the assumptions for regression analysis done**

The adherence to the assumptions for parametric tests is important even though Field (2005, p. 324) suggested that it is not completely inflexible.

The researcher points out that a violation of the assumption of independence between the respondents will cause very serious problems. But this should not be a problem in this research because the respondents were not given to know other respondents and they tended to keep confidentiality of their identities very much.

In the regression results, the graphs of standardized residuals against standardized predicted values are also produced. As a check, the plot of standardized residuals against the standardized predicted values should look like a random array of dots evenly dispersed around zero. If there is any sort of curve, then there is chance that the data have broken the assumption of linearity (Field, 2005, pp.202-203).

After examining the scatterplot graphs for the 12 regression analyses, it is considered that there is no problem of linearity in all the regressions done because no patterns or curves, like funnel out or S shape curve, can be detected from the graphs.

The pre-analysis tests conducted in Section 5.3 and the post-analysis of  $R^2$  values and ANOVA values and the graphical examination here should sufficiently guarantee the appropriateness of regression analysis.

### **5.4.3 Results of regression analysis – demographic variables**

In Part III of the questionnaire form some demographic information of the respondents, namely, age, gender, rank and education level were collected. The following regression equations include this information as dummy variables to see if they have any effects on the level of resistance and level of IT usage.

There are six categories of answer for the age construct; two for gender construct; three for rank construct and four for education level construct. The first category of each construct was chosen as the control group and the following dummy variables were created in SPSS subsequently:

For rank:

- Senior (R1)
- Directorate (R2)

For age:

- Aged 26-30 (A1)
- Aged 31-35 (A2)
- Aged 36-40 (A3)
- Aged 41-45 (A4)
- Aged 46+ (A5)

For gender:

- Female (G1)

For education level:

- F.7 (Senior secondary school) (E1)
- Bachelor degree holder (E2)
- Master degree or above (E3)

The results of the two additional regression analyses for effects of demographic variables on resistance to change (RTC) and actual IT usage (AU) are appended in Tables 5.19 and 5.20 below.

The test results indicate that, at significance level of 0.05, out of the dummy variables for rank, age, gender and education level, only R2 – the dummy variable for directorate rank group is statistically significant influencing the level of resistance to change. Specifically, the regression equation can be represented by:

$$\text{RTC} = 35.001 + 25.144 (\text{R2})$$

The above equation suggests that the directorate rank group is having 25.144 points higher in the RTC score when compared to other groups. It infers that the directorate group IT users have a lower level of resistance to change because a higher score in the RTC construct means a lower level of resistance.

From the R<sup>2</sup> statistics, it is shown that 48.1% of the variance in resistance to change is explained by these demographic characteristics.

**Table 5.19: Regression result of effects of demographic variables on resistance to change**

|   |                                    | <b>a</b><br>Coefficients    |            |                           |        |      |
|---|------------------------------------|-----------------------------|------------|---------------------------|--------|------|
|   |                                    | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig. |
|   |                                    | B                           | Std. Error | Beta                      |        |      |
| 1   | (Constant)                         | 35.001                      | 7.692      |                           | 4.550  | .000 |
|   | Senior (R1)                        | 5.309                       | 3.282      | .226                      | 1.617  | .112 |
|   | Directorate (R2)                   | 25.144                      | 11.032     | .294                      | 2.279  | .027 |
|   | Aged 26-30 (A1)                    | 1.400                       | 7.029      | .035                      | .199   | .843 |
|   | Aged 31-35 (A2)                    | -2.944                      | 6.932      | -.092                     | -.425  | .673 |
|   | Aged 36-40 (A3)                    | -2.505                      | 6.846      | -.092                     | -.366  | .716 |
|   | Aged 41-45 (A4)                    | -9.224                      | 7.171      | -.434                     | -1.286 | .204 |
|   | Aged 46+ (A5)                      | -10.529                     | 7.404      | -.389                     | -1.422 | .161 |
|   | Female (G1)                        | .189                        | 2.548      | .009                      | .074   | .941 |
|   | F.7 (Senior secondary school) (E1) | -1.844                      | 3.107      | -.083                     | -.593  | .555 |
|   | Bachelor degree holder (E2)        | 2.810                       | 3.920      | .122                      | .717   | .477 |
|   | Master degree or above (E3)        | 10.194                      | 6.775      | .233                      | 1.505  | 0.14 |
| a. Dependent Variable: RTC                            |                                    |                             |            |                           |        |      |
| R <sup>2</sup> =0.481; adjusted R <sup>2</sup> =0.375 |                                    |                             |            |                           |        |      |



**Table 5.20: Regression result of effects of demographic variables on actual IT usage**

| Coefficients <sup>a</sup>                             |                                    |                             |            |                           |        |      |
|---|------------------------------------|-----------------------------|------------|---------------------------|--------|------|
| Model   |                                    | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig. |
|   |                                    | B                           | Std. Error | Beta                      |        |      |
| 1   | (Constant)                         | 8.586                       | 1.982      |                           | 4.332  | .000 |
|   | Senior (R1)                        | .183                        | .846       | .029                      | .216   | .830 |
|   | Directorate (R2)                   | 3.564                       | 2.842      | .154                      | 1.254  | .215 |
|   | Aged 26-30 (A1)                    | -.317                       | 1.811      | -.030                     | -.175  | .862 |
|   | Aged 31-35 (A2)                    | -2.117                      | 1.786      | -.245                     | -1.186 | .241 |
|   | Aged 36-40 (A3)                    | -3.220                      | 1.764      | -.440                     | -1.826 | .073 |
|   | Aged 41-45 (A4)                    | -3.335                      | 1.847      | -.581                     | -1.805 | .077 |
|   | Aged 46+ (A5)                      | -3.604                      | 1.907      | -.492                     | -1.890 | .064 |
|   | Female (G1)                        | .516                        | .656       | .091                      | .786   | .436 |
|   | F.7 (Senior secondary school) (E1) | .639                        | .800       | .107                      | .798   | .428 |
|   | Bachelor degree holder (E2)        | 2.898                       | 1.010      | .465                      | 2.870  | .006 |
|   | Master degree or above (E3)        | 2.939                       | 1.745      | .248                      | 1.684  | .098 |
| a. Dependent Variable: AU                             |                                    |                             |            |                           |        |      |
| R <sup>2</sup> =0.529; adjusted R <sup>2</sup> =0.433 |                                    |                             |            |                           |        |      |

The test results indicate that, at significance level of 0.05, out of the dummy variables for rank, age, gender and education level, only E2 – the dummy variable for users whose an education level of bachelor degree is statistically significant influences the

level of actual IT usage. Specifically, the regression equation can be represented by:

$$AU = 8.586 + 2.898 (E2)$$

The above equation suggests that the bachelor degree holders are having 2.898 points higher in the AU score when compared to other groups. It infers that the bachelor degree holder IT users have a higher level of actual IT usage because a higher score in the AU construct means a higher level of usage.

From the  $R^2$  statistics, it is shown that 52.9% of the variance in IT usage is explained by these demographic characteristics.

## 6 DATA ANALYSIS (II)

### 6.1 Results of t-tests

The correlation and regression analyses done in Chapter 5 validate and confirm the relationships theorised in Section 4.2. This Chapter will use t-test to explore the data further. This research brings the Technology Acceptance Model (TAM) to the Government of Hong Kong Special Administrative Region (HKSARG) context and includes new external variable, i.e. resistance to change (RTC) with the assistance of Theory of Bureaucracy (TB). Therefore, the focus of t-test is to explore the characteristics of RTC and HKSARG.

The 66 usable responses received from the survey will be treated as a pool and divided into groups by different demographic characteristics to explore if there is any hidden trend.

The demographic information collected in Part III of the questionnaire are gender, age, rank and education level. It is desirable to know if these characteristics have any association with the resistance level, perceptions on the IT, the attitude towards IT, the intention to use IT and actual usage of IT.

Simple t-test can be used to check if the survey result is significantly different from a test value. Therefore, it is useful to test if the average response in a particular construct is significantly above or below a test value. Moreover, two independent (unrelated) sample t-test will be used to compare the scores of two groups or variables (e.g. Bryman and Cramer, 1990; Foster, 1998 and Field, 2005).

The guidelines for the interpretation are clear. The Levene's test results will be looked at before interpreting the t-values. When Levene's test value is non significant, that is  $>0.05$ , the t-value in the row "Equal variances assumed" of the SPSS output should be used to determine whether the difference between the means of the two groups is significant; if the Levene's test value is significant, that is  $\leq 0.05$ , then the t-value in row "Equal variances not assumed" in the SPSS output should be used for interpretation (Bryman and Cramer, 1990, pp. 135-136; Foster, 1998, pp. 151-156 and Field, 2005, 296-303).

Furthermore, if the final t-value is significant, that is  $p \leq 0.05$ , then it is considered that there is a significant difference in the means of the groups in question. Therefore, if the significance for the final t-value is  $p \leq 0.05$ , then the means of the two groups in question differ significantly at a 0.05 level (Bryman and Cramer, 1990, pp. 135-136; Foster, 1998, pp. 151-156 and Field, 2005, 296-303).

In t-tests, the mid-point of the scale will frequently be used for comparison and subsequent discussion.

### **6.1.1 Is the HKSARG staff really resistant to change?**

Bureaucratic organisations are criticised for severely resistant to change. Because HKSARG bears the characteristics of Weberian bureaucracy, it should have a high level of resistance.

The t-test is used to check whether the average RTC recorded from the survey responses is significantly above the mid-point. Since the possible score of RTC is from 12 to 60,

the mid-point is 36.

| One-Sample Statistics |    |       |                |                 |
|-----------------------|----|-------|----------------|-----------------|
|                       | N  | Mean  | Std. Deviation | Std. Error Mean |
| RTC                   | 66 | 31.35 | 10.524         | 1.295           |

|     | Test Value = 36 |    |                    |                    |  |        |
|-----|-----------------|----|--------------------|--------------------|--|--------|
|     | t               | df | Sig.<br>(2-tailed) | Mean<br>Difference | 95% Confidence Interval of the<br>Difference |        |
|     |                 |    |                    |                    | Lower  | Upper  |
| RTC | -3.591          | 65 | .001               | -4.652             | -7.239                                       | -2.064 |

Based on the above t-test results, it is seen that the calculated mean for the responses received is lower than the test value, 36, and the difference is significant at a level of 0.001. Therefore, the results suggest that the average score in the construct RTC is significantly lower than the average value of 36. Referring to the explanation in Table 4.6, this low score infers a higher than average level of RTC amongst the IT users in HKSARG.

### 6.1.2 RTC in different demographic groups

The pooled result of resistance level suggests that IT users are in general resistant to change. This section goes on to look at the behaviors in different demographic groups.

## Gender

It is useful to investigate if there is any difference in the means of the resistance level for male and female IT users. Using the SPSS software and dividing the respondents into male and female for an independent samples t-test, the results are:

| Group Statistics |        |    |        |                |                 |
|------------------|--------|----|--------|----------------|-----------------|
|                  | Gender | N  | Mean   | Std. Deviation | Std. Error Mean |
| RTC              | Male   | 31 | 31.097 | 11.250         | 2.021           |
|                  | Female | 35 | 31.571 | 9.998          | 1.690           |

|     |                             | Levene's Test for Equality of Variances |       | t-test for Equality of Means |    |                 |                 |                       |   |       |
|-----|-----------------------------|---|-------|------------------------------|----|-----------------|-----------------|-----------------------|---|-------|
|     |                             | F                                       | Sig.  | t                            | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |       |
|     |                             |   |       |                              |    |                 |                 |                       | Lower                                     | Upper |
| RTC | Equal variances assumed     | 2.474                                   | 0.121 | -0.182                       | 64 | 0.857           | -0.475          | 2.615                 | -5.699                                    | 4.750 |
|     | Equal variances not assumed |   |       | -0.180                       | 61 | 0.858           | -0.475          | 2.634                 | -5.743                                    | 4.793 |

There are 31 male and 35 female respondents. The calculated mean for female is slightly greater than that of male. Since the Levene's test is non significant at 0.121 ( $>0.05$ ), the t-value in the row "Equal variances assumed" should be referred. Because the significance level stands at  $p=0.857 > 0.05$ , there is no significant difference between the means of RTC level for male and female IT users.

It should be added that the means for male and female civil servants are both below the mid-point of RTC score, i.e. 36, implying a higher than average level of resistance to change.

### **Age Group**

For comparing the means of different age groups, it was decided to divide the respondents into two age groups, namely the (i) older group (aged 36 or above) and (ii) younger group (aged 35 or below) for the following reasons:

- The independent samples t-test is for two groups;
- The distribution of respondents across the age groups is not even, e.g. there are only 2 and 5 respondents in the age groups of 18-25 and 26-30, respectively;
- There would be an insufficient number of respondents in each individual age group for meaningful statistical tests to be conducted;
- An overall or indicative picture of the differences, if any, between the older and younger groups suffices the purpose; and
- The using of 36 years old as a cutoff point is justified since the minimum age to work in the HKSARG is 18 and the normal retiring age is 55, that is the mid-point is 36.5 years old.

The t-test results are as follows :

| Group Statistics |          |    |        |                |                 |
|------------------|----------|----|--------|----------------|-----------------|
|                  | Age      | N  | Mean   | Std. Deviation | Std. Error Mean |
| RTC              | Aged 36+ | 51 | 29.667 | 10.573         | 1.481           |
|                  | Aged 35- | 15 | 37.067 | 8.345          | 2.155           |

|     |                             | Levene's Test for Equality of Variances |      | t-test for Equality of Means |        |                 |                 |                       |   |        |
|-----|-----------------------------|---|------|------------------------------|--------|-----------------|-----------------|-----------------------|---|--------|
|     |                             | F                                       | Sig. | t                            | df     | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |        |
|     |                             |   |      |                              |        |                 |                 |                       | Lower                                     | Upper  |
| RTC | Equal variances assumed     | 2.854                                   | .096 | -2.488                       | 64     | 0.015           | -7.400          | 2.975                 | -13.343                                   | -1.457 |
|     | Equal variances not assumed |   |      | -2.831                       | 28.558 | 0.008           | -7.400          | 2.614                 | -12.750                                   | -2.050 |

After the grouping, there are 51 IT users aged 36 or above; and 15 IT users are at the age of 35 or below. The mean scores of RTC for older and younger age groups are 29.667 and 37.067, respectively. Because the result of the Levene's test is non significant at  $p=0.096>0.05$ , the row of "Equal variances assumed" is referred. The significance level of the t-test stands at  $p=0.015<0.05$  and indicates that the difference



in the means between the two groups is significant.

The result reveals that the mean score for RTC in the older group is significantly lower than the younger group, revealing the older civil servants are more resistant to change. Taking into consideration of the mid-point score for RTC, that is 36, it would suggest that the older group is more resistant to change than average and the younger group is less resistant to change than average. It is seen that there are different behavioral groups included in the HKSARG work force.

Moreover, because the number of older respondents outweighs the younger, it may be one of the reasons for finding the HKSARG IT users are in general having higher than average resistance in Section 6.1.1 (i.e. the calculated mean is lower than 36). As said in Section 4.9 where respondent profile is presented, there is however no official statistics on the age distribution of IT users/civil servants in HKSARG for comparison and further points cannot be established.

### **Education level**

The respondents are divided into two education groups for testing of the RTC level. The two groups are (i) more educated (with bachelor degree or above) and (ii) the less educated (senior secondary school, i.e. Form 7 (F.7) or lower) groups.

The t-test results are as follows:

| Group Statistics |                          |    |        |                |                 |
|------------------|--------------------------|----|--------|----------------|-----------------|
|                  | Education level          | N  | Mean   | Std. Deviation | Std. Error Mean |
| RTC              | Bachelor degree or above | 23 | 39.261 | 10.046         | 2.095           |
|                  | Form 7 or below          | 43 | 27.116 | 8.119          | 1.238           |

|     |                             | Levene's Test for Equality of Variances |       | t-test for Equality of Means |        |                 |                 |                       |   |        |
|-----|-----------------------------|---|-------|------------------------------|--------|-----------------|-----------------|-----------------------|---|--------|
|     |                             | F                                       | Sig.  | t                            | df     | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |        |
|     |                             |   |       |                              |        |                 |                 |                       | Lower                                     | Upper  |
| RTC | Equal variances assumed     | 0.383                                   | 0.538 | 5.325                        | 64     | 0.000           | 12.145          | 2.281                 | 7.588                                     | 16.701 |
|     | Equal variances not assumed |   |       | 4.991                        | 37.648 | 0.000           | 12.145          | 2.433                 | 7.217                                     | 17.072 |

There are 23 IT users whose education background of degree or above while 43 IT users are having no degree. The calculated mean scores for the more educated and less educated groups are 39.261 and 27.116, respectively.

Because the result of the Levene's test is non significant at  $p=0.538 > 0.05$ , the row of

“Equal variances assumed” is referred. The significance level of the t-test stands at  $p=0.000<0.05$ , suggesting that the difference is significant.

The result reveals that the mean score for RTC in the more educated group is higher than the less educated group. In other words, the more educated civil servants are less resistant to change. Comparing to the mid-point score for RTC, that is 36, it indicates that the less educated group is more resistant to change than average and the more educated group is less resistant to change than average. Similar to the case in age groups, it is seen that there are different behavioral groups within the HKSARG work force.

Also, as revealed in the situation in age groups, the less educated group has nearly double the number of IT users than that of more educated group. The majority status of and unwillingness to change by these less educated group users may be one of the reasons for the general unwillingness observed for HKSARG IT users as a whole.

### **Ranking**

Lastly, the respondents are divided into different ranking groups for testing, too. Two groups, namely the more senior staff (senior and directorate staff) and junior (middle level and below) are formed. The independent sample t-test results are attached below :

| Group Statistics |                  |    |        |                |                 |
|------------------|------------------|----|--------|----------------|-----------------|
|                  | Rank             | N  | Mean   | Std. Deviation | Std. Error Mean |
| RTC              | Senior or above  | 19 | 36.000 | 14.044         | 3.222           |
|                  | Junior or middle | 47 | 29.468 | 8.172          | 1.192           |

|     |                             | Levene's Test for Equality of Variances |       | t-test for Equality of Means |        |                 |                 |                       |   |        |
|-----|-----------------------------|---|-------|------------------------------|--------|-----------------|-----------------|-----------------------|---|--------|
|     |                             | F                                       | Sig.  | t                            | df     | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |        |
|     |                             |   |       |                              |        |                 |                 |                       | Lower                                     | Upper  |
| RTC | Equal variances assumed     | 19.731                                  | 0.000 | 2.362                        | 64     | 0.021           | 6.532           | 2.765                 | 1.008                                     | 12.056 |
|     | Equal variances not assumed |   |       | 1.901                        | 23.095 | 0.070           | 6.532           | 3.435                 | -0.573                                    | 13.637 |

The more senior group have 19 IT users and the remaining 47 IT users are in the junior group. The calculated mean scores for the more senior and junior groups are 36 and 29.468, respectively.

Because the result of the Levene's test is significant at  $p=0.000 < 0.05$ , the row of "Equal variances not assumed" is referred to. The significance level of the t-test stands at  $p=0.07 > 0.05$  and indicates that the difference in the means between the two groups is

non significant.

The result reveals that the mean score for RTC in the more senior group is not significantly different to the junior group. Because both groups record mean scores at or below 36, it can conclude that both groups are tend to be more resistant to change than average or are at the dividing line at best.

The investigation of RTC level for the sample pool and the various demographic groups gives useful insights. On an aggregated level, the sample in general is more resistant to change than average, reinforcing the criticism that bureaucrats are resistant to change to an extent. It is not conclusive because testing of and comparison with other types of organisations is required before the proposition that bureaucrats are most resistant to change amongst all types of organisations can be empirically confirmed.

Certain demographic characteristics of IT users are found to have impact on the readiness to change. There is no significant difference found when the pool is divided into groups of different genders or ranks. But if the pool is divided into age or education groups, significant different RTC levels are observed. In particular, older group is more resistant to change than younger group; and less educated group is more reluctant to change than more educated group. In addition, because the numbers of IT users in the older group and the less educated group are dominating in number, it is argued that the observed overall high resistance is indeed a result of these groups' effects.

### **6.1.3 The general reactions to other TAM constructs**

Similar to the analyses done pertaining to the RTC construct in Section 6.1.1 and 6.1.2 above, this Section continues to explore the reactions of HKSARG IT users pertaining to perceived usefulness (PU), perceived ease of use (PEOU), attitude toward using the IT (ATU), behavioural intention to use (BI) and actual IT usage (AU) constructs. The analyses will be done by treating all the respondents as a pool and by dividing them into different demographic groups as in Section 6.1.2. The results of the t-test analyses are summarised in Table 6.1 below.

**Table 6.1: Summary of t-test results**

| <b>Construct/<br/>Group</b>   |                               | <b>RTC<br/>(Mid-point: 36)</b> | <b>PU<br/>(Mid-point: 18)</b> | <b>PEOU<br/>(Mid-point: 18)</b> | <b>ATU<br/>(Mid-point: 15)</b> | <b>BI<br/>(Mid-point: 6)</b> | <b>AU<br/>(Mid-point: 7)</b> |
|-------------------------------|-------------------------------|--------------------------------|-------------------------------|---------------------------------|--------------------------------|------------------------------|------------------------------|
| <b>Pooled</b>                 | (66)                          | High<br>Mean: 31.349*          | Neutral<br>Mean: 17.621 **    | Neutral<br>Mean: 19.273 **      | Neutral<br>Mean: 15.394 **     | Negative<br>Mean: 6.636 **   | Average<br>Mean: 7.303 **    |
| <b>By gender</b>              | Male (31)                     | NSS<br>Mean: 31.097 *          | NSS<br>Mean: 18.548 **        | NSS<br>Mean: 19.323 **          | NSS<br>Mean: 15.677 **         | NSS<br>Mean: 6.807 *         | NSS<br>Mean: 6.871 **        |
|                               | Female (35)                   | NSS<br>Mean: 31.571 *          | NSS<br>Mean: 16.800 **        | NSS<br>Mean: 19.229 **          | NSS<br>Mean: 15.143 **         | NSS<br>Mean: 6.846 *         | NSS<br>Mean: 7.686 **        |
| <b>By age</b>                 | Older (aged<br>36+/51)        | High<br>Mean: 29.667 *         | Negative<br>Mean: 19.216 *    | Negative<br>Mean: 20.745 *      | Negative<br>Mean: 16.686 *     | Negative<br>Mean: 7.137 *    | Low<br>Mean: 6.510 *         |
|                               | Younger (aged<br>35-/15)      | Low<br>Mean: 37.067 *          | Positive<br>Mean: 12.200 *    | Positive<br>Mean: 14.267 *      | Positive<br>Mean: 11.000 *     | Positive<br>Mean: 4.933 *    | High<br>Mean: 10.000 *       |
| <b>By education<br/>level</b> | More educated<br>(degree+/23) | Low<br>Mean: 39.261 *          | Positive<br>Mean: 12.957 *    | Positive<br>Mean: 14.087 *      | Positive<br>Mean: 10.957 *     | Positive<br>Mean: 5.087 *    | High<br>Mean: 9.739 *        |
|                               | Less educated<br>(43)         | High<br>Mean: 27.116 *         | Negative<br>Mean: 20.116 *    | Negative<br>Mean: 22.047 *      | Negative<br>Mean: 17.767 *     | Negative<br>Mean: 7.465 *    | Low<br>Mean: 6.000 *         |
| <b>By rank</b>                | Senior (19)                   | NSS<br>Mean: 36.000 *          | NSS<br>Mean: 16.368 **        | NSS<br>Mean: 17.263 **          | NSS<br>Mean: 13.790 **         | NSS<br>Mean: 6.053 *         | NSS<br>Mean: 7.684 **        |
|                               | Junior (47)                   | NSS<br>Mean: 29.468 *          | NSS<br>Mean: 18.127 **        | NSS<br>Mean: 20.085 **          | NSS<br>Mean: 16.043 **         | NSS<br>Mean: 6.872 *         | NSS<br>Mean: 7.149 **        |

Note : (1) The numbers in the brackets indicate the number of respondents in the group; (2) NSS: No statistically significant inter group difference between the means;

(3) \* The differences are at significance level of  $p < 0.05$ ; (4) \*\* Not significantly different from the construct's mid-point of answer scale

In the pooled analysis, the calculated mean of PU is slightly lower than 18. However, the difference is non significant ( $p=0.634$ ). The average perception on PU sits in the neutral point only.

Similar to PU, the difference between the calculated mean of PEOU (19.273) and mid-point value (18) is non significant ( $p=0.116$ ). So, the average perception on PEOU sits in the neutral point only.

For ATU, even though the calculated mean is 15.394 (slightly higher than the mid-point value 15), the difference is non significant ( $p=0.576$ ). The average attitude towards IT sits in the mid-point of the response range only.

For BI, the mid-point of the response is 6, where a neutral intention to use the IT lies. It is seen that the calculated mean is slightly higher than 6 and the difference is significant ( $p=0.027<0.05$ ). It infers that the respondents are having slightly lower than average intention to use the IT in HKSARG workplace.

Regarding AU, the mid-point of the response is 7, where an average duration and frequency of using IT lies. It is seen that the calculated mean is slightly higher than 7. However, the difference is non significant ( $p=0.39$ ). Thus, the statistical test reveals that the duration and frequency of IT usage is in the middle point of the response range.

Summing up the findings, the levels of PU, PEOU, ATU and AU are at the middle of the possible response range. The BI records a slightly lower than average level. Following the tests in RTC, the following sections examine the responses to different TAM constructs by the respondents by demographic group.



According to Table 6.1, for PU, dividing the respondents into demographic groups gives much more insights of the IT users' behaviors. It is seen that there is no significant differences in different genders although the arithmetic mean scores for the genders are different. This happens in ranking groups as well. While mean scores for the two groups are calculated to be above and below the mid-point, the difference is non significant.

There are significant differences in age and education groups. Specifically, the younger group is having a more positive perception of IT usefulness and the older group is having a worse than neutral perception. Moreover, the more educated IT users are having a more favorable perception on IT's usefulness than their less educated colleagues.

To summarise the observations on PEOU, additional information is obtained when the pool of respondents is divided into demographic groups.

There is no significant difference in response to PEOU that can be detected when the pool is divided according to gender or rank. Hence, if the pool is separated in terms of age and education background, there are significant inter group differences observed. For instance, the younger IT users believe the IT is easy to use but the older ones perceive IT is worse than neutral in terms of ease of use. Education groups are not homogeneous either. The more educated staff perceive IT is easy to use while the less educated staff hold a negative perception on IT's ease of use.

As can be seen from the summary of t-test results in Table 6.1, in the pooled analysis, the level of resistance to change of the IT users is higher than average. But the influence of RTC on PU and PEOU is not so apparent. In fact, it is observed that most of the

responses to various constructs are neutral. The pooled results do not reveal any pattern and this motivates the analysis by demographic groups.

When the respondents are divided into groups by gender or rank, there is no statistically significant difference between the groups for all the constructs.

However, the inter group differences become statistically significant when the respondents are grouped by age or education level.

It can be seen from Table 6.1 that different genders or ranks do not have statistically different responses to all the constructs. Significantly different views are observed in different education backgrounds and age groups. The younger and more educated groups are lower than average in resistance level; and the older and less educated groups are higher than average in resistance to change level. When the group is high in resistance level, it will have negative perceptions on PU and PEOU; negative attitude toward IT and negative intention to use the IT. In the end, the IT usage will be low. This chain of reaction is expected in TAM theories and new theories devised in Section 3.6. This shows that applicability of the augmented TAM in HKSARG context has been clearly demonstrated in this research.

Since it is one of the objectives in this research to discover the relationships between RTC and other original TAM constructs, the effects of RTC attracts special attention. To have more detailed understanding of RTC, we use the mid-point score of RTC, i.e. 36, to divide the respondents into two groups, namely the low resistance group and the high resistance group, and to examine the relationships by t-tests again. To avoid lengthy presentations, the results are summarised in Table 6.2 for easy reference and discussion below.

Based on the information in Table 6.2, when the staff is resistant to change, they will have bad perceptions on the usefulness and ease of use of the IT. In turn, this group of IT users will have a bad attitude towards the IT and low intention to use the IT which is also shown by a lower than average actual IT usage in the end of the chain of relationships. The relationships between the constructs are validated again in the low resistance group as shown in the Table. These observed relationships between the RTC and other original TAM constructs are totally in line with those theorised in Chapters 2 and 3 and the research model of this thesis.

It is also important to note that after splitting the respondents into high and low resistance groups, their perceptions on other TAM constructs become clear, i.e. either clearly and significantly higher or lower than the mid-point values of the respective constructs, indicating the two groups are having very clear and different perceptions (either positive or negative). T-tests confirm that all the means calculated for the two groups for the constructs differ from the constructs' mid-point scores significantly at a level of as high as  $p < 0.01$ .

**Table 6.2 : Summary of t-test results in different resistance level groups**

| <b>Construct/<br/>Groups</b>                        | <b>Perceived<br/>usefulness (PU)<br/>(Mid-point=18)</b> | <b>Perceived ease of use<br/>(PEOU)<br/>(Mid-point=18)</b> | <b>Attitude towards<br/>using (ATU)<br/>(Mid-point=15)</b> | <b>Behavioural<br/>intention to use (BI)<br/>(Mid-point=6)</b> | <b>Actual usage (AU)<br/>(Mid-point=7)</b> |
|---|---|--|--|--|--|
| High resistance<br>group<br>(RTC score<36)<br>N=41  | Bad<br>Mean score=<br>21.585                            | Bad<br>Mean score=<br>23.220                               | Bad<br>Mean score=<br>18.976                               | Bad<br>Mean score=<br>8.049                                    | Low<br>Mean score=<br>5.634                |
| Low resistance<br>group<br>(RTC score >=36)<br>N=25 | Good<br>Mean score=<br>11.123                           | Good<br>Mean score=<br>12.800                              | Good<br>Mean score=<br>9.520                               | Good<br>Mean score=<br>4.320                                   | High<br>Mean score=<br>10.044              |

Note :

- All the differences between the means of the two resistance groups for the respective constructs are significant at  $p < 0.01$
- All the mean scores calculated are significantly different from the test values (i.e. significantly higher or lower than the mid-point of the possible scores for the respective constructs) at a significance level of  $p < 0.01$ .

## **6.2 Information gathered from change agents (CA)**

Apart from the questionnaire survey and analyzing the results by statistical methods, letters were sent to 10 randomly selected change agents (CAs) in the HKSARG on 9.11.2007 soliciting their assistance for a personal interview or to complete an open-ended questions questionnaire. These CAs are the directors or deputy directors of the HKSARG departments. The letter to the CAs and the open-ended type questionnaire are attached at Appendix VII.

As mentioned in Chapter 4, the personal interview and open-ended questionnaire to the CAs are aiming at obtaining additional information to supplement and validate the data collected from the questionnaire survey. Unlike the pre-defined questionnaire to general IT users to pick the most appropriate answers from a set, the personal interviews and open-ended questions could provide the CAs with more flexibility to share whatever ideas and comments they may have.

The cover letter to the CAs explained the purpose and importance of the survey but did not mention the model or theories we are basing to rule out the possibilities of bias or intentionally giving untrue or colored answers. The CAs were put with the questions on how the interactions between some constructs they would expect. This was done for the purpose of checking how well the theories and the research model make sense and fit with the ideas held by these senior staff.

Another purpose to target these CAs, senior staff in the HKSARG, is that they are

responsible to steer the change in HKSARG. Knowing whether their thoughts are consistent with the general workforce in the HKSARG workplace is thus essential.

It was unfortunate that five of the 10 CAs agreed to complete and return the questionnaires but refused the interview. One CA (at the level of assistant director, to represent the department) agreed to have the interview and the meeting was held on 24.11.2007 in his office. The responses from the CAs are attached at Appendix VIII.

The lack of the opportunity to approach more CAs for personal interview and discussion on the issues in depth is a pity and makes the drawing of more convincing and conclusive results difficult in this research. However, given the nature of the civil servants of HKSARG as discussed in Section 4.6.3; and the success rate (only 21 out of 317 trainers in HKSARG Training institute approached) of requesting personal interviews with HKSARG employees reported by Huque and Vyas (2004) cited in Section 4.4.2, the only one successful interview out of the 10 CAs approached in this survey was not bad or unexpected. Moreover, after receiving the completed questionnaire from the five change agents, the researcher tried to call at two of the change agents to thank them for their assistance and to ask for a personal interview. The responses were hostile and further attempts to ask for personal interview was thus stopped. An analysis of their replies is appended in the following parts.

### On Question 1

Question 1 asks “It is said that whenever there is a change, there is Resistance to Change (RTC). What do you think the level of RTC of your staff facing the change in question?”

Firstly, it is noted that from responses to Question 1 that all the responding CAs did not admit that there is a high level of resistance to change (RTC) in their departments. They believe there is low or an average level of RTC in their respective departments. Some excerpts of the CAs’ replies are as follows:

CA1 : “... there is no resistance to change.”

CA3 : “...The level of RTC of our staff is considered low.”

CA6 : “...the level of RTC is therefore envisaged to be low.”

CA8 : “...our staff are quite receptive to change ...”

CA9 : “... no sign of RTC among [this department’s] colleagues is detected.”

CA2 : “... the level of RTC in this department is average.”

Comparing to the t-test result in Section 6.1 where the statistical test results suggest a higher than average level of resistance to change is observed in the HKSARG

workplace, the CAs seem too optimistic or undermined the resistance in their departments.



## **On Question 2**

Question 2 tries to extract CAs' views on the impact of RTC on PU and PEOU. The replies from these senior staff are as follows:

CA1 : "Resistance to change will affect the staff's perceptions of the usefulness and ease of use of internet technology."

CA3 : "Yes..."

CA8 : "Yes..."

CA6 : "As said in Q1, the RTC at our department is envisaged to be low, the impact in question is insignificant."

CA9 : "In general, users may be reluctant to use new Internet Technology if they are unfamiliar with it or cannot foresee the benefits brought from its use. Under the circumstances, promotion on the use of IT would be ineffective. Besides, ideas for enhancement/further development of the deployed technology would be confined since feedbacks from users would be limited by their rare use of such technology/application."

CA2 : "[CA2] believes that the RTC may not have such extreme impacts on the perceived usefulness and ease of use..."

It can be seen from the above quotations that CAs1,3 and 8 agreed directly that RTC will influence PU and PEOU. CA 6 was of the view that because RTC is low, so the impact of RTC on PU and PEOU are also low in her department. She also agreed that there is influence of RTC on PU and PEOU. CA 9's response was quite vague. However, it is considered that he was admitting the relationships even though his words did not explicitly and directly say. CA2 did not object to the proposed relationships but showed reservation on the impact of RTC.

From the responses, the CAs agreed that RTC is having its impact on PU and PEOU, albeit some of their wordings were quite conservative and vague.

Comparing to the findings from t-tests (Section 6.1) and regressions (Section 5.1.3), the CAs' views tally with the findings, which in turn are in line with the theoretical predictions (Section 3.6 refers).

### On Question 3

This question enquires if the CAs think the perceived ease of use will lead to perceived usefulness. The CAs responded in the following terms.

CA 1: “Yes...”

CA 8 : “Yes.”

CA 2 : CA 2 expressed that simple steps in using the system and speedy system response are important. These factors will lead the users to believe the system is easy to use and useful. And he agrees that easy to use may make the users think the system more useful.

CA 3 : “If our staff perceives IT as easy to use, it does not necessary (sic) imply they will regard it as useful too. But surely easy to use is one of the important factors considered.”

CA 6 : “It may not be true for all cases. The usefulness of the IT much depends on how it has been designed and deployed to fit the operational needs of the staff. And easy to use does not strictly imply usefulness.

CA 9 : “It is noticeable that if the application is developed with a user-friendly interface, users will also be more adaptable to the IT changes in the long run when they have experienced the usefulness of IT in their daily work.”

None of the CAs rejected the proposition in Question 3, i.e. when an IT is perceived easy to use, it will also be considered useful. Varying in the degree of firmness of their answers, some CAs (CAs 1,2 and 8) admitted explicitly and firmly that they agreed to the proposition.

CAs 3 and 6 were more conservative in wording and tried to make their answers not too restrictive. Hence, the researcher believes that the replies concur with the PEOU-PU link.

CA 9 was more oblique. He suggested that if the users believe the IT is easy to use, he will try to use the IT and he will experience the usefulness of the IT through time. CA9 did not respond to Question 3 directly. Hence, it would be easy for CA9 to express disagreement to the proposed relationship and the wording was intended to project an agreement. Therefore, it is argued that CA9 was agreeing to the proposition too.

The PEOU-PU link is one of the fundamental relationships theorised in TAM. Although not all the previous researches found a significant link between PEOU and PU, the discussion in Section 2.5.5 does reflect that this relationship is expected in most cases. In the present research, the strong correlation between PEOU and PU ( $r=0.891$ ,  $p<0.01$ ) found in Section 5.1 and the significant regression equation obtained in regression number (vi) ( $PU=0.884PEOU$ ) in Section 6.1 confirm the existence of the PEOU-PU relationship.

Therefore, the CAs' views on the interaction between PEOU and PU are consistent with both theories in Chapter 2 and subsequent empirical findings in this research.

#### **On Question 4**

Question 4 puts an overall link between RTC and AU to the CAs.

CA 1 : “To a certain extent, the answer is the affirmative”

CA 2 : “A high level of resistance to change will lead to lower system usage.”

CA 3 : “Yes. RTC affects actual IT system usage to certain extent. Staff with high RTC may find ways to get away from the IT systems and use their preferred method in handling their work.”

CA 6 : “N.A. in [this department].”

CA 8 : “Yes.”

CA 9 : “Yes. RTC will affect the actual system usage.”

All the CAs answered this question but CA 6 was of the view that the issue was “N.A.” in their department. It is unknown why CA 6 had such an impression.

Concerning the other CAs, CAs 2, 8 and 9 agreed that the level of resistance has an impact on the actual system usage without any reservation. CAs 1 and 3 concur with the suggested link but only to an extent. In short, all the respondents’ expectations are consistent with the theories presented in Section 3.6.

### **On Question 5**

This is a question inviting the CAs to list some other factors that they believe will have influence on system usage.

CA 1 opined that training and publicity are factors that could enhance system usage. Also, she revealed that as time passes, more and more staff will accept IT system usage as a norm and few people doubt its effectiveness

CA 2 suggested that training and continuous refresher courses are very essential to make staff use the systems. In addition, assistance (or even incentive) should be rendered to the affected staff. Conversely, in extreme cases, management directives may be the option to increase the system usage.

CA 3 listed line management directive and support and training as the factors that influence system usage.

CA 6 opined that system usefulness/friendliness, utilization of IT and culture of competitors and management's directives are factors that could be considered.

CAs 8 and 9 did not provide more suggestions on this question.

The researcher did not include any hint or framework or scope in Question 5 and gave all the freedom to the CAs to share their ideas and insights. An examination of the answers from these senior staff in HKSARG shows "training" is the single most

commonly cited factor that would enhance system usage. All the CAs in various points proposed that training is a relevant factor in their answers. Management support, refresher course (an extension of training), incentives, culture and directives are also enabling factors in CAs' minds.

To summarise, it is seen that even the CAs only admit a low to medium level of RTC in the HKSARG workplace. When high RTC is in place, they expect it will adversely affect the system usage. It is observed that the CAs thought quite similarly on various issues asked in the questionnaire where open questions are used. It may be a true reflection of their individual minds or a result of a coordinated response when media or the public approach them for their views on management issues. It calls back and repeats the experience of Huque and Vyas (2004) when conducting their interviews with HKSARG trainers that they did not willing to elaborate on issues and provided standard answers similar to those in government brochures.

In general, the CAs agreed that the resistance to change was a relevant factor in IT implementation in the HKSARG workplace. They believe that the resistance will influence staff's perceptions of the system and in turn the actual IT system usage. In particular, they were in agreement that when the level of resistance is high, the system usage will be low. Their beliefs about the impact of resistance to change are in agreement with the theories set out in Chapter 3 of this research.

Regarding other relevant factors, the CAs suggested training, management assistance and management directives were important and these issues have been the research subjects in previous studies in the area.

### **6.3 Further Discussions**

The data analysis results of individual constructs and brief comments and remarks on them have been reported in Chapter 5 and the first part of this Chapter 6. In this Section, the findings will be discussed holistically.

For more than 20 years after the seminal papers for TAM by Davis (1989) and Davis, et al (1989), the model attracts much attention in the information system stream of study. As reviewed in the literature review Chapters, there are abundant previous researches validating the predictive power of TAM in many contexts. This research aims to examine the applicability of the augmented TAM model, which includes RTC as an external variable in the HKSARG context. The identification and inclusion of suitable external variable is vital for TAM since it can enhance the explanatory power of the model and make it more practical, which is one of the major limitations of the original model.

In the literature review, it is seen that many of the prior researches are not strict enough before excluding construct(s), namely attitude toward using (ATU) and behavioural intention (BI) (in more recent times) of TAM. In addition, evidence suggests that there may be problems in selecting process of the core constructs in TAM by Davis (1989) and Davis, et al (1989). In particular, their dropping of subjective norm (SN) from the model is questionable.

Moreover, the direct causal link between usefulness (PU) and BI theorised by Davis (1989) and Davis, et al (1989) is found to be unstable and non significant in previous



researches (e.g. Davis, et al, 1989; Taylor and Todd, 1995; Jackson, et al, 1997 and Dishaw and Strong, 1999). This research also finds a non significant linkage between PU and BI. More discussion on this aspect will be provided in subsection of BI below.

In general, the findings from the data analysis in Chapters 5 and 6 support (i) that the augmented TAM is applicable in the context of the HKSARG workplace and (ii) that RTC is a relevant antecedent and determinant of the belief constructs and (iii) as expected by the theories developed in this research, the RTC exerts its influence through the belief constructs onto attitudes and intention, which impacts on the actual usage level in the end.

As a response to the weaknesses of TAM stipulated in Section 2.5.7, in particular the limited ability of TAM to provide explanation of system adoption and practical guidance to system designers and managers (Igbaria, et al, 1997; Venkatesh, 2000), we will examine the contributions of RTC to the explanatory power of TAM in the last part of this discussion section. In addition, the practical implications to system designers and managers and policy makers will also be drawn.

Moreover, a careful comparison between the previous findings on antecedents and external variables and the nature of RTC provides cogent evidence that it is in fact the bridge to link and channel the effects of many previously found items into TAM.

### **The perceived usefulness (PU)**

Insofar, PU is considered by most researchers as the strongest predictor of system usage and it is significant in most previous tests (e.g. Davis, 1989; Davis, et al, 1989; Chau, 1996). Meta-analyses done by Legris, et al (2003), Lee, et al (2003), King and He (2006) and the reviewing study of Venkatesh, et al (2003) all point to this same conclusion. Based on TAM and the theories set out in Section 3.6, this research hypothesized the level of RTC will adversely affect PU; and PU will positively affect ATU, BI and AU. Related correlation, regression and t-test results of PU are recapped below:

In Chapter 5, PU is found to be influencing the ATU ( $\beta=0.837$ ,  $p<0.001$ ) and BI ( $\beta=0.313$ ,  $p<0.001$ ). Regarding its antecedent, RTC ( $\beta=-0.534$ ,  $p<0.001$ ) and PEOU ( $\beta=0.884$ ,  $p<0.001$ ) are confirmed to have respective impacts on PU. To assess the relative influence on PU, RTC and PEOU reveal  $\beta$  values at -0.243 and 0.542, respectively. The t-test results presented in Tables 6.1 and 6.2 also reveal the changes of PU in response to RTC and PEOU; and the corresponding changes of constructs in response to PU.

Therefore, when IT users perceive the IT to be useful, they will have a good attitude toward the system and higher intention to use it. Also, PU is jointly influenced by the IT users' resistance level and their belief of the IT's ease of use.

The relationships between PU, PEOU, ATU and BI are consistent with theories set out in TAM (Davis, 1989; Davis, et al, 1989) and the mainstream findings of early researches summarised in Table 2.4.

According to regression number 1, the effect of RTC on PU is in line with the relationship theorised in Section 3.6. It is shown from the values of the beta coefficients in regressions number 3 and 4 that, relatively, PU has a greater effect on ATU than BI. Similarly, regression number 10 reveals that PEOU has a greater effect on PU than RTC.

There is evidence to show that PU's influence on BI is mediated by ATU and RTC's effect on PU is mediated by PEOU.

The partial correlation results in Table 5.5 indicate that RTC's correlation with PU when PEOU's effect is controlled for is -0.432. Compared to the RTC-PU correlation when PEOU's effect is not taken into account ( $r=-0.872$ ,  $p<0.01$ ), PEOU seems mediating a lot of RTC's effect on PU. The relative weights of RTC and PEOU on PU as shown in regression number 10 reinforce this point. The mediating effect of ATU between PU and BI will be explored in the subsection of BI.

More insights relating to PU are obtained in this research. In accordance with the t-test results in Chapter 6, RTC and demographic characteristics of the respondents are determinants of PU.

In pooled analysis, the resistance level of IT users in HKSARG is found to be slightly above the arithmetic mid-point of the scale and the PU is only on the neutral point. However, Table 6.2 clearly shows that the higher resistance level IT users group has a negative perception on IT usefulness, and the opposite also holds true. These chains of

movements reinforce the relationships in the regression analysis.

t-tests in Section 6.1.3 reveal that gender and rank groups have no influence on PU but age and education level groups do.

In particular, younger (aged 35 or below) or more educated (degree holder or above) IT users in HKSARG will perceive IT more positively, i.e. useful.

### **The perceived ease of use (PEOU)**

PEOU is another belief construct in TAM that determines the system usage (Davis, 1989; Davis, et al, 1989). It is expected that PEOU will exert its influence on ATU both directly and indirectly via PU. Past studies in the area find that PEOU is more important in the early adoption stage of the system and will become less and less and finally non significant over time (Davis, et al, 1989).

Regression analysis in Chapter 5 suggests that PEOU influences PU ( $\beta=0.884$ ,  $p<0.001$ ) and ATU ( $\beta=0.815$ ,  $p<0.001$ ). Together with PU, PEOU is exerting its influence on ATU directly and indirectly. Regression number 11 shows the joint effects of PU and PEOU on ATU :  $ATU = 0.508PU + 0.366PEOU$ .

Because TAM depicts PEOU exerting its influence on ATU both directly and indirectly through PU, the beta coefficients in regression equation number 11 suggest that PU is playing a more important role than PEOU in determining ATU. Taking into account their respective beta coefficients in regressions number 3 and 5, that is PU ( $\beta=0.837$ )

and PEOU ( $\beta=0.815$ ), regression number 11 validates the theory that some of the PEOU's impact on ATU is mediated by PU.

Similar to PU, PEOU is theorised to be affected by the RTC in Section 3.6. The regression equation for regression number 2 reveals a beta coefficient of  $\beta=-0.536$  ( $p<0.001$ ). With RTC, PEOU affects PU as :  $PU=14.772 - 0.243RTC +0.542 PEOU$  (regression number 10).

In words, if the IT users believe the IT is easy to use, they will accord a better attitude toward the IT system and will have higher intention to use it. Unlike in PU, PEOU is only influenced by RTC and no other variable in the modified TAM model. That is, a lower resistance level IT user will perceive the IT easier to use. As noted in the discussion on PU, PEOU mediates the effects of RTC on PU.

For the relationships revealed by the regression analysis in Chapter 5, they are in line with TAM and Section 3.6. For more information on the mainstream findings in the past, Table 2.4 is related.

More knowledge on IT users' behaviours about PEOU is generated by the t-tests done in Chapter 6.

Similar to the case of PU, the pooled analysis conducted in Section 6.1.3 points out that even the general resistance level in HKSARG is slightly above average, PEOU is at the neutral level only.

Based on the information in Table 6.2, if the respondents are divided into two groups by

their resistance level, the higher resistance level user group will have worse than neutral perceptions on the IT's ease of use and the opposite is also observed in lower resistance level users.

When the pool of respondents is divided into demographic groups for analysis, it is observed that gender and rank are not factors which will vary the IT users' perception on how easy it is to use the IT.

Same as PU, there are significant inter group differences in the IT users' belief on how easy it is to use an IT should the grouping criteria be age or education level. Younger or more educated IT users will have better and more positive perceptions on IT's ease of use.

Up to this stage, there are more can be told from the findings of PU and PEOU. Firstly, unlike in the cases of many previous studies, PEOU is neither non significant nor having very limited role compared to PU. Many researchers (e.g. Davis, et al, 1989; Chau, 1996; Chau and Hu, 2002; Cheng, et al, 2006) try to explain the marginal or non significant role of PEOU by suggesting that people will attach much higher value to usefulness and performance gain brought by the system; the more user-friendly system makes learning to use the system not a real concern; good staff support may relief the worries and the users are becoming more competent nowadays are likely reasons for the observed role of PEOU in their studies.

But perceived ease of use is vital in determining usage for both its direct and indirect influences on subsequent constructs in TAM (Igbaria, et al, 1997 and Venkatesh, 2000).

Having shown by the findings in this research, PEOU is essentially as important as PU in determining users' adoption of the IT in question. Sharply contrasting to the rationales of previous arguments listed in the above paragraph, the weighty role of PEOU may point to the fact that the civil servants may not be so concerned with the performance gains compared to their effort to learn to use the IT. In addition, the IT in HKSARG may be not user friendly enough; the IT users are not competent enough to use the IT or the support provided to these IT users is insufficient. Moreover, Morris and Venkatesh (2000) pointed out that older users will pay more attention to ease of use than younger users; and younger users value system usefulness and performance gain more. Since there is significant proportion of the respondents are older (77.3% are aged 36+, see Table 4.7 for details), it is argued that the age distribution is one of the factors making PEOU so important in HKSARG workplace.

These arguments are not necessarily contradictory to the explanations given by previous researchers but may be supplementary because this research is conducted in a different and new contexts, compared to most previous researches. These observations underscore the need to investigate the relative weights of PU and PEOU in various contexts and stages in a more systematic manner. In fact, Segars and Grover (1993) revealed that the relationships and strengths of PU and PEOU may be more complicated than thought and researcher's concerns of the impact of user, technology and task characteristics on the belief constructs should be properly followed up. Igbaria, et al (1997) also found that the relative weights of the two belief constructs in small and large firms may be different. The relative weights may also be altered by the user experience. If large and small firms are good categories to define PU and PEOUs' weights. Governments should fall into large category. The long line of previous

researches conducted in large firms and universities suggest that PU is always more significant and important than PEOU. This is not the case in government context as shown in this research. These findings and discussions indeed remind that the impact of organisation and user characteristics as well as implementation stage on system acceptance should be investigated further.

### **The attitude toward using (ATU)**

Rightly or wrongly, researchers have ignored this construct frequently. It has been seen from the literature that early researchers while briefly discuss ATU and their respective reasons for giving up this construct in their studies (e.g. Davis, et al, 1989; Chau, 1996 and Venkatesh, 2000). After some years, researchers started ignoring the ATU in their research models even without mentioning their rationales. It has become a take-it-for-granted action to drop ATU.

In TAM, ATU mediates the effects of PU and PEOU to BI. Table 5.2 reveals that PU and PEOU correlate with ATU at  $r=0.948$  ( $p=0.01$ ) and  $r=0.931$  ( $p=0.01$ ), respectively. In addition, ATU correlates with BI at  $r=0.913$  ( $p=0.01$ ).



In Chapter 6, regression analysis shows that:

| Regression number | Hypothesis (ses) | Equation                      |
|-------------------|------------------|-------------------------------|
| 3                 | H3               | $ATU = 0.837 PU$              |
| 5                 | H5               | $ATU = 0.815 PEOU$            |
| 7                 | H7               | $BI = 1.006 + 0.366 ATU$      |
| 11                | H3 and H5        | $ATU = 0.508 PU + 0.366 PEOU$ |
| 12                | H4 and H7        | $BI = 0.933 + 0.295 ATU$      |

The meaning of the above results is that when the IT user is having a better attitude toward an IT, he is more likely to use the IT. For ATU itself, it is influenced jointly by PU and PEOU. If the users believe the IT is useful and easy to use, he will accordingly have more positive attitude to adopt the IT. Contrast these causal relationships and sequences to those summarised in Table 2.4, the findings in this research are just solidifying the long line of mainstream findings in previous researches in the area. It should be noted that PEOU, despite its direct effect on ATU, has an indirect effect on ATU through PU. Regression number 6 suggests that  $PU = 0.884 PEOU$ . Therefore, if the IT is perceived to be easy to use, it will benefit the PU and ATU. This again calls for system managers' attention to the role of PEOU in attracting IT users to adopt a particular IT.

An inconsistency to the theories in TAM happens in regression number 12 where PU and ATU's effects on BI are tested. The discussion of this is held over to the discussion of BI below.

In Chapter 6, the pooled t-test results have no clear signal and point out that while the IT

users have higher than the mid-point level of resistance, their response to ATU is only at the mid-point of the scale.

The analysis of sub-groups shows the demographic groups are not homogeneous to the ATU. With reference to Table 6.2, different genders and ranks do not have different attitudes toward the IT. But younger or more educated IT users in the HKSARG are significantly different to other groups in that they are more positive to IT.

### **The behavioural intention to use (BI)**

Results in Chapters 5 and 6 pertaining to BI are largely within expectations. Namely, ATU exerts impact on BI ( $\beta=0.366$ ,  $p<0.001$ ); BI exerts its influence on AU ( $\beta=-1.04$ ,  $p<0.001$ ). Table 2.4 is used to verify these results with previous findings.

The only inconsistency happens in regression number 12 where PU and ATU are hypothesized to affect BI jointly. In fact, the partial correlation tests also reveals PU is not significantly correlated with BI when ATU's effect is partialled out. The rationales of Davis (1989) and Davis, et al (1989) to include the PU-BI link to TAM have been reviewed in Section 2.5.3. Previous study results and some researchers' observations and comments on the relationship have also been recorded in Sections 2.5.5 and 2.5.7.

As explained in regression number 12 in Section 5.4.1 where the analysis results are briefly discussed, the HKSARG workplace context may be an exception to the "organisational settings" where "people form intention towards behaviors they believe that will increase their job performance, over and above positive or negative feelings..."

referred by Davis, et al, (1989, p.986). Apparently, these researchers referred organisations to private organisations and universities. In the HKSARG context, it is believed and the results show that IT users behave in accordance with the causal sequence of belief-attitude-intention-behavior as in the TRA more strictly. As argued in Section 5.4.1, job performance may not be the overwhelming consideration for IT users in the HKSARG workplace. Their intention to use the IT concerned is determined by ATU, which is influenced by both PU and PEOU. Moreover, as elaborated in previous subsections, PEOU always plays an equally weighty role as PU in the context. Therefore, the effort needed to use the IT is a vital factor. Only when the belief constructs influence the attitudes favorably will these IT users intend to use the IT.

This is of paramount importance to system developers and policy makers that in bureaucratic organisations like HKSARG, IT users may not be convinced to have a positive intention to use the IT simply because of the potential performance gains. Instead, system developers are required to take measures for invoking the IT user's positive attitude first. In order to attain the desired good attitude, PU and PEOU are the determinants. Moreover, the importance of PEOU is underscored by the fact that it has both direct and indirect effects on ATU. Because PU will be influenced by PEOU, if the users perceive the IT difficult to use, they will correspondingly perceive the IT not so useful, too.

The implications are of multifaceted. Even though many researchers seem to have lost interest in ATU and undermined the importance of PEOU, the above observation calls for researcher's attention to PEOU and ATU again.

Very much the same with PU, PEOU and ATU, we discover heterogeneous demographic groups when the pool is divided into age and education background. The t-test results illustrate that the younger IT users in HKSARG are having higher intention to use the IT and the more educated IT users in the service show a higher intention than their less educated colleagues to use the IT.

This research is not the only reported research to observe a non significant PU-BI link when ATU is kept in place. Jackson, et al (1997) found both PU-BI and PU-ATU links are non significant. Dishaw and Strong (1999) used the full TAM model for testing and find a non significant PU-BI link. Lucas and Spitler (1999) also found a non significant PU-BI link in their research, noting that their research model does not include ATU. Furthermore, Lucas and Spitler (1999) found non significant relationships between PEOU, PU and AU. Overall, the field study of Lucas and Spitler (1999) did not provide support for TAM.

These non significant PU-BI links found in a number of previous researches and in the present research, together with the frequently omitted ATU in the previous TAM researches when support for significant PU-BI link is drawn, call for a re-consideration and thorough exploration of the characteristics, appropriateness and stability of this link.

### **The resistance to change (RTC)**

The context of this research is in the HKSARG workplace. Based on the discussions in the literature review chapters, the Theory of Bureaucracy (TB) can be used to have a closer look at the characteristics of the context. Moreover, a review of the criticisms on

bureaucrats shows that RTC is a commonly cited weakness of bureaucrats albeit the existence of RTC is expected whenever changes happen and regardless of organisation types. This makes the knowledge of this research more important and valuable because of its ability to generalize across contexts.

Because RTC is new to be included in the TAM, there is no corresponding previous study results for comparison. Based on the discussion and theories set in Section 3.6, it is theorised that the level of resistance to change will adversely affect the users' perceptions on PU and PEOU.

Beginning with the correlation results in Chapter 5, the score of RTC correlates with that of PU and PEOU at  $r=-0.872$  ( $p=0.001$ ) and  $r=-0.869$  ( $p=0.01$ ) respectively. In Section 5.4, regression analysis reveals that the score of RTC affects that of PU and PEOU at  $\beta=-0.534$  ( $p=0.001$ ) and  $\beta=-0.536$  ( $p=0.001$ ) respectively. Regression number 10 confirms that RTC and PEOU are both determinants of PU.

As depicted in TAM, the effects of external variables are mediated through the belief constructs onto ATU. The results of partial correlation validate this by showing that RTC has no significant correlation with ATU when PU and PEOU's effects are controlled for.

Summarizing all the above findings, it can be seen that level of resistance will inversely relate to IT user's perceptions and RTC is exerting its influence on ATU through PU and PEOU.

Criticisms on bureaucracy have been reviewed in Section 2.6.4. Section 3.1 pointed out that RTC is especially serious in bureaucratic organisations. These statements are tested in Section 6.1.1 and the statistical test results show that the respondents have a higher than neutral point resistance level. Hence, the statements are not yet confirmed because RTC is identified and tested in this research for the first time. Despite the fact HKSARG's IT users have higher than neutral resistance, no information about other types of organisations is available for comparison. Therefore, concluding bureaucratic organisations are most resistant to change is pre-mature.

t-tests done in Chapter 6 further reveal that both male and female IT users are resistant to change. Ranks do not have an impact on IT users and all ranks are reluctant to change.

When breaking down the pool according to age and education level, results show that younger IT users are more readily to change than older group. Heterogeneous behaviors are also observed in different education background groups. It is confirmed by t-test that the more educated IT users' willingness to change is at the high side and the less educated users' willingness is at the low side of the continuum.

The role of RTC as an external variable and ultimate driver for IT adoption is presented by Table 6.2, where we group IT users to a high resistance group and a low resistance group with reference to the mid-point of the scale, i.e. 36. The findings suggest that when the IT user is reluctant to change, he will have negative perception on the usefulness and ease of use of the IT concerned. These beliefs in turn induce a negative attitude toward the IT and he will have low intention to use the IT. In the end, the IT

adoption and usage rate is low. To reinforce, the opposite results can be found in the low resistance group.

### **Mediating effects and causal sequences**

Further to the above discussions which are grouped by individual constructs, this subsection explores more in the causal sequence and mediating effects of various constructs. In TAM, Davis (1989) and Davis, et al (1989) adapt and use the external influence – belief – attitude – intention – behavior sequence from Theory of Reasoned Action (TRA). Thus, it is theorised that RTC's effects on ATU will be mediated by PU and PEOU; PU and PEOU's effects on BI will be mediated by ATU (plus PU's direct effects on BI); and ATU's effects on AU will be mediated by BI. To test the above-mentioned steps, the following pairs of regression analysis are conducted.

It can be seen from Table 6.3 that on ATU, RTC's impact has been vanished when PU and PEOU are present. Even though RTC is included in the regression as an independent variable for trial, it is found to be non significant predictor of ATU and the  $R^2$  only improves by 0.1%.

**Table 6.3: Pairs of regression analysis**

| Pair | Regression equation         | R <sup>2</sup> | Improvement |
|------|-----------------------------|----------------|-------------|
| 1    | ATU=RTC+PU+PEOU             | 0.935          | 0.1%        |
|      | ATU=0.475PU+0.335PEOU       |                |             |
|      | ATU=PU+PEOU                 | 0.934          |             |
|      | ATU=0.508PU+0.366PEOU       |                |             |
| 2    | BI=RTC+PU+PEOU+ATU          | 0.87           | 3.8%        |
|      | BI=4.508-0.0664RTC+0.156ATU |                |             |
|      | BI=PU+ATU                   | 0.838          |             |
|      | BI=0.933+0.295ATU           |                |             |
| 3    | AU=RTC+PU+PEOU+ATU+BI       | 0.74           | 6.8%        |
|      | AU=16.707-0.518BI           |                |             |
|      | AU=BI                       | 0.693          |             |
|      | AU=14.204-1.04BI            |                |             |

For preceding variables' influences on BI when ATU is in place, the regression analysis pair number 2 reveals that only ATU and RTC are significant determinants of BI. Hence, the beta coefficient of RTC suggests that it has very marginal and trivial contribution. The unexpected non significant PU-BI direct link has been addressed in detail in the above sub sections. Regarding the R<sup>2</sup>, it only improves 3.8%. BI is regarded as the strongest predictor of behavior. The third pair of equations in Table 6.3 reassures this theory. The inclusion of other variables to estimate AU is found worthless and they are all non significant. These insights are critical for giving more confidence to the researcher to conclude that the mediating effect and causal sequence found are entirely consistent with the theories of TAM and the newly theorised relationships in Section 3.6.



### **Change agents (CAs) response**

The CAs' responses are recorded in Section 6.2. It is found that the CAs are under estimating the resistance level of their staff members. There may be various reasons for the observation. Firstly, the staff under their charge may pretend they are ready to change when facing the CAs and causes the CAs to have wrong impression. Secondly, the CAs may have no chance or intention to talk with their staff members for feedback and rely on the information gateways in the departments who may either report wrong information or collect incorrect or inaccurate information. Thirdly, these CAs know the reality but choose not to admit their staff are reluctant to change. There will be many reasons to account for their inaccuracy but direct and honest communication between the CAs and staff affected is a must in the circumstances.

The CAs are intelligent and correct to suggest higher resistance level will adversely affect IT adoption. Their proposed measures to enhance IT usage are sensible and tally with the ideas of previous researchers. It is proposed training, management support, incentive, culture and directives are potential enablers of IT adoption. These factors have been raised and tested by various researchers before. For example, Igarria, et al (1997) proposed and confirmed training and management support are relevant factors to encourage IT usage.

The CAs had never been informed of or explained the theories or research model used in this research. Rather, they were put with some open-ended questions for their comments freely. Therefore, their responses make sure the fitting between the research model and the reality.

### **Further knowledge obtained from this research**

This research examines the augmented TAM model with RTC as an external variable. Unlike most of the previous studies, this research uses the full model of TAM for testing. Moreover, it is one of the few applications of TAM in government contexts. In the Hong Kong context, it is the first research bringing the TAM to government context.

While many previous researches treat PU and PEOU as the starting point to predict system usage, this research begins from a different perspective - by exploring the ultimate causes of system usage – the external variables. This shift of focus to the external variables gives more information and tools to the system managers to enhance system acceptance and to improve the likeliness of more successful system implementation by informing them what are the causes of behaviors.

Because external variables of TAM are contextual, this research employs the Theory of Bureaucracy (TB) to verify and confirm the bureaucratic nature of HKSARG. At the same time HKSARG is shown to be bureaucratic, this research also validates the applicability of TB in current date. Being a bureaucracy, HKSARG is subject to the same criticisms as other Weberian bureaucracy. Through the process, RTC is selected as an external variable to TAM for validation because RTC is universal to all changes although it is said that different types of organisation structures are inherent with different levels of resistance. Therefore, the knowledge gained in this research should be more generalizable and useful. The empirical findings from the survey in HKSARG show that resistance to change (RTC) is a strong external variable that influences the determinants constructs, PU and PEOU in TAM model and finally the IT usage. For

RTC is common to all organisations, this research is beginning to show that RTC needs to be treated as an important external variable, measured accurately and empirically verified using appropriately applied statistical methods.

This research confirms the applicability of TAM in the government context and bureaucratic culture. However, future research on RTC in other types of organisation structures would be required to give a fair comparison on the level of resistance in various organisation structures so as to make a more objective judgement on the relationship between structure and level of resistance.

Having successfully shown RTC is a strong external variable of TAM provides a platform to connect and to make sense of previous fragmented findings. Tables 2.2 and 2.3 tabulate the lists of “external variables” identified by previous studies. After contrasting these formerly so-called “external variables” to the sources of RTC summarised in Table 3.6, it is argued that many of these previously identified “external variables” are in fact factors that affect the level of RTC, which is now shown to be an external variable of TAM. How these “external variables” found in previous researches are bridged by RTC? This can best be demonstrated by a number of examples.

Taylor and Todd (1995); Dishaw and Strong (1999); Venkatesh (2000) and Venkatesh and Morris (2000) argued that prior experience with IT systems is an “external variable”. Venkatesh (2000) explained that if the user is having more experience on IT, he will have lower anxiety toward the IT. He went on to add that this lower anxiety level will reduce the user’s negative perception on IT. This may be over simplified.

Basing on the discussion in Section 3.6, Heinszen and Glass (1987) and Harrison and Rainer (1993) showed that computer anxiety will influence user's self-confidence and the performance outcome. In particular, Harrison and Rainer (1993) empirically showed that the decreased anxiety can lead to a greater readiness for and acceptance of change (p.107). Combining these with the validated theories proposed in this research, the reduced level of RTC will generate better perception on IT (i.e. PU and PEOU) which will in turn trigger subsequent chain reactions in TAM. Therefore, it is argued that the chain of effect should be: a more experienced user will have a lower anxiety level; the less anxious user will have a lower resistance to accept the IT and have more positive perceptions.

Chau (1996b) identified transitional support and Igbaria, et al (1997) identified computing support, management support and training as "external variables" to TAM in their studies. Chau (1996b) defined transitional support as the training and other management supports that may be rendered to the users when they encounter difficulties. Igbaria, et al (1997) did not explicitly define the external variables but opine that the availability of these would improve the adoption rate of the systems.

In the RTC sources lists, del Val and Fuentes (2003) adopted Rumelt's (1995) brief definition of the source capabilities gap as "lack of the necessary capabilities to implement the change". In Table 3.6, "capabilities gap" is the second most important source of RTC. Drafke and Kossen (1998) viewed the source personal attitude and impact is influenced by how the users feel the extra effort necessary to learn new things and the source lack of trust aroused from the users' belief that managers do not want to invest or involve in the change.

Comparing these meanings to those of the “external variables” identified by Chau (1996b) and Igarria, et al (1997), it is crystal clear that the claimed “external variables” by Chau (1996b) and Igarria, et al (1997) are actually ways to narrow or close the capabilities gap (e.g. support and training) or ways to show that management is committed to invest resources to the change, i.e. IT adoption in the context. In either case, it is argued that the level of resistance will be intervened by these actions and RTC is the real key to pass the influence to the belief constructs. By the strength of the augmented TAM, a lower RTC will enhance user’s perception on PU and PEOU, equip the user with better attitude and intention to use the IT, and the user will use the IT more in the end.

Furthermore, Venkatesh and Davis (1996) included and verified two “external variables”, namely self-efficacy and objective usability as the antecedents of the perception constructs in TAM. Because self-efficacy is the belief that one has the capability to perform a particular behavior, similar to the above, it is argued that this will have impact on the resistance level by influencing the sources of resistance, in particular, capabilities gap. Moreover, another source the low motivation due to past failure may also be lowered because the user is confident in his ability to use the IT; and the confidence may reduce the chance for an user to have incommensurable beliefs.

The objective usability could also have impact on RTC. For instance, if the user believes that IT is really useful, he may accord different and lower costs to the change (i.e. To adopt the IT). Also since he is of the view that the IT is useful, he will have a much clearer vision on the change. As a result, the user will have higher motivation and

intention to change his routines and embedded values so as to take advantage of the newly available and useful IT. Using the terms of Drafke and Kossen(1998), if the IT is shown to be useful in enhancing job performance, there should not be the problems of “lack of recognition of need” or “insufficient need”. Again, the net result of an apparently useful and performance-improving new system should be able to lower the resistance from users.

More recently, Vathanosphas, et al (2008) proposed that training, involvement of staff in planning and implementation, communication of the project’s benefits, building trust and autonomy, increase employee’s competence, management support are most relevant external variables to IT acceptance in the context of Thai Navy. Comparing these items to the sources of RTC stated in Table 3.6, it is easy to see that these items indeed will impact on some of the sources of RTC. The effects of these items are indeed mediating through RTC to the belief constructs of TAM instead of influencing PU and PEOU directly.

Simply speaking, there are cogent evidences here that RTC is the real key that bridges previous researchers’ findings to TAM. With this new insight, the findings of previous researches can be tidied up and grouped to become factors influencing various RTC sources. This would be helpful to have a systematic understanding of these fragmented pieces of knowledge.

More in-depth knowledge about PU is obtained as well. Meta analyses (Legris, et al, 2003; King and He, 2006 and Lee, et al, 2003) and study by Venkatesh, et al. (2003) repeatedly spelt out the outstanding and prime role of PU in TAM. More often than not,

PEOU is regarded as secondary or even non significant.

The findings in this research suggest PU to be significant but not in the *a priori* direction as suggested in the theory by Davis and found by some subsequent researches. Regression number 11 presents  $ATU = 0.508 PU + 0.366 PEOU$ . The regression equation seems to suggest, consistent with Venkatesh, et al (2003), PU is significant and more important than PEOU. While PU is having a larger beta coefficient, PEOU plays a weighty role as well. It should not be forgotten that PU also mediates the effect of PEOU on ATU. That is, PEOU should not be undermined or marginalized. Moreover, it is found PU has no direct impact on BI in this research. These two findings suggest that when Davis (1989) and Davis, et al (1989) devise TAM, the researchers may have overlooked the effects of system and user characteristics on the constructs and the dynamics between the constructs.

Regarding the role of ATU in TAM, with due respect, it is inappropriate for researchers (e.g. Adams, et al, 1992; Bagozzi, et al, 1992 and Lu and Gustafson, 1994; Szajna, 1996; Chau, 1996; Venkatesh, 2000; Venkatesh and Davis, 2000; Sun and Zhang, 2006) to remove ATU from TAM for a simpler research model. Although regression number 4 shows that PU is a determinant of BI, regression number 12 shows that PU is not a significant factor determining BI when ATU is in place. Therefore, if one relies on the result of regression number 4 as in many previous researches where ATU is not considered and ignores regression number 12 (which most previous researches are unable to reproduce as a result of their dropping of ATU), different conclusion may be arrived at.

We provide some possible explanations on why these relationships are observed in this research in the sub Section of discussion on BI above. However, there will certainly be doubt on the reliability of the previous findings of significant PU-BI links when ATU is missing. A natural question would be: Would the PU-BI link still be valid when ATU is not taken out?

Two demographic variables, age and education background, attract much attention in this research. When the pool of IT users is divided into groups according to these factors, the groups behave differently and indeed in a dichotomous and opposite way since their levels of RTC and responses to other TAM constructs are located at two sides of the mid-point of the responding scales. This suggests that government should not be viewed as a large organisation with only one kind of culture. This monolithic view will lead to missing of a lot of possibilities to implement change successfully and smoothly. The existence of heterogeneous sub cultures in organisation do have significance. This issue will be considered further in managerial implications part soon.

The above new information and insights pertaining to (i) the integrity of the TAM model in government context as a whole; (ii) the role of RTC as an external variable and as an antecedent of PU and PEOU; (iii) the instability of the PU-BI link in the context and (iv) the heterogeneous groups within the HKSARG are essential for system developers and policy makers to deliver successful IT projects.

The following Section elaborates how the knowledge from this research can be brought to the real world. The practical implications and implied strategies for change will be discussed as well.



#### **6.4 Practical/Managerial Implications**

RTC has been shown to be a determinant of the belief constructs. A proper understanding of this is critical to IT implementation.

Based on the discussions of Ford, et al (2008), to beat RTC, CAs should take measures to make change recipients to believe they are treated fairly, to believe CAs will not breach their agreement and to build trust. CAs should also keep communicating with the users to legitimize the change and to keep change recipients in knowledge of their progress. The CAs should not be too optimistic about the change, i.e. to oversell positive and undersell the negative. Otherwise, when the change unfold, the change recipients will compare and know they have been misled and their trust has been violated. Ford, et al (2008) suggest that the change recipients should be kept “in play” and involved. (pp. 364-370).

These could be treated as principal guidelines for CAs. Indeed, the discussion of sources of resistance in Section 3.5 provides much information and possible ways for system designers and change agents to minimize the resistance. CAs could refer to the sources and tackle them accordingly.

The importance of PEOU reminds system designers should not only focus on the functions of the IT. This is in particular true in the HKSARG workplace. In private sector, where compensation to reward performance improvement can be quick and remarkably and the users are used to compete and change, the usefulness of IT system may be a prime consideration and incentive to use. However, for contexts like HKSARG,

performance gain is not as essential as in competitive environment. Rather, the users may value how easy is the IT system to be used more since it relates to the effort they are required to put in immediately. Therefore, an easy to use IT is a must. In addition, an perceived easy to use IT will be perceived to be useful according to TAM. It is a “one stone two birds” strategy to focus more on ease of use.

The empirical evidences validate the take-it-for-granted assertion that bureaucratic organisations are resistant to change, higher than the scale mid-point level of RTC but only by a small margin, not as serious or extreme as many critics have expected. To complete the picture, more research using the same instrument in this research should be done to have a more thorough understanding of the relative resistance levels amongst organisation types. A remark should be inserted here for caution. While it is discovered that the resistance level of the respondents is only slightly higher than average, the respondents are IT users in HKSARG. They may not represent the general resistance level of HKSARG employees as a whole because of the different compositions of respondents and general HKSARG employees as revealed in Table 4.7. The difference in age distribution is particularly important because the HKSARG employees have a much higher proportion of aged 46 or above. Moreover, Morris and Venkatesh (2000) and the findings of this research suggest that age is a factor that influence the resistance level a lot. Having said that, at the moment, CAs should not assume the organisation is placed at a hopeless dead end in front of change initiatives.

With reference to Section 3.5, bureaucratic and flexible structures are two ends of a spectrum of organisational structures. Organisations will need to pick up the suitable or required mix they needed (Adair, 2007). As pointed out by Drucker (1992; 1995; 1999;

2002), because of the needs and uniqueness of the public sector and government, it tends much more to the bureaucratic end inherently. Adair (2007) pointed out that the bureaucratic structure is not the sole source of resistance to change. He states:

“Systems and structures are important, but they are only half of the matter. The other half is the people who use the systems” (Adair, 2007, p. 108)

Branson (2008) held similar views that change of the staff's attitude and perception is essential to prepare for change and the hard issues like structure, rules, systems are relatively easy to adjust accordingly.

If the government is mandated to adopt a bureaucratic structure, would the management be intelligent enough to design the rules, systems, policies etc to enhance the change ability of the organisation? For example, would the entry and exit system in HKSARG be reviewed for necessary modifications to unroot the inertia associated with the system (see Scott (2005) in Section 3.3.4 for more details).

In addition, it is also proposed that management can use measures such as job rotations to “loosen” some of the deep-rooted cultures of certain groups; to recruit more educated and younger employees and provide more flexible entry and exit options for talent to work in and leave government for specific projects or as and when specific expertise is necessary.

The arguments put forward by Branson (2008) and Greasley, et al (2009) that there are subcultures exist in the government open up possibilities to implement change. In this

research, the pooled result hides away some useful and critical details – there are heterogeneous groups amongst the IT users, namely, younger and more educated staff are willing to change while older and less educated staff are reluctant to change.

Unfortunately, while younger and more educated groups are more ready to change, these are relatively small groups (15 younger and 23 more educated, respectively). As a result, the IT users' overall resistance level is still on the high side. Because HKSARG offers good job security and employee protection policies, the turnover rate is very low. Together with the systematic difficulties and clumsiness to remove non-performers, even the less competitive staff (possibly less educated or have lesser job skills) can stay until retirement or voluntary departure. Furthermore, there are a large number of supporting staff (lower education level) work in the HKSARG. All these factors contribute to the high percentage of older or less educated staff and overall higher resistance level in HKSARG. The structural composition of the government, i.e. more less educated or older staff may be the real reasons why bureaucratic organisations are perceived as reluctant to change. At last, the bureaucratic structure should not be blamed as the sole source of inertia.

The existence of sub-cultural groups suggests that management would be better advised to target these staff as a starting point in any new IT implementation plan. It is argued that these staff members are the appropriate groups to run the pilot projects or act as the pilot unit to implement change, as advocated by Drucker (1999; 2002). This is more likely to generate a positive demonstration effect for the other groups in the organisation. Specifically, it can give time the other users to see how the IT can improve their job performance, how easy the IT can be learnt and used. After building up a sufficient mass

of users, peer group influence will be cultivated and a full implementation and proliferation of the IT in question to all users will have higher successful rate. The building up of a critical mass and cultivate peer pressure is indeed very useful to act as horizontal peer pressure to produce greater momentum of change than to rely solely on top down decisions alone (see Thompson, 1999 cited earlier).

There is another important managerial implication. While both age and education are influential, the management can only change the education level of the employees by providing more training opportunities to the employees to alter their change orientation. Nothing can be changed regarding the age, unless the managers decide to lay off the old staff. Moreover, at least numerically, because a lower score in RTC means more unwilling to change, the less educated group is indeed more reluctant than older group to change. Therefore, managers should grasp tightly this enabler of change. For convenience, this research uses degree holder as a dividing line of educational background. Hence, in reality and application, more IT related training and course can also be beneficial to enhance the related educational background of the users. The management should not adopt a restrictive or narrow interpretation in this aspect.

In general, the findings in this research emphasise that management cannot approach the government, the department or unit by taking them to have a homogeneous and unified culture, they must deal with sub cultures in their respective departments.

The communication of change can take different approaches to different groups of users as well. The findings of heterogeneous behavioral groups in this research and Morris and Venkatesh's (2000) discussion on priority accorded to functions and ease of use of

the technology by users at different age groups have meaningful managerial implications. For younger users, they are ready for change already and value performance and promotion more. As such, to increase the momentum to take up change, the change agent should advertise the usefulness of the IT. For older users, they may not welcome the IT at once. The tactics should focus on communicating to them the ease of use of the IT concerned at the beginning to alleviate the possible confronting situation. In parallel, training and other support should be coordinated to target these users to comfort them and avoid cultivation of hard feelings. Ideally, the younger users should take up the IT at an accelerated pace and the older user's resistance level will decrease gradually. After some time, a mass of users will be formed and successful stories will be airing around the workplace. This will in turn create peer pressure to the older users, whose resistance level is lowered, to adopt the IT.

The accelerated take up of IT by younger IT users is further supported by the fact that younger IT users usually have better education background as a result of the increased opportunities of continuous and tertiary educations. Therefore, selecting this group is equal to selecting a group of users whose two positive factors, i.e. young and educated, for better change implementation in one go.

## 7. CONCLUSION

In this research, a survey was conducted in the Government of Hong Kong Special Administrative Region (HKSARG) workplace to examine if there is positive contribution to the explanatory power of the Technology Acceptance Model (TAM) by including the external variable “resistance to change” as an antecedent to perceived usefulness and perceived ease of use. To operate, the e-government underpinning IT are taken as example for testing. It is expected the knowledge gained from this research can enhance the understanding of IT usage within the government context. Then, system developers, management, change agents (CAs) and alike can take necessary actions correspondingly so as to better implement the e-government initiatives. It turns out that the research does not only give new knowledge in the area, but also new insights to some conventional viewpoints held by system developers and academics.

This research began with a review of TAM – its origin; a literature review on previous studies of TAM; the strengths and mainstream findings of the model; some possible shortcomings of the model and researchers’ habits were highlighted in Chapter 2. Afterwards, in Chapter 3, we examined whether HKSARG is a bureaucracy using the lens of Theory of Bureaucracy (TB) and revisited the criticisms on bureaucracy. The resistance to change (RTC) was identified as a relevant external variable and its relationships with the TAM constructs were theorised in that Chapter too.

In order to empirically validate the applicability of TAM in HKSARG and new theories set out in Chapter 3, Chapter 4 considered and finalised the details of the survey to be done. The necessary data were subsequently collected by way of questionnaire survey sent out by emails. With a view to soliciting more information, invitation letters were

sent to senior members of HKSARG (i.e. the CAs) for personal interview. These additional information were then fed into the data analysis procedures in Chapters 5 and 6.

Based on the analyses done in Chapters 5 and 6, there is confidence that the three research questions proposed in Section 4.2 have been addressed fully. In particular, we empirically demonstrated : (i) TAM is applicable in the HKSARG context; (ii) RTC is a relevant external variable of TAM and an antecedent of perceived usefulness (PU) and perceived ease of use (PEOU); and (iii) RTC's effect mediates through PU and PEOU and other TAM constructs all the way to self-reported usage.

TAM theorised a chain of relationships that affect system usage. The relationships start from external variables. With relatively less attention given to these external variables in the past, this research adds to our understanding of them by making reference to Weber's TB. The evidence gathered from this research confirms the relevance of the RTC in system usage. The benefits are substantial because management can now direct their attention to lower the resistance of their staff if an IT system is to be successfully implemented.

It is shown that the level of RTC will influence PU and PEOU and finally the self-reported IT usage. Apart from confirming the role of PU, the findings also remind system developers of the determining role of PEOU. It is an important message because functionality and performance considerations are only necessary but not sufficient conditions for IT users to adopt an IT in government context.

The attitude toward the IT held by users is underscored by the findings as well. Unlike most of the previous studies, this research includes and demonstrate the vital role of



attitude towards using (ATU). The instability of the perceived usefulness (PU) – behavioural intention to use (BI) direct link attracts attention and it may be related to the characteristics of the government context where TAM is rarely tested or the significant PU-BI link found by many researchers' earlier work are just spurious because ATU is taken out in those studies.

RTC is important not only its relevance shown in the government context. Since it is universally accepted that RTC happens whenever the status quo is disturbed, it is expected that it is a relevant external variable of TAM in ALL contexts. At last, whenever there is change, there is resistance.

In addition, there is strong evidence to suggest that at least some of the previously identified “external variables” are having their impacts on the belief constructs via the bridge provided by RTC. In Sections 3.6, some general measures that can be employed to minimize the RTC proposed by researchers are reviewed. In Section 6.4, based on the responses of CAs in HKSARG, relevant measures are mentioned for the CAs' consideration.

In the past, we knew beliefs held by IT users affect their system usage rate but were difficult to explain why they held such beliefs. With the knowledge gained from this research, we start having the ability to answer the question “why the IT users are willing or unwilling to use a system?”

The successful application of the TB and TAM in this research indicates that an appraisal of the context where TAM is to be used with suitable theories could be very helpful to obtain more insights. Integrating the special characteristics of the context may lead to discovery of relevant external variables and these are essential for TAM not only

to predict but also explain IT usage. By accumulating knowledge in this aspect, it may be possible to have a list of external variables drawn for different contexts and the stability of TAM relationships in various contexts can also be validated. TAM is not operating in a vacuum but within a context. It should be beneficial to the power of TAM for system developers to have more knowledge about the system adoption in various kinds of contexts and more researches in this direction is thus vital.

Another important discovery in this research is the nature of bureaucracy and the existence of sub cultures within it. Equipped with these, better change strategies have been proposed in Chapter 6 as well.

To recap, firstly, RTC is present whenever there is change (see Section 3.3 for the elaborations by researchers there). Secondly, organisations will have some ingredient of bureaucracy because bureaucratic and organic are two extremes of a spectrum (Adair, 2007). For government, it is inherently bureaucratic (Drucker, 1992; 1995; 1999; 2002) as a result of its unique nature. Thirdly, bureaucracy is not only related to government or public sector organisations. Rather, big organisations tend to organize along bureaucracy (Sharma, 1999; Styhre, 2007). Fourthly, there may be sub cultures existing in an organisation. People should not view large organisations monolithically. The empirical findings in this research confirm that HKSARG is bureaucratic; it has higher than arithmetic mean level of RTC; there are heterogeneous behavioral groups in HKSARG and they have opposite orientations toward change.

Connecting these once fragmented information and new findings becomes vital messages, which provide a solid foundation for the corresponding policy recommendations.

## **Policy recommendations**

There are a number of policy recommendations proposed to the management, system designers, change agents (CAs) and alike (collectively referred to as “management”) who are responsible to implement IT related change programs in HKSARG. These recommendations are also of reference value to other public sector managers and change initiatives.

First of all, management should devote more resources to have a proper understanding of RTC because of its determining role in IT implementation. However, it should be added that the management in HKSARG should recognize and admit the existence of high resistance level in the civil service since it was seen that the CAs' were underplaying the seriousness of the resistance (Section 6.2 refers). If the CAs do not admit there is a problem, they will not take necessary actions to tackle it. Therefore, this is the most important first step to face the resistance to change in HKSARG. Once the CAs are willing to admit the problem, the discussion of sources of resistance in Section 3.5 provides useful information and possible ways to minimize the resistance.

Concerning the design of the IT system, system designers should not only focus on the functions of the IT. For contexts like HKSARG, performance gain is not as essential as in a competitive environment and immediate and monetary compensation for performance gain is restrictive. Rather, the users may concern how much effort they are required to put in to learn to use new IT more. Therefore, an easy to use IT is a must. In addition, a perceived easy to use IT will be perceived to be useful, according to TAM. It is a “one stone two birds” strategy to focus more on ease of use.

More important messages at the policy level are discussed. Since the government is

mandated to adopt a bureaucratic structure to discharge its unique role, the management must be intelligent enough to design the rules, systems and policies to enhance the change ability of the organisation.

The long adopted policies on recruitment, promotion, rewarding and performance management resulted in very good job security and employee protection policies and the systematic difficulties to remove non-performers. Subsequently, the civil servants are complacent and prefer to avoid risk taking. Worse, even the less competitive staff (possibly less educated or have lesser job skills) can stay until retirement or voluntary departure. Furthermore, there are a large number of supporting staff (lower education level) who work in the HKSARG. All these factors contribute to the high percentage of older or less educated staff and overall higher resistance level in HKSARG. The structural composition of the civil service, i.e. more less educated or older staff may be the real reason why HKSARG is in general reluctant to change. The management should seriously consider to modify existing policies and to introduce new policies so as to encourage innovation and change. For example, it is proposed that management can use measures such as job rotations to “loosen” some of the deep-rooted cultures of certain groups; to recruit more educated and younger employees and provide more flexible entry and exit options for talent to work in and leave government for specific projects or as and when specific expertise is necessary; and to strike a balance between rewarding consistent performers and innovative staff and those who occasionally fail.

To implement change, the empirical findings showed that there are heterogeneous groups amongst the IT users, namely, younger and more educated staff are willing to change while older and less educated staff are reluctant to change. Unfortunately, while younger and more educated groups are more ready to change, these are relatively small groups (15 younger and 23 more educated, respectively). As a result, the IT users’

overall resistance level is still on the high side.

The existence of sub-cultural groups suggests that management would be better advised to target these staff as a starting point in any new IT implementation plan. It is argued that these staff members are the appropriate groups to run the pilot projects or act as the pilot unit to implement change, as advocated by Drucker (1999; 2002). This is more likely to generate a positive demonstration effect for the other groups in the organisation. Specifically, it can give time to the other users to see how the IT can improve their job performance, how easy the IT can be learnt and used. After building up a sufficient mass of users, peer group influence will be cultivated and a full implementation and proliferation of the IT in question to all users will have a higher success rate. The building up of a critical mass and cultivation of peer pressure is indeed very useful to produce greater momentum of change than to rely on top down decisions alone (see Thompson, 1999 cited earlier).

There is another important message. While both age and education are influential, the management can only change the education level of the employees by providing more training opportunities to the employees to alter their change orientation. Nothing can be changed regarding the age, unless the managers decide to lay off the old staff. Moreover, at least numerically, because a lower score in RTC means more unwilling to change, the less educated group is indeed more reluctant than older group to change. Therefore, managers should grasp tightly the argument that education level is a tool and enabler of change. For convenience, this research uses degree holder as a dividing line of educational background. Hence, in reality and application, more IT related training can be beneficial to enhance the related educational background of the users. The management should not adopt a restrictive or narrow interpretation in this respect.

The approaches adopted to communicate the change to different groups of users should be different too. The findings of heterogeneous behavioural groups in this research and Morris and Venkatesh's (2000) discussion on priority accorded to functions and ease of use of the technology by users at different age groups revealed that younger users value performance and promotion more. In order to take advantage of this the change agent should advertise to the younger users the usefulness of the IT. For older users, on the other hand, the tactics should focus on communicating to them to learn and to use the IT and this will not require much effort to decrease their resistance.

The policies on delivering training and providing support to users should be adjusted, too. For instance, special packages of training and support should be coordinated to older users with the main objectives of comforting them and avoiding the cultivation of 'hard feelings'. For younger users, training should be tailor-made to teach them how to take the most benefits from the IT to enhance their performance. These tactics should induce the younger users to take up the IT at an accelerated pace and the older user's resistance level to decrease gradually. After some time, a mass of users will be formed and successful stories will be airing around the workplace. This will in turn create peer pressure to the older users, whose resistance level is lowered, to adopt the IT.

In general, the findings in this research emphasise that management cannot approach the HKSARG as a single culture organisation. The handling of the sub cultures needs tailor-made tactics for each group. In the long term, the management should consider to employ new policies to change the composition of the civil service. Nowadays, the majority of civil servants in HKSARG are relatively older and less educated. These groups do not welcome change. Suitable policies should therefore aim to reduce the size of these groups in the civil service. Policies which attract younger and more educated people to join the government should be devised. The promotion system should be

revamped to reward staff who are willing to change and accept challenges instead of focusing on consistency and seniority only. To cultivate a more change ready civil service, training and support packages should be offered to civil servants on an on-going basis to continuously update and upgrade the capabilities of them because “more educated” staff are shown to be more willing to change. Moreover, the offerings should not adopt a “one size fits all” approach. Instead, these offerings should have different emphases to tie in with the different values, needs and interests of various groups in the civil service.

## 7.1 Limitations

There are several limitations in this research. They are outlined in this Section briefly.

The unavailability of a full directory of all the IT users in HKSARG means the researcher could not access all potential respondents. Together with the restrictions of time and other resources, only 700 IT users were contacted and the response rate was around 9% only. In Section 4.4.2, we have seen that a 9% response rate for survey conducted by post or email in Asia or Hong Kong context indeed cannot be regarded as low. The actual number of usable responses is 66. As a result, some data analysis methods, e.g. SEM cannot be used. Hence, the low response rate should not be damaging the reliability of this research.

In Section 4.7, the issues pertaining to reliability, validity and replicability have been considered thoroughly. The selection of questionnaire questions, sampling and adverse effects of non response bias are given due attention. Moreover, future research to replicate this research for test-retest confirmation is feasible because the steps in this research are recorded in detail. The follow up calls to non respondents show that there is no systematic reasons for not responding and no non response bias. Statistically, reliability and validity tests have been conducted in Section 5.3 and the findings indicate that none of the criteria is compromised.

The controversial self-reported IT usage is taken as the dependent variable although it may not be an accurate reflection of the actual behavior. Given the necessity to keep respondents anonymous and there is insufficient observers to observe the respondents even in case they agree, there is no alternatives in this research. As a reminder, it has also been arguing that when the respondents know they are being observed, their behaviors will not be an accurate reflection of their normal activities.



## **7.2 Recommendation for future research directions**

A number of future research directions seem to be very promising:

RTC is expected to exist in all kinds of change and in all types of organisation structures, future research could test the appropriateness of the itemized RTC sources in other kinds of change and organisation structures for finalizing a construct measurement tool for RTC.

Further researches can be done to explore and verify the level of RTC in different kinds of organisations so that the proposition of bureaucratic organisation is most resistant to change structure can be verified.

Although, in general, the relationships proposed in TAM are preserved in this research, the exception discovered in this research may also suggest that further research attention should be directed to explore the limitation of TAM.

Given the observation in regression number 12 where PU's role is found to be non significant, albeit many previous researches confirmed the role of PU, further research to explore the status of the PU-BI link is particularly worthy.

Also, a larger scale and longitudinal study will be required to confirm the findings in this research. Although some previous researches dropped certain constructs, in particular ATU, to simplify the research models, the mediation function of ATU observed in this research underscores the use of a full TAM model in future research.

## 8. REFERENCES

Accenture, (2000), *e-Government: connecting the dots*, available at: [www.accenture.com/xdoc/en/industries/government/egovernmenta4.pdf](http://www.accenture.com/xdoc/en/industries/government/egovernmenta4.pdf)

(last accessed 4 December 2006)

Adair, J., (2007), *Leadership for innovation : how to organize team creativity and harvest ideas*, Kogan Page, London.

Adams, D.A., Nelson, R.R. and Todd, P.A., (1992), "Perceived usefulness, ease of use, and usage of information technology : a replication", *MIS Quarterly*, Vol. 16, Issue 2, pp. 227-247.

Agarwal, R. and Prasad, J., (1997), "The role of innovation characteristics and perceived voluntariness in the acceptance of information technologies", *Decision Sciences*, Vol. 28, No. 3, pp. 557-582.

Agarwal, R. and Prasad, J., (1999), "Are individual differences germane to the acceptance of new information technologies?", *Decision Sciences*, Vol. 30, No.2, pp. 361-391.

Ajzen, I., (1989), "Attitude Structure and Behavior" in Partkanis, A.R., Breckler, S.J. and Greenwald, A.G. (Eds), *Attitude Structure and Function*, Lawrence Erlbaum Associates Publishers, Hillsdale, NJ, pp. 241-274.

Ajzen, I. and Fishbein, M., (1980), *Understanding Attitudes and Predicting Social Behavior*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

Al-Gahtani, S. and King, M., (1999), "Attitude, satisfaction and usage : Factors contributing to each in the acceptance of information technology", *Behavior & Information Technology*, Vol. 18, No. 4, pp.277-197.

Al-Kibsi, G., de Boer, K., Mourshed, M., and Rea, N.P., (2001), "Putting Citizens on-line, not inline", *The McKinsey Quarterly*, 2001 Number 2, available at: [www.mckinseyquarterly.com/putting\\_citizens\\_online\\_not\\_in\\_line\\_1020](http://www.mckinseyquarterly.com/putting_citizens_online_not_in_line_1020) (last accessed 13 April 2009).

Allinson, C.W., (1984), *Bureaucratic Personality and Organisation Structure*, Gower Publishing C. Ltd., Great Britain.

Amoroso, D.L., and Cheney, P.H., (1992), "Quality and user developed applications : some essential ingredients", *Database*, Vol. 23, No. 1, pp.1-11.

Appelbaum, S.H., St-Pierre, N. and Glavas, W. (1998), "Strategic organisational change : the role of leadership, learning, motivation and productivity", *Management Decision*, 36/5, pp. 289-301.

Atkinson, R.D. and Leigh, A. (2003), "Customer-oriented e-government : can we ever get there?", *Journal of Political Marketing*, Vol.2, No.3/4, pp. 159-181.

Atkinson, R.D. and Leigh, A., (2003), "Customer-oriented e-government: can we ever get there?", in Curtin, G.G., Sommer, M.H. and Vis-Sommer, V. (Ed), *The World of E-government*, the Haworth Press, Inc., USA, pp. 159-184.

Australian Government, (2003), *E-government benefits study: demand for E-government*, Australian Government, available at:  
[http://www.noie.gov.au/publications/NOIE/egovt\\_benefits/demand\\_egov.htm](http://www.noie.gov.au/publications/NOIE/egovt_benefits/demand_egov.htm), (last accessed on 11 December 2003).

Bagozzi, R.P., Davis, F.D. and Warshae, P.R., (1992), "Development and test of a theory of technological learning and usage", *Human Relations*, Vol. 45, No.7, pp. 659-686.

Balogun, J. and Hailey, V.H., (1999), *Exploring Strategic Change*, Prentice Hall, England.

Bartlett, J.E., Kotrlík, J.W. And Higgins, C.C., (2001), "Organisational Research: determining appropriate sample size in survey research", *Information Technology, Learning, and Performance Journal*, Vol. 19, No.1, pp. 43-50.

Bauer, M., (1993), *Resistance to Change: a functional analysis of responses to technical change in a Swiss bank*, PhD thesis, London School of Economics, University of London, United Kingdom.

Bauer, M., (1995), "Resistance to new technology" in Bauer, M., (Ed), *Resistance to New Technology: Nuclear Power, Information Technology and Biotechnology*, Cambridge University Press, pp.1-41.

Beyer, W.H. (Ed), (1968), *CRC Handbook of Tables for Probability and Statistics (2nd edition)*, The Chemical Rubber Company, US, Ohio.

- Blau, P., (1956), *Bureaucracy in Modern Society*, Random House, New York.
- Blau, P.M. and Scott, W.R., (1963), *Formal Organisations : a Comparative Approach*, Routledge and Kegan Paul, London.
- Boisot, M., (2006), "Moving to the edge of chaos: bureaucracy, IT and the challenge of complexity", *Journal of Information Technology*, Vol. 21, pp. 239-248.
- Bouma, G.D. and Atkinson, G.B.J., (1995), *A Handbook of Social Science Research (2<sup>nd</sup> Edition)*, Oxford University Press, USA.
- Bovaird, T., (2005), "Performance measurement and evaluation of e-government and e-governance programmes and initiatives", in Khosrow-Pour, M. (Ed.), *Practicing E-government: a global perspective*, Idea Group Publishing, USA, pp. 16-42.
- Bovaird, T., (2005b), "E-government and e-governance: organisational implications, options and dilemmas", in Khosrow-Pour, M. (Ed.), *Practicing E-government: a global perspective*, Idea Group Publishing, USA, pp. 43-61.
- Bowerman, B.L. and O'Connell, R.T., (1990), *Linear Statistical Models: an applied approach (2/e)*, PWS-KENT Publishing Company, USA.
- Boyle, B. and Nicholson, D., (2003), "e-Government in New Zealand", *Journal of Political Marketing*, Vol.2, No.3/4, 2003, pp.89-105.
- Brancheau, J.C. and Wetherbe, J.C. (1990), "The adoption of spreadsheet software : testing innovation diffusion theory in the context of end-user computing", *Information System Research*, Vol. 1, No.2, pp. 115-143.
- Branson, C.M., (2008), "Achieving organisational change through value alignment", *Journal of Educational Administration*, Vol 46, No. 3, pp. 376-395.
- Brown, S.A., Massey, A.P., Montoya-Weiss. M.M. And Burkman, J.R., (2002), "Do I really have to? User acceptance of mandated technology", *European Journal of Information Systems*, Vol. 11, pp. 283-295.
- Bryman, A. (1992), "Quantitative and qualitative research: further reflections on their integration" in Seale, C. (Ed), (2004), *Social Research Methods : a Reader*, Routledge, London, pp. 505-509.

- Bryman, A., (2004), *Social Research Methods (2/e)*, Oxford University Press, US.
- Bryman, A. and Bell, E., (2003), *Business Research Methods*, Oxford University Press Inc., New York.
- Bryman, A. and Cramer, D., (1997), *Quantitative Data Analysis with SPSS for Windows : a guide for social scientists*, Routledge, USA (UST HA 32. B794, 1997, pp.237-275)
- Bunker, D., Kautz, K. and Nguyen, A.L.T., (2007), "Role of value compatibility in IT adoption", *Journal of Information Technology*, Vol. 22, pp. 69-78.
- Burn, J.M. and Martinsons, M.G. (Editors), (1997), *Information Technology and the Challenges for Hong Kong*, Hong Kong University Press, Hong Kong.
- Burn, J. and Robins, G, (2003), "Moving towards e-government: a case study of organisational change processes", *Logistics Information Management*, Vol. 16, No. 1, pp. 25-35.
- Burns, T. and Stalker, G.M., (1994), *The Management of Innovation (3<sup>rd</sup> edition)*, Oxford University Press, London.
- Burnes, B., (2000), *Managing Change: a strategic approach to organisational dynamics (3<sup>rd</sup> Edition)*, Prentice Hall.
- Burton-Jones, A. and Hubona, G.S., (2003), "The mediation of external variables in the Technology Acceptance Model", working paper, Department of Computer Information Systems, Georgia State University, available at: <http://mis.sauder.ubc.ca/members/burton-jones/PDFs/ABJ-GH-03.pdf> (last accessed: 10 December 2009).
- Calantone, R.J., Griffith, D.A. and Yalcinkaya, G., (2006), "An empirical examination of a Technology Adoption Model for the context of China", *Journal of International Marketing, AMA*, Vol. 14, No.4, pp.1-22.
- Central Cyber Government Office (CCGO) of HKSARG, Website of CCGO, available at: <http://portal.ccgohksarg/index.jsp> (last accessed: 23 June 2006).
- Chau, P.Y.K., (1996), "An empirical assessment of a modified Technology Acceptance Model", *Journal of Management Information System*, Vol. 13, No.2, pp.185-204.

Chau, P.Y.K., (1996b), "An empirical investigation on factors affecting the acceptance of CASE by systems developers", *Information & Management*, Vol. 30, pp. 269-280.

Chau, P.Y.K. and Hu, P.J.H., (2002), "Investigating healthcare professionals' decisions to accept telemedicine technology: an empirical test of competing theories", *Information & Management*, Vol. 39, pp. 297-311.

Chen, L. and Holliday, M., (1982), *Statistics for Social Scientists*, Harper & Row, London, UK.

Cheng, T.C.E., Lam, D.Y.C. and Yeung, A.C.L., (2006), "Adoption of internet banking: an empirical study in Hong Kong", *Decision Support Systems*, vol. 42, pp. 1558-1572.

Cheung, A.B.L., (1996), "Public sector reform and the re-legitimation of public bureaucratic power : the case of Hong Kong", *International Journal of Public Sector Management*, Vol. 9, No.5/6, pp.37-50.

Cheung, A.B.L., "Civil service pay reform in Hong Kong: principles, politics and paradoxes" in Cheung, A.B.L. (editor), (2005), *Public Service Reform in East Asia: reform issues and challenges in Japan, Korea, Singapore and Hong Kong*, The Chinese University Press, HK, pp.157-192.

Cheung, S.F.Y., (1998), *Human Resource Management Practice in Hong Kong : Survey Report 1998*, Hong Kong Institute of Human Resources Management, Hong Kong.

Cheung, W., Chang, M.K. and Lai, V.S., (2000), "Prediction of internet and world wide web usage at work : a test of an extended Triandis Model", *Decision Support Systems*, Vol. 30, No. 1, pp. 83-100.

Chin, W.W. And Todd, P.A., (1995) "On the use, usefulness and ease of use of structural equation modeling in MIS research: a note of caution", *MIS Quarterly*, Vol. 19, No. 2, pp. 237-246.

Cicourel, A.V., (1964), *Methods and Measurement in Sociology*, Free Press, New York.

Civil Service Bureau (CSB) of HKSARG, (2007), *Civil Service Newsletter*, Issue 69, HKSARG.

Civil Service Bureau (CSB) of HKSARG, CSB Homepage, available at:

[www.csb.gov.hk](http://www.csb.gov.hk) (last accessed: 22 May 2010).

Clark, T., (1990), "International marketing and national character: a review and proposal for an integrative theory", *Journal of Marketing*, Vol. 54, No. 4, pp. 67-79.

Clegg, F., (1990), *Simple Statistics*, Cambridge University Press, Cambridge

Collis, J. and Hussey, R., (2003), *Business Research : a practical guide for undergraduate and postgraduate students (2nd edition)*, Palgrave Macmillan, Great Britain.

Commerce, Industry and Technology Bureau (CITB) of HKSARG, (2004), *Digital 21 Strategy : Sustainability and Opportunities*, HKSARG.

Converse, J.M. and Presser, S., (1990), *Survey Questions : handcrafting the standardized questionnaire (7th edition)*, Sage Publication, USA.

Cooper, D.R. and Schindler, P.S. (2003), *Business Research Methods*, McGraw Hill.

Cordella, A., (2007), "E-government: towards the e-bureaucratic form", *Journal of Information Technology*, Vol. 22, Issue 3, pp.265-275.

Cronbach, J.L., (1951), "Coefficient alpha and the internal structure of tests". *Psychometrika*, Vol. 16, pp.297-334.

Culnan, M.J. and Markus, M.L., (1987), "Information technologies" in Jablin, F.M., Roberts, K.H., Putnam, L.L. and Porter, L.W. (Ed), *Handbook of Organisational Communication : an Inter-disciplinary perspective*, Saga Publications, Newbury Park, pp. 420-443.

Curtin, G.G., Sommer, M.H. and Vis-Sommer, V., (2003), "The world of e-government", *Journal of Political Marketing*, Vol. 2, No.3/4, pp.1-16.

Davidson, R.M., Wagner, C. and Ma, L.C.K., (2005), "From government to e-government : a transition model", *Information Technology & People*, Vol. 18, No.3, pp. 280-299.

Davis, F.D. (1989), "Perceived usefulness, perceived ease of use and user acceptance of information technology", *MIS Quarterly*, Vol. 13, pp. 319-339.

Davis, F.D., (1993), "User acceptance of information technology : system characteristics, user perceptions and behavioral impacts", *International Journal of Man-Machine Studies*, Vol. 38, pp. 475-487.

Davis, F.D., Bagozzi, R.P. and Warshaw, P.R., (1989), "User Acceptance of computer technology : a comparison of two theoretical models", *Management Science*, Vol. 35, No. 8, pp.982-1003.

Davis, F.D., Bagozzi, R.P. and Warshaw, P.R., (1992), "Extrinsic and intrinsic motivation to use computers in the workplace", *Journal of Applied Social Psychology*, Vol. 22, pp. 1111-1132.

Davis, F.D. and Venkatesh, V., (1996), "A critical assessment of potential measurement biases in the TAM: three experiments", *International Journal of Human-Computer Studies*, Vol. 45, pp. 19-45.

de Vaus, D., (2002), *Analyzing Social Science Data: 50 key problems in data analysis*, Sage Publications, Great Britain.

Del Aguila Obra, A.R., Camara, S.B. and Melendez, A.P., (2002), "Internet usage and competitive advantage: the impact of the internet on an old economy industry in Spain", *Internet Research*, Vol. 12, Issue 5, pp. 391-401.

del Val, M.P. and Fuentes, C.M., (2003), "Resistance to change: a literature review and empirical study", *Management Decision*, Vol. 41, No. 2, pp. 148-155.

Deloitte Research, (2000), *At the Dawn of E-government: The citizen as customer*, available at: <http://www.egov.vic.gov.au/pdfs/e-government.pdf> (last accessed: 3 November 2002).

Delone, W.H. (1988), "Determinants of success for computer usage in small business", *MIS Quarterly*, Vol. 12, No.1, pp. 51-61.

Devadoss, P.R., Pan, S.L. and Huang, J.C., (2002), "Structural analysis of e-government initiatives: a case study of SCO", *Decision Support Systems*, Vol. 34, pp.253-269.

Dillman, D.A., (1978), *Mail and Telephone Surveys the Total Design Method*, John Wiley and Sons, New York.

Dishaw, M.T. and Strong, D.M., (1999), "Extending the technology acceptance model



with task-technology fit constructs”, *Information and Management*, Vol. 36, pp. 9-21.

Drafke, M.W. and Kossen, S., (1998), *The Human Sides of Organisations (7<sup>th</sup> Edition)*, Addison Wesley Longman, US.

Drucker, P.F., (1992), *The Age of Discontinuity*, Transaction Publishers, USA.

Drucker, P.F., (1995), *Managing in a Time of Great Change*, Truman Talley Books, USA.

Drucker, P.F., (1999), *Management Challenges for the 21<sup>st</sup> Century*, Harper Business, New York.

Drucker, P.F., (2002), *Managing in the Next Society*, Truman Talley Books, New York.

Du Gay, P., (2005), *The Values of Bureaucracy*, the Oxford University Press, UK.

Dunleavy, P., Margetts, H., Bastow, S. and Tinkler, J., (2006), *Digital Era Governance: IT Corporations, the State and E-government*, Oxford University Press, New York USA.

Ebrahim, Z. and Irani, Z., (2005), “e-government adoption: architecture and barriers”, *Business Process Management Journal*, Vol. 11, No.5, pp. 589-611.

Elder, V.B. et al. (1987), “Gender and age in technostress : effect on white-collar productivity”, *Government Finance Review*, Vol. 3, No. 6, pp. 17-21.

Esteves, J. and Joseph, R.C., (2008), “A comprehensive framework for the assessment of e-government projects”, *Government Information Quarterly*, Vol. 25, pp. 118-132.

Evans, G. (2003), *Implementing e-Government: an executive report for civil servants and their advisors*, Gower Publishing Limited, Hampshire, England.

Fazio, R.H., (1988), “On the power and functionality of attitudes : the role of attitude accessibility” in Partkanis, A.R., et. al, (Eds), *Attitude Structure and Function*, Lawrence Erlbaum Associates Publishers, NJ.

Ferlie, E., Pettigrew, A., Ashburner, L. and Fitzgerald, L., (1996), *The New Public Management Action*, Oxford University Press, UK.

Field, A., (2005), *Discovering Statistics Using SPSS (2/e)*, Sage Publications, Great

Britain.

Fishbein, M. and Ajzen, I., (1975), *Belief, Attitude, Intention, and Behavior: an introduction to theory and research*, Reading, MA: Addison-Wesley.

Ford, J.D. And Ford, L.W., (2009), "Decoding resistance to change", *Harvard Business Review*, April 2009, pp. 99-103.

Ford, J.D., Ford, L.W. and D'Amelio, A, (2008), "Resistance to change: the rest of the story", *Academy of Management Review*, Vol. 33, No.2, pp. 362-377.

Foster, J.J., (1998), *Data Analysis Using SPSS for Windows*, Sage Publication, Great Britain.

Fowler, F.J., Jr., (1995), *Improving Survey Questions: design and evolution*, Sage Publication, USA.

Friedlander, A., (2000), *Is Digital Government Good Government?*, available at: [www.cisp.org/imp/october\\_2000/10\\_00editorial.htm](http://www.cisp.org/imp/october_2000/10_00editorial.htm), (last accessed 15 May 2003)

Futrell, D. (1994), "Ten reasons why survey fail", *Quality Progress*, April 1994.

Gefen, D. and Straub, D.W., (1997), "Gender difference in the perception and use of email: an extension of the Technology Acceptance Model", *MIS Quarterly*, Vol. 21, No. 4, pp. 389-400.

Gefen, D., Karahanna, E. and Straub, D.W., (2003), "Inexperience and experience with online stores: the importance of TAM and trust", *IEEE Transactions on Engineering Management*, Vol. 50, No. 3, pp.307-321.

Gefen, D. and Keil, M., (1998), "The impact of developer responsiveness on perceptions of usefulness and ease of use : an extension of the technology acceptance model", *The DATABASE for Advances in Information Systems*, Vol. 29(2), pp. 35-49.

Ghalib, A., (2002), *Automating Public Sector Bank Transactions in South Asia (an e-Government for Development Case Study, Institute for Development Policy and Management, University of Manchester)*, available at: [www.egov4dev.org/bankauto.htm#title](http://www.egov4dev.org/bankauto.htm#title) ( last accessed: 11 April 2006 )

Ghobadian, A., Speller, S. and Jones, M. (1993), "Service Quality : Concepts and

Models”, *International Journal of Quality and Reliability Management*, Vol. 11, No.9, 1994, pp.43-66.

Gilbert, C.G., (2005), “Unbundling the structure of inertia : resource versus routine rigidity”, *Academy of Management Journal*, 2005, vol. 48, No. 5, pp. 741-763

Goode, S. and Sterens, K., (2000), “An analysis of the business characteristics of adopters and non-adopters of world wide web technology”, *Information Technology and Management*, Vol. 1(1-2), pp. 129-154.

Goodwin, N.C., (1987), “Functionality and usability”, *Communication of the ACM*, Vol. 30, Issue 3, pp. 229-233.

Greasley, K., Watson, P. and Patel, S., (2009), “The impact of organisational change on public sector employees implementing the UK Government's 'Back to Work' programme”, *Employee Relationship*, Vol. 31, No. 4, pp. 382-397

Hair, J.F., Anderson, R.E., Tatham, R.L., and Black, W.C., (1998), *Multivariate Data Analysis with Readings (5/e)*, Prentice Hall, NJ, USA.

Harris, P., (1988), *Hong Kong : A Study in Bureaucracy and Politics*, Macmillan Hong Kong.

Harrison, A.W. and Rainer, R.K., Jr., (1993), “The influence of individual differences on skill on end-user computing”, *Journal of Management Information Systems*, Vol. 9, No.1, pp. 93-111.

Hayllar, M.R., “Outsourcing: enhancing private sector involvement in public sector services provision in Hong Kong”, in Cheung, A.B.L. (editor), (2005), *Public Service Reform in East Asia: reform issues and challenges in Japan, Korea, Singapore and Hong Kong*, The Chinese University Press, HK, pp. 193-230.

Hedge, J.W. and Pulako, E.D., (2002), “Grappling with implementation: some preliminary thoughts and relevant research” in Hedge, J.W. and Pulakos, E.D. (Ed.), *Implementing Organisational Intervention*, Jossey-Bass, San Francisco, CA, pp. 1-11.

Heijden, H. van der, (2003), “Factors influencing the usage of websites : the case of a generic portal in the Netherlands”, *Information and Management*, Vol. 40, pp. 541-549.

Heinssen, R.K., Glass, C.R. and Knight, L.A., (1987), “Assessing computer anxiety :

development and validation of the computer anxiety rating scale”, *Computer in Human Behavior*, Vol. 3, pp.49-59.

Hendrickson, A.R., Massey, P.D. and Cronan, T.P., (1993), “On the test-retest reliability of perceived usefulness and perceived ease of use scales”, *MIS Quarterly*, Vol. 17, No. 2, pp. 227-230.

Henriksen, H.Z. And Damsgaard, J., (2007). “Dawn of e-government – an institutional analysis of seven initiatives and their impact”, *Journal of Information Technology*, Vol. 22, pp. 13-23.

Heracleous, L. and Johnston, R., (2009), “Can business learn from the public sector?”, *European Business Review*, Vol. 21, No. 4, pp. 373-379

Hirschman, E.C. and Holbrook, M.B., (1982), “Hedonic consumption: emerging concepts, methods and propositions”, *Journal of Marketing*, Vol 46, pp. 92-101.

HKU POP, (2004), *Questionnaire Survey on Professional Accountants’ views on Constitutional Reform*, available at: <http://hkupop.hku.hk/english/archive/report/accountant04/index.htm> (last accessed: 13 April 2007).

Ho, A.T, (2002), “Reinventing local governments and the e-government initiative”, *Public Administration Review*, Vol. 62, No. 4, pp.434-445

Hoecklin, L., (1995), *Managing Cultural Differences: Strategies for Competitive Advantage*, Addison-Wesley, Cambridge.

Hofstede, G., (1993), “Cultural constraints in management theories”, *Academy of Management Executive*, Vol. 7, pp. 81-94

Hoggett, P., (2005) in Du Gay, P. (editor), *A Service to the Public: the containment of ethical and moral conflicts by public bureaucracies*, the Oxford University Press, UK.

Hong Kong General Chamber of Commerce (HKGCC), (2006), *HKGCC Business Prospects Survey reveals companies remain upbeat for 2007*, available at: [www.chamber.org.hk/info/press\\_release/press\\_release\\_template.asp?id=2590&txt\\_kw=](http://www.chamber.org.hk/info/press_release/press_release_template.asp?id=2590&txt_kw=), (last accessed: 7 September 2009)

Hood, C.C., (1995), “The New Public Management in the 1980s: variation on a

theme”, *Accounting, Organisation and Society*, Vol. 20, Issue 2/3, pp. 93-109.

Horton, R.P., Buck, T., Waterson, P.E. And Clegg, C.W., (2001), “Explaining intranet use with the technology acceptance model”, *Journal of Information Technology*, Vol. 16, No. 4, pp.237-249.

Hudson, K.M., (2001), “Transforming a conservative company – one laugh at a time” in *Harvard Business Review on Culture and Change* (2002), Harvard Business School Publishing Corporation, USA, pp. 107-124.

Hummel, R.P., (1994), *The Bureaucratic Experience: a critique of life in the modern organisation (4/e)*, St Martin Press Inc., New York.

Huque, A.S. And Vyas, L., (2004), *Public Service in a Globalized World: central training institutes in India and Hong Kong*, Ashgate, Aldershot, UK

Hwang, Y., (2005), “Investigating enterprise systems adoption: uncertainty avoidance, intrinsic motivation and the technology acceptance model”, *European Journal of Information Systems*, Vol. 14, pp. 150-161.

Igbaria, M. (1990), “End-user computing effectiveness : a structural equation model”, *Omega International Journal of Management Science*, Vol. 18, No. 6, pp.637-652.

Igbaria, M. (1993), “User acceptance of microcomputer technology : an empirical test”, *Omega International Journal of Management Science*, Vol. 21, No. 1, pp. 73-90.

Igbaria, M., Schiffman, S.J. and Wieckowski, T.J., (1994), “The respective roles of perceived usefulness and perceived fun in the acceptance of microcomputer technology”, *Behavior and Information Technology*, Vol. 13, No. 6, pp. 349-361.

Igbaria, M., Iivari, J. And Maragahh, H., (1995), “Why do individuals use computer technology? A Finnish case study”, *Information and Management*, Vol. 29, No. 5, pp. 227-238.

Igbaria, M., Zinatelli, N., Cragg, P. and Cavaye, A., (1997), “Personal computing acceptance factors in small firms : a structural equation model”, *MIS Quarterly*, pp. 279-302.

Information Technology and Broadcasting Bureau (ITBB) of HKSARG, (1998), *HKSAR Information Technology Strategy : Digital 21*, HKSARG, Hong Kong.

Information Technology and Broadcasting Bureau (ITBB) of HKSARG, (1999), *1999 Policy Address : Information Technology*, HKSARG, Hong Kong.

Information Technology and Broadcasting Bureau (ITBB) of HKSARG, (2001), *Hong Kong Digital 21 Strategy : Connecting the World*, HKSARG, Hong Kong.

Irani, Z., Love, P.E.D. And Montazemi, A., (2007), “e-government: past, present and future”, *European Journal of Information Systems*, Vol. 16, pp. 103-105

Jackson, C.M, Chow, S. and Leitch, R.A., (1997), “Toward an understanding of behavioral intention to use an information system”, *Decision Sciences*, Vol. 28(2), pp. 357-389.

Jackson, D. and Humble, J. (1994), “Service excellence – the role of information technology”, *Managing Service Quality*, Vol. 4, No.4, pp.36-40.

Jain, A., (2004), *Using the lens of Max Weber's Theory of Bureaucracy to examine e-Government Research* in 37th Hawaii International Conference on System Sciences – 2004, available at: <http://csdl2.computer.org/comp/proceedings/hicss/2004/2056/05/205650127c.pdf> (Last accessed : 17 April 2006 ).

Jensen, T.B. and Aanestad, M., (2007), “How healthcare professionals “make sense” of an electronic patient record adoption”, *Information Systems Management*, Vol. 24, No.1, pp. 29-42.

Jiang, J.J., et al., (2000), “e-commerce user behavior model: an empirical study”, *Human Systems Management*, Vol. 19, No.4, pp. 265-276.

Joyce, S., David, A. and Irwin, M., (2001), *Organisational Behavior : an Experimental Approach (7<sup>th</sup> Edition)*, Prentice Hall, New Jersey.

Jupp, V., (2003), “Realizing the vision of e-Government”, *Journal of Political Marketing*, Vol.2, No.3/4, pp.129-145.

Kamal, M.M., (2006), “IT innovation adoption in the government sector: identifying the critical success factor”, *Journal of Enterprise Information Management*, Vol. 19, No. 2, pp. 192-222.

Karahanna, E., Straub, D.W. and Chervany, N.L., (1999), "Information technology adoption across time : a cross-sectional comparison of pre-adoption and post-adoption beliefs", *MIS Quarterly*, Vol. 23, No.2, pp. 183-213.

Kiessling, T.S. And Richey, R.G., (2004), "Examining the theoretical inspirations of a management guru: Peter F. Drucker and the Austrian School of Economics", *Management Decision*, Vol. 42, No. 10, pp. 1269-1283.

King, N. and Anderson, N., (2002), *Managing Innovation and Change: a critical guide for organisations*, Thomson, Great Britain.

King, W.R. and He, J., (2006), "A meta-analysis of the technology acceptance model", *Information and Management*, Vol 43, pp.740-755.

Kiraz, E. and Ozdemir, D., (2006), "The relationship between educational ideologies and technology acceptance in per-service teachers", *Educational Technology & Society*, Vol. 9, No. 2, pp. 152-165.

Kirk, J. and Miller, M.L., (1986), *Reliability and Validity in Qualitative Research*, Sage Publications, Beverly Hills.

Kluckhohn, C., (1951), *The Study of Culture*, Stanford University Press, Stanford.

Koga, T., (2003), "Access to government information in Japan: a long way toward electronic government?", *Government Information Quarterly*, Vol. 20, pp. 47-62.

Kotter, J.P., (1996), *Leading Change*, Harvard Business School Press, Boston, US.

Kotter, J.P. and Cohen, D.S., (2002), *The Heart of Change : Real-life Stories of How People Change Their Organisations*, Harvard Business School, Boston.

Kotter, J.P. and Schlesinger, L.A., (2008), "Choosing strategies for change", *Harvard Business Review*, Issue July-August, pp. 130-139, Harvard University, Boston.

Kubo, S. and Shimada, T., (2007), "Local e-governments in Japan: IT utilization status and directions" in Al-Hakim, L. (Ed), *Global E-government: theory, applications and benchmarking*, Idea Group Publishing, USA, pp. 300-318.

Kulviwat, S., Brunner II, G.C. and Neelankavil, J.P., (2006), *Self-efficacy as an antecedent of cognition and affect in technology acceptance*, working paper,

Department of Marketing and International Business, Frank G. Zarb School of Business, Hofstra University, available at: [www.hofstra.edu/pdf/BIZ\\_mlc\\_workingpaper11.pdf](http://www.hofstra.edu/pdf/BIZ_mlc_workingpaper11.pdf) (last accessed: 22 October 2006).

Lallmahamood, M., (2007), "An examination of individual perceived security and privacy of the internet in Malaysia and the influence of this on their intention to use e-commerce using an extension of the Technology Acceptance Model", *Journal of Internet Banking and Commerce*, Vol. 12, No.3, available at: [www.arraydev.com/commerce/jibc](http://www.arraydev.com/commerce/jibc) (last accessed 16 August 2008).

Lam, J.T.M. and Lee, J.C.Y., (1994), *Administrative Culture of the Hong Kong Civil Servants*, City Polytechnic University, Hong Kong.

Lau, S.K., (1982), *Society and Politics in Hong Kong*, The Chinese University Press, Hong Kong.

Lawrence, P.R., (1954), "How to deal with resistance to change", *Harvard Business Review*, Issue May/June, pp. 49-57.

Layne, K. and Lee, J. (2001), "Developing fully functional e-government : A four stage model", *Government Information Quarterly*, Vol. 18, pp.122-136.

Lazer, D., (2002), "How to Maintain Innovation.gov in a Networked World? (Prepared for the Digital Government Workshop at the Kennedy School of Government)", Harvard University, available at: [www.ksg.harvard.edu/cbg/dgworkshop/lazer.pdf](http://www.ksg.harvard.edu/cbg/dgworkshop/lazer.pdf) (last accessed: 22 March 2006).

Lederer, A.L., Maupin, D.J., Sena, M.P. and Zhuang, Y., (2000), "The technology acceptance model and the world wide web", *Decision Support Systems*, Vol. 29, pp. 269-282.

Lee, J.C.Y., (1996), "The civil service" in Cheng, J.Y.S. and Lo, S.S.H. (editors), (1996), *From Colony to SAR: Hong Kong's Challenges Ahead*, The Chinese University Press, Hong Kong, pp. 39-50.

Lee, Y, Kozar, K.A. and Larsen, K.R.T., (2003), "The Technology Acceptance Model : past, present and future", *Communications of the Association for Information Systems*, Vol. 12, Article No. 50, pp. 752-780.



Legge, K. (1995), *Human Resource Management : Rhetorics and Reality*, Macmillan Business, Basingstoke.

Legris, P., Ingham, J. and Collerette, P., (2003), "Why do people use information technology? A critical review of the Technology Acceptance Model", *Information and Management*, Vol. 40, No. 3, pp. 191-204.

Lehaney, B, Clarke, S., Kimberlee, V. and Spencer-Matthews, S., (2002), "The human side of information systems development : a case of an intervention at a British visitor attraction" in Szewczak, E. and Snodgrass, C. (Ed), *Human Factors in Information Systems*, IRM Press, UK, pp. 31-44.

Leung, A.S.M. and Clegg, S.R., (2001), "The career motivation of female executives in the Hong Kong public sector", *Women in Management Review*, Vol. 16, No. 1, pp. 12-20.

Leung, B.K.P., (1996), *Perspectives on Hong Kong Society*, Oxford University Press, US, New York.

Lewin, K., (1936), *Principles of Topological Psychology*, McGraw Hill, New York.

Lightner, N., (1996), "What is wrong with world wide web: a diagnosis of some problems and prescription of some remedies", *Ergonomics*, Vol. 39, No. 8, pp. 995-1004.

Lim, S.S. and Leng, L.Y., (2003), "e-Government in action : Singapore case study", *Journal of Political Marketing*, Vol. 2, No.3/4, pp. 19-30.

Lippert, S.K. and Volkmar, J.A., (2007), "Cultural effects on technology performance and utilization: a comparison of US and Canadian users", *Journal of Global Information Management*, Vol. 15, No.2, pp. 56-90.

Lu, H.P. and Gustafson, D.H., (1994), "An empirical study of perceived usefulness and perceived ease of use on computerized support system use over time", *International Journal of Information Management*, Vol. 14, No. 5, pp. 317-329.

Lu, H.P., Hsu, C.L. and Hsu, H.Y., (2005), "An empirical study of the effect of perceived risk upon intention to use online applications", *Information Management & Computer Security*, Vol. 13, No. 2, pp. 106-120.

Lu, J., et. al., (2003), "Technology Acceptance Model for wireless internet", *Internet Research : Electronic Networking Application and Policy*, Vol. 13, No. 3, pp. 206-222.

Lucas, H.C. and Spittler, V.K., (1999), "Technology use and performance: a field study of broker workstations", *Decision Sciences*, Vol. 30, No. 2, pp. 291-311.

Lui, T.T., (1984), "Recruitment and selection", in Scott, I. And Burns, J.P. (Ed), *The Hong Kong Civil Service : Personnel Policies and Practices*, Hong Kong Oxford University Press, Hong Kong.

Lui, T.T., (1988), "Changing Civil Servants' Values" in Scott, I. and Burns, J.P. (Ed), *The Hong Kong Civil Service and Its Future*, Oxford University Press, Hong Kong.

Mackie, B., (2008), "Organisational performance management in a government context: a literature review", Scottish Government Social Research, available at: <http://www.scotland.gov.uk/Publications/2008/08/25142353/0>, (last accessed 12 May 2010)

Malhotra, Y. and Galletta, D.F., (1999), "Extending the Technology Acceptance Model to account for social influence: theoretical bases and empirical validation", Proceedings of the 32nd Hawaii International Conference on System Sciences – 1999, IEEE, available at <http://www.brint.org/technologyacceptance.pdf> (last accessed: 5 October 2007)

Manuela Pardo del Val and Clara Martinez Fuentes, (2003), "Resistance to change: a literature review and empirical study", *Management Decision*, Vol. 41, Issue 1/2, pp. 148-155.

Margetts, H. (1999), *Information Technology in Government: Britain and America*, Routledge, Great Britain.

Martinsons, M.G., (1997), "Business Process Change Enabled by Information Technology" in Burn, J.M. and Martinsons (eEd, *Information Technology and the Challenges for Hong Kong*, Hong Kong University Press, Hong Kong.

Mathieson, K., (1991), "Predicting user intentions : Comparing the technology acceptance model with the theory of planned behavior", *Information Systems Research*, Vol. 3, No. 3, pp.173-191.

Mathieson, K., Peacock, E. and Chin, W.W., (2001), "Extending the Technology

Acceptance Model: the influence of perceived user resources”, *Database for Advances in Information Systems*, Vol. 32, No. 3, pp. 86-112.

Maurer, R., (1996), “Using resistance to build support for change”, *The Journal for Quality and Participation*, Vol. 19, No. 3, pp.56-66.

May, T., (2001), *Social Research : Issues, Methods and Process (3/e)*, Open University Press, UK. <ST 307.2 May>

McClure, D.L., (2000), “Statement of general accounting office to subcommittee on government management”, Information and Technology of the Committee on Government Reform, House of Representatives, available at: [www.gao.com](http://www.gao.com) (last accessed: 16 August 2003).

McCoy, S., Galletta, D.F. and King, W.R., (2007), “Applying TAM across cultures: the need for caution”, *European Journal of Information Systems*, VOL. 16, pp. 81-90

McIvor, R., McHugh, M. and Cadden, C. (2002), “Internet technologies : supporting transparency in the public sector”, *The International Journal of Public Sector Management*, Vol. 15, No. 3, pp. 170-187.

McKenney, J.L., Doherty, V.S. and Sviokla, J.J., (1986), “The impact of electronic networks on management communications : an information processing study”, working paper of Harvard Business School

Melone, N.P., (1990), “A theoretical assessment of the user-satisfaction construct in information systems research”, *Management Science*, 36(1), 1990, pp.76-91.

Mendenhall, W., Reinmuth, J.E. and Beamer, R.J., (1993), *Statistics : for Management and Economics (7/e)*, Duxbury Press, California.

Merchant, S., (2007), “Exploring the influence of cultural values on the acceptance of information technology: an application of the Technology Acceptance Model”, *Issues in Informing Science and Information Technology*, Vol. 4, pp. 431-443.

Merton, R.K., (1940), “Bureaucratic structure and personality”, *Social Forces*, Vol. 18, No.4, May 1940, pp.560-568.

Merton, R.K., (1957), *Social Theory and Social Structure*, Free Press, Glencoe.

Merton, R.K., (1976), *Sociological Ambivalence and Other Essays*, Free Press, New York.

Miles, M.B. and Huberman, A.M., (1994), *Qualitative Data Analysis (2/e)*, Sage Publications, Newbury Park.

Mintzberg, H., (1979), *The Structuring of Organisations : a Synthesis of the Research*, Englewood Cliffs, NJ : Prentice Hall Inc.

Moon, J.M. and Kim, Y.G., (2001), "Extending the TAM for a world-wide-web context", *Information and Management*, 38, 2001, pp.217-230.

Morris, M.G. and Venkatesh, V., (2000), "Age differences in technology adoption decisions: implications for a changing workforce", *Personnel Psychology*, Vol. 53, No. 2, pp. 375-403.

Muczyk, J.P. and Saber, H., (2001), Gaining competitive advantage by streamlining bureaucracy: a lesson for developing countries, *Journal of Comparative International Management*, Vol. 4, No. 1, available at: [http://www.lib.unb.ca/Texts/JCIM/vol4\\_1/contents.htm](http://www.lib.unb.ca/Texts/JCIM/vol4_1/contents.htm) (last accessed 22 May 2006).

National Opinion Research Centre and University of Chicago, (1993), *General Social Surveys 1972-1993 Cumulative Codebook, Issue : August 1993*, National Opinion Research Centre, USA.

Ndubisi, N.O. and Jantan, M., (2003), "Extending IS usage in Malaysian small and medium-sized firms using the Technology Acceptance Model", *Logistics Information Management*, Vol. 16, No. 6, pp. 440-450.

No specified author, (2002), "A Single Personnel Information System for a Southern African Government", e-Government for Development Case Study, Institute for Development Policy and Management, University of Manchester, available at: [www.egov4dev.org/centralpersis.htm#title](http://www.egov4dev.org/centralpersis.htm#title) (last accessed : 10 April 2006 )

No specified author, (2002), "Challenges to Management Information Systems in Nigerian Universities", e-Government for Development Case Study, Institute for Development Policy and Management, University of Manchester, available at: [www.egov4dev.org/misuniv.htm#title](http://www.egov4dev.org/misuniv.htm#title) ( last accessed : 10 April 2006)

No specified author, (2003), "An integrated Information System for Defense Force Management in the Middle East", e-Government for Development Case Study, Institute for Development Policy and Management, University of Manchester, available at: [www.egov4dev.org/defenceiis.htm#title](http://www.egov4dev.org/defenceiis.htm#title) ( last accessed : 10 April 2006 )

Nunnally, J.C. (1978), *Psychometric Theory (2/e)*, McGraw Hill, New York.

Office of Management and Budget (OMB) of USA, (2002), *E-government Strategy: simplified delivery of services to citizens*, OMB, USA, available at: <http://www.whitehouse.gov/omb/inforeg/egovstrategy.pdf>, (last accessed 10 September 2009)

O'Leary, Z., (2004), *The Essential Guide to Doing Research*, Sage Publication.

Olivier, K.T., (2002), "Problems in Computerizing the Ministry of Foreign Affairs", e-Government for Development Case Study, Institute for Development Policy and Management, University of Manchester, 2002, available at: [www.egov4dev.org/mofa.htm#title](http://www.egov4dev.org/mofa.htm#title) (last accessed : 15 April 2006 )

Olivier, K.T., (2003), "Integrated Information System for Trade at Douala Autonomous Port", e-Government for Development Case Study, Institute for Development Policy and Management, University of Manchester, available at: [www.egov4dev.org/doualatrade.htm#title](http://www.egov4dev.org/doualatrade.htm#title) (last accessed : 10 April 2006 )

Olivier, K.T., (2003b), "Starting Up the Cameroon Department of Tax's Website", e-Government for Development Case Study, Institute for Development Policy and Management, University of Manchester, available at: [www.egov4dev.org/camtax.htm#title](http://www.egov4dev.org/camtax.htm#title) ( last accessed : 11 April 2006 )

Osborne, D. and Gaebler, T., (1992), *Reinventing Government: how the entrepreneurial spirit is transforming the public sector*, Addison-Wesley, MA.

Ostroff, F., (2006), "Change management in government", *Harvard Business Review*, May 2006, Harvard Business School Publishing, pp.141-147.

Ozen, S., (1993), "Political and administrative attitudes of Turkish bureaucrats: an explanatory framework for change and stability", *Turkish Public Administration Annual*, Vol. 17, pp. 17-37.

Parasuraman, A., Zeithaml, V.A. and Berry, L.L., (1985), "A conceptual model for

service quality and its implications for future research”, *Journal of Marketing*, Vol. 49, Autumn 1985, pp 41-50.

Pijpers, G.G.M., Bemelmans, T.M.A., Heemstra, F.J. And van Montfort, K.A.G.M., (2001), “Senior executives’ use of information technology”, *Information and Software Technology*, 43, 2001, pp. 959-971.

Pollitt, C. and Summa, H., (1997), “Trajectories of reform: public management change in four countries”, *Public Money and Management*, January to March, pp. 7-17.

Price Waterhouse Change Integration Team, (1995), *Better Change: Best Practices for Transforming Your Organisation*, Irwin Professional Publishing, New York.

Qureshi, S. and Hoppel, C. (1995), “Profiling computer predispositions”, *Journal of Professional Services Marketing*, Vol. 12, No.1, pp 73-83.

Rashid, M.Z.A., Sambasivan, M. and Rahman, A.A., (2004), “The influence of organisational culture on attitudes toward organisational change”, *The Leadership and Organisational Development Journal*, Vol. 25, No.2, pp. 161-179.

Rivard, S. and Huff, S., (1988), “Factors of success for end-user computing”, *Communication of ACM*, 31(5), pp.552-561.

Robbins, S.P., (1990), *Organisation Theory : Structure, Design and Applications (3/e)*, Prentice Hall, New Jersey.

Robbins and Barnwell, (1998), *Organisational Theory (3rd Edition)*, Prentice Hall, Australia.

Roberts, P. and Henderson, R., (2000), “Information Technology acceptance in a sample of government employees: A test of the Technology Acceptance Model”, *Interacting with Computers*, 12(5), pp. 427-443.

Rohlf, F.J. and Sokal, R.R., (1995), *Statistical Tables (3/e)*, W.H. Freeman and Company, New York.

Roy, J., (2001), “E-governance & digital government in Canada: the necessity of both structural and cultural transformation” in Schmid, B., et al (Ed), *Towards the E-society, E-business and E-government*, Kluwer Academic Publishers, USA, pp. 845-857.

Rumelt, R.P., (1995), "Inertia and transformation", in Montgomery, C.A., *Resource-based and Evolution Theories of the Firm*, Kluwer Academic Publishers, Massachusetts, pp. 101-132.

Sarker, A.E., (2006), "New public management in developing countries: an analysis of success and failure with particular reference to Singapore and Bangladesh", *International Journal of Public Sector Management*, Vol. 19, No. 2, pp. 180-203.

Scott, I., (1988), "Generalists and specialists", in Scott, I. and Burns, J.P. (Ed), *The Hong Kong Civil Service and Its Future*, Oxford University Press, Hong Kong.

Scott, I., (2005), *Public Administration in Hong Kong: Regime change and its impact on the public sector*, Marshall Cavendish Academic, Singapore

Scott, I. and Burns, J.P (editors), (1984), *The Hong Kong Civil Service : Personnel Policies and Practices*, Oxford University Press, Hong Kong

Scott, I. and Burns, J.P. (editors), (1988), *The Hong Kong Civil Service and Its Future*, Oxford University Press, Hong Kong

Segars, A.H. and Grover, V., (1993), "Re-examining perceived ease of use and usefulness: a confirmatory factor analysis", *MIS Quarterly*, vol.17, no.4, pp. 517-525.

Selim, H.M., (2003), "An empirical investigation of student acceptance of course websites", *Computers & Education*, 40, 2003, pp. 343-360.

Selmer, J. and Corinna de Leon, (1992), *Consistency of Chinese Work-related Values : Middle Managers in Hong Kong, Singapore and Thailand (Working Paper)*, Hong Kong Baptist College, Hong Kong.

Selznick, P., (1949), *TVA and the Grass Roots*, University of California Press, Berkeley.

Seyal, A.H. and Rahman, N.A., (2007), "The influence of external variables on the executives' use of the internet", *Business Process Management Journal*, Vol. 13, No. 2, pp. 263-278.

Sharma, A., (1999), "Central dilemmas of managing innovation in large firms", *California Management Review*, Vol. 31, No. 3, pp. 146-164.

Sheatsley, P.B., (1983), "Questionnaire construction and item writing", in Rossi, P.H.,

Wright, J.D. and Anderson, A.B. (editors), *Handbook of Survey Research*, Academic Press Inc (London) Limited, London, pp. 195-230.

Sheehan, K., (2001), "Email survey response rates : a review", *Journal of Computer-Mediated Communication*, vol. 6, No.2, Article No.3, available at: <http://jcmc.indiana.edu/vol6/issue2/sheehan.html> (last accessed 10 April 2007)

Sheehan, K.B. and Hoy, M.G., (1999), "Using email to survey internet users in the United States : methodology and assessment", *Journal of Computer-Mediated Communication*, vol. 4, No. 3., Article No. 6, available at: <http://jcmc.indiana.edu/vol4/issue3/sheehan.html> (last accessed 10 April 2007)

Siddiquee, N.A., (2010), "Managing for results: lessons from public management reform in Malaysia", *International Journal of Public Sector Management*, Vol. 23, No. 1, pp. 38-53.

Sinha, M.N. (1999), "Gaining perspectives : the future of TQM in public sectors", *The TQM Magazine*, Volume 11, Number 6, pp. 414-418.

Sotirakou, T. and Zeppou, M., (2006), "Utilizing performance measurement to modernize the Greek public sector", *Management Decision*, Vol. 44, No. 9, pp. 1277-1304.

Sozen, S. and Shaw, I., (2002), "The international applicability of "new" public management: lessons from Turkey", *The International Journal of Public Sector Management*, Vol. 15, No. 6, pp. 475-486.

Spacey, R., Goulding, A. and Murray, I., (2004), "Exploring the attitudes of public library staff to the internet using the TAM", *Journal of Documentation*, Vol. 60, No. 5, pp. 550-564.

Straub, D., (1994), "The effect of culture on IT diffusion: e-mail and fax in Japan and the US", *Information Systems Research*, Vol. 5, No.1, pp. 23-47.

Straub, D., Limayem, M. and Karahanna-Evaristo, E., (1995), "Measuring system usage : implications for IS theory testing", *Management Science*, 41(8), pp. 1328-1342.

Straub, D., Keil, M and Brenner, W., (1997), "Testing the Technology Acceptance Model across cultures: a three country study", *Information and Management*, Vol 33, pp. 1-11.



Strebel, P., (1994), "Choosing the right change path", *California Management Review*, Vol. 36, No. 2, pp. 29-51.

Styhre, A., (2007), *The Innovative Bureaucracy: bureaucracy in an age of fluidity*, Routledge, USA.

Srite, M., Thatcher, J.B. and Galy, E., (2008), "Does within-culture variation matter? An empirical study of computer usage", *Journal of Global Information Management*, Vol. 16, Issue 1, pp. 1-25.

Sudman, S., (1983), "Applied sampling", in Rossi, P.H., Wright, J.D. and Anderson, A.B. (editors), (1983), *Handbook of Survey Research*, Academic Press Inc (London) limited, London, pp. 145-192.

Sun, H. and Zhang, P., (2006), "The role of moderating factors in user technology acceptance", *International Journal of Human-Computer Studies*, Vol. 64, pp. 53-78.

Szajna, B., (1994), "Software evaluation and choice predictive validation of the Technology Acceptance instrument", *MIS Quarterly*, Vol. 18, No. 3pp. 319-324.

Szajna, B., (1996), "Empirical Evaluation of the Revised Technology Acceptance Model", *Management Science*, Vol. 42, No.1, pp. 85-92.

Sze, S.M.H., (1996) "Culture" in Cheng, J.Y.S. and Lo, S.S.H. (editors), (1996), *From Colony to SAR: Hong Kong's Challenges Ahead*, The Chinese University Press, HK, pp. 527-542.

Taylor, S. and Todd, P., (1995), "Assessing IT usage : the role of prior experience", *MIS Quarterly*, Vol. 19, No. 4, pp. 561-570.

Taylor, S. and Todd, P.A. (1995b), "Understanding information technology usage: a test of competing models", *Information Systems Research*, Vol. 6, No. 2, pp. 144-176.

Teo, S.H. (2001), "Demographic and motivation variables associated with internet usage activities", *Internet Research : Electronic Networking Applications and Policy*, Vol. 11, No.2, pp.125-137.

Teo, T., Lim, V. and Lai, R., (1999), "Intrinsic and extrinsic motivation in internet usage", *Omega International Journal of Management Science*, Vol. 27(1), pp. 25-37.

Teicher, F., Hughes, O. and Dow, N. (2002), "E-government : a new route to public sector quality", *Managing Service Quality*, Vol.12, No.6, pp.384-393.

The Council for Excellence in Government (US) (2001), *E-government : The Next American Revolution*, available at: [www.excelgov.gov/egovpoll/report/contents.htm](http://www.excelgov.gov/egovpoll/report/contents.htm), (last accessed : 29 April 2003)

*The Economist* (2000), Issued date : 24 June 2000.

HKSARG (1998), *Policy Objectives : The 1998 Policy Address*, HKSARG, Hong Kong.

HKSARG (1999), *Policy Objectives : The 1999 Policy Address*, HKSARG, Hong Kong.

Thompson, V.A., (1969), *Bureaucracy and Innovation*, University Press of Alabama, USA.

Thompson, R.K. et al. (1991), "Personal computing : towards a conceptual model of utilization", *MIS Quarterly*, Vol. 15, pp. 125-143.

Trader-Leigh, K.E., (2002), "Case study: identifying resistance in managing change", *Journal of Organisational Change Management*, Vol. 15, No.2, 2002, pp. 138-155.

Tung, C.H. (Chief Executive of HKSAR) (1998), *From Adversity to Opportunity*, HKSARG, Hong Kong.

Turban, E. et al. (2002), *Electronic Commerce 2002: A Managerial Perspective*, Prentice Hall, Upper Saddle, NJ.

United Nations, (2002), *Benchmarking E-government: A Global Perspective - Assessing the UN Member States*, United Nations, New York.

Vathanophas, V., Krittayaphongphun, N. and Klomsiri, C., (2008), "Technology acceptance toward e-government initiative in Royal Thai Navy", *Transforming Government: People, Process and Policy*, Vol. 2, No. 4, pp. 256-282.

Venkatesh, V., (1999), "Creation of favorable user perceptions: exploring the role of intrinsic motivation", *MIS Quarterly*, vol. 23, no. 2, pp. 239-260.

Venkatesh, V., (2000), "Determinants of perceived ease of use: integrating control, intrinsic motivation, and emotion into the Technology Acceptance Model", *Information Systems Research*, Vol. 11, No.4, pp. 342-365.

Venkatesh, V. and Davis, F.D., (1996), "A model of the antecedents of perceived ease of use : development and test", *Decision Sciences*, Vol. 27, No. 3, pp. 451-481.

Venkatesh, V. and Davis, F.D., (2000), "A theoretical extension of the technology acceptance model : four longitudinal field studies", *Management Science*, Vol. 46, No. 2, pp. 186-204.

Venkatesh, V., Davis, F.D. and Morris, M.G., (2007), "Dead or alive: the development, trajectory and future of technology adoption research", *Journal of Association for Information Systems*, Vol. 8, Issue 4, Article 9, pp. 267-286.

Venkatesh, V., and Morris, M.G., (2000), "Why do not men ever stop to ask for direction? Gender, social influence and their role in technology acceptance and usage behavior", *MIS Quarterly*, Vol. 24, No. 1, pp. 115-139.

Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D., (2003), "User acceptance of information technology : toward a unified view", *Management Information Systems Quarterly*, Vol. 27, No. 3, pp. 425-478.

Vogt, W.P., (1993), *Dictionary of Statistics and Methodology*, Sage Publication, Newbury Park.

Waddell, D. and Sohal, A.S., (1998), "Resistance: a constructive tool for change management", *Management Decision*, Vol. 36, No. 8, pp. 543-548.

Wagner, J.A. III and Hollenbeck, J.R., (1992), *Management of Organisational Behavior*, Prentice Hall, New Jersey.

Wall, F.J., (1986), *Statistical Data Analysis Handbook*, McGraw-Hill Publishing Company, US.

Weber, M., (1947), *The Theory of Social and Economic Organisation (translated version)*, Free Press, New York.

Weber, M., (1948), *Essays in Sociology (edited and translated by Gerth, HH and Mills, C.W.)*, Routledge and Kegan Paul, London.

Weber, M., (1968), *Economy and Society: An Outline of Interpretive sociology* (edited and translated by Roth, G. and Wittich, C.), Bedminster Press, New York.

Webster, E.J. and Martocchio, J.J. (1992), "Microcomputer playfulness : development of a measure with workplace implications", *MIS Quarterly*, Vol. 6, pp. 201-226.

Website of Wikipedia, (2006), *Section of Random Number Table*, available at [http://en.wikipedia.org/wiki/Random\\_number\\_table](http://en.wikipedia.org/wiki/Random_number_table) (last accessed 2 December 2006).

Wilder, G., Mackie, D. and Cooper, J., (1985), "Gender and computers: two surveys of computer-related attitudes", *Sex Roles*, Vol. 13, No. 3/4, pp. 215-229.

Wilkinson, A. (1992), "The other side of quality : 'soft' issues and human resource dimension", *Total Quality Management*, Vol. 3, No.3, pp.323-329.

Wilkinson, A. et al. (1998), *Managing with Total Quality Management : Theory and Practice*, Macmillan Business, Basingstoke.

Wang, K.W., (2010), "Creating competitive advantage with IT architecture: an interview with Shanghai Mobile's CIO", *McKinsey Quarterly Online*, No. 18 (Winter 2010), McKinsey & Company, available at: [http://www.mckinseyquarterly.com/business\\_technology/BT\\_strategy/creating\\_competitive\\_advantage\\_with\\_IT\\_architecture\\_an\\_interview\\_with\\_shanghai\\_mobile\\_cio\\_2492](http://www.mckinseyquarterly.com/business_technology/BT_strategy/creating_competitive_advantage_with_IT_architecture_an_interview_with_shanghai_mobile_cio_2492) (last accessed 24 December 2009).

The World Bank Group, (2003), Homepage of World Bank Group, available at <http://www1.worldbank.org/publicsector/egov/definition.htm> (last accessed: 18 August 2003).

Yardley, D., (2002), *Successful IT Project Delivery: learning the lessons of project failure*, Addison-Wesley, Great Britain.

Zeffane, R. and Cheek, B. (1993), "Profiles and correlates of computer usage : a study of the Australian telecommunications industry", *Computers in Industry*, Vol. 22, pp. 53-69.

## Appendix I – Development phases of e-government

### Development phases of e-Government

| Government's Explanation/Goals   | Corresponding Deloitte's Transformation Process  | Tentative schedule from HKSARG |
|--|--|--------------------------------|
| <p><b>Level 1 : Internet as additional information channel</b><br/>                     Internet as an additional information channel for citizens to retrieve information from the bilingual web sites of all Government bureaux and departments.</p>   | <p><b>Stage 1 :</b><br/>                     Information Publishing</p>  | Late 1990s to 2000             |
| <p><b>Level 2 : Provision of departmental electronic services</b><br/>                     Over 70% of services amenable to electronic mode of delivery go online. Citizens are able to perform transactions with individual departments online or by other electronic means.<br/>                     Target to increase the percentage of electronically available services to 90% by end 2003.</p>  | <p><b>Stage 2 :</b><br/>                     "Official"<br/>                     Two-Way Transaction</p>                                 |                                |
| <p><b>Level 3 : Joined up Government</b><br/>                     The traditional boundaries between departments begin to fade. ESD Scheme provides a one-stop, customer-oriented Government service. Citizens are able to access all Government related information and services through a single entry point. This requires business process reengineering.</p>  | <p><b>Stage 3&amp;4 :</b><br/>                     Multi-purpose Portals and Portal Personalization</p>                                  | 2001 onwards                   |
| <p><b>Level 4 : Re-defined Government</b><br/>                     Partnership with the private sector in developing and operating the ESD Scheme leads a changing role for Government in the provision of public services. Many outsourcing activities for the provision of Government services to the private sector, leveraging the use of Internet and information technology. Government to make efficient use of the resources, expertise and flexibility of the private sector.</p> | <p><b>Stages 5&amp;6 :</b><br/>                     Clustering of Common Services and Full Integration and Enterprise Transformation</p> |                                |

Sources : ITBB (2001) and Deloitte Research (2000)

## Appendix II – Reply from OGCIO

“Thank you for your email dated 27.4.2006 referred from Civil Service Bureau.

The requested information is appended below : -

(i) and (ii)

| <b>PC &amp; E-Mail</b>                                  |         |
|---|---------|
| Percentage of staff with PC                             | 75.35%  |
| No. of PC   | 123,731 |
| Percentage of staff with PC with internal e-mail access | 69.06%  |
| No. of internal e-mail account                          | 85,450  |
| Percentage of staff with PC with Internet access        | 73.56%  |
| No. of staff have access to Internet e-mail             | 91,021  |

(iii) The contact information of Government staff as available on the online Government Telephone Directory is maintained by individual bureaux and departments who determine (1) which staff members have the operational need to be assigned with an individual email address, and (2) which email addresses of their respective staff members are published.”

**Appendix III –Original List of Price Waterhouse Change Integration (PWCI)  
Team**

1. Perceived threat to job security
2. Loss of expertise
3. Need to learn new skills
4. Shifts in influence, authority, control
5. Shifts in communication patterns
6. Loss of social status
7. Change in habits/customs
8. Limited understanding of the change and its implications
9. Low tolerance for change

Source : Price Waterhouse Change Integration Team, 1995, pp. 23-24

## Appendix IV - Cover Letter to Respondents – Final

6 January 2007

Dear HKSARG staff,

A Survey on the User Acceptance of Internet Technology (IT) in HKSARG workplace.

This is a research conducted by a Phd research student of the Napier University of Edinburgh, UK to investigate the perception and actual usage of internet technology (IT) in the Government context for academic study and research purposes.

In this study, the change means to use internet technology (IT) which includes the applications of browsing of the web, emails and downloading of information and programs in the workplace.

To collect the necessary information for the study, your kind assistance is sought to complete the attached questionnaire and return it to me via email or by fax (Fax No. 2827 0974) before 27 January 2007.

Your email address is randomly selected from the HKSARG online telephone directory. Please be assured that all the information collected would only be presented in a collective sense and would be kept strictly confidential and complete anonymity.

Thank you in advance for your kind assistance.

Yours sincerely,

Tony Leung  
Phd Research Student  
Napier University, Edinburgh, UK.



# Appendix V – Finalised questionnaire

## Questionnaire Form

In Parts I and II, please use the following scales:

- 1 = Strongly agree/Very likely
- 2 = Agree/likely
- 3 = Not sure
- 4 = Disagree/unlikely
- 5 = Strongly disagree/Very unlikely

### **Part I**

#### **Statements**

##### **Set 1 (Level of RTC)**

Please indicate your answer by putting the number (i.e. 1-5) in the space below

- (i) There is no need for the change in HKSARG \_\_\_\_\_
- (ii) I do not know or understand why the change is needed \_\_\_\_\_
- (iii) There will be costs for me (e.g. I will need to sacrifice other things) to adopt the change \_\_\_\_\_
- (iv) The change is not to my benefits \_\_\_\_\_
- (v) The change is to the management's benefits \_\_\_\_\_
- (vi) The change will make my department/team/myself suffer \_\_\_\_\_
- (vii) The change is not tally with the values or culture or routines in HKSARG \_\_\_\_\_
- (viii) I believe "the way we do things here" is the best way to do the work \_\_\_\_\_
- (ix) Even the change is needed, I do not want to be the "first mover" \_\_\_\_\_
- (x) I am afraid I do not have the necessary capabilities to implement the change \_\_\_\_\_
- (xi) There are too many uncertainties about the change \_\_\_\_\_
- (xii) There may be threat to my job if the change is implemented \_\_\_\_\_

### **Part II**

#### **Statements**

##### **Set 1 (Perceived Usefulness)**

Please indicate your answer by putting the number (i.e. 1-5) in the space below

- (i) Using IT in my job would enable me to accomplish tasks more quickly \_\_\_\_\_
- (ii) Using IT would improve my job performance \_\_\_\_\_
- (iii) Using IT in my job would increase my productivity \_\_\_\_\_
- (iv) Using IT would enhance my effectiveness on the job \_\_\_\_\_
- (v) Using IT would make it easier to do my job \_\_\_\_\_
- (vi) I would find IT useful in my job \_\_\_\_\_

**Set 2 (Perceived Ease of Use)**

Please indicate your answer by putting the number (i.e. 1-5) in the space below

- (i) Learning to operate IT would be easy for me
- (ii) I would find it easy to get IT to do what I want to do
- (iii) My interaction with IT would be clear and understandable
- (iv) I would find IT to be flexible to interact with
- (v) It would be easy for me to become skillful at using IT
- (vi) I would find IT easy to use

---

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---

**Set 3 (Attitude Toward Using)**

All things considered, my using of IT in accomplishing tasks in workplace is :

Please indicate your answer by putting the number (i.e. 1-5) in the space below

- (i) Good
- (ii) Wise
- (iii) Favorable
- (iv) Beneficial
- (v) Positive

---

---

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---

---

**Set 4 (Behavioral Intention to Use)**

Please indicate your answer by putting the number (i.e. 1-5) in the space below

- (i) I always try to use IT to do a task whenever it has a feature to help me to perform it
- (ii) I always try to use IT in as many cases/occasions as possible

---

---

**Part III**

**(Actual System Use)**

**(1) Frequency of Usage**

On average, how frequently do you use the IT (e.g. browsing, email and downloading) in the workplace?

Please indicate your answer by putting the number (i.e. 1-6) in the space below

- 1. Never
- 2. Less than once a month
- 3. A few times a month
- 4. A few times a week
- 5. At least once a day
- 6. Several times a day

---

**(2) Daily Usage**

On an average working day, how much time is spent on the IT (e.g. browsing, email and downloading)?

Please indicate your answer by putting the number (i.e. 1-6) in the space below

1. Never
2. Less than 0.5 hour
3. From 0.5 -1 hour
4. From 1- 2 hours
5. From 2- 3 hours
6. More than 3 hours

---

### Information of Respondents

#### 1. What is your rank ?

Please indicate your answer by putting the number (i.e. 1-3) in the space below

- 1 Junior or middle (at or below MPS 33, or equivalent)
- 2 Senior (MPS 34 - 49, or equivalent)
- 3 Directorate (D1 or above or equivalent)

---

#### 2. What is your age ?

Please indicate your answer by putting the number (i.e. 1-6) in the space below

- 1 18 - 25
- 2 26 - 30
- 3 31- 35
- 4 36 - 40
- 5 41- 45
- 6 46 or above

---

#### 3. What is your gender ?

Please indicate your answer by putting the number (i.e. 1 or 2) in the space below

- 1 Male
- 2 Female

---

#### 4. What is your education level ?

Please indicate your answer by putting the number (i.e. 1-4) in the space below

- 1 Secondary School (Form 5) or below
- 2 Matriculation (Form 7) or below
- 3 Bachelor degree or below
- 4 Postgraduate level

---

**Thank You Very Much !!**

Note : the name of the constructs in brackets are concealed before the questionnaire is sent to respondents.

## Appendix VI – Letter to non respondents

[Name and address of the selected staff]

[Date]

Dear sir/madam,

### A Survey on the User Acceptance of Internet Technology (IT) in HKSARG workplace

In relation to the above research, emails and questionnaire form had been sent to you for your kind completion and return during the period between January and February 2007.

I have received a number of completed questionnaire forms. In order to have more insight of your thoughts on the subject under study, I am writing to appeal for your kind assistance again for allowing me to have a short face to face interview (around 10 to 15 minutes) to go through the questionnaire form and discuss the issue with you. The venue and time of meeting can be at your convenience. Alternatively, if it is inconvenient for a face to face interview, we could have a brief discussion through telephone.

I will telephone you in around one week's time to fix the details of the proposed interview. In the meantime, you could also contact me at mobile number 90283433 or by email to : tamresearch1@yahoo.com.hk.

As explained and pledged in my previous emails, your contact information was randomly selected from the online government directory and your identity will not be disclosed and all the results collected will only be presented in a collective manner.

Again, because the study is very important for us to understand the problems in using the internet technologies in the government workplace, your favorable consideration and participation in it is essential to the success of the study. I look forward to meeting and discussing with you in the near future.

Tony Leung.  
Research student  
Napier University, UK.

## Appendix VII – Letter to change agents

9 November 2007

Dear XXX,

### A Survey on the User Acceptance of Internet Technology (IT) in HKSARG workplace

This is a research conducted by a PhD research student of the Napier University of Edinburgh, UK to investigate the perception and actual usage of internet technology (IT) in the Government context for academic study and research purposes.

In relation to the above research, emails and questionnaire forms had been sent to several hundreds of randomly selected civil servants for data collection in early 2007.

I have received a number of completed questionnaire forms. In order to have more insight of the thoughts of the more senior staff members on the subject under study, I am writing to appeal for your kind assistance for allowing me to have a short face to face interview (around 10 to 15 minutes) to discuss the issue with you. The venue and time of meeting can be at your convenience. Alternatively, if it is inconvenient for an interview, nomination of your deputy for the interview would also be appreciated. For your reference, I have also enclosed the questions that are proposed to be discussed in the interview for your information in advance. Should the arrangements of interview with you or your deputy is not feasible, you may also fill in your comments and opinions to the questions and fax the sheet back to me at 2827 0974.

I will telephone you in around one week's time to fix the details of the proposed interview. In the meantime, you could also contact me at mobile number 90283433 or by email to : [tamresearch1@yahoo.com.hk](mailto:tamresearch1@yahoo.com.hk). Your contact information was randomly selected from the online government directory and your identity will not be disclosed and all the results collected will only be presented in a collective manner.

Again, because the study is very important for us to understand the problems in using the internet technologies in the government workplace, your favorable consideration and participation in it is essential to the success of the study. I look forward to meeting and discussing with you in the near future.

My Name

Fax reply to : 2827 0974 (Attn : Mr Tony Leung)

**Proposed questions to be discussed during the interview:**

Note: In this research, the change means to introduce and to use internet technology (IT) which includes the applications of browsing of the web, emails and downloading of information and programs in the government workplace.

Q1. It is said that whenever there is change, there is Resistance to Change (RTC). What do you think the level of RTC of your staff facing the change in question?

Comments/Opinions: \_\_\_\_\_  
\_\_\_\_\_

Q2. Do you think the RTC would have an impact on the staff's perceptions of the usefulness and ease of use of the Internet Technology (IT)? If yes, in what way(s) the impact would you expect?

Comments/Opinions: \_\_\_\_\_  
\_\_\_\_\_

Q3. Do you think if your staff perceive an IT easy to use, then they will perceive the IT useful too?

Comments/Opinions: \_\_\_\_\_  
\_\_\_\_\_

Q4. Do you think the RTC will eventually affect the actual system usage?

Comments/Opinions: \_\_\_\_\_  
\_\_\_\_\_

Q5. If you believe RTC is irrelevant to the actual system usage, what factors in your view are affecting the usage of IT in the workplace?

Comments/Opinions: \_\_\_\_\_  
\_\_\_\_\_

-- End --

## Appendix VIII – CA's responses

### Reply from CA 1

Fax reply to : 2827 0974 (Attn : Mr Tony Leung)

#### Proposed questions to be discussed during the interview:

Note: In this research, the change means to introduce and to use internet technology (IT) which includes the applications of browsing of the web, emails and downloading of information and programs in the government workplace.

Q1. It is said that whenever there is change, there is Resistance to Change (RTC). What do you think the level of RTC of your staff facing the change in question?

Comments/Opinions: Apart from some senior staff who may need to perform research, there is no need for our staff to collect information from the web. For security reasons, downloading of programs is strictly prohibited. We are using email as a communication means and there is no resistance to change.

Q2. Do you think the RTC would have an impact on the staff's perceptions of the usefulness and ease of use of the Internet Technology (IT)? If yes, in what way(s) the impact would you expect?

Comments/Opinions: Resistance to change will affect the staff's perceptions of the usefulness and ease of use of internet technology. Staff may not be willing to make efforts to learn using the applications and they will not feel comfortable with using internet technology. They will have doubts in the security issues. They may complain about the fatigue and pressure associated with performing work online as well as the user-friendliness of the applications.

Q3. Do you think if your staff perceive an IT easy to use, then they will perceive the IT useful too?

Comments/Opinions: Yes. The correct perception on the use of internet technology will help staff adapt to the change. Our staff find the email system easy to use and they also find the system convenient, effective and efficient.



Q4. Do you think the RTC will eventually affect the actual system usage?

Comments/Opinions: To a certain extent, the answer is the affirmative.

Q5. If you believe RTC is irrelevant to the actual system usage, what factors in your view are affecting the usage of IT in the workplace?

Comments/Opinions: While resistance to change may affect the actual system usage, training and publicity may also affect the actual system usual. The time element is another factor which may affect the system usage. Back in the early 90s, not too many civil servants used email. Now, we use email as a norm and few people doubt its effectiveness.

-- End --

### Reply from CA 3

Fax reply to : 2827 0974 (Attn : Mr Tony Leung)

#### Proposed questions to be discussed during the interview:

Note: In this research, the change means to introduce and to use internet technology (IT) which includes the applications of browsing of the web, emails and downloading of information and programs in the government workplace.

Q1. It is said that whenever there is change, there is Resistance to Change (RTC). What do you think the level of RTC of your staff facing the change in question?

Comments/Opinions: RTC is common in workplaces. The level of RTC of our staff is considered low. We believe that effective communication can minimize RTC among staff. We have held, constantly, seminars and discussion forum for line management to provide deliberation on proposed changes, whereas our staff can openly express their concern on changes.

Q2. Do you think the RTC would have an impact on the staff's perceptions of the usefulness and ease of use of the Internet Technology (IT)? If yes, in what way(s) the impact would you expect?

Comments/Opinions: Yes. If RTC is high, staff will be reluctant to try deploying IT in their work especially when they encounter problems in their initial trials. For staff rarely use IT in daily work, normally they'll have more concern towards IT in areas such as system complexity, user friendliness, system flexibility, etc.

Q3. Do you think if your staff perceive an IT easy to use, then they will perceive the IT useful too?

Comments/Opinions: If our staff perceives IT as easy to use, it does not necessary (sic) imply they will regard it as useful too. But surely easy to use is one of the important factors considered.

Q4. Do you think the RTC will eventually affect the actual system usage?

Comments/Opinions: Yes. RTC affects actual IT system usage to certain extent. Staff with high RTC may find ways to get away from the IT systems and use their preferred method in handling their work.

Q5. If you believe RTC is irrelevant to the actual system usage, what factors in your view are affecting the usage of IT in the workplace?

Comments/Opinions: In addition to RTC, the following factors also affect usage of IT in workplace.

(a) line management directive and support. A typical example is line management encourages or even rewards staff who are keen in use of IT, then usage of IT in the workplace will become relatively higher.

(b) Better training. When staff are equipped with proper IT skills and knowledge, the adoption of IT in their work will become higher.

-- End --

## **Reply from CA 6**

Fax reply to : 2827 0974 (Attn : Mr Tony Leung)

### **Proposed questions to be discussed during the interview:**

Note: In this research, the change means to introduce and to use internet technology (IT) which includes the applications of browsing of the web, emails and downloading of information and programs in the government workplace.

Q1. It is said that whenever there is change, there is Resistance to Change (RTC). What do you think the level of RTC of your staff facing the change in question?

Comments/Opinions: Most of the staff here are familiar with the use of IT in their daily work, the level of RTC is therefore envisaged to be low.

Q2. Do you think the RTC would have an impact on the staff's perceptions of the usefulness and ease of use of the Internet Technology (IT)? If yes, in what way(s) the impact would you expect?

Comments/Opinions: As said in Q1, the RTC at our department is envisaged to be low, the impact in question is insignificant.

Q3. Do you think if your staff perceive an IT easy to use, then they will perceive the IT useful too?

Comments/Opinions: It may not be true for all cases. The usefulness of the IT much depends on how it has been designed and deployed to fit the operational needs of the staff. And easy to use does not strictly imply usefulness.

Q4. Do you think the RTC will eventually affect the actual system usage?

Comments/Opinions: N.A. in [this department].

Q5. If you believe RTC is irrelevant to the actual system usage, what factors in your view are affecting the usage of IT in the workplace?

Comments/Opinions: RTC is one of the factors affecting system usage. Other factors will include system usefulness/friendliness, adoption (sic) rate/culture of competitors, management's directives, etc.

## **Reply from CA 8**

Fax reply to : 2827 0974 (Attn : Mr Tony Leung)

### **Proposed questions to be discussed during the interview:**

Note: In this research, the change means to introduce and to use internet technology (IT) which includes the applications of browsing of the web, emails and downloading of information and programs in the government workplace.

Q1. It is said that whenever there is change, there is Resistance to Change (RTC). What do you think the level of RTC of your staff facing the change in question?

Comments/Opinions: In general, our staff are quite receptive to change in respective of the use of internet technology. All staff of [this department] have access to email and internet facilities through our Technical Infrastructure.

Q2. Do you think the RTC would have an impact on the staff's perceptions of the usefulness and ease of use of the Internet Technology (IT)? If yes, in what way(s) the impact would you expect?

Comments/Opinions: Yes, a high level of RTC may imply staff's reluctance to use Internet Technology or perceived difficulties in using Internet Technology.

Q3. Do you think if your staff perceive an IT easy to use, then they will perceive the IT useful too?

Comments/Opinions: Yes.

Q4. Do you think the RTC will eventually affect the actual system usage?

Comments/Opinions: Yes.

Q5. If you believe RTC is irrelevant to the actual system usage, what factors in your view are affecting the usage of IT in the workplace?

Comments/Opinions: We believe RTC will have impact on the actual system usage.

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## Reply from CA 9

Fax reply to : 2827 0974 (Attn : Mr Tony Leung)

### Proposed questions to be discussed during the interview:

Note: In this research, the change means to introduce and to use internet technology (IT) which includes the applications of browsing of the web, emails and downloading of information and programs in the government workplace.

Q1. It is said that whenever there is change, there is Resistance to Change (RTC). What do you think the level of RTC of your staff facing the change in question?

Comments/Opinions: With the wide adoption of Office Automation in government and the popularity of Internet for all people in these years, such as e-mails for communication, browsing departmental homepages and electronic document processing, [this department's] staff nowadays are more readily adaptable to advancement of internet technology than those in the old days. Due to the easy acquisition of information from Internet and speedy collaborations among colleagues by using e-mails, no sign of RTC among [this department's] colleagues is detected.

Q2. Do you think the RTC would have an impact on the staff's perceptions of the usefulness and ease of use of the Internet Technology (IT)? If yes, in what way(s) the impact would you expect?

Comments/Opinions: In general, users may be reluctant to use new Internet Technology if they are unfamiliar with it or cannot foresee the benefits brought from its use. Under the circumstances, promotion on the use of IT would be ineffective. Besides, ideas for enhancement/further development of the deployed technology would be confined since feedbacks from users would be limited by their rare use of such technology/application.

Q3. Do you think if your staff perceive an IT easy to use, then they will perceive the IT useful too?

Comments/Opinions: It is noticeable that if the application is developed with a user-friendly interface, users will also be more adaptable to the IT changes in the long run when they have experienced the usefulness of IT in their daily work.

Q4. Do you think the RTC will eventually affect the actual system usage?

Comments/Opinions: Yes. RTC will affect the actual system usage.

Q5. If you believe RTC is irrelevant to the actual system usage, what factors in your view are affecting the usage of IT in the workplace?

Comments/Opinions: As stated in Q4, we believe that RTC will affect the actual system usage.

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**This is a record of the interview held with CA 2 on 24.11.2007 a.m. in his office.**

Fax reply to : 2827 0974 (Attn : Mr Tony Leung)

**Proposed questions to be discussed during the interview:**

Note: In this research, the change means to introduce and to use internet technology (IT) which includes the applications of browsing of the web, emails and downloading of information and programs in the government workplace.

Q1. It is said that whenever there is change, there is Resistance to Change (RTC). What do you think the level of RTC of your staff facing the change in question?

CA 2's Comments/Opinions: He believes the level of RTC in his department is average. He continues to share an example of introducing new systems in his department. Years ago, when a new system was introduced in his department, the system was very complicated and inconvenient to use. Moreover, some individual officers were appointed to collate and submit returns to headquarters via the system. There were concerns over the system for the difficulties in using it and if mistakes were made, the identity of the officer will be recorded by the system too. Most importantly, many staff members thought that the system was violating their working routines. However, as the management responded promptly to staff's concerns by modifying the system; upgrading the speed of the system and integrating the various systems within the department, the staff are working well with the systems nowadays.

In the course of responding to the staff, CA 2 believes that factors like education level, age, related experience in using IT are playing important roles in the RTC.

Q2. Do you think the RTC would have an impact on the staff's perceptions of the usefulness and ease of use of the Internet Technology (IT)? If yes, in what way(s) the impact would you expect?

CA 2's Comments/Opinions: CA 2 believes that the RTC may not have such extreme impacts on the perceived usefulness and ease of use. According to his experience, a sincere attitude from the management to involve the staff affected, including frontline staff, will benefit the perceived usefulness and ease of use very much. Indeed, his department involve affected staff at early stage of system development and staff's comments and opinions play an important role of system characteristics too.

Q3. Do you think if your staff perceive an IT easy to use, then they will perceive the IT



useful too?

Comments/Opinions: CA 2 expressed that simple steps in using the system and speedy system response are important. These factors will lead the users to believe the system is easy to use and useful. And he agrees that easy to use may make the users think the system more useful.

Q4. Do you think the RTC will eventually affect the actual system usage?

Comments/Opinions: CA 2 agrees that a high level of resistance to change will lead to lower system usage.

Q5. If you believe RTC is irrelevant to the actual system usage, what factors in your view are affecting the usage of IT in the workplace?

Comments/Opinions: CA 2 suggests that training and continuously refreshing courses are very essential to make staff use the systems. In addition, assistance (or even incentive) should be rendered to the affected staff. Conversely, in extreme cases, management directives may be the option to increase the system usage.

-- End --