The Role of Location on Email Usage in Malaysian Public and Private Universities

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Abstract: This study examines and compares the adoption of technology, specifically in regards to the use of email between the non-academic staff found in universities (public and private) of Malaysia, based on urban and rural location. To measure technology adoption in organisations, study employed Technology Acceptance Model (TAM) to become a part of the perspective theory on technology adoption. The model measures perceived ease of use (PEOU), perceived usefulness (PU) and e-mail usage (U). While location (urban and rural) of the universities served as moderator on the relationships in TAM. Sample of 402 non-academic staff were collected from 4 public (2 metropolitan and 2 non-metropolitan areas) and 4 private universities (2 metropolitan and 2 non-metropolitan areas) in which 202 samples were from metropolitan universities while 190 samples were from non-metropolitan universities. Results showed that there was significant different in relationships of technology acceptance model between metropolitan and non-metropolitan universities in Malaysia, with $X^2 = 25.238$ (p < 0.05). At significance level of 0.05, PEOU of non-academic staff in metropolitan universities was found to have higher/ stronger influence on PU (BETA= 0.699) as compared to non-academic staff in non-metropolitan universities (BETA = 0.474). Further, PEOU of non-academic staff in metropolitan universities showed a considerably positive impact of U (BETA = 0.330) while insignificant effect was found for non-academic staff in non-metropolitan universities. Furthermore, study discovered that PU partially mediated the relationship of PEOU on U in metropolitan universities and fully mediated the relationship of PEOU on U in non-metropolitan universities.

Keywords: email, metropolitan, non-metropolitan, Technology Acceptance Model (TAM), perceived ease of use (PEOU), perceived usefulness (PU), moderate.

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I. INTRODUCTION

1.1. Background

Over the past few decades, research done on information systems adoption has suggested that one of the critical factors contributing to success or failure of any information systems adoption is due to the technological factors on the information system itself. It was explained by Bidin (2000) that it was of most importance for organizations to take into consideration the technological features as well as social interaction planning when it comes to the implementation and the maintenance in regards to the application of communication technology. Recent studies by many scholars around the world suggested the same finding on the significant influence of technological factors on acceptance of information system at workplace (Mahomed 2015; Mahomed *et al.* 2015; Mahomed *et al.* 2017). For instance, research conducted by Mahomed *et al.* (2017) suggested that the technological factors specifically in regards to the easiness of usage and seen usefulness provides an affirmative relationship in regards to the email acceptance. The study also found that public institutions of higher learning perceived emails more helpful when they are easier to be accessed.

As explained by Mahomed (2015) the government in Malaysia has executed many procedures in order to push up the Information and Communications Technology (ICT) sector in Malaysia through increased investments on ICT infrastructure as well as publicising ICT usage in institutes and workforces all over Malaysia. However, Mahomed (2017) argue in order to promote ICT usage (especially with email communication) towards betterment of performance as well as communication inside the office, there are a number of obstacles that need to be faced as Mohamad & Hashim (2010) and Mahomed (2015) mentioned. For example, Mohamad and Hashim (2010) organised a study that recorded email responsiveness among administrative staff found in 24 Malaysian ministries. It was done through a short mystery email which purposed was to enquire general facts regarding the agencies under each ministry, but it was discovered that the rate of response was very bad, where replies were only 8 per cent, 75 percent were unresponsive, and 17 percent of the emails sent had been bounced.

This dismal 8 percent response exposed that email as a mode of communication was not considered a serious form or valid form of communication when it comes to general enquiries. The same finding was implied by Mahomed (2015) which found that email usage was lower in Malaysian public universities as compared to Malaysian private universities.

Worldwide, the usage of email are still increasing even though there are other methods for communication at interpersonal level such as via chat, social networking and instant messaging. Despite, the strong growth of email in regards to the business world is more focused as means for mainly notification purposes, such as online sales; instead of a tool for interpersonal communication. Coming to 2017, the whole amount of emails both in sellers as well as consumers sent and received in a day have amounted to 269 billion, and there is an estimated continual growth with an average yearly figure of 4.4% across the coming four years, with an estimate whole of 319.6 billion at the end of 2021. By 2017 email users around the world will exceed 3.7 billion. This figure will then reach 4.1 billion at the end of 2021. Even in 2017 half of the world's population already uses email (Radicati 2017).

Study done by Mitomo and Sanbonmatsu (2007) on factors influencing the usage of mobile phone in five metropolis cities, Beijing Hongkong, Seoul, Taipei and Tokyo proved that many who were living in urban places actually benefited from new technologies and services, and generally the younger generations

are able to assimilate with cell phone related services at a much quicker pace then their seniors. Yet there has been only a handful of research done in investigating the differences and similarities found in the urban young hand phone users of different regions.

They also concluded that, the set of technologies which have been accepted in one place will not necessarily be accepted in another. Information sources which people use to make their consumption and usage decisions also vary by country. Even though the technologies are shifting, adoption differ significantly by country. (Mitomo and Sanbonmatsu 2007).

The overall findings by Farrington, *et al.* (n.d) on rural internet use of a group isolated geographically indicated that they are very unlikely to use the online medium at a level considered the norm in similar groups in Britain in regards to artistic, social, civic, and commercial life.

According to Porter and Dontu (2006) work, they advocate the importance of perceived ease of use and perceived usefulness as the core principle of TAM, and demonstrate that within internet usage context (1) different ways of perception can play an influential role in the attitudes of the consumer and (2) a set of certain ideas towards technology may also influence particular consumers represented in different spheres in a population (Porter and Donthu 2006).

According to DiMaggio and Hargittai (2001), the "Digital Divide" is viewed as a way dividing two distinct groups of people which are the ones who have internet access and the ones who don't. The "digital divide" framework was extremely useful in the beginning years of Internet distribution.

Howell (2010) conducted a study using the data from Yellow Pages and concludes that the New Zealand 'rural–urban digital divides' exist, but this does not mean that business in rural areas are inferior in advantage to that of the business in urban areas. However, the Yellow Pages data is not a sufficient proof to explain the 'digital divide' in regards to application of e-mail and website induction across provincial and metropolitan sites found in New Zealand, hence merely of geographical assumptions.

Mahomed (2015) in his work, mentioned that the model of email usage acceptance or adaptation can be integrated with other factors such as gender, age, location (metropolitan/non-metropolitan), race, religion and different forms of establishment. He also included in his study the location (metropolitan/non-metropolitan) factor and tested if it has any relationship on level of technology adoption. He found that there is no significant relationship between location (metropolitan/non-metropolitan) and level of email usage. Mahomed (2015) also accepted the idea that it was necessary to run a throughout comparative analysis of usage across location (metropolitan and non-metropolitan). In contrast to Mahomed (2015) study, which only explore the level of email usage between location of university, this study take it further by comparing the differences in the technology acceptance model based on different location, i.e. metropolitan and non-metropolitan universities. Therefore this study will seek to understand the role of location in determining email usage among metropolitan and non-metropolitan universities by using a holistic conceptual framework of Technology Acceptance Model developed by Davis (1989). From the model, it seeks to understand the reason behind the higher or lower email usage among Malaysian government and non-government universities based on location (metropolitan and non-metropolitan universities).

II. REVIEW OF LITERATURE

2.1. E-mail usage

Communication through the email is regarded to have a distinct upper hand when it is set side by side with various workplace communication channels. In fact, emails allow workers to send and receive information without the constraints of time and space (Derks and Bakker, 2010). On top of that it helps save the environment as it is paperless, as well as cuts down the time, as it allows users to send off information to a huge group of people with just a simple click.

Based on research done by Yeoh (2007) on communication through email at work in New Zealand as well as Malaysia, it stated that to be more efficient email is an important tool on managing business and for management system. Since its creation in communicative technology at the office around the 1970 to 1980s, email has established itself as one of the most used, and having the widest influence on an organisations communications and behaviour.

Serenko and Turel (2010) explain that the email was first created as a basic communication app, but currently has been employed with many other task. An example would be to help consumers in managing their information, coordinating their tasks, arranging their document archive, file storage keeping and collaboration.

There are even others who used email as personal data management tools. Even though the benefits of email cannot be denied, yet there are some negative side effects such as over burdening at work, changes in personality, and even addictions (Sereno & Turel 2010).

Based on Silverstone (2010) research with the background of universities in the United Kingdom, it was determined that there was a loss of £1.2 million annually due to dealings with unimportant messages.

On the other hand, Chui *et al.*'s research (2012, p. 47) discovered a hike in productivity as much as 25 to 30 percent by using emails during work.

Email use at work had in fact contributed to bountiful yearly returns from $900 billion to $1.3 trillion seen in four major industries which are package and delivery, shopping services, advanced manufacturing and professional services in America.

Based on the above, we can see that there are pros and cons in regards to email usage. When it comes to an organisation using emails for its organisations communication, there has to be many factors to be considered, which also includes the location. In line with the location factor, we can see through the studies conducted between the metropolitan and non-metropolitan organisations, the effect of location in the promotion or inhibition of the use of emails. The study results may also be able to explain other technological and email adoption issues within the education sector and nation as a whole.

2.2. Location

Stern *et al.* (2009) in his explanation of how location can be seen as an aspect in a demographic factor implies that there is a divide in technological adoption between the metropolitan and non-metropolitan sectors, yet Hitoshi and Norio (2007) and Mahomed (2015), claim otherwise. Their findings point to only minute variables when it comes to email usage and internet access between areas which are metropolitan and not.

For the purpose of this study in regards to digital diversity among universities based on geographical and demographical factors, a total of eight universities were selected, four located in a metropolitan area, four more suburban than a metropolitan area. Each groups have both private and government universities. Before going deeper, we must first understand first hand data in regards to urbanisation in Malaysia. Due to Malaysia's accelerated growth in terms of development, the urban population increased from 62 per cent in the year 2000 to 71 per cent in the year 2010 (Department of Statistics Malaysia 2010, p. 4). The graph below shows the development in urbanisation during the last thirty years from 1980 to 2010.
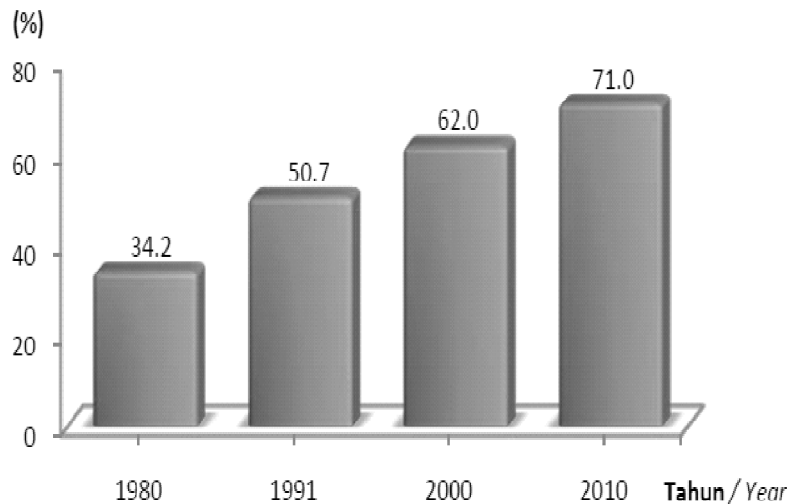
Figure 1: Malaysia Urbanization Level

Source: Department of Statistics, Malaysia (DOSM 2010)

Based on the study by Stern *et al.* (2009), the data showed that those who resided in more less developed counties will opt to engage with Internet technologies which are slower and lagging in form, which in turn are tied to reduced proficiency as well as usage of the web for daily activities. Rural folk also show lower tendency to move into opportunities provided through the Internet. This finding is of great importance in finding the connection between Internet usage for urgent tasks and technology efficiency levels, as it is vital towards figuring out the ramifications that happen in the course of unbalanced development and diffusion.

Even though some suggested that there are several geographical tendencies in technology advances, research done by Hitoshi and Norio (2007) prove that there are no significant geographical tendencies in technology advancements affected on ways student communicate in each state.

According to Hitoshi and Norio (2007), locational communication behaviour may differ because of geographic location. This is due to the location itself which have various hidden factors. Other than that, specific inherent element will lead to different usage behaviour.

The author also claimed that, economic factor, gender and frequency or SMS/emails are not significant, because no tendency was found in factor influencing choice of advance 3G technology.

The study done by Calvert *et al.* (2009) about the usage of technology among the urban and rural elderly demonstrated a noteworthy digital divide among the city and country folk, only 6 out of 56 individuals

use the computer at a frequent rate in rural areas. Better socioeconomic status and higher education were also linked to the usage of more advance technological gadgets such as hand phones, DVD players, and PCs. Interestingly enough findings showed an interest among the elderly in acquiring these devices thus showing a spark of interest for technology usage among the aged group, as we first stated in our introduction (Calvert *et al.*, 2009).

So, it is certainly possible that the elderly, who report potential interest towards technology they do not have, might not actually use it on a regular basis, or even consider it useful once they have it.

As such the research claimed that it found out that the aged in both the rural and urban communities who used technology frequently were as predicted influence by factors of education, socioeconomic status, age, as well as geographical location.

2.3. Technology Acceptance Model (TAM)

The theory adopted for this research purpose is Technology Acceptance Model (TAM) due to the fact that this model is more specialised in terms of information system usage, as it applies two important key concepts which are perceived ease of use and perceived usefulness.

In measuring the application of various information systems, TAM is believed to have upper hand when it comes to model simplicity yet be able to yield good result. On top of that TAM has been shown to be especially useful when it comes to the dissertation and expounding of behaviour implementation in regards to information systems. TAM is a theory that has been proven with countless empirical researches and its quality as a model tool has been tested many times with results that are very reliable statically (Davis 1989, 1993; Adams *et al.*, 1992; Mahomed, 2015). Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) are the two major determinants in TAM.

Research conducted by Lin (2007) on 297 Taiwanese customers from an online bookstores showed that 5-variable TAM is more parsimonious than that of the 12-variable decomposed TPB in terms of predicting the buyer's objectives online. Furthermore Mahomed (2015), applied TAM in the analysis of email usage which has shown very high validated results especially with Western states (Adams *et al.*, 1992; Davis, 1989, 1993), Eastern countries (Mutlu and Ergeneli, 2012) including Malaysia (Mahomed 2015; Mahomed *et al.* 2017).

(a) Perceived Ease of Use

Perceived Ease of Use (PEOU) is based on the measurement levels of the belief of a person towards the effortless use of a particular system which also hinders the user from too hard an effort of difficulty (Davis, 1989).

PEOU demonstrates a significant positive connection to technology adoption (Davies, 1989; Mahomed 2015; Mahomed at al. 2017). In terms of email usage, PEOU has showed similar positive relationship with higher level PEOU of email, in which the higher the level of PEOU in an email, the higher the level of email usage in Malaysian universities (Mahomed, 2015). According to Davies (1993), users' perceived ease of use affects the perceived usefulness of the users. In other words, having a user-friendly information technology system will likely lead to a useful system. In fact, numerous studies have suggested that PEOU

posted a significant positive impact on PU (Davies, 1989; Mahomed, 2015; Mahomed *et al.* 2015; Mahomed *et al.* 2017). Based on the discussion, study hypothesised that:

H1: Perceived ease of use (PEOU) has significant positive effect on perceived usefulness (PU) pertaining to email usage in Malaysian universities; where

H1a:Perceived ease of use (PEOU) has significant positive effect on perceived usefulness (PU) pertaining to email usage in Malaysian metropolitan universities.

H1b:Perceived ease of use (PEOU) has significant positive effect on perceived usefulness (PU) pertaining to email usage in Malaysian non-metropolitan universities.

H2: There is a significant positive influence of perceived ease of use (PEOU) towards email usage (U) in Malaysian universities; where

H2a:Perceived ease of use (PEOU) has significant positive influence on email usage (U) in Malaysian metropolitan universities.

H2b:Perceived ease of use (PEOU) has significant positive influence on email usage (U) in Malaysian non-metropolitan universities.

(b) Perceived Usefulness (PU)

Perceived Usefulness (PU) is an indicator to the degree in which a person believes in using a specific system which would aid them in enhancing performance at work (Davis, 1989).

Multiple research conducted and insistently points towards PU having a noteworthy positive connection with the use of various technologies (Davies, 1989; Mahomed 2015; Mahomed *et al.* 2015; Mahomed *et al.* 2017). A study by Mahomed (2015) indicates that there is a similar significant positive relationship in which members of an organisation show high level of email usage when they believe in a higher rate of usefulness in an email.

As such this hypothesis was proposed:

H3: Perceived usefulness (PU) has significant positive impact on email usage (U) in Malaysian universities; where

H3a:Perceived usefulness (PU) has significant positive impact on email usage (U) in Malaysian metropolitan universities.

H3b:Perceived usefulness (PU) has significant positive impact on email usage (U) in Malaysian non-metropolitan universities.

Researchers postulated that location of universities moderates the relationships in technology acceptance model (TAM).

H4: University location moderate the relationships of TAM pertaining to email usage in Malaysian universities; where

H4a:University location moderate the relationship of perceived ease of use (PEOU) on perceived usefulness (PU) in Malaysian universities

H4b: University location moderate the relationship of perceived ease of use (PEOU) on email usage (U) in Malaysian universities

H4c: University location moderate the relationship of perceived usefulness (PU) on email usage (U) in Malaysian universities

In addition to the relationships of PEOU on PU and PU on U, researchers proposed that PU played a significant role in mediating the relationship of PEOU on U in Malaysia universities.

H5 (H1 x H4): There is significant mediation effect of PU on the relationship of PEOU and U in Malaysian universities

H5a: There is significant mediation effect of PU on the relationship of PEOU and U in Malaysian metropolitan universities

H5b: There is significant mediation effect of PU on the relationship of PEOU and U in Malaysian non-metropolitan universities

The core framework for the constructs of PEOU and PU on Technology Acceptance Model is as illustrated in figure 2; while figure 3 depicted the TAM model with university location as moderator. It is important to note that H5 was not illustrated in the figure to avoid confusion with H2. Nonetheless, the mediation effect will be estimated and discussed in the findings.

III. RESEARCH METHODOLODY

Total of 402 respondents participated in this study in which 212 respondents are from metropolitan university while 190 respondents are from non-metropolitan university. The data or samples were collected through random sampling among the non-academic staff of selected universities, using self-administrated questionnaire. In addition, the questionnaire consisted of two major sections, i.e. the demographic section
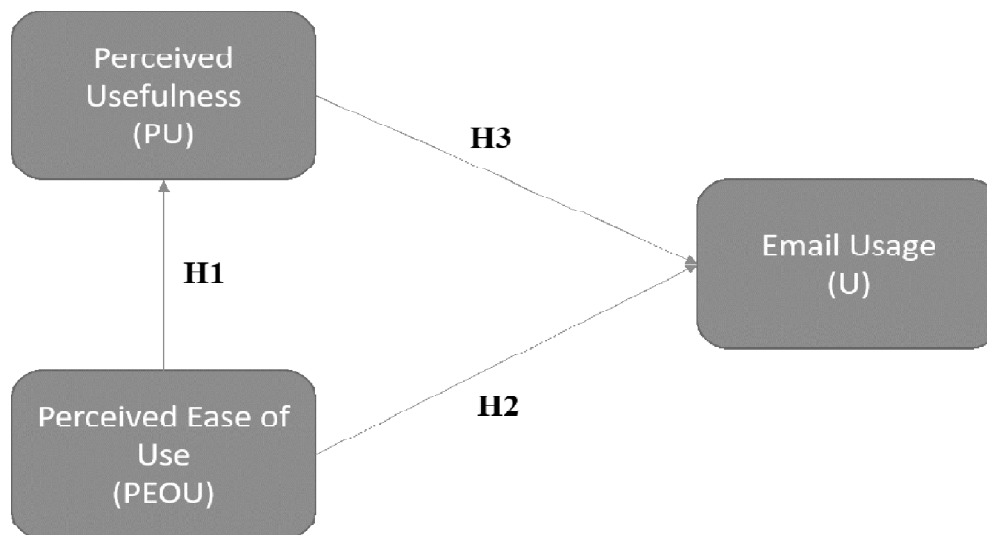

Figure 2: Research Model

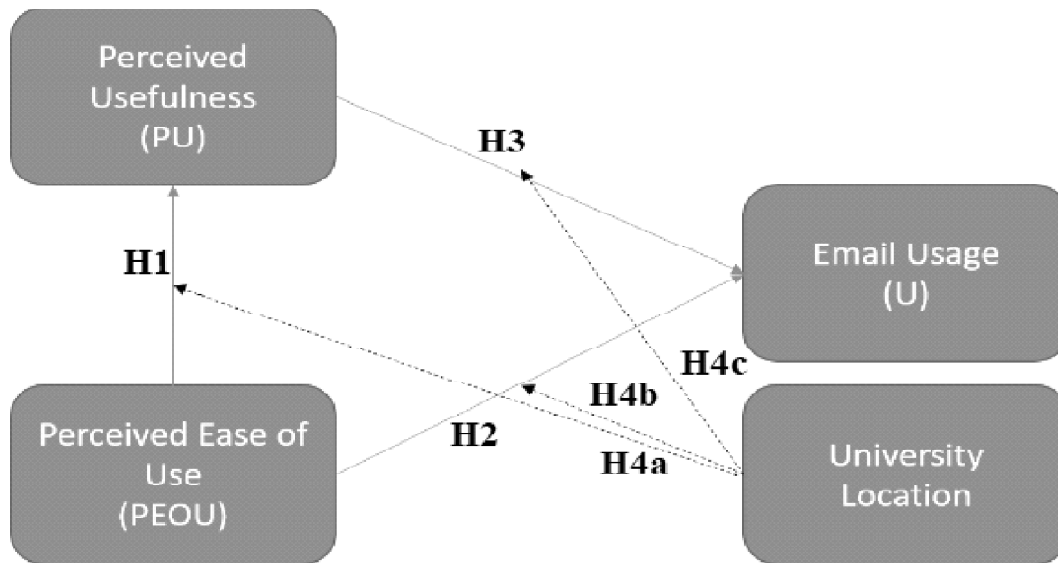*Source:* Adopted from the model of Davis (1989)

Figure 3: Research Model (Moderation)

and technology acceptance section. In demographic section, the gender, age group, ethnic group, education level and religion were measured. For technology acceptance section, three main dimensions were measured, namely perceived ease of use (PEOU), perceived usefulness (PU) and actual usage (U). In addition, 5-point Likert scale was utilised in instruments. The scale took values from 1 to 5, in which 1 refer to strongly disagree while 5 represent strongly agree. As for demographic section, a number of response choices were predefined by researchers.

To study the technology acceptance model (TAM) among metropolitan and non-metropolitan university, study conducted confirmatory factor analysis (CFA) as well as structural equation modelling (SEM). In addition, CFA was conducted to evaluate the reliability and validity of TAM, while SEM was conducted to examine the postulated hypotheses. In addition confirmatory factor analysis can be utilized to examine the theoretical relationships among the observed and unobserved variables (Schreiber, *et al.* 2006). Structural equation modelling on the other hands, is commonly used as a statistical modelling tool to validate relationship between various models or more complicated studies (Chin & Todd, 1995).

In CFA, the goodness-of-fit of a model need to be assessed prior in conducting hypotheses testing. Study followed guidelines by Hair, *et al.* (2010) which refer to three categories of fit indices, i.e. absolute, incremental and parsimonious. Following, the indices that were assessed are 1) Chi-Square ($\chi 2$), 2) Normed chi-square the ratio of the ($\chi 2$) to its degree of freedom (df), 3) Root Mean Square Error of Approximation (RMSEA), 4) Comparative Fit Index (CFI) and 5) Root Mean Square Residual (RMR).

The threshold values for each index to show good model fit are as follows:

- $\chi 2$/df: between 1 to 3 (Carmines and McIver, 1981)

- TLI: ≥.90 or more recently ≥.95 (Lei & Wu, 2007)

- RMSEA: <.08 good fit (MacCallum *et al.*, 1996), <.05 decent fit (Wu, 2009)

IV. RESULTS AND DISCUSSIONS

Table 1
Respondents' profile

	Percentage (%)	
	Metropolitan (n=212)	*Non-Metropolitan (n=190)*
Gender		
Male	48.1%	41.6%
Female	51.9%	58.4%
Race		
Malay	75.0%	67.9%
Chinese	19.8%	27.9%
Indian	2.8%	4.2%
Other	2.4%	0.0%
Religion		
Muslim	76.4%	68.5%
Buddhist	13.2%	23.7%
Hindu	4.2%	2.6%
Christian	5.2%	4.7%
Age		
20-25 years	9.4%	6.8%
26-30 years	32.5%	34.2%
31-35 years	22.2%	23.7%
36-40 years	13.7%	7.4%
41-45 years	4.2%	5.3%
46-50 years	8.5%	12.1%
51-55 years	7.1%	8.4%
56-60 years	1.4%	2.1%
Over 60 years	0.9%	0%
Education		
Diploma	13.7%	7.4%
Bachelor Degree	62.3%	68.9%
Master Degree	23.1%	23.7%
PhD/Professional Doctorate	0.9%	0%

The data was split into metropolitan and non-metropolitan university. The distribution of respondents demographic factors were presented using percentage as shown in Table 1. For respondents' gender distribution, both metropolitan universities and metropolitan universities have slightly less male respondents. It was found that metropolitan universities have slightly more male respondents (48.1%) as compared to non-metropolitan universities (41.6%). For both type of universities, majority of respondents are Malays

followed by Chinese. In addition, non-metropolitan universities seemed to have more Chinese respondents (27.9%) compared to metropolitan universities (19.8%). Next, similar pattern was found in respondents' religion in which majority of respondents are Muslim, followed by Buddhist. This finding is expected as Malay in Malaysia are Muslim while most of Chinese in Malaysia are Buddhist. As for age groups, study discovered that both types of universities exhibited same pattern in which majority of respondents are from age groups of 26 – 30 years old and 31 – 35 years old. In terms of education level, study found that non-metropolitan universities have slightly more respondents with bachelor degree (68.9%) as compared to metropolitan universities (62.3%).

4.1. CFA for Measurement Model

In TAM model, recalled that three latent variables were studied, encompassed perceived usefulness (PU – 5 items), perceived ease of use (PEOU – 5 items), and usage (U – 3 items). CFA was conducted for both data and item PU3 and PEOU2 were omitted due to low regression weight (<0.5) and also high modification index from their error terms. Following, the final CFA of technology acceptance model (TAM) for both metropolitan and non-metropolitan universities are as presented in Figure 4 and 5. For metropolitan TAM's CFA, the model showed good model fit in general. Both TLI and CFI values were greater than 0.95, while RMSEA and RMR values were less than 0.08 cut off point, suggesting a good model fit. Then, normed chi square of 19.62 was between the suggested ranges of 1 to 3, indicating a good model fit as well.
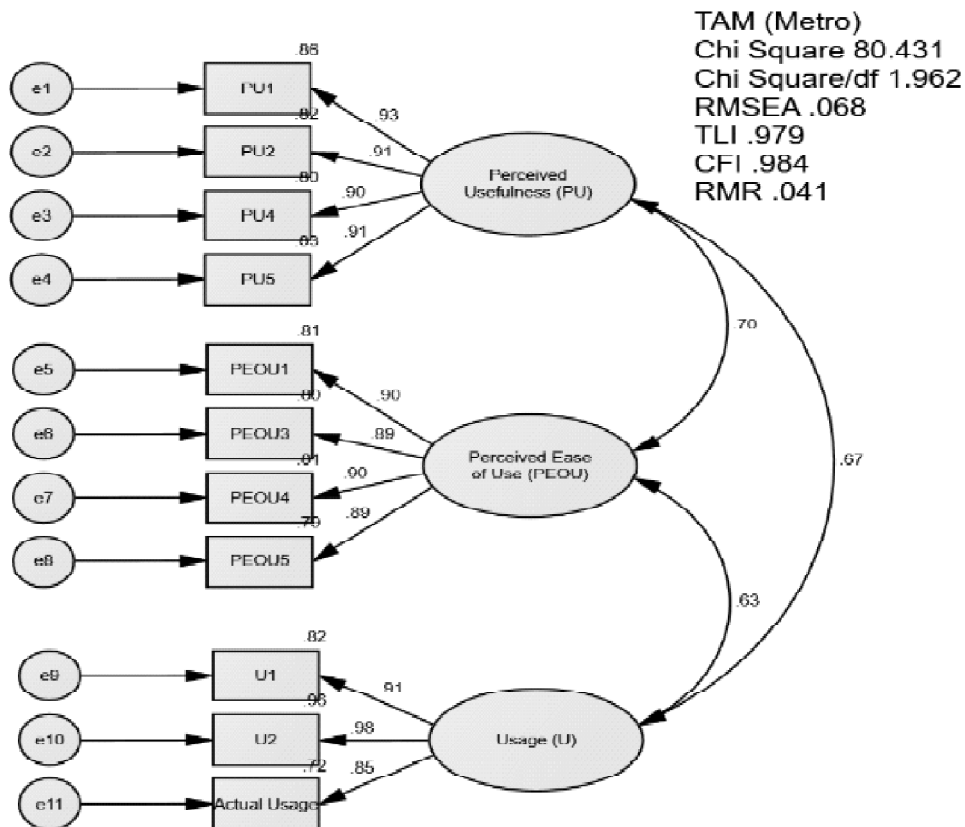

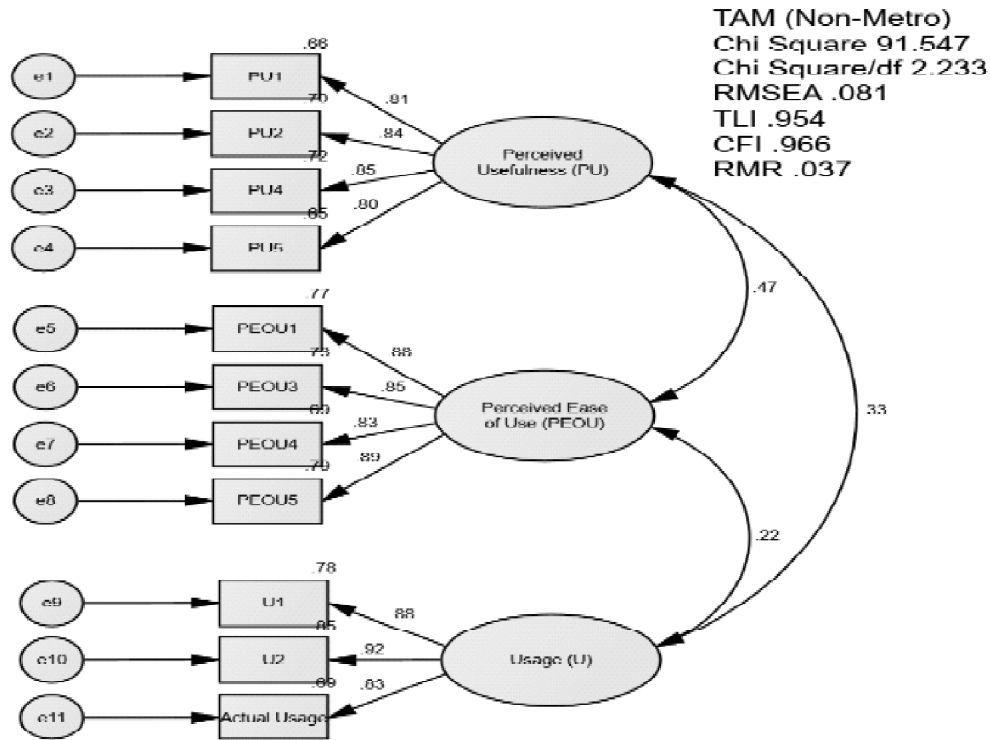**Figure 4: Final CFA for TAM (Metropolitan)**

Figure 5: Final CFA for TAM (Non-Metropolitan)

As for non-metropolitan TAM's CFA, the model showed satisfactory model fit in general. Both TLI and CFI indices were also greater than 0.95 threshold value. The RMSEA value of 0.081, suggesting a lack of model fit, but it is just slightly higher than the 0.08 threshold value. Next, RMR value of 0.037 was close to zero, suggesting a good model fit. Thus, study concludes that both final CFA for technology acceptance model (metropolitan and non-metropolitan) have good model fit for SEM analysis.

4.2. Reliability and Validity of Measurement Model

Table 2 reported factor loadings (BETA), average variance explained (AVE) values and composite reliability (CR) as advised by Hair *et al.* (2010). Based on results, high factor loading were detected for metropolitan (0.851 - 0.978) and non-metropolitan data (0.812 - 0.920). Further, AVE values showed that both models have adequate convergent validity with at least 80.1% (metropolitan) and 68.1% (non-metropolitan) of the variance explained by the items. Also, high composite reliability values of non-metropolitan data (0.938 - 0.951) and metropolitan data (0.895 - 0.921) showing that both models have satisfactory reliability.

For discriminant validity, Table 3 reported the squared multiple correlation matrix. Based on table, noticed that all AVE values are higher than their corresponding squared multiple correlation value, indicating that the measurement model for both non-metropolitan and metropolitan data have good discriminant validity. Thus, study concludes that TAM for both non-metropolitan and metropolitan data exhibited adequate reliability, convergent as well as discriminant validity.

Table 2
Convergent validity and reliability for measurement model

Path			Metropolitan			Non-Metropolitan		
			Beta	AVE	CR	Beta	AVE	CR
PU1	<—-	PU	0.929	0.831	0.951	0.812	0.681	0.895
PU2	<—-	PU	0.908			0.839		
PU4	<—-	PU	0.896			0.846		
PU5	<—-	PU	0.912			0.803		
PEOU1	<—-	PEOU	0.897	0.801	0.942	0.879	0.744	0.921
PEOU3	<—-	PEOU	0.892			0.852		
PEOU4	<—-	PEOU	0.902			0.832		
PEOU5	<—-	PEOU	0.890			0.887		
U1	<—-	U	0.908	0.835	0.938	0.883	0.773	0.911
U2	<—-	U	0.978			0.920		
Actual Usage	<—-	U	0.851			0.832		

Table 3
Squared multiple correlation matrix

	Metropolitan			Non-Metropolitan		
	U	PU	PEOU	U	PU	PEOU
U	**0.835**			**0.773**		
PU	0.444	**0.831**		0.106	**0.681**	
PEOU	0.402	0.489	**0.801**	0.048	0.225	**0.744**

AVE value: Bold and diagonal value

4.3. Normality and Outliers

For metropolitan universities model, both Skewness and Kurtosis value for all items were between ±2, indicating univariate normality. Mardia's multivariate kurtosis value of 18.155 (<143), suggesting the data has multivariate normality. Mahalanobis d-squared value further showed that there is no serious outlier in the data. As for metropolitan universities model, all items showed univariate normality with Skewness and Kurtosis value between ±2. Also, Mardia's multivariate kurtosis value of 4.705 (<143), indicating good multivariate normality. Similarly, non-metropolitan universities model showed no outlier based on the Mahalanobis d-squared value.

4.4. Result of SEM

Figure 6 and 7 showed the structural equation modelling of technology acceptance model for both non-metropolitan and metropolitan universities. Table 4 reported results of SEM results together with invariance group analysis (metropolitan versus non-metropolitan). Invariance group analysis showed that there is significant different for technology acceptance model between metropolitan and non-metropolitan

universities with $X^2 = 25.238$ ($p < 0.05$). This finding shows that university location moderates the strength of relationships in technology acceptance model (TAM). Referring to the p value under path different column, noticed that there are significant differences in relationship's strength for PEOU towards PU and PEOU towards U, both with p values less than 0.05 significance levels. For the influential relationship of PEOU towards PU, metropolitan universities were found to have higher influence (0.699) as compared to non-metropolitan universities (0.474). On the other hand, the PEOU of metropolitan universities were found to have significant positive impact on U (0.330) while non-metropolitan universities were found to have insignificant effect of PEOU on U. Another finding worth mention is the mediation effect of PU between the relationship of PEOU and U for both metropolitan and non-metropolitan universities. Both types of universities were found to have significant mediation effect of PU on the relationship between PEOU and U. Study discovered that for metropolitan universities, PU is a partial mediator (direct effect of PEOU towards U remained significant, from 0.634 to 0.330) while for non-metropolitan universities, PU is a full mediator (direct effect of PEOU towards U became insignificant, from 0.218 to 0.082). Looking at total effect column (without mediation effect) for metropolitan universities, PU (0.435) and PEOU (0.634) have significant positive effect towards U at 0.05 significance level. For non-metropolitan, the PU (0.287) and PEOU (0.218) were found to have significant positive impact on U at 0.05 significance level. These findings indicate that for both types of universities, the increase in the perceived usefulness and the perceived ease of use towards email technology will lead to higher email usage in the university. Besides, study discovered that there is significant influence of PEOU on PU for metropolitan (0.699) and non-metropolitan (0.474) at 0.05 significance level. This finding tells that increase level of perceived ease of use will result in higher level of perceived usefulness among the respondents, regardless the location of the universities.
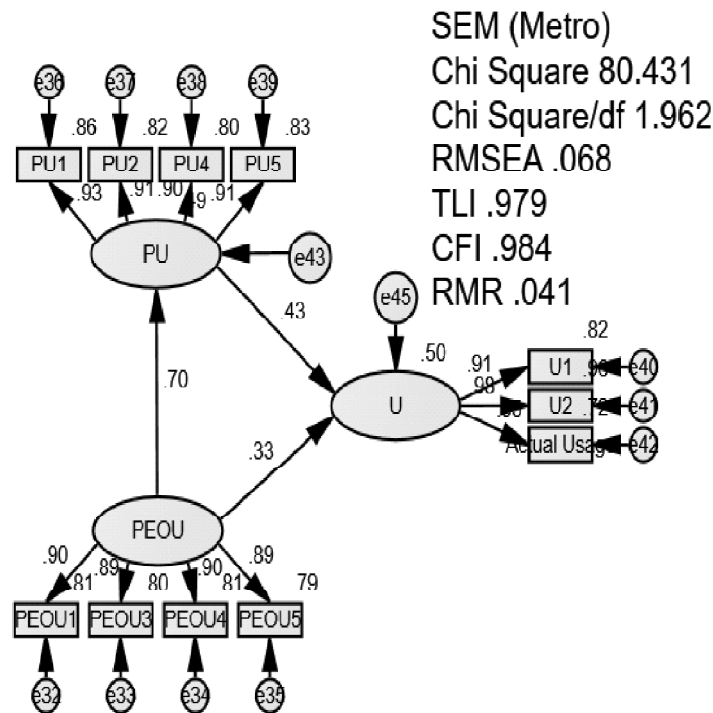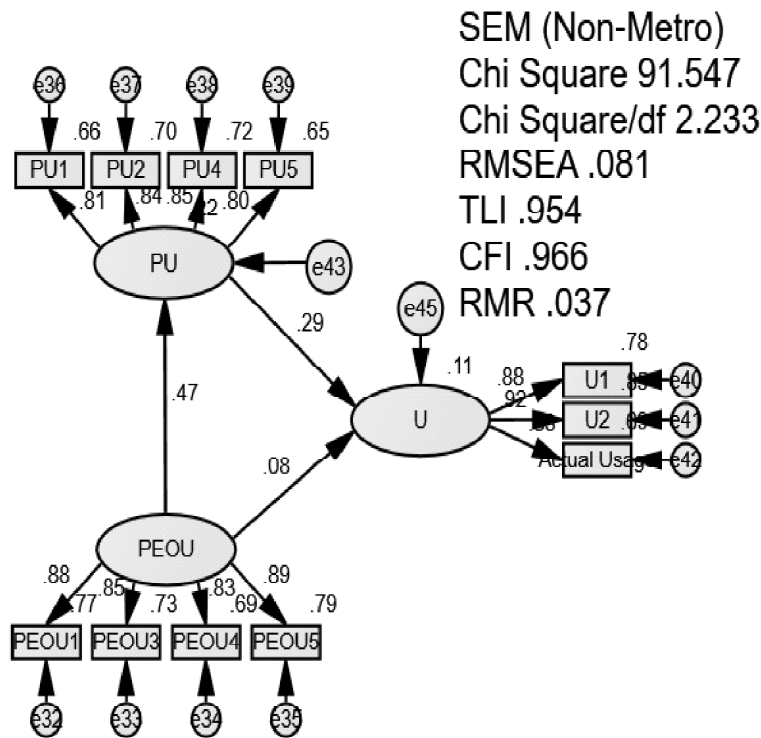

Figure 6: SEM for TAM (Metropolitan)

Figure 7: SEM for TAM (Non-Metropolitan)

Table 4
Regression weights

	Path		Metropolitan Direct	Metropolitan Indirect	Metropolitan Total	Non-Metropolitan Direct	Non-Metropolitan Indirect	Non-Metropolitan Total	Path different p value
PU	<—–	PEOU	0.699**	NIL	0.699**	0.474**	NIL	0.474**	≈ 0.000
U	<—–	PEOU	0.330**	0.304**	0.634**	0.082	0.136**	0.218**	0.030
U	<—–	PU	0.435**	NIL	0.435**	0.287**	NIL	0.287**	0.614

* 0.05 significance level, ** 0.01 significance level

$X_2^2 = 25.248$, $p \approx 0.000$ (Structural weight comparison, path fixed = 3)

Table 5
Summary of Hypothesis Testing Results

	Hypothesis	Supported
H1a:	Perceived ease of use (PEOU) has significant positive effect on perceived usefulness (PU) pertaining to email usage in Malaysian metropolitan universities.	Yes
H1b:	Perceived ease of use (PEOU) has significant positive effect on perceived usefulness (PU) pertaining to email usage in Malaysian non-metropolitan universities.	Yes
H2a:	Perceived ease of use (PEOU) has significant positive influence on email usage (U) in Malaysian metropolitan universities.	Yes

contd. table 5

	Hypothesis	*Supported*
H2b:	Perceived ease of use (PEOU) has significant positive influence on email usage (U) in Malaysian non-metropolitan universities.	Yes
H3a:	Perceived usefulness (PU) has significant positive impact on email usage (U) in Malaysian metropolitan universities.	Yes
H3b:	Perceived usefulness (PU) has significant positive impact on email usage (U) in Malaysian non-metropolitan universities.	Yes
H4a:	University location moderate the relationship of perceived ease of use (PEOU) on perceived usefulness (PU)	Yes
H4b:	University location moderate the relationship of perceived ease of use (PEOU) on email usage (U).	Yes
H4c:	University location moderate the relationship of perceived usefulness (PU) on email usage (U).	No
H5a	There is significant mediation effect of perceived usefulness (PU) on the relationship of perceived ease of use (PEOU) and email usage (U) in Malaysian metropolitan universities	Yes
H5b	There is significant mediation effect of perceived usefulness (PU) on the relationship of perceived ease of use (PEOU) and email usage (U) in Malaysian non-metropolitan universities	Yes

V. CONCLUSION AND RECOMMENDATIONS

This study presents a conceptual framework on how perceived ease of use (PEOU), perceived usefulness (PU), and universities location affect the email usage (U) of non-academic staff in Malaysian universities. In general, most of the hypotheses proposed were supported. This study have implications on the email system adaptation or acceptance in Malaysian universities, considering its cost and effectiveness. Using the findings, efforts need to be given to design easy to use and useful email system since both of them are significant factors for the actual email usage in Malaysian universities. For universities' authority, it is important for them to shape the perception of non-academic staffs in the ease of use and usefulness of the email system. In addition, universities' authority could focus more on perceived usefulness of email, as it was found that perceived usefulness have higher or stronger influence on actual email usage as compared to perceived ease of use. Moreover, perceived ease of use (PEOU) for non-metropolitan universities has less effect of perceived usefulness (PU) and actual usage (U) as compared to metropolitan universities. Thus, it is more practical for authorities or interested parties to increase or improve the acceptance of email usage in non-metropolitan universities by tackling perceived usefulness than perceived ease of use.

REFERENCES

Adams, DA, *et al.* (1992), 'Perceived usefulness, ease of use, and usage of information technology: a replication', *MIS quarterly,* , vol. 16, no. 2, pp. 227-47.

Bidin, R (2000), 'Media Richness, Social Influences and electronic mail in the workplace', Master Thesis thesis, Universiti Putra Malaysia.

Calvert, J, Kaye, J, Leahy, M, Hexem, K & Carlson, N (2009), 'Technology use by rural and urban oldest old', *Technology and Health Care,* vol 17, no. 1, pp. 1–11.

Carmines, EG & McIver, JP (1981), Analyzing models with unobserved variables. In Bohrnstedt, Social measurement: Current issues. Beverly Hills: Sage. *G.W. & Borgatta, E.F. [Eds.]*.

Chin, WW & Todd, PA (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. 237-46.

Chui, M. *et al.* (2012), The social economy: Unlocking value and productivity through social technologies. *McKinsey Global Institute, New York, United States.*

Davis, FD (1993), 'User acceptance of information technology: system characteristics, user perceptions and behavioral impacts', *International Journal of Man-Machine Studies,*, vol. 38, no. 3, pp. 475-87.

Davis, FD *et al.* (1989), 'User acceptance of computer technology: Acomparison of two theoretical models'. *Management science*, vol. 35, no. 8, pp. 982-1003.

Department of Statistics Malaysia (2010), Population Distribution and Basic Demographic Characteristic, Department of Statistics, Malaysia, Kuala Lumpur.

Derks, D & Bakker, AB (2010), 'The impact of e-mail communication on organizational life', Cyberpsychology: . *Journal of Psychosocial Research on Cyberspace,* vol. 4, no. 1, pp. 1-14.

DiMaggio, P & Hargittai, E (2001), From the 'Digital Divide' to `Digital Inequality': Studying Internet Use As Penetration Increases. Working Paper 15. Center for Arts and Cultural Policy Studies, Woodrow Wilson School, Princeton University.

Farrington, J, *et al.* (n.d.). Two-Speed Britain: Rural and Urban Internet. *RCUK Digital Economy Research Hub dot.rural.*

Hair, JF *et al.* (2010), Multivariate Data Analysis: A global perspective. *Pearson Prentice Hall, New Jersey.*

Howell, B (2001), The Rural-Urban 'Digital Divide' in New Zealand: Fact or Fable?,. *Prometheus: Critical Studies in Innovation,* vol. 19, no 3, pp. 231-251.

Jones, AB & Hubona, GS (2005), Individual Differences and Usage Behaviour: Revisiting a Technology Acceptance Model Assumption. *The Data Base for Advances in Information Systems - Spring* ,vol. 36, no. 2, pp. 58-77.

Kean, J. (2009), Workplace Email Communication In New Zealand and Malaysia: Three Case Studies.

MacCallum, RC, *et al.* (1996), 'Power analysis and determination of sample size for covariance structure modeling', Psychological methods, vol. 1, no. 2, p. 130.

Mahomed, ASB (2015), "Examining Usage of emails among Non-Academic Staff in Public and Private Malaysian Universities", PhD thesis, Victoria University, Australia.

Mahomed, ASB, McGrath, GM and Keating, M (2015), "Usage of emails among Youth in Malaysian Public and Private Universities", *Malaysian Journal of Youth Studies*, vol. 13, no. 8, pp. 120-152.

Mahomed, ASB, McGrath, GM and Yuh, BZ (2017), "The Role of National Culture on Usage of emails among Non-Academic Staff in Malaysian Public Universities", *International Journal of Economics and Management*, Vol. 11, No. 1, pp. 153-185.

Mitomo, H & Sanbonmatsu, N (2007), Factor Influencing the Usage of Mobile Phone in Asia: A Comparitive study based on Asian Metropolitan Mobile Survey. *Studies in Regional Science*, vol.37. no 2, pp. 455-469.

Mohamad, WMW & Hashim, NH (2010), 'The effectiveness of email use by Malaysia government ministries ', paper presented to International Conference on Business and Economic Research (ICBER 2010) Malaysia, Kuching, Sarawak, Malaysia, 15-16 March 2010.

Mutlu, S & Ergeneli, A (2012), 'Electronic mail acceptance evaluation by entended technology acceptance model and moderation effects of espoused national cultural values beween subjective norm and usage intention'. *Intellectual economics*, vol. 6, no. 2, pp.

Porter, E & Donthu, N (2006), Using the technology acceptance model to explain how attitudes determine Internet usage: The role of perceived access barriers and demographics. *Journal of Business Research* , vol 59, pp. 999–1007.

Radicati (2017), Email Statistics Report, 2017-2021, *Palo Alto, CA.*

Schreiber, J. (2006), Reporting structural equation modelling and confirmatory factor analysis results: A review. *The Journal of Educational Research*, vol. 99, no. 6, pp. 323-38.

Serenko, A & Turel, O (2010), Rigor and Relevance: The Application of The Critical Incident Technique to Investigate Email Usage. *Journal of Organizational Computing and Electronic Commerce*, vol 20, no. 2, pp. 182-207.

Silverstone, B (2010), 'The growth and development of email and its effectiveness as a means of communication. A case study of staff at Pembrokeshire College'. *, MSc Dissertation thesis, University of Glamorgan, UK.*

Stern, MJ, Adams, AE, & Elsasser, S. (2009), Digital Inequality and Place: The Effects of Technological Diffusion on Internet Proficiency and Usage across Rural, Suburban, and Urban Counties. *Sociological Inquiry,*, vol. 79, no. 4, pp. 391–417.

Wu, M (2009), Structural equation modeling: Amos operation and application. *Wu-Nan Book Inc, Taipei, Taiwan.*