

## **Analysing Factors influencing Stated Preference of the Administrative and Academic Employees towards Telecommuting in IIUM Campus, Gombak**

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**Abstract:** Telecommuting is seen as a Transportation Demand Management (TDM) tool that can reduce congestion by eliminating a trip or shifting it out of the peak travel period by allowing employees to work from home. This paper constitutes an empirical study on factors influencing the choice of telecommuting adoption in the International Islamic University Malaysia (IIUM) among the administrative and academic employees. Methods of analysis conducted in this study are chi-square test and spearman's correlation coefficient. The results showed that age, marital status, presence of children age 12 and less and frequency of face to face communication were significantly associated with the preference towards telecommuting. Furthermore, this research has tested the relationship between facilitators of telecommuting and willingness to telecommute as well as relationship between inhibitors of telecommuting and the willingness to perform telecommuting. Lastly, the study concludes with suggestions and recommendations to increase the penetration of telecommuting in IIUM.

**Keywords:** Telecommuting, Teleworking, Transportation Demand Management, Private Vehicle, Peak-hour Traffic

### **1. INTRODUCTION**

Malaysia has been experiencing high levels of motorization over the past two decades to meet the growing transportation demand. According to Siti Indati *et al.* (2011), the total number of vehicles in the country has increased from about 5 million in 1991 to 19 million in 2009, at an average annual growth rate of about 8% during this period. The growth in the number of vehicles in the country was much faster than the growth in population, where an average annual growth rate of population was 2.5% between 1991 and 2009. The highest growth of urbanization and motorization in Malaysia was recorded in Kuala Lumpur, the capital city of Malaysia and Klang Valley Region (Noresah, 2012). The number of vehicles registered in Kuala Lumpur has increased from 2,357,971 in 2001 (Department of Statistics Malaysia, 2011) to 4,635,212 in 2010 (Ministry of Transport Malaysia, 2010). In Kuala Lumpur, the number of registered motor vehicles has been increasing continuously every year as a result of rapid economic growth and development (Suwardo *et al.*, 2008). The demand for traveling to the city of Kuala Lumpur has been increasing due to increase in vehicle ownership. Klang

Valley region comprises of towns in the suburb of Kuala Lumpur including Kuala Lumpur city. In Klang Valley, private vehicles are growing at an alarmingly faster rate with an average of 30,000 registered cars per month. Sabariah (2011) claimed that only 17% (1.24 million) of the trips were made by public transport while the remaining 83% (6 million) of trips made by private transport and mostly by single occupancy vehicles. The Star (2011) reported that Malaysians heavy dependency on private vehicles was due to the ineffective public transportation system. This explains why huge traffic jams and constant traffic gridlock situations are taking place in Klang Valley region. The increasing travel demand to the city was clearly found to be far beyond the capacity of road system, even after new roads were built and existing roads were improved. The increase in the number of vehicles on the road infrastructure has given rise to traffic accidents, traffic congestions and reduced the efficient supply of parking spaces in the city (Norlida *et al.*, 2008). There is also growing concern for noise pollution, energy use and conservation as well as environmental pollution from the excessive use of motor vehicles (Saadiah and Noriani, 2008).

The increase in the number of private vehicles has been taking place in the University campuses. However, a relatively little attention has been given to parking and transportation issues in the University campuses in Malaysia. International Islamic University Malaysia (IIUM) for example, one of the universities located in the district of Gombak, a suburb of the capital city of Kuala Lumpur, has been facing with slow moving of traffic especially during peak hours and insufficient parking spaces. The University is located at around 10 kilometers in the northeast direction from Kuala Lumpur and at the foot of the Gombak hillside. It can be accessed by Middle Ring Road 2 (MRR2), Karak Highway or the Gombak road. The campus is currently accommodating 20 thousand students and 2,226 employees (IIUM Management Service Division, 2012). The number of registered vehicles of IIUM employees has increased between 2007 and 2010. In 2010, the total number of registered cars has reached the highest level with 2989 vehicles, increased from 2787 vehicles in 2007, at an average annual increase of 1.8% (IIUM Security Management Unit Office, 2011). With the increasing number of vehicles, it creates constant pressure on the road infrastructures in IIUM. The traffic volume on-campus has been increasing especially during peak hours. Traffic volume was the highest during the evening period from 5.00 pm to 6.00 pm; a total of 786 vehicles were leaving the campus during this time period (Centre for Built Environment, 2007). High use of private vehicles and most employees leaving the campus at the same time after office hours were the main cause of increase in traffic volume. As a result, it develops long queues and causes disturbances to the traffic movement along the main road. Furthermore, the primary survey data in 2013 has revealed that only 9% of IIUM employees were relying on public transport as their main mode of travel from home to IIUM and back to home. This explains that IIUM employees rely heavily on private vehicles as the remaining 91% of the employees who travel between home and IIUM were using private vehicles. IIUM records showed an increasing number of staffs every year. As the number of employees relying on private vehicles increases, the traffic volume on-campus also increases. As a result, it, undoubtedly, poses constraints on the existing physical road infrastructure. The existing traffic scenario in IIUM has necessitated studying the applicability of telecommuting as an attractive and alternative work arrangement among the employees. Stough and Button (2006) claimed that telecommuting can be viewed as potential means to alleviate traffic congestion.

The traffic situation in the campus is becoming even worse whenever the parking demand exceeds the capacity of parking supply. The Centre for Built Environment (2007) reveals from the previous survey that parking spaces provided within the campus was highly utilized with an average of 83.55% parking occupancy. Whenever the parking spaces are fully occupied, users tend to park their vehicles at the curb sides of the major road and

undesigned locations which has caused obstructions to the traffic movement around the campus. Subsequently, it interrupts the traffic flow along the major road and gradually creates congestion. It indicates that demand for parking is increasing because of the increase in the number of vehicles on-campus. These problems have posed a strain on the ability of the existing infrastructure to cope with the increasing traffic. Due to the limited availability of resources, the existing road infrastructure is burdened by the increasing volume of private vehicles. Thus, a study on telecommuting is considered appropriate and timely, as it would help to address the increase in the number of private vehicles and parking problems on campus.

Telecommuting is designed to allow commuters to use telecommunication technology to work at home or at a location close to home during regular work hours (Sullivan, 2003). Telecommuting, therefore, not only helps commuters to save their driving time to work, but more importantly to eliminate some vehicle trips (Zhou *et al.*, 2009). It is seen as an important Transportation Demand Management (TDM) tool that can reduce congestion by eliminating a trip or shifting it out of the peak travel period (Pidaparathi, 2003). Expanded telecommuting has the potential to reduce vehicular travel, traffic congestion and travel time. As a result, telecommuting can reduce air pollution emissions, including greenhouse gases, energy consumption and accidents, and eliminate the need for some highway construction and capacity expansion (USDOT, 2007). Furthermore, telecommuting can improve individuals' overall work-life quality; telecommuters may be more satisfied with their jobs (Kurland and Bailey, 1999). Even though telecommuting has proved to provide benefits regardless of employees' or employers' perspectives, however, this programme has not yet gained popularity in Malaysia particularly in the higher educational institutions. Nevertheless, some forms of informal telecommuting arrangements were practiced by few employees whenever need arises. Therefore, it is necessary to look into the initiatives of implementing telecommuting particularly the benefits that will be gained by the employees and to address current traffic and parking problems at the institutions of higher educational campuses in Kuala Lumpur. Hence, this paper examines the factors influencing the stated preference of administrative and academic employees towards telecommuting in International Islamic University Malaysia, Gombak.

## **2. LITERATURE REVIEW**

### **2.1 Factors Influencing the Choice of Adopting Telecommuting Mode**

Practically, the idea of telecommuting was foreseen way back as early as 1950s in the United States (Karia and Asaari, 2004). The popular press noted the arrival of telecommuting back in the late 1990s and researchers provide mixed perceptions of the telecommuting phenomenon, which includes varied definitions (Kurland and Egan, 1999). Telecommuting according to Mokhtarian and Salomon (1994) is defined as using technology to work at home or at another location during regular working hours, instead of commuting to the workplace. It may be part-time or full-time, and need not exclusively involve computers. The desire to telecommute by employees has been increasing over the years. Telecommuting has become an area of interest not only to employees but also to employers, transportation planners, communities, telecommunications industry, and others (Pidaparathi, 2003). Peters *et al.* (2003) indicate that socio-demographic variables, such as gender and age were found to influence telecommuting adoption and its preference. Similarly, Theriault *et al.* (2005) suggested that gender influence telecommuting choice, and older workers are more likely to telecommute than younger ones.

A previous study of telecommuting adoption, Mokhtarian and Salomon (1996a) found that indeed females were significantly more likely towards the idea of telecommuting than males ( $p=0.0008$ ). In other study done by Grippaldi (2002) women were slightly in favour of telecommuting than men. These findings suggest that women have stronger positive attitudes about telecommuting and generally rated the benefits of telecommuting higher than men (Mokhtarian, 1998). Moreover, Yeraguntla and Bhat (2005) showed that women households with children were likely to be part-time telecommuters, reinforcing the notion that women are the primary caregivers of children. In contrary, Huws *et al.* (1990) found interest on telework to be stronger among couples with no children than among couples with one to two children. Kinsman (1987) reports that teleworkers with small children found it difficult to balance childrearing with work. Yeraguntla and Bhat (2005) considered age as one of the important socio-demographic variables that turn out to be significant predictor of telecommuting. The San Diego study showed that as age increases the likelihood that an individual prefers to telecommute decreases (Bagley and Mokhtarian, 1997). Marital status has a positive effect on both – choice to telecommute and the frequency of telecommuting. In the study of Aboelmaged and Elamin (2009), they found that employees' marital status does significantly influence teleworking choice ( $p<0.05$ ). This supports the results obtained by previous researchers and suggested that married individuals were more committed to household obligations than unmarried individuals, and therefore prefer to telecommute (Popuri and Bhat, 2003).

Telecommuting is usually defined as the substitution of working at home, or at an office close to home, for commuting to a regular workplace. At first sight, commuting is the distinguished elements. This is fully in line with local or national policies to reduce traffic congestion by promoting telecommuting (Peters *et al.*, 2001). In several studies, it was documented that the commute trip from home to work is proportional to the propensity to adopt telecommuting (Nilles, 1988; Mahmassani *et al.*, 1993; Sullivan *et al.*, 1993; Mokhtarian and Salomon, 1997). Jiang (2008) and Mokhtarian and Salomon (1996a) explained workers who have longer commute distances may be more likely to telecommute. In many studies commuting time was indeed found to have a large positive effect on telecommuting adoption (Mokhtarian and Salomon, 1997). Moreover, commuting time was indeed found to have a large positive effect on telecommuting adoption (Peters *et al.*, 2003). Based on samples of more than 500 workers in public agencies, Mannering and Mokhtarian (1995); Mokhtarian and Salomon (1996b); Mokhtarian and Salomon (1997) found that work-related factors were most predictive of an individual's choice to work remotely. Job suitability reigns high among traits considered indicative of which employees are eligible for telework. Individual control of work pace and little need for face-to-face interaction are examples of suitable job traits for adopting telecommuting. In addition, Bagley and Mokhtarian (1997) revealed that job type and length of service were also important influential factors for the choice of telecommuting mode. Study done by Yeraguntla and Bhat (2005) revealed that employees who have worked less than a year in the firm were more likely to be part-time telecommuters than those who were working for longer period of time. In the analysis of the telework survey conducted by the Southern California Association of Governments (SCAG), individuals with more professional experience in general and a longer tenure with one's current company will boost the probability of teleworking (Safirova and Walls, 2004).

A study on telecommuting at University Utara Malaysia (UUM), Sintok, was carried out to investigate the employees' perceptions and willingness to telecommute as well as the possibility of implementing telecommuting as the first mode of working. The research obtained information from lecturers through questionnaire surveys particularly on the

suitability of telecommuting for a lecturer and their allocation of time for each task. 70 questionnaire surveys were distributed among the lecturers and out of this total, 33 (47%) lecturers have replied. According to the research by Wan Rozaini and Haitham (2005), among the UUM lecturers, the findings revealed 70.5% reported high agreement with telecommuting, 13.5% reported moderate agreement, 15.9% of the respondents reported low agreement. The study also found that the average daily travel cost for lecturer was RM 12.70 per person. If a lecturer telecommutes two days per week, it could save up to RM 101.60 per month. In relation to that, 69.9% of the lecturers seemed to agree with the benefits of telecommuting in reducing travel costs and stressed, at the same time, increase productivity and enjoyment of flexible working hours. The study showed that the position of a lecturer is suitable for telecommuting at least part-time. People are willing to telecommute, if adequate supporting infrastructures are readily available to support telecommuting, but most importantly, support from top management is needed to establish organizational policies and regulations that could enable employees to telecommute.

Most of the telecommuting literature has generally taken their roots in the developed countries, most probably North America and Western Europe (Aboelmaged and Elamin, 2009). This indicates that there is a gap in the literature especially in terms of lack of studies in developing contexts including at higher educational institutions. Considering the existing traffic and parking problems in IIUM, this study would contribute to abridge that identified gap. When examining the benefits of telecommuting in the literatures, it seems that very limited research on factors influencing the telecommuting choice in the context of higher education institutions was undertaken. By examining the relationships between telecommuting choice and position of employees (academic and administrative) in IIUM, it is expected to add further knowledge to the literatures. Furthermore, the expected outcome of this study would provide important insights on the benefits of the telecommuting to both employees and University management which could help to make decisions concerning telecommuting programmes in the future.

### **3. RESEARCH APPROACH**

#### **3.1 Background of Study Area and Study Objectives**

International Islamic University Malaysia was established in 23 May 1983 being founded based on Islamic principles with the aim to become a premier Islamic University in the world (The Star, 2007). IIUM Gombak campus comprises of 8 faculties, also known as Kulliyahs, specialized in Architecture and Environmental Design, Economics and Management Sciences, Engineering, Islamic Revealed Knowledge and Human Sciences, Education, Law, Information and Communication Technology and Language Centre. The main objectives of this paper are:

1. To investigate the demographic profile, travel behaviour and work characteristics of administrative and academic employees in IIUM.
2. To examine factors influencing the administrative and academic employees' preferences towards telecommuting

#### **3.2 Sample Size**

Academic and administrative staffs of IIUM were selected as the target population for this study because of their high involvement in using computers and Internet in their work tasks.

Among the job types of administrative employees, technician and technical assistant were not included in this study due to unsuitability of their job traits to perform telecommuting as part of work arrangement. They are required to physically present to handle laboratories, workshops and audio-visual equipments. However, technicians who are working at Information Technology Division of IIUM (ITD) were included as sample in this study because of the nature of their work tasks spending a lot of time using computers and dealing with computer programmes, information systems and softwares. Mokhtarian (1998) stressed that information workers are potential workers to telecommute because of spending most of their time on dealing, processing and delivering information related tasks. On the other hand, academic employees are highly engaged with telecommuting-compatible jobs such as research and consultancy. These job traits are seen as a potential option, which may increase the probability of telecommuting adoption. The main aim of this research is to investigate the factors contributing the employees' choice towards the adoption of telecommuting. Because telecommuting programme has not officially been implemented in IIUM, it is essential to gauge the stated preference of the employees to examine their views on the benefits of telecommuting and the penetration level of adopting telecommuting in IIUM. According to IIUM Management Service Division (2012) the total number of employees in IIUM in 2010 was 1808 staff (excluding technicians and technical assistants except those from ITD). The estimation of sample size for this research is based on Cochran's formula (Cochran, 1977):

$$\begin{aligned} n_0 &= \frac{(t)^2 * (p)(q)}{(d)^2} \\ n_0 &= \frac{(1.96)^2(.5)(.5)}{(.05)^2} = 384 \end{aligned} \tag{1}$$

where,  $t$  : value for selected alpha level of .025 in each tail = 1.96  
 $(p)(q)$  : estimate of variance = .25  
 $d$  : acceptable margin of error for proportion being estimated = .05

Therefore, for a population of 1,808 the required sample size is 384. However, as this sample size exceeds 5% of the population ( $1,808 * .05 = 90$ ), Cochran's (1977) correction formula was used to calculate the final sample size (as cited in Bartlett et al., 2001). The calculations are as follows:

$$\begin{aligned} n_1 &= \frac{n_0}{(1 + n_0 / \text{Population})} \\ n_1 &= \frac{(384)}{(1 + 384/1808)} = 317 \end{aligned} \tag{2}$$

where, Population : 1,808

$n_0$  : required return sample size according to Cochran's formula = 384  
 $n_1$  : required return sample size because sample > 5% of population

These procedures resulted in a minimum returned sample size of 317. As this study considered two types of job position i.e. administrative and academic, the stratified random sampling method was used to select samples from each population strata. In this case, the sample units were allocated through proportional allocation approach (Anderson, 1989):

$$n_i = N_i \times \frac{n}{N} \tag{3}$$

where,  $n_i$  : sample units of  $i$ th stratum  
 $N_i$  : population size of  $i$ th stratum  
 $n$  : sample size  
 $N$  : population size.

Table 1 shows the calculated sample size on each type of the job positions.

Table 1. Proportional allocation of sample according to job position

Job field	Population	Sample units	Percentage
Administrative	639	112	35.3%
Academic	1169	205	64.7%
<b>Total</b>	<b>1808</b>	<b>317</b>	<b>100.0%</b>

### 3.3 Questionnaire Survey and Method of Analysis

The samples from each sub-population strata were selected by using simple random sampling method. Microsoft Excel was used to generate random numbers for the selection of samples. Each selection is independent of other selections, and every possible combination of sampling units has an equal and independent chance of being selected. After an element was selected from the population, it was removed from the population. Therefore, the same population element would not enter the sample more than once. Questionnaire survey forms were distributed to the employees in IIUM and data were collected by face to face interview and drop and collect method. The findings of this paper are based on only 150 questionnaires as only 150 questionnaires were collected at the time preparing this paper. Out of 150 employees, 54 were administrative staff and the remaining 96 academic staff. The survey instrument includes several statements which were being designed to measure the research constructs. First, choice to select telecommuting is presented in a nominal scale with three options; (1) definitely yes; (2) may consider; (3) not at all. Second, the perceived importance on each telecommuting facilitators and inhibitors was measured by using 5-point Likert scale ranging from “least important” to “most important”. The data on demographic profiles, travel behaviour, work characteristics and perceptions on telecommuting were also collected. Descriptive analysis was used to illustrate the frequency, mean and standard deviation of each variable for administrative and academic staff. Chi-square test was used to examine the association between selected demographic, travel and work variables and preference towards telecommuting for statistical significance.

## 4. ANALYSIS AND FINDINGS

### 4.1 Demographics, Travel Behaviour and Work Characteristics of the Sample

The demographic profiles of the respondents are given in table 2. It describes the demographic profile of the respondents by job position (i.e., administrative, academic). The

findings showed that 54 respondents (36.0%) were administrative staff while 96 respondents (64.0%) were academic staff. About 74% of the administrative staffs and 65% of the academic staffs were female. About 43% of the administrative staff and 47% of the academic staff were in the age structure between 31 and 40 years. The average age of the administrative staff and academic staffs were 33 years and 35 years respectively. About 74% of the administrative staffs and 91% of the academic staffs were married. The number of academic staff (75%) having children less than 12 years old was higher than administrative staffs (54%). Nearly 50.0% of the administrative employees were having bachelor degree and 49.0% of the academic staffs master degree. The average monthly income of the academic staff was RM 4820 and that of administrative staff RM 2650. All the administrative staffs and 90% of the academic staffs were Malaysian. Table 3 describes the travel behaviour of the respondents. A high number of academic staffs (69%) were traveled to workplace by car (single occupancy) as compared to administrative staffs (48%). The mean commute distance (one-way) of the administrative staffs was 18.5 km and that of academic staffs 17 km. The mean delay time of the respondents from home to office was lower than from office to home. The delay time considered in this study is defined as the time lost by a vehicle due to causes beyond the control of the driver. Delay time includes extra time caused by impedance from other vehicles, traffic control, weather, or/and running personal errands when traveled from home to IIUM and vice versa.

Table 2. Demographic profile of the respondents by job position (n=150)

Demographic profile	Job position		Total	Mean	
	Admin.	Academic		Admin.	Academic
<b>Gender</b>					
Male	14 (25.9)	34 (35.4)	48 (32.0)	-	-
Female	40 (74.1)	62 (64.6)	102 (68.0)	-	-
<b>Age</b>					
21-30 years	21 (38.9)	6 (6.3)	27 (18.0)	32.96	34.84
31-40 years	23 (42.6)	45 (46.9)	68 (45.3)		
41-50 years	10 (18.5)	36 (37.5)	46 (30.7)		
51-60 years	-	8 (8.3)	8 (5.3)		
61-70 years	-	1 (1.2)	1 (0.7)		
<b>Marital status</b>					
Single	14 (25.9)	9 (9.4)	23 (15.3)	-	-
Married	40 (74.1)	87 (90.6)	127 (84.7)	-	-
<b>Presence of children age 12 and less</b>					
Yes	29 (53.7)	72 (75.0)	101 (67.3)	-	-
No	25 (46.3)	24 (25.0)	49 (32.7)	-	-
<b>Level of education</b>					
SPM	12 (22.2)	-	12 (8.0)	-	-
Diploma	11 (20.4)	-	11 (7.3)		
Degree	27 (50.0)	3 (3.1)	30 (20.0)		
Master	4 (7.4)	47 (49.0)	51 (34.0)		
PhD	-	46 (47.9)	46 (30.7)		
<b>Monthly income</b>					
RM1,000-3,000	29 (53.7)	3 (3.1)	32 (21.3)	2648.15	4822.92
RM3,001-5,000	20 (37.0)	31 (32.3)	51 (34.0)		
RM5,001-7,000	4 (7.5)	35 (36.4)	39 (26.0)		
RM7,001-9,000	1 (1.9)	21 (21.9)	22 (14.7)		
RM9,001-11,000	-	6 (6.2)	6 (4.0)		
<b>Nationality</b>					
Malaysian	54 (100.00)	86 (89.6)	140 (93.3)	-	-
Non-Malaysian	-	10 (10.4)	10 (6.7)	-	-
<b>Total</b>	<b>54 (100.0)</b>	<b>96 (100.0)</b>	<b>150 (100.0)</b>		

Table 3. Travel behaviour of the respondents by job position (n=150)

Travel behaviour	Job position		Total	Mean	
	Admin.	Academic		Admin.	Academic
<b>Mode of transport</b>					
Car-as driver (single occupancy)	26 (48.1)	66 (68.8)	92 (61.3)		
Car-as driver (ride sharing)	10 (18.5)	17 (17.7)	27 (18.0)	-	-
Car-as passenger	7 (13.0)	8 (8.3)	15 (10.0)		
Motorcycle	6 (11.1)	3 (3.1)	9 (6.0)		
Public transport	5 (9.3)	2 (2.1)	7 (4.7)		
<b>Commute distance</b>					
10 km and less	23 (42.6)	52 (54.1)	75 (50.0)		
11-20 km	9 (16.7)	15 (15.6)	24 (16.0)		
21-30 km	11 (20.4)	11 (11.5)	22 (14.6)		
31-40 km	5 (9.3)	4 (4.1)	9 (6.0)	18.33	16.96
41-50 km	4 (7.4)	10 (10.4)	14 (9.3)		
51-60 km	2 (3.7)	3 (3.1)	5 (3.4)		
61-70 km	-	1 (1.0)	1 (0.7)		
<b>Delay time from home to IIUM</b>					
No delay	12 (22.2)	28 (29.2)	40 (26.7)		
10 minutes and less	31 (57.4)	43 (44.8)	74 (49.3)		
11-20 minutes	10 (18.5)	15 (15.6)	25 (16.6)	8.86	10.38
21-30 minutes	1 (1.9)	8 (8.3)	9 (6.0)		
31-40 minutes	-	2 (2.1)	2 (1.3)		
<b>Delay time from IIUM to home</b>					
No delay	9 (16.7)	21 (21.9)	30 (20.0)		
10 minutes and less	16 (29.6)	37 (38.5)	53 (35.4)		
11-20 minutes	18 (33.3)	23 (23.9)	41 (27.3)		
21-30 minutes	6 (11.2)	10 (10.4)	16 (10.7)	12.00	11.33
31-40 minutes	2 (3.7)	2 (2.1)	4 (2.7)		
41-50 minutes	1 (1.9)	2 (2.1)	3 (2.0)		
51 minutes -1 hour	2 (3.7)	1 (1.0)	3 (2.0)		
<b>Total</b>	<b>54 (100.0)</b>	<b>96 (100.0)</b>	<b>150 (100.0)</b>		

The work characteristics of the respondents are given in table 4. The administrative staffs include clerical, officer, secretary, assistant officer, accountant, engineer and assistant accountant, graphic designer, quantity surveyor, internal auditor and technical. The academic staffs include professor, associate professor, assistant professor, lecturer, teacher and academic fellow. The average length of service by administrative staff was 9 years and that of academic staffs 12 years. About 48% of the administrative staffs (mean = 10.93 hours) have spent 1-8 hours per week communicating with students whereas 41% of the academic staffs (mean = 16.71 hours) 9-16 hours per week. It showed that academic staffs have spent much more time with students as compared to the administrative staffs. The obvious reason is due to involvement in teaching by academic staffs. Finally, about 74% of the administrative and 58% of the academic respondents have spent 1-10 times per day involving in face to face communication related to their jobs.

Table 4. Work characteristics of the respondents by job position (n=150)

Work characteristics	Job position		Total	Mean	
	Admin.	Academic		Admin.	Academic
<b>Length of service</b>					
1-5 years	22 (40.7)	18 (18.8)	40 (26.7)	9.11	11.70
6-10 years	9 (16.7)	27 (28.1)	36 (24.0)		
11-15 years	17 (31.5)	26 (27.1)	43 (28.7)		
16-20 years	3 (5.6)	14 (14.6)	17 (11.3)		
21-25 years	1 (1.9)	9 (9.4)	10 (6.7)		
26-30 years	2 (3.7)	2 (2.1)	4 (2.7)		
<b>Time spend in oral communication with students</b>					
Not related	8 (14.8)	1 (1.0)	9 (6.0)	10.93	16.71
1-8 hours/week	26 (48.1)	10 (10.4)	36 (24.0)		
9-16 hours/week	9 (16.7)	39 (40.6)	48 (32.0)		
17-24 hours/week	5 (9.3)	34 (35.4)	39 (26.0)		
25-32 hours/week	6 (11.1)	10 (10.4)	16 (10.7)		
33-39 hours/week	-	2 (2.1)	2 (1.3)		
<b>Frequency of using face-to-face</b>					
1-10 times/week	7 (13)	29 (30.2)	36 (24.1)	-	-
1-10 times/day	40 (74.1)	56 (58.3)	96 (64.0)		
11-20 times/day	5 (9.3)	10 (10.4)	15 (10.0)		
21-30 times/day	2 (3.7)	-	2 (1.3)		
31-35 times/day	-	1 (1.0)	1 (0.7)		
<b>Total</b>	<b>54 (100.0)</b>	<b>96 (100.0)</b>	<b>150 (100.0)</b>		

#### 4.2 Perceptions of the Respondents on Telecommuting

Figure 1 demonstrates familiarity of telecommuting concept by job position. 57.4% of the administrative respondents were somewhat familiar with the concept of telecommuting while 18.5% were not familiar. On the other hand, 50.0% of the academic respondents were somewhat familiar with the concept of telecommuting. 94.4% of the administrative respondents and 57.3% of the academic respondents stated that they did not perform any informal telecommuting during their tenure in IIUM (Refer Figure 2). On the willingness to adopt telecommuting, the employees, generally, were found inclined towards its adoption as part of their working arrangement. Figure 3 shows that 56% of the administrative staffs and 43% of the academic staff may consider to adopt telecommuting. Nearly 35% of the academic staffs were inclined to adopt telecommuting and 22% were not. As for administrative staff, 20% stated they were willing to telecommute and 24% were not. Figure 4 illustrates high number of academic staffs (83%) were having their own work space at home as compared to administrative staffs (51%). Nearly 37% of the administrative staffs and 48% of the academic staffs were preferred to telecommute for 2 days per week (Figure 5). The administrative staffs were willing to telecommute, on average, 3.5 days per week whereas academic staffs 3.24 days per week.

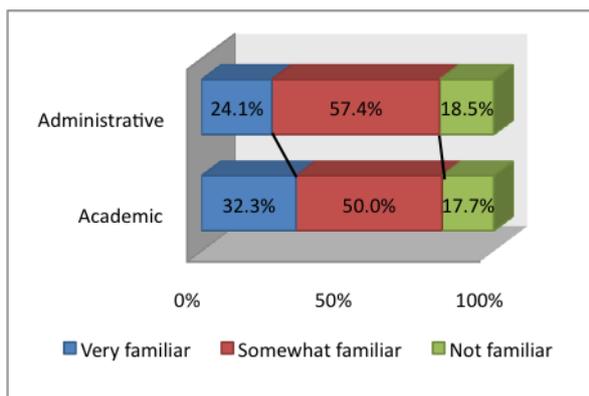


Figure 1. Awareness of telecommuting concept by job position (n=150)

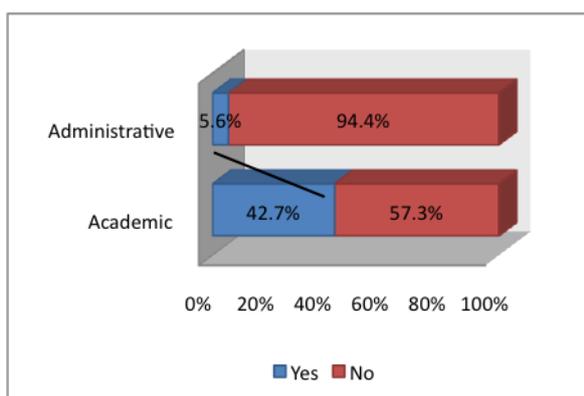


Figure 2. Experience on practicing informal telecommuting by job position (n=150)

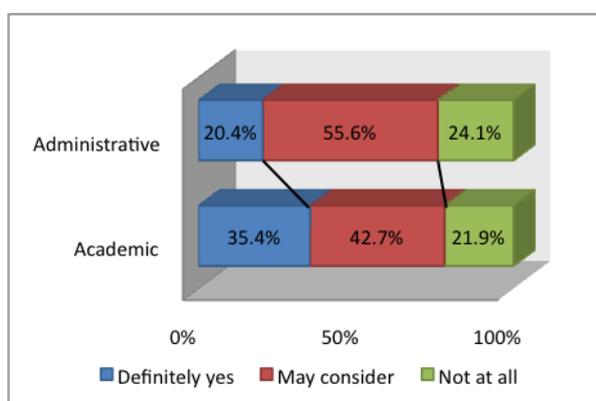


Figure 3. Preference towards telecommuting adoption by job position (n=150)

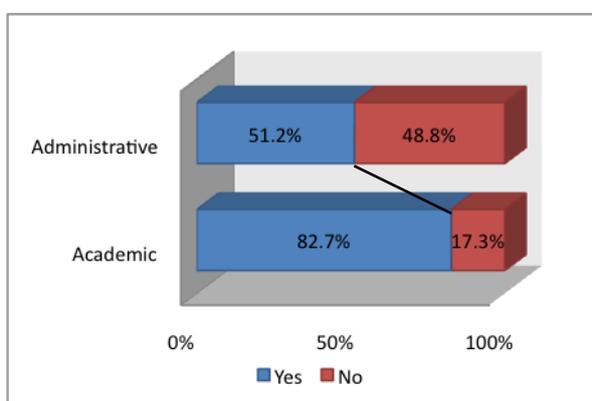


Figure 4. Availability of work space at home by job position (n=116)

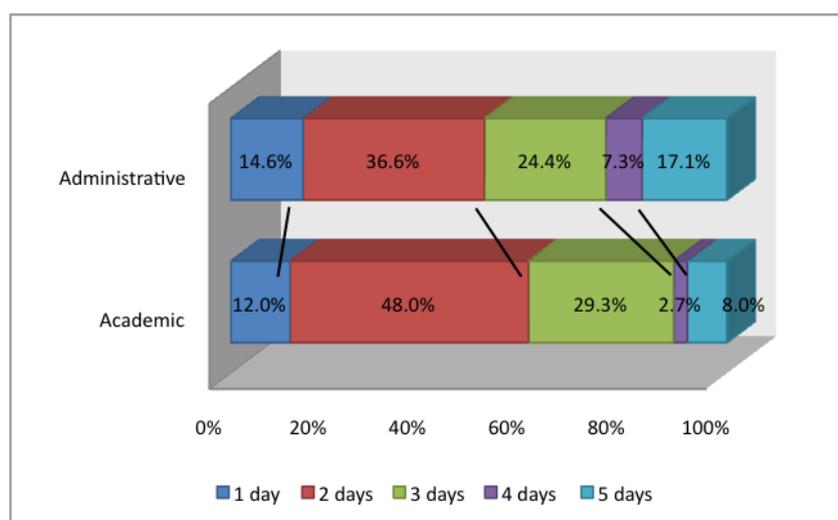


Figure 5. Frequency of telecommuting adoption (per week) by job position (n=116)

### 4.3 Factors Influencing the Employees' Choice of Adopting Telecommuting

#### 4.3.1 Demographic, travel behavior and work related factors

Chi-square test was conducted to assess the significant relationship between the willingness to adopt telecommuting and variables related to demographic, travel behaviour and work characteristics. Table 5 presents the chi-square results for each of the selected variables according to job position (i.e., administrative, academic). The findings showed that the relationship between gender and choice of telecommuting by both administrative ( $\chi^2 = 0.10$ ,  $p > 0.05$ ) and academic staffs ( $\chi^2 = 1.490$ ,  $p > 0.05$ ) were statistically insignificant. The results also showed that the association between age group and the choice of telecommuting ( $\chi^2 = 7.831$ ,  $p < 0.01$ ) by academic staffs was statistically significant but insignificant by administrative staffs ( $\chi^2 = 3.307$ ,  $p > 0.05$ ). The correlation indicates that among the academic employees who has shown their inclination toward the adoption of telecommuting, 53.3% belong in the age group of 31-40 years while only 5.3% in the age group of 51-60 years. Furthermore, the chi-square results indicate that the relationship between marital status and the preference to telecommute by administrative staffs ( $\chi^2 = 4.203$ ,  $p < 0.05$ ) were statistically significant, but insignificant by academic staffs ( $\chi^2 = .202$ ,  $p > 0.05$ ). Nearly 76% of the administrative staffs who were willing to perform telecommuting as an alternative work mode are married but only 24% of them are single. The analysis on the relationship between presence of children age 12 and less and willingness to adopt telecommuting showed statistical significance for both administrative ( $\chi^2 = 4.480$ ,  $p < 0.05$ ) and academic staffs ( $\chi^2 = 7.148$ ,  $p < 0.01$ ). About 56% of the administrative and 83% of the academic staffs having children 12 years or less were willing to telecommute.

Table 5 also presents the chi-square value of the relationship between commute distance and willingness to adopt telecommuting. It showed no statistical significant relationship for administrative ( $\chi^2 = .000$ ,  $p > 0.05$ ) and academic staffs ( $\chi^2 = .442$ ,  $p > 0.05$ ). The tests also showed no relationship between delay time from home to office or from office to home and preference to telecommute. This clearly shows that delay time experienced during their travel for work purpose does not influence their choice of telecommuting adoption.

Chi-square results on the relationship between length of service and preference to telecommute by administrative ( $\chi^2 = 1.041$ ,  $p > 0.05$ ) and academic staffs ( $\chi^2 = 1.243$ ,  $p > 0.05$ ) showed statistical insignificance. Finally, table 5 provides the relationship between frequency of using face to face communication for daily work performance and willingness towards telecommuting mode. It shows that frequency of using face to face communication does influence the choice of telecommuting for only administrative staff ( $\chi^2 = 11.039$ ,  $p < 0.01$ ) statistically but statistically insignificant for the academic staffs ( $\chi^2 = .697$ ,  $p > 0.05$ ). Cross tabulation results revealed that 73.2% of administrative employees who were willing to perform telecommuting involved in face to face communication in their daily work for 1-10 times per day. On the contrary, only 2.4% of those who consider telecommuting concept were involved in face to face communication for 21-30 times per day.

Table 5. Chi-square results

Demographic, travel and work characteristics	Preference towards adoption of telecommuting			
	Administrative		Academic	
	Chi-square value	p-value	Chi-square value	p-value
Gender	.010	.920	1.490	.222
Age	3.307	.069	7.831	.005**
Marital status	4.203	.040*	.202	.653
Presence of children age 12 and less	4.480	.034*	7.148	.008**
Commute distance	.000	1.000	.442	.506
Delay time from home to IIUM	1.173	.279	.662	.718
Delay time from IIUM to home	.020	.888	.243	.886
Length of service	1.041	.308	1.243	.743
Frequency of using face to face	11.039	.001**	.697	.706

\*\* Significant at 99% level; \* Significant at 95% level.

### 4.3.2 Facilitators to telecommute

Sixteen variables were listed as facilitators to telecommute and grouped into four major factors namely (1) commute factors, (2) work related factors, (3) environmental factors and (4) family and personal factors. Table 6 illustrates the mean and standard deviation of each facilitator by job position. The results show that family and personal factors having the highest mean for administrative staff (mean = 4.00). This is followed by commute factors (mean = 3.71), environmental factor (mean = 3.64) and work related factors (mean = 3.45). However, for the academic staffs, environmental factors recorded the highest mean (mean = 4.21), followed by commute factors (mean= 4.13), family and personal factors (mean = 4.08) and work related factors (mean = 4.21).

Table 6. Mean, standard deviation of the facilitators to telecommute by job position

Facilitators to telecommute		Administrative		Academic	
		Mean	Std. Deviation	Mean	Std. Deviation
<b>Commute related factors</b>		<b>3.71</b>	<b>1.039</b>	<b>4.13</b>	<b>1.069</b>
A1	Reduction in overall travel	3.68	1.047	4.16	1.040
A2	Reduction in peak period travel	3.78	1.050	4.20	1.000
A3	Ability to avoid long commute distance	3.60	1.033	3.93	1.189
A4	Ability to reduce travel cost ( <i>fuel saving</i> )	3.78	1.050	4.25	1.001
A5	Ability to reduce travel time	3.75	1.104	4.21	.990
A6	Ability to reduce stress of travelling to work	3.65	.949	4.05	1.196
<b>Work related factors</b>		<b>3.45</b>	<b>1.008</b>	<b>3.85</b>	<b>1.023</b>
A7	Control over physical environment ( <i>i.e. at home</i> )	3.55	.959	3.73	1.107
A8	Increase job performance	3.35	.975	3.77	.967
A9	Increase productivity	3.40	1.033	3.95	.957
A10	Increase comfort of workspace ( <i>i.e. at home</i> )	3.50	1.013	3.99	.966
A11	Self confidence in getting more work done	3.43	1.059	3.79	1.119
<b>Environmental related factors</b>		<b>3.64</b>	<b>0.923</b>	<b>4.21</b>	<b>0.977</b>
A12	Contribute in reducing pollution	3.60	.928	4.21	.949
A13	Contribute in reducing traffic congestion	3.68	.917	4.21	1.004
<b>Family and personal related factors</b>		<b>4.00</b>	<b>0.879</b>	<b>4.08</b>	<b>0.898</b>
A14	Increase scheduling flexibility	3.98	.891	4.23	.815
A15	Having more time with family	4.15	.893	3.95	1.012
A16	Proper management of time	3.88	.853	4.05	.868

Spearman correlation coefficient was calculated to determine how strong the relationship between four major facilitators (i.e., commute factor, work related factor, environment factor, family and personal factor) and choice of telecommuting. Table 7 shows the results of correlation coefficients. The findings show that all the factors except commute related factor were moderately related with willingness to telecommute and statistically significant significantly at 90% confidence interval for administrative staffs. Whereas, in the case of academic group all the factors namely commute factor ( $r = 0.717$ ,  $p < 0.01$ ), work related factor ( $r = 0.753$ ,  $p < 0.01$ ), environmental factor ( $r = 0.748$ ,  $p < 0.01$ ) and family and personal factor ( $r = 0.727$ ,  $p < 0.01$ ) were strongly related with the willingness to telecommute.

Table 7. Spearman’s rho correlation coefficient

Facilitators to telecommute	Willingness to telecommute	
	Administrative	Academic
Commute related factor	.086	.717**
Work related factor	.578**	.753**
Environmental related factor	.646**	.748**
Family and personal related factor	.541**	.727**

\*\* Correlation is significant at the 0.01 level (2-tailed)

### 4.3.3 Inhibitors to telecommute

This study also explores on the inhibitors to telecommute by job position. Ten variables were listed as inhibitors to telecommute and grouped into two major factors namely (1) work related factors, (2) family and personal factors. The results shown in table 8 reveal the family and personal related factors recorded the highest mean (mean = 4.04) in the case of administrative staffs while the work related factors ( $M = 4.12$ ) for the academic staffs. Table 9 shows that all the factors under inhibitors to telecommute were negatively correlated with the willingness to telecommute. It showed that the presence of these factors decrease the willingness to telecommute among the academic and administrative staffs.

Table 8. Mean, standard deviation of the inhibitors to telecommute by job position

Inhibitors to telecommute		Administrative		Academic	
		Mean	Std. Deviation	Mean	Std. Deviation
<b>Work related factors</b>		<b>3.84</b>	<b>1.045</b>	<b>4.12</b>	<b>1.054</b>
B1	Decrease job performance	3.87	.915	4.19	1.078
B2	Decrease productivity	3.80	.862	4.24	.995
B3	Lack of resources to accomplish the task remotely	3.87	1.187	3.86	1.276
B4	Inadequate work environment at home	3.93	1.163	4.14	1.108
B5	Lower perceived carrier advancement – due to invisibility	3.73	1.100	4.19	.814
<b>Family and personal related factors</b>		<b>4.04</b>	<b>0.912</b>	<b>3.60</b>	<b>1.137</b>
B6	Emotional stress – feeling seclusion/loneliness	4.00	.845	3.38	1.117
B7	Lack of social interaction with other colleagues	4.07	.799	3.62	1.161
B8	Family conflict	4.07	1.033	3.57	1.165
B9	Increase level of overwork	4.07	.884	3.33	1.197
B10	Potential distraction at home	4.00	1.000	4.10	1.044

Table 9. Spearman’s rho correlation coefficient results

Inhibitors to telecommute	Willingness to telecommute	
	Administrative	Academic
Work related factor	-.710**	-.787**
Family and personal related factor	-.716**	-.787**

\*\* Correlation is significant at the 0.01 level (2-tailed)

## 5. DISCUSSION

This paper highlights the determination of factors in influencing telecommuting choice of the IIUM staffs. Studies showed personal and household characteristics were significant in influencing one's choice to telecommute (Dam, 2009). Thériault *et al.*, (2005) suggested that older workers were more likely to telecommute than younger ones. This study, however, reports academic employees between 31 and 41 years showed higher inclination towards telecommuting than those in the age group of 51-61 years. Previous studies suggested that telecommuting would be of particular interest to employees who are married (Popuri and Bhat, 2003; Yap and Tng, 1990; Wells *et al.*, 2001). Similarly, results of the test have reported that married administrative employees have higher inclination towards the adoption of telecommuting. Furthermore, several studies have suggested that telecommuting would be of particular interest to employees who have children (Popuri and Bhat, 2003; Yap and Tng, 1990; Wells *et al.*, 2001). This research also found that the presence of children age 12 and less have influenced the choice of employees towards the telecommuting adoption. Both administrative and academic employees having children age 12 and less showed willingness to perform telecommuting as an alternative work mode. Peters *et al.* (2004) assumed that the likelihood of preferring telecommuting is positively influenced by the number of children especially children in the youngest age group. Employees with children under the age of four were more often prefer to telecommute than employees with children over 12 years old. Moreover, the length of service also found to be one of the important influential factors for the decision to telecommute (Bagley and Mokhtarian, 1997). Safirova and Walls (2004) confirmed that having more professional experiences in general and a longer tenure with one's current company and one's current supervisor would boost the probability of telecommuting. Popuri and Bhat (2003) also suggested that employees with a long period of service with the current employer tend to be more inclined to telecommute. Nevertheless, this study found that there is no significant relationship between the length of service and their choice of performing telecommuting. In addition, Brown (2010) suggested that job position plays an important role in the selection process or in some non-telecommuters' decision to opt out of telecommuting. An individual's choice to adopt telecommuting would depend on the nature of work at one's job and the suitability of technology for specific work-related tasks. Examples of suitable job traits include: high control in time spent on individual work and working with others remotely – little need for face-to-face interaction (Dam, 2009). Correspondingly, in this study, the results show that telecommuting is of particular interest to the administrative employees who were less frequent (1-10 times per day) in using face to face communication method than those who were involved with face to face communication more frequently (21-30 times per day).

Several studies suggested the advantages of telecommuting are: it reduces absenteeism, increases employees' loyalty to the organization, and increases their general satisfaction level. Moreover, improved productivity and quality of work associated with telecommuting is probably the most cited benefits of telecommuting (Baruch and Nicholson, 1997). Correlation results have shown that work related factor, environmental factor and family and personal factors were significantly related with the willingness to telecommute among the administrative and academic employees. Walls *et al.* (2007) claimed that both the choice of telecommuting were found to be substantial influenced by workplace-related factors. However, in the case of academic employees, commute factors were the determinant factor for their willingness to telecommute. Generally, commuting to and from work daily could take a toll on some people depending on how long they commute or how stressful in terms of traffic congestion. Thus, elimination of the commute trip could be a driving force behind

current telecommuters. Besides, this study further explores on the disadvantages of telecommuting. Telecommuting may also produce some undesirable effects on individuals. For example, increased levels of overwork, the invasion of personal life, a loss of confidentiality, the lack of adequate feedback related to work performance, and social isolation of telecommuters (Pinsonneault, 1999). In fact, feelings of isolation and the loss of morale were the most commonly cited drawbacks of telecommuting (Fitzer, 1997; Haddon and Lewis, 1994). Correlation results of this study show that work related factor and family and personal factor were negatively related with willingness to telecommute for administrative and academic staffs. As a result, it clearly indicates that the presence of work related and family and personal factors were the inhibitors for the IIUM staffs to telecommute.

## 6. CONCLUSIONS

This study examines the factors contributing to the choice of telecommuting by the employees (both academic and administrative staffs) in IIUM. Based on the findings, the employees have shown high inclinations towards the practice of telecommuting. The relationships between demographic, travel behaviour and work-related variables and telecommuting choice were investigated. The research reveals that age, marital status, presence of children age 12 and less and frequency of face to face communication were significantly associated with the choice of telecommuting adoption. Langhoff (1996) suggested that telecommuting provides staffing flexibility where the staffs can still be able to work regardless of weather or traffic peaks. Moreover, improved productivity and quality of work associated with telecommuting is probably the most cited organizational benefits in the literatures (Mills *et al.*, 2001). The benefits of telecommuting highlighted in the literatures and derived from this study clearly showed a positive outlook in practicing telecommuting especially in the higher learning institutions because of the presence of high percentage of telecommuting compatible jobs.

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