

**EXPLORING THE POTENTIALS OF TELECOMMUTING IN
THE PHILIPPINES WITH EMPHASIS ON EMPLOYEES'
PERCEPTIONS AND STATED-PREFERENCES**

Rolyn Q. Zambales
Local Government Operations Officer VII
Office of Project Development Services
Department of the Interior and Local Government
Government of the Philippines

Dr. Hussein S. Lidasan
Associate Professor
School of Urban and Regional Planning
University of the Philippines

Dr. Yoji Kawakami
Visiting Professor
College of Engineering
University of the Philippines

abstract: This paper summarizes the results of the study which was conducted to investigate the possible adoption of telecommuting in the Philippines. The study focused primarily on employees' perceptions on the various aspects of telecommuting as well as on their stated-preferences on several hypothetical working arrangement scenarios. The results revealed that considering the employees' side, this kind of working arrangement has very high potentials for adoption even in a developing country.

1. INTRODUCTION

Transport has always been viewed to play a positive role in development. It has been considered a necessary ingredient in nearly every aspect of economic and social progress. In recent years, however, it has become increasingly clear that the growth of transport and traffic, particularly in urban areas, has become a threat to the people's well being, this being manifested by problems like traffic congestion, air pollution and the increasing energy consumption.

One basic problem confronting transport planners and policy-makers is how to properly organize transport and traffic -- on the one hand, to minimize the negative effects and on the other, to maximize efficiency and service. Organizing transport and traffic, however, is not as simple as increasing the capacity by implementing the so-called 'hard measures' or constructing new public transport facilities such as roads, bridges, railways, etc. Of equal importance are the 'soft measures', often referred to as travel demand management (TDM) schemes, which offer the opportunity to alter trip patterns or the demand for travel.

In most developed countries, transport planners and policy-makers have become more concerned with the reduction in the demand for travel. Some are suggesting that investments in telecommunications can offset some of these demands, thereby attaining

energy conservation, reductions in congestion and traffic related pollution. Early futurists in these countries, for instance, believed in the advent of the 'wired city', in which each home will be equipped with electronic communication channels that are capable of transmitting voice, graphics, hard paper copies and possibly video pictures. As they envisioned, in such as city, people will be able to conduct many of their day-to-day activities, including work, from the comfort of their homes. Obviously, with the current trend in telecommunications technology, these concepts are no longer futuristic. Potentially, through the electronic medium, communication can eliminate much of today's travel needs.

Telecommuting is the often cited phenomenon of using telecommunications and computer facilities as an alternative for work at a central workplace. In most developed countries, this has already been considered as one possible strategy that can reduce the demand for travel. The experiences, however, in developing countries are different considering that measures being adopted are still limited to traditional approaches which, apparently, are only helpful up to a certain extent.

By definition, telecommuting is simply a type of working arrangement wherein an employee is allowed to perform his job from a remote location with the aid of telecommunications and computer facilities. It can take the form of working from home or working at a local work center near the home. If the center is used by one company it is referred to as a satellite work center; when more than one company shares space in the same building, it is called a neighborhood work center. The concept first received public attention in the 1970s, when the energy crisis was much of the issue during those times. In the 1980s, with the increasing concern over urban traffic congestion and air quality, this was proposed as one element of a broader array of measures aimed at reducing work trips and engine emissions in peak hours. Some sociological researchers have likewise advocated it as an opportunity for parents with young children or workers with disabilities to participate fully in the labor force.

Researchers in developed countries have indicated that the success of telecommuting relies heavily on how people will accept or adopt it. To determine its possible adoption in the Philippines, a research was conducted in Metro Manila which focused mainly on the investigation of the adoption process. In particular, it focused on the determination of the socio-economic factors that are exerting significant association with employees' perceptions and stated-preferences. More importantly, the study focused on the calibration of empirical models describing individual employee's behavior in choosing telecommuting as a working alternative. These models subsequently described the most relevant factors influencing employee's decision and the important attributes of the most suitable telecommuting program.

1.1 Advantages and Disadvantages of Telecommuting

From the transportation perspective, telecommuting is a potential substitute for work trips and therefore can alter travel patterns. With this, the most immediate expected benefit is

the reduction in the number of peak-hour trips due to the reduction in commutes. A shift of trip time to off-peak may also be observed and non-work trip destinations may be expected to be close to home, allowing a shift to non-motorized transportation modes.

From the employees' perspective, telecommuting means no longer having to deal with the daily drive or commute into the central business area, which may result to less travel time and cost. This may also result to more flexible hours for employees, allowing them to use their former commuting time to meet family requirements or earn more income for leisure activities. From the employers' end, this offers the prospect of reducing the expenses incurred in the operation of large, centrally located office buildings, which means they may greatly reduce overhead and space requirements. It may also result to less turnover, higher employee productivity and better morale of employees who are telecommuters. A properly designed telecommuting program may likewise enhance the company's image as providing a good work environment, thereby improving their ability to recruit qualified employees.

Many long term effects may also result due to the adoption of the concept. For instance, a reduction in the level of automobile ownership may be expected. Changes in job location may be observed. Changes in residential location may occur, which may further lead to benefits in terms of energy consumption and pollution reduction.

Disadvantages may also exist. For employees, these include less opportunity for social interaction with co-workers, fewer opportunities for on-the-job learning from senior workers, possibly lower salary under some scenarios and fewer opportunities for promotion. For companies, the major possible disadvantages include potentially high initial investment, difficulty of performance measurement, resistance from management, resistance from unions, and less data security.

Work well suited for telecommuting involves handling information and does not require extensive, daily face-to-face interaction with others or specialized materials and equipment, such as files and photocopiers. Examples are reading writing, thinking, computer programming, preparing presentations, designing graphics, or talking on the phone. With this, the potential telecommuters are assumed to include managers, computer programmers, engineers, architects, designers, researchers, analysts, writers, accountants and clerical workers and the like.

2. OBJECTIVES OF THE STUDY

At this point, telecommuting is just one potential strategy to address the growing demand in urban transport. However, when understood and adopted, this may contribute to contain urban transport problems in developing countries like the Philippines.

Within the above context, the study being presented here attempted to address the broader question of - Can telecommuting be adopted in the Philippines?

As earlier emphasized, one essential element in determining the potentials of this type of working arrangement is the extent to which it can be adopted by the employees. With this assumption, at the micro level, the study aimed to address the questions of - To what extent is the employee willing to participate in a telecommuting program? What are the attributes of the most suitable telecommuting arrangements?

With the given problems, the research aimed to address the following objectives:

- Describe the relevant characteristics of an individual employee that may influence his decision to adopt or not to adopt telecommuting;
- Examine the potential impact of this kind of working arrangement on individual employee once adopted; and
- Describe the characteristics of the most likely adaptable telecommuting program within the context of a developing country.

2.1 Limitations of the Research

The research focused only on one type of telecommuting, that of home-based. In terms of sampling, the surveyed samples were primarily taken from engineering consultancy firms and, therefore, represent only a specific stratum.

3. SURVEY METHODOLOGY

A survey was conducted in two (2) pre-selected CBDs in Metro Manila, namely, Makati Business District and Ortigas Business Center, to gather information on the socio-economic characteristics of employees who are potential telecommuters. The survey was, more importantly, intended to gather information on employees' perceptions on various aspects of telecommuting as well as on their stated-preferences on several hypothetical telecommuting scenarios.

The survey questionnaire was structured comprising five (5) sections, such as (a) Household Information, (b) Individual Characteristics, (c) Job Information, (d) Commuting Trip Information, (e) Perceptions and Stated-Preferences. The Perception sub-section includes 23 questions designed to measure employees' attitude on the various aspects of telecommuting. The Stated-Preference sub-section includes twelve (12) telecommuting scenarios which are defined in terms of the different combinations of three (3) attributes such as (a) salary arrangements, (b) responsibility in out-of-pocket costs, and (c) benefit arrangements.

Salary arrangements were defined into three levels: (a) stays the same, (b) increases by 5%, and (c) increases by 10%. Responsibilities in out-of-pocket costs were of two levels: (a) the employee assumes all costs, and (b) the employer assumes all costs. Benefit

arrangements were of two levels: (a) employee enjoys vacation and sick leaves, and (b) employee does not enjoy leave benefits. For each alternative scenario, the employee was asked to state a preference in terms of the number of days they are willing to work from home.

The choice of employee respondents was based on the following criteria: (a) those who are currently employed, (b) those who are working on a fixed-time basis, (c) those who are regular work-trip makers, and (d) those whose jobs can be performed at home or can be converted to telecommuting. Out of 150 target respondents, 145 were actually interviewed with only 3 being rejected as spoiled returns due to missing information.

4. DATA PROFILE

4.1 Individual and Household Characteristics

Majority of the respondents are male (59%) and seventy-six percent (76%) are between 20 and 40 years of age. Most respondents have attained high education, with 89% having completed college and about 8% having at least a masters degree. Seventy-two (equivalent to 51%) are married, with sixty-eight percent of these having their spouses working.

About sixty percent (60%) have at least one telephone line at home, with only about 10.5% having more than two lines. The penetration of facsimile machine is still limited with 95% of the respondents not owning such equipment. Personal computers are more prevalent with 37.3% of the respondents having at least one (1) unit at home. In terms of cars, only about 45% have at least one car available for their use.

4.2 Job Characteristics

All respondents are working full time, indicating that they are all currently employed on a fixed-time basis. Sixty-seven (67%) are permanent employees, majority are engineers and architects (64%). The monthly salary is approximately normally distributed with the mode in the range of P6,000 - P9,999 per month. The mean number of years working with the company is 6 years; considerable variability in this quantity, however, is present across the respondents with a standard deviation of 6.9 years. The mean number of work-hours is 8.3 hours, indicating that most respondents are working longer than the required period.

More than 75% of the respondents have at least five units of computer available for their use in the office. Ninety-three percent of them need computers to perform their job, with 64% working on it for more than two hours. Some respondents even claimed that they spend half of the day just working on it. About 75% of the respondents spend more than two hours just doing paper work like preparing plans, estimates and reports.

4.3 Commuting Trip Information

Majority of the respondents are taking public transport both for their AM and PM trips (79% in the morning and 80% in the afternoon). More than half of the public commuters (58% in AM and 54% in PM) are taking air-conditioned buses. Only about 20% in the morning and 16% in the afternoon are taking private cars; majority of the car users in the morning are just passengers. Interestingly, a significant number are taking informal van-pooling both on their way to office and way back home.

The average waiting time is 18 minutes in the morning and 20 minutes in the afternoon. Considering both private and public modes, the mean travel cost (fuel or fare) is about P19.00 for both AM and PM trips. The mean number of transfers is 1.8 while the mean number of stops is 1.2 for both AM and PM trips. It was noted, however, that more people are making stops in the afternoon (44%) compared to 25% in the morning. Most of the PM stops are made primarily for grocery and shopping; majority of the respondents (43%) make their stop once or twice a week. About 58% in the morning and 68% in the afternoon travel for more than 1 hour. On the average, the respondents encounter longer travel time in the afternoon (89 minutes) than in the morning trip (75 minutes).

5. PERCEPTION RESULTS

This section discusses the responses to the 23 questions intended to describe employees' attitudes and perceptions toward some aspects of telecommuting. A list of these questions and the corresponding results are given in Table 1.

Questions 1, 2 and 3 were designed to measure employee's attitude or perception toward the current transportation system. In response to Question 1, only 18.3% of the respondents expressed convenience in commuting to work, with 54.93% finding it otherwise. This can be attributed to the long travel time the respondents are experiencing in traveling to/from work plus the fact that majority of the respondents are taking public transport. For Question 2, majority of the respondents (72.54%) described the traffic they encounter on their way to office as congested, with only about 9.2% thinking it is smooth. A greater percentage of respondents (78.88%) described the afternoon traffic as congested, with only 8.45% thinking it is smooth (Question 3). A closer look revealed that these are the employees who take public transport in going to and coming from work. It is a common knowledge in Metro Manila that private car users and those taking vanpooling have the option to take other routes (by using minor roads) when heavy traffic exists in their usual routes, and therefore have that perception that traffic is smooth.

Question 4 was designed to measure employee's attitude toward the current telecommunications system while Question 5 was intended to measure their proficiency level in computer. Responses to Question 4 showed that about forty-six percent (46%) of the respondents rated the telecommunications system in their office area as already efficient, while 24.65% believe it is not. These are the respondents having at least one telephone line

at home. The higher percentage can also be attributed to the "boom" in the telecommunications industry in Metro Manila in recent years. In response to Question 5, majority of the respondents (76.76%) believed they have at least an average knowledge in computer. These are the respondents who have computers available for their use in the office.

Questions 6, 7 and 12 were designed to determine employee's attitude toward work performance. Most respondents (90.14%) believed they can perform their job without being supervised (Question 6). However, only about 35.2% felt comfortable about the idea of working beyond the required time without being paid. In response to Question 12, 71.12% indicated the importance of office equipment in performing their job.

Questions 8, 9, 10 and 11 were designed to measure the suitability of respondent's job in telecommuting. About 42.25% believed their job is suitable for working from home everyday (Question 8). This number increases to 50% if working from home is done only for several days per week (Question 9). On the other hand, only about 18% believed their supervisors would approve of their working from home everyday. This, likewise, increases to 23.24% if work is done several days per week (Questions 10 and 11). Clearly, most employees perceived their supervisor would not really approve of their working from home. It is likewise obvious that working from home several days per week is more acceptable than everyday.

Questions 15, 16 and 17 were designed to investigate some potential negative impacts. Responses to Question 15 indicate that 40% of the respondents believed that working from home would lessen their opportunities for on-the-job learning from senior workers. Interestingly, a lesser number (33.81%) believed that working from home will adversely affect their chances for promotion (Question 16). On the potential effects on social life, majority believed (62%) they will have less opportunity for social interaction with co-workers if they work from home; 15.5% believed otherwise (Question 17).

Questions 14, 18, 19 and 20 were designed to investigate some positive impacts of telecommuting. On the potential impact on job performance, fifty-eight percent (58%) of the respondents think they could get more work done if they work from home; whereas, only 18% think they could not (Question 14). In terms of money savings, seventy-six percent (76%) believed they can save a lot of money if they work from home, with 11.26% believing they cannot (Question 18). On the effects on commuting stress, a significant number (89.44%) believed that working from home will reduce commuting stress with only 3.5% believing it will not. In response to Question 20, about half of the respondents (50.7%) believed they will have more time for leisure, whereas 21.8% believed they will not have time at all.

Questions 21, 22 and 23 were designed to determine the potential impact of telecommuting on family or household relationships. In response to Question 21, sixty-nine percent (69%) of the respondents believed that working from home will help them in scheduling their other activities, whereas 10.57% believed it will not help at all.

Table 1: Perception Responses

SCENARIOS	RESPONSES					
	(1)	(2)	(3)	(4)	(5)	
1. Do you find commuting to work convenient?	Frequency	59	19	38	13	13
	Rel. Freq.	41.55	13.38	26.76	9.15	9.15
2. On a typical day, how would you describe the traffic you encounter on your way from home to your workplace?	not at all					definitely
	Frequency	63	40	26	9	4
3. On a typical day, how would you describe the traffic you encounter on your way from your workplace to home?	Rel. Freq.	44.37	28.17	18.31	6.34	2.82
	too congested					very smooth
4. How would you rate the current telecommunications system in your area?	Frequency	63	49	18	9	3
	Rel. Freq.	44.37	34.51	12.68	6.34	2.11
5. How would you rate your proficiency level in computer?	too congested					very smooth
	Frequency	25	10	42	29	36
6. Do you think you can perform your job without being paid?	Rel. Freq.	17.61	7.04	29.58	20.42	25.35
	poor					efficient
7. Do you feel comfortable working beyond the required time without being paid?	Frequency	11	22	52	40	17
	Rel. Freq.	7.75	15.49	36.62	28.17	11.97
8. Do you think your job is suitable for working from home everyday?	poor					excellent
	Frequency	2	2	10	33	95
9. Do you think your supervisor would approve your working from home several days per week?	Rel. Freq.	1.41	1.41	7.04	23.24	66.90
	no					definitely
10. Do you think your supervisor would approve your working from home everyday?	Frequency	60	8	24	21	29
	Rel. Freq.	42.25	5.63	16.90	14.79	20.42
11. Do you think your job is suitable for working from home several days per week?	no					definitely
	Frequency	25	16	41	27	33
12. How much important is it for your job to use equipment which are available only in the office?	Rel. Freq.	17.61	11.27	28.87	19.01	23.24
	not suitable					very suitable
13. Should you be offered a telecommuting option, would you be interested to participate under certain conditions?	Frequency	17	21	33	34	37
	Rel. Freq.	11.97	14.79	23.24	23.94	26.06
14. If you could work from home, do you think you could get more work done?	not suitable					very suitable
	Frequency	55	28	33	12	14
15. If you could work from home, do you think you would have opportunities for on-the-job learning from senior workers?	Rel. Freq.	38.73	19.72	23.24	8.45	9.86
	not at all					definitely
16. If you could work from home, how do you think this would affect your chance for promotion?	Frequency	43	23	43	14	19
	Rel. Freq.	30.28	16.20	30.28	9.86	13.38
17. If you could work from home, do you think you would have opportunities for social interaction with co-workers?	not at all					definitely
	Frequency	4	19	18	22	79
18. If you could work from home, do you think you could save a lot of money?	Rel. Freq.	2.82	13.38	12.68	15.49	55.63
	not important					very important
19. If you could work from home, do you think this would reduce commuting stress?	Frequency	9	4	25	33	71
	Rel. Freq.	6.34	2.82	17.61	23.24	50.00
20. If you could work from home, do you think you would have more time for leisure?	not at all					definitely
	Frequency	10	16	34	25	57
21. If you could work from home, do you think this would help you in scheduling other activities?	Rel. Freq.	7.04	11.27	23.94	17.61	40.14
	not at all					definitely
22. If you could work from home, do you think this would help improve family/household relationships?	Frequency	31	26	39	26	20
	Rel. Freq.	21.83	18.31	27.46	18.31	14.08
23. Do you feel comfortable about the possibility of having the whole family together frequently?	not at all					definitely
	Frequency	23	25	49	26	19
24. If you could work from home, do you think this would help improve family/household relationships?	Rel. Freq.	16.20	17.61	34.51	18.31	13.38
	adversely					positively
25. If you could work from home, do you think you would have opportunities for social interaction with co-workers?	Frequency	48	40	32	10	12
	Rel. Freq.	33.80	28.17	22.54	7.04	8.45
26. If you could work from home, do you think you could save a lot of money?	not at all					definitely
	Frequency	3	13	18	22	86
27. If you could work from home, do you think this would reduce commuting stress?	Rel. Freq.	2.11	9.15	12.68	15.49	60.56
	not at all					definitely
28. If you could work from home, do you think you would have more time for leisure?	Frequency	2	3	10	16	111
	Rel. Freq.	1.41	2.11	7.04	11.27	25.4
29. If you could work from home, do you think this would help you in scheduling other activities?	not at all					definitely
	Frequency	12	19	39	23	49
30. If you could work from home, do you think this would help improve family/household relationships?	Rel. Freq.	8.45	13.38	27.46	16.20	34.51
	not at all					definitely
31. Do you feel comfortable about the possibility of having the whole family together frequently?	Frequency	11	4	29	25	73
	Rel. Freq.	7.75	2.82	20.42	17.61	51.41
32. If you could work from home, do you think this would help improve family/household relationships?	not at all					definitely
	Frequency	13	4	19	26	80
33. Do you feel comfortable about the possibility of having the whole family together frequently?	Rel. Freq.	9.15	2.82	13.38	18.31	56.34
	not at all					definitely
34. Do you feel comfortable about the possibility of having the whole family together frequently?	Frequency	5	7	18	21	91
	Rel. Freq.	3.52	4.93	12.68	14.79	64.08
	not at all					definitely

A significant number (74.65%) believed that working from home will improve family or household relationships, with 12% believing it will not (Question 22). A more significant

number (78.87%) felt comfortable about the possibility of having the whole family together frequently, with only 8.45% feeling otherwise.

Question 13 was especially designed to measure employee's interest in participating in a telecommuting program. In response to this, more than seventy-three percent (73.24%) of the respondents felt interested in participating in a telecommuting program under certain conditions.

6. STATED-PREFERENCE RESULTS

This section discusses the responses to the questions regarding employees' willingness to participate in the different types of telecommuting options. A list of these alternative scenarios and the corresponding summary of the results are given in Table 2.

Scenario 12 (salary increases by 10%, no cost to employee and enjoying the usual leave benefits) dominated all others. Under this scenario, 96% of the respondents showed interest in working from home at least once a week. Scenario 1, (salary stays the same, employee bears all costs and does not enjoy the usual benefits) was the least attractive, as indicated by the 78.9% of the respondents not willing to work from home. Scenario 8, reflects the status quo for employees (the same salary, no cost on their part and he/she enjoys the usual leave benefits). Under this scenario, 84.5% of the respondents are willing to work from home at least once a week.

The possibility of incurring all costs and at the same time not enjoying the usual leave benefits seems to quickly discourage the employees. This can be confirmed from the results of Scenario 1 and 3 where majority of the respondents would not want to work from home (79% under Scenario 1 and 62% under Scenario 3). The number decreased only to 48.6% under Scenario 5, when a 10% increase in salary is offered.

Benefit Arrangements appears to be an important factor. For instance, under Scenario 2, when Leave Benefits are not enjoyed, about 42% of the respondents showed reluctance. The same can be noted under Scenarios 4 and 6 where 30% and 27%, respectively, are still reluctant. Under Scenario 8, however, when the usual benefits are enjoyed, the number of reluctant respondents dropped to 15.5%. The number further drops to 8.45% and 2.82% under Scenarios 10 and 12, respectively, when salary increases are offered at the same time.

The second attribute, Responsibility in Costs, is apparently the most important factor. Considering Scenario 1, when all costs are borne by the employee, the number of respondents who are not willing to telecommute is about 79%. Comparing this with the results of Scenario 2, when all costs are borne by the employer, the number drops to 41.55%, posting a significant difference of 37.32%. Whereas, comparing the results of Scenario 1 with those of Scenario 7, where the difference is in Benefit Arrangements, the drop in number is only about 30.3%. The same is true when comparing Scenarios 3 and 4 (the difference is basically on Responsibility in Costs), where there is a drop of 31.7% in the number of reluctant respondents. Whereas, if Scenario 3 is compared with Scenario 9, where

the difference is in Benefit Arrangements, the drop in reluctant respondents is only about 22.53%. Similar results are evident when Scenarios 5 and 6, 7 and 8, 9 and 10, 11 and 12 are compared.

Table 2: Stated-Preference Responses

SCENARIOS	RESPONSES						
	(0)	(1)	(2)	(3)	(4)	(5)	
1. Salary stays the same. employee buys computer & pays telephone installation and bills. employee does not enjoy vacation and sick leaves	Frequency	112	11	4	13	1	1
	Rel. Freq.	78.9	7.8	2.8	9.2	0.7	0.7
2. Salary stays the same. employer buys computer & pays telephone installation and bills. employee does not enjoy vacation and sick leaves	Frequency	59	29	23	18	8	5
	Rel. Freq.	41.6	20.4	16.2	12.7	5.6	3.5
3. Salary increases by 5%. employee buys computer & pays telephone installation and bills. employee does not enjoy vacation and sick leaves	Frequency	88	19	16	15	3	1
	Rel. Freq.	62.0	13.4	11.3	10.6	2.1	0.7
4. Salary increases by 5%. employer buys computer & pays telephone installation and bills. employee does not enjoy vacation and sick leaves	Frequency	43	22	32	25	13	7
	Rel. Freq.	30.3	15.5	22.5	17.6	9.2	4.9
5. Salary increases by 10%. employee buys computer & pays telephone installation and bills. employee does not enjoy vacation and sick leaves	Frequency	69	16	28	19	8	2
	Rel. Freq.	48.6	11.3	19.7	13.4	5.6	1.4
6. Salary increases by 10%. employer buys computer & pays telephone installation and bills. employee does not enjoy vacation and sick leaves	Frequency	38	17	27	35	17	8
	Rel. Freq.	26.8	12.0	19	24.7	12.0	5.6
7. Salary stays the same. employee buys computer & pays telephone installation and bills. employee enjoys vacation and sick leaves	Frequency	69	27	19	14	8	5
	Rel. Freq.	48.6	19.0	13.4	9.9	5.6	3.5
8. Salary stays the same. employer buys computer & pays telephone installation and bills. employee enjoys vacation and sick leaves	Frequency	22	23	33	27	15	22
	Rel. Freq.	15.5	16.2	23.2	19	10.6	15.5
9. Salary increases by 5%. employee buys computer & pays telephone installation and bills. employee enjoys vacation and sick leaves	Frequency	56	22	24	20	11	9
	Rel. Freq.	39.4	15.5	16.9	14.1	7.8	6.3
10. Salary increases by 5%. employer buys computer & pays telephone installation and bills. employee enjoys vacation and sick leaves	Frequency	12	10	32	37	15	36
	Rel. Freq.	8.5	7.0	22.5	26.1	10.6	25.4
11. Salary increases by 10%. employee buys computer & pays telephone installation and bills. employee enjoys vacation and sick leaves	Frequency	50	16	17	22	22	15
	Rel. Freq.	35.2	11.3	12.0	15.5	15.5	10.6
12. Salary increases by 10%. employer buys computer & pays telephone installation and bills. employee enjoys vacation and sick leaves	Frequency	4	7	10	36	22	63
	Rel. Freq.	2.8	4.9	7.0	25.4	15.5	44.4
(0) : Would not like to work from home. (1) : Would like to work from home one day per week. (2) : Would like to work from home two days per week.							(3) : Would like to work from home threedays per week. (4) : Would like to work from home four days per week. (5) : Would like to work from home everyday.

It can be noted that under Scenarios 1 to 9 and 11, more employees would choose to telecommute only from 1 to 3 days per week. The potential full-time telecommuters increased only under Scenario 10 (25.35%) and Scenario 12 (44.37%), when salary increases are offered and at the same time the employee incurs no costs and enjoys the usual leave benefits. The results further indicate that, considering all the scenarios, the most attractive alternative is to telecommute only for two (2) to three (3) days. This strengthens the results in

the attitudinal question, where working from home several days per week is more acceptable than everyday.

7. FACTORS AFFECTING EMPLOYEES' PERCEPTIONS

The responses to each question in the Perception Section were cross-tabulated with individual, household and job characteristics as well as commuting trip attributes of the respondents. The Chi-Square Tests of Lack of Independence were performed in order to determine the variables that are exerting significant effects on the perceptions of the employees toward the various aspects of telecommuting. As indicated in Table 3 there are at least 28 variables exerting significant associations with at least one of the perceptions. Below are some significant findings:

Generally, socio-economic characteristics (individual, household, job) and commuting trip characteristics influence employees' perceptions on some aspects of telecommuting as well as their stated-preferences on several telecommuting scenarios. More specifically:

- Commuting trip characteristics influence employees' attitude toward the performance of the transportation system as well as their attitude toward work performance and some potential positive impact of telecommuting.
- Job characteristics influence employees' attitude toward job suitability to telecommuting as well as their attitude toward job performance and some negative impact of telecommuting.
- Individual and Household characteristics influence employees' attitude toward some positive impact of telecommuting particularly on household or family relationship.

The results indicated that there is a significant fraction of employees who showed interest in telecommuting. In terms of Job Classification, these are the Engineers, Architects, Computer Professionals, Accountants and Researchers. In terms of Gender, female employees showed more interest in participating.

Looking at the potential impacts of telecommuting:

- The possibility of losing the opportunity to learn from senior workers will have more effect on Engineers, Managers, Accountants and Researchers and those who belong to lower income or monthly salary groups. Computer Professionals and Architects are quite confident that they still have the opportunity.
- The possibility of losing the chance for promotion will have more impact on younger and older employees (those below 30 and those above 50 years of age). Likewise, this will have more impact on those employees belonging to lower income groups.
- The possibility of losing the opportunity to socialize with co-workers will most certainly affect those employees who need constant communications with supervisors. Presumably, these are the employees who belong to lower ranks.

Table 3: Results of Chi-Square Tests of Independence Between Responses to Perception Questions and Characteristics of Respondents

Variables	Perception Questions																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Home Location		#		@		&								+					@				@
Household Income					#		+								X	@	@			o	@		
Mode of Dwelling												@											
Gender	@						@	x											@		@	o	
Age	X		+		o		x				@				o			@					
Civil Status	#	X	X	&	#			@			o	o					x	&	@	o	+	o	
Educational Level							&	x		@			x				x						
Owning Driver's Licens				+					#											@			
No. of Cars Available for Use			#				o				o			@						@			
No. of Children Below 16 years old	x				o			o						@								@	
Job Classification					&		@			x		o		@			x		o	@	&	&	&
Monthly Salary	@			@			&			o		@	x		o				o				
Time Com. w/ client thru' telephone							x					@							o				
Time communicating w/ client face-to-face	@				o	x		@		x													
Time communicating w/ supervisors	o	@	o		o					x							+						
Time communicating with subordinates							o																
Time using Computers		+		x	&	@					x		o		@								
Time doing paper work									@		&		@		@								
AM Mode of Transport							&																
AM Waiting Time		@					+																+
PM Waiting Time		x	@				@														@		
AM Travel Time	@	+	x			#	@																
PM Travel Time		x	&			#	#		@										@				
AM No. of Stops				o																@			
PM No. of Stops	&	o	#		o	@	+	@				o								o			
AM.No. of Transfers					@																x		
PM No. of Transfers															@						+		

& - significant at 0.001 level
 + - significant at 0.005 level
 # - significant at 0.01 level
 o - significant at 0.025 level
 x - significant at 0.05 level
 @ - significant at 0.1 level

- The possibility of increasing productivity appears to have more impact on those employees who are working on computers for longer hours.
- The possibility of saving more money will likely have greater impact on single respondents as well as on car users.
- Employees residing in Metro Manila will likely benefit in terms of reduction in commuting stress. This is probably because they are the ones making more transfers. A closer scrutiny revealed that Metro Manila residents tend to make more transfers in going to and from work, while non-Metro Manilans tend to take

informal van-pooling, thus making less transfers. Likewise, female employees will likely benefit in terms of reduction in commuting stress.

- Married employees and those belonging to middle income groups will likely benefit in terms of having more time for leisure and having more time with the family.
- Engineers, Architects and Computer Professionals will likely benefit in terms of having flexibility in scheduling their activities.

8. MODELLING EMPLOYEES' DECISION

The Chi-Square Tests of Lack of Independence presented above showed only the socio-economic factors exerting significant associations with respondents' perceptions on the various aspects of telecommuting and their stated-preferences on several telecommuting scenarios. The purpose of model estimation herein presented was to determine the most relevant factors affecting individual employee's decision.

8.1 Modelling Framework

The modelling framework used was partially patterned from the works of Bernardino, et. al. as illustrated in Figure 1 below.

At the microscopic level, the framework suggests that any individual has a desired lifestyle, for instance, the working arrangement that he prefers. The presence of constraints, however, creates a gap between his desired working arrangement and the one that he is actually engaged in, which is working in the office. To reduce the gap, there are two possible courses of action: to relax the constraints, which at the current situation is beyond the control of the employee, or probably, over a longer time span, to adjust the 'work choice'.

An alternative working arrangement such as telecommuting is offered and, in part, is attractive to the employee. Based on the arrangements offered, perceptions and socio-economic characteristics, employees decide whether to telecommute or not. There are two possible sequential decisions the employee will make in the adoption process: the decision to participate and the subsequent decision with respect to the level of participation. The first decision depends on the sociological factors (individual, household, job and commuting trip characteristics), some of which implicitly constitute the constraints. The second depends on the attributes of the telecommuting program itself. In some cases, however, the level of participation may be predetermined and consequently part of the first decision.

The framework likewise suggests how decisions are made: an option of telecommuting offers perceived opportunities for relaxing constraints and consequently reducing the gap. With such perception, the employee evaluates some qualitative and quantitative factors and he then makes the decision. The whole process is not a daily decision of whether to telecommute or to work in the office, but a long term choice of accepting certain conditions in exchange for some benefits. In some cases, individuals may be able to move in and out of this condition depending on the characteristics of the arrangements.

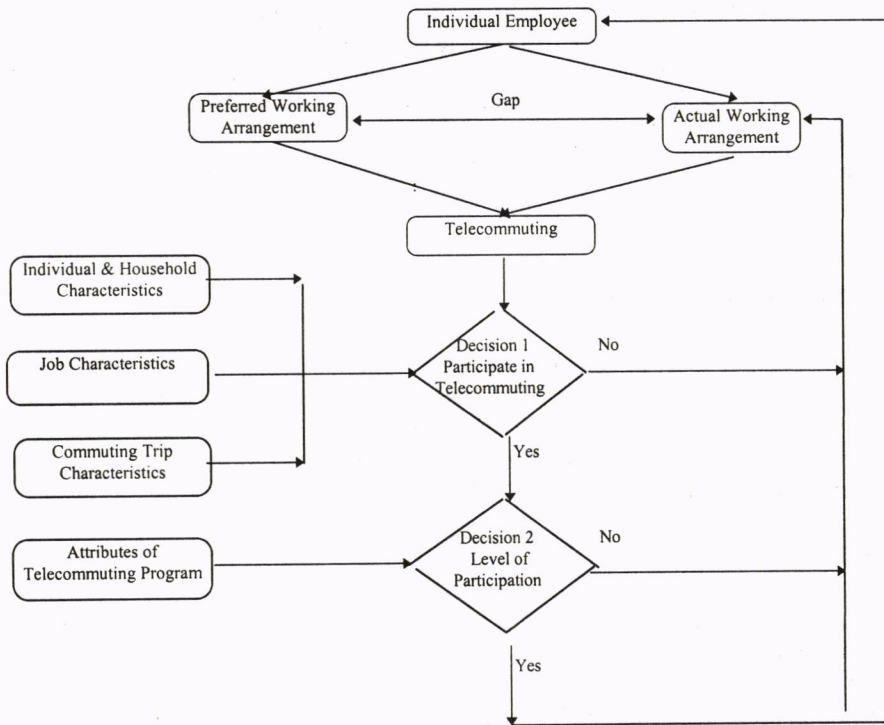


Figure 1
Modelling Framework

8.2 Model Estimation

The SAS System Version 6.0 was used in the model estimation. The specific procedure adopted was the PROC LOGISTIC which fits logistic regression models for binary or ordinal response data by the method of maximum likelihood. The link function used was the LOGIT Function.

Most of the variables were reclassified into several dummy variables. For example, the Household Income (HINC) was divided into four (4) dummy variables, representing four (4) income groups. This was done to test whether the Income Group of a respondent has significant effect on his decision to participate in telecommuting. Another example is the Gender, in which two (2) dummy variables were specified to test whether men and women represent two distinct groups in the adoption process.

Three (3) modelling processes were carried out. All the 142 employee samples were included in the data set. All the models were estimated for the probability of R. A maximum of 500 iterations was specified for each run.

The intention of the first modelling process was to determine the most relevant factors affecting employees decision to participate in telecommuting. The socio-economic variables were used as the explanatory variables. Question 13 of the Perception Section was considered as the Response Variable (R). This is equal to one (1) when the respondent is interested to participate in a telecommuting program (when the response in Question 13 is either 4 or 5), and zero (0), otherwise (when the response is either 1 or 2 or 3). The model was estimated for the probability of R.

The second modelling process focused on the stated-preferences on the twelve (12) telecommuting scenarios. The three (3) attributes of telecommuting options were considered as explanatory variables. The choice in terms of the number of days per week was considered as the Response Variable (R). This is equal to 1 when the respondent chooses to telecommute at least once a day, and 0, if not. This was done to determine the most relevant attributes of a telecommuting program that will influence employees decision with respect to the level of participation.

The third modelling process was carried out wherein socio-economic variables and attributes of telecommuting were combined as explanatory variables. This was done to determine whether a combined model can better describe the factors being determined. As in the second modelling process, the choice in terms of the number of days per week was considered as the response variable (R). Two models were calibrated. The first (Model 3A) was that the response variable R is equal to one (1) if the respondent chooses to telecommute at least once a week and zero otherwise. The second (Model 3B) was that the response variable R is equal to 1 if the respondent chooses to telecommute at least three days a week, and zero (0), otherwise.

A summary of the results of the chosen models at different levels is shown in Table 4. As can be noted, all of the estimated parameters have the expected signs and the levels of significance that these are equal to zero are very low. Considering the ρ^2 and the percentage correct, it can be concluded that the combined models, Model 3A and 3B, have much higher explanatory powers. It must be emphasized, however, that since these models were restricted to stated-preference data, they lack the stability, as indicated by the magnitude of the error term (intercept).

The results of the combined models revealed the following:

- There are at least three (3) groups of employees (categorized by job classification) having high potentials for telecommuting. These are the Engineers, Architects and Researchers. It can be noted, however, that the Researchers, are more interested to telecommute for fewer days.
- In the case of Civil Status, the dummy variable CS2 was instead forced into the models and turned out to be significant. The coefficients are both positive which strongly suggest that married respondents are more interested in telecommuting.
- The variable GEN2 turned out to be significant, which indicates that female employees showed more interest in telecommuting.

Table 4 : Summary of Model Estimation

Variable	Description	Model 1B	St. Error	Pr>Chi Sq.	Model 2	St. Error	Pr>Chi Sq.
INTERCEPT	Error Term	-2.4662	1.2517	0.0488	-0.1121	0.1716	0.5136
MODE1	Mode of Dwelling, Owned	-1.2188	0.5316	0.0219			
GEN2	Gender, Female						
AGE1	Age Group 1, Below 30 yrs old						
CS1	Civil Status, Single	0.8119	0.4946	0.1007			
CS2	Civil Status, Married						
EDUC1	Educ. Level, completed College	1.6749	0.9096	0.0656			
JOB2	Job Classification 2, Engineers	1.1462	0.4716	0.0151			
JOB3	Job Classification 3, Architects						
JOB7	Job Classification 7, Researchers						
MSAL1	Monthly Salary, < P15,000	0.9335	0.5633	0.0975			
WKYR	No. of Yrs Working w/ Company	0.0671	0.0357	0.0601			
TSUB1	Time w/ Subordinate, < 1 hr	-1.5114	0.5855	0.0098			
JCOM2	Time Using Computers, > 1 hr	0.7660	0.4875	0.1161			
MODW1	Mode of AM Transport, Private Cars	0.9810	0.6228	0.1161			
TMIN	AM Travel Time	0.0181	0.0077	0.1152			
NSTOP	Number of AM STops						
SALARY	Salary Arrangements				0.5262	0.0741	0.0001
COST1	Resp. in Costs, employee incurs l costs				-1.7439	0.1250	0.0001
BFIT1	Benefit Arran, employee enjoys ben.				1.3280	0.1228	0.0001
L(β)		-69.4985			-850.2425		
-2[L(c)-L(β)]		25.9680			373.8320		
p-value		0.0038			0.0001		
ρ^2		0.1574			0.1802		
% Correct at p=0.90 level		41.50%			51.90%		
No. of Samples		142			132		
No. of Obs.		142			1584		

Variable	Description	Model 3A	St. Error	Pr>Chi Sq.	Model 3B	St. Error	Pr>Chi Sq.
INTERCEPT	Error Term	-2.5158	0.3744	0.0001	-5.7662	0.4558	0.0001
MODE1	Mode of Dwelling, Owned						
GEN2	Gender, Female	0.3986	0.1450	0.0060	0.5955	0.1459	0.0001
AGE1	Age Group 1, Below 30 yrs old	0.6420	0.1510	0.0001	0.7295	0.1580	0.0001
CS1	Civil Status, Single						
CS2	Civil Status, Married	0.6492	0.1503	0.0001	1.6642	0.1639	0.0001
EDUC1	Educ. Level, completed College	1.2548	0.2679	0.0001	1.8396	0.3154	0.0001
JOB2	Job Classification 2, Engineers	1.1285	0.1512	0.0001	0.7137	0.1526	0.0001
JOB3	Job Classification 3, Architects	1.1811	0.2002	0.0001	0.8556	0.1954	0.0001
JOB7	Job Classification 7, Researchers	0.8810	0.3584	0.0140			
MSAL1	Monthly Salary, < P15,000						
WKYR	No. of Yrs Working w/ Company						
TSUB1	Time w/ Subordinate, < 1 hr	-0.4229	0.1502	0.0049	-0.5196	0.1474	0.0004
JCOM2	Time Using Computers, > 1 hr						
MODW1	Mode of AM Transport, Private Cars	0.8393	0.1779	0.0001	0.6701	0.1875	0.0002
TMIN	AM Travel Time						
NSTOP	Number of AM STops	-0.9389	0.1476	0.0001	-0.7734	0.1709	0.0001
SALARY	Salary Arrangements	0.5903	0.0791	0.0001	0.8085	0.0833	0.0001
COST1	Resp. in Costs, employee incurs l costs	-1.9621	0.1365	0.0001	-1.7494	0.1388	0.0001
BFIT1	Benefit Arran, employee enjoys ben.	1.4904	0.1323	0.0001	1.6034	0.1374	0.0001
L(β)		-771.3490			-735.0060		
-2[L(c)-L(β)]		531.6190			560.0440		
p-value		0.0001			0.0001		
ρ^2		0.2560			0.2760		
% Correct at p=0.90 level		54.10%			68.10%		
No. of Samples		132			132		
No. of Obs.		1584			1584		

- The presence of variables AGE1 indicate that younger employees showed more interest in telecommuting.
- The variable EDUC1 showed strong significance. The positive coefficients confirm that telecommuting is suitable to those employees who have completed college.
- The variable TSUB1 is significant which confirms that employees belonging to lower ranks are not potential telecommuters.
- The variable MODW1 still showed significance, which strongly suggests that car users have higher potential in telecommuting than public commuters.
- The variable NSTOP was forced into the model and found to have high significance. The negative coefficient indicates that, all else being equal, employees who make more stops are quite reluctant to telecommute.

The three attributes of telecommuting showed strong significance at 0.0001 level. An interesting finding that can be derived from the results is the trade-off among the attributes. This is sometimes referred to as the marginal rate of substitution that can be taken from the ratios of the parameter estimates. Considering Model 3A, it can be concluded that the rate of substitution between Responsibility in Costs and Benefit Arrangement is 1.3 and about 3.3 between Responsibility in Costs and Salary Arrangements. This means that employees value the Responsibility in Costs more than the two attributes.

9. CONCLUSION

It is recognized that the research is limited in scope and samples. Nonetheless, this has yielded useful insights into the possible adoption of telecommuting in the Philippines.

The perception results revealed that about 73% of the surveyed employees are interested to telecommute. The results of the Stated-Preference Portion, however, showed a lesser number. Considering the 12 scenarios, on the average, 63% indicated willingness to telecommute at least once a week.

The research demonstrated that the socio-economic characteristics of the employees significantly affect their perceptions. Likewise, the models developed indicated that the willingness of individuals to telecommute is a function of both socio-economic characteristics and the attributes of the working arrangement proposed. As indicated above, there are at least eight (8) socio-economic variables that can be considered most relevant in influencing employee's decision to participate or not in telecommuting. These are Gender, Age, Civil Status, Educational Level, Job Classification, Time with Subordinates, AM Mode of Transport and the AM Number of Stops. More specifically, the results showed that:

- Telecommuting is applicable only to professionals or those who have at least completed college.
- In terms of Job Classification, the results revealed that Engineers, Architects and Researchers have high potentials in telecommuting. It is, however, noteworthy that at the first modelling process, employees who use computers in the office for

longer hours have, likewise, high potentials for telecommuting. Obviously, these include computer professionals and the like. These employees are more inclined to believe that their supervisor would approve of their working from home but only for several days.

- Consistent with the findings in developed countries, female and/or married employees are the most likely telecommuters. This finding is expected considering that Filipino women tend to be more family-oriented instead of pursuing career goals. Although the Perception results indicated that female employees will likely benefit only in terms of reduction in commuting stress, most likely, they will also benefit in terms of improvement in family relationships. Married employees, for their part, have strongly indicated that telecommuting will have a positive impact on family and household relationships as they are more comfortable in having the whole family more frequently. They likewise expressed that they would have flexibility in scheduling their other activities, should they decide to telecommute.
- Male and single employees have likewise showed some interest in telecommuting. Based on the Perception results, male employees tend to favor telecommuting because of the flexibility it offers and they tend to put more value on home and family. This is in contrast with the findings in developed countries where male are more career-oriented. Single employees, on the other hand, showed interest, mainly because of the potential money savings.
- Younger employees (those below 30 years old) have likewise high potentials in telecommuting.
- Private car users have indicated more interest in telecommuting than public transport commuters. From the transportation perspective, this finding is very significant particularly if telecommuting is to be considered as a TDM Measure. Based on the Perception results, private car users will likely benefit in terms of money savings.

It must be emphasized that these groups of potential telecommuters have expressed discomfort in working beyond the required time without being paid. The Engineers and Researchers have expressed more concern on the possibility of losing the opportunity to learn from senior workers if they decide to telecommute. Younger employees, for their part, expressed concern on the possibility of losing the chance for promotion.

It must likewise be emphasized that even though socio-economic and attitudinal characteristics may be important in individual's decision to adopt telecommuting, they do not immediately determine adoption because some trade-offs are made in considering the attributes of the proposed arrangement. The models developed indicated that the three attributes of telecommuting (Salary Arrangement, Responsibility in Costs and Benefit Arrangement) showed more influence on employee's decision, particularly with respect to the level of participation. As far as the employees are concerned, the Responsibility in Cost is the most important attribute. The results strongly suggest that employees are more willing to telecommute if they are not to incur any costs. As suggested by the models, they are more willing to trade-off benefit privileges. As can be noted, Scenarios 4 and 6 appear to be the most suitable options.

The models showed some predictive powers, but because of some limitations in sampling and their restrictions to stated-preferences, which present reliability problems, they may lead to imprecise forecasts. In view of these, several points for undertaking further research are herein emphasized:

- To improve the external validity of the models, some revealed-preference data should be obtained to allow for a jointly estimated model. In the case of the Philippines, this is not possible at this point in time. Therefore, demonstration programs have to be conducted first before this can be done.
- The surveyed sample represents a specific stratum. To obtain a broader picture of the attractiveness of telecommuting, a more diversified sample needs to be collected. Some innovative approaches, however, has to be introduced in gathering the data in order to capture other job types as well as employees at the higher hierarchy.
- Finally, a thorough investigation on the employers' side must likewise be undertaken.

With the above findings it can be concluded that telecommuting has very high potentials for adoption even in a developing country like the Philippines. Because of these potentials, employees may no longer be compelled to work in the central office. This could lead to changes in traffic patterns and reduce the number of business and work related trips from the home to office. Traveling, for instance, during peak hours, could be better planned and spread out over the day or week. Consequently, traffic congestions and/or overloading of physical infrastructure will most likely be reduced. However, it should be emphasized that the adoption process itself will take considerable time and effort to bring about major changes in workstyles and, probably, in doing business. Therefore, the impacts of telecommuting in transport cannot be readily measured. All these are strongly recommended for further investigation.

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