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A SURVEY OF THE STATUS OF TELEWORKING IN SINGAPORE

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This paper presents the main findings from the survey of the status of Teleworking in Singapore, which was jointly conducted by National Computer Board, National University of Singapore and Nanyang Technological University. Covering 868 establishments employing 10 or more employees, this teleworking survey is the first of its kind in terms of scale and coverage. The results show that 12% of the responding organisations practise some form of teleworking with some having more than one teleworking arrangements. Increased productivity and reduced office space are viewed as the main benefits of teleworking, while main perceived problems include data security, provision of adequate supervision. The results of the second phase survey with selected companies which are currently practising teleworking in Singapore are also presented in this paper.

1 Introduction

"Telecommuting" was coined by Jack Nilles in 1976 to refer to "the substitution of computer and telecommunication technologies for physical travel to a central work location." (Nilles, 1992) This concept was later expanded to include "any form of substitution of information technologies (telecommunications and computers) for work-related travel" (Nilles, 1992) and telecommuting was redefined as "that portion of teleworking that applies to the daily commute to and from work - the primary source of traffic congestion, air pollution and loss of productivity in urban areas." Teleworking is a work option that aims at reducing dependence on transportation by exploiting information and telecommunication technologies.¹

Teleworking is a relatively new concept in Singapore and most of the existing teleworking research and development are conducted in overseas. As pointed out by Yap (1993) and DOT (1993), the adoption of teleworking is mainly affected by the following reasons:

- 1) the advances in telecommunications and information technology,
- 2) the changes in demographics, the nature of work, and the workplace,
- 3) urban traffic congestion and
- 4) environmental legislation.

¹ In our study, telecommuting and teleworking are interchangeable terms although we prefer the later by choice.

Some countries, like USA, have laws that require companies to set up trip-reduction programmes for cutting down urban traffic congestion and air pollution (Smart Valley, 1994). Many consider teleworking as a viable option to achieve such goals and these have prompted a new wave of research activities in the area of teleworking. At present the number of teleworkers in USA is estimated at 2 to 6.6 million from various sources. This figure is projected to grow to about 7.5 to 10 million, or 5 to 10% of the labour force by the year 2002 (DOT, 1993).

Worldwide, teleworking programmes may be found in both the public and private sectors. Many companies have tried or currently process teleworking programmes. Selected examples in the public sectors include the California Telecommuting project, Federal Flexiplace project, and Los Angeles County Telecommuting project (DOT, 1993). In the telecommuting programme in the LA County, more than 1000 participants, from low level clerical staff to upper manager, took part in the study. Some of the telecommuting programmes in the private sectors include Pacific Bell (Niles, 1992), Bell Atlantic (Bell Atlantic, 1992) and Smart Valley Corp. (Smart Valley, 1994). With close to 1000 professional staff and managers participating as formal or informal telecommuters, Pacific Bell and Atlantic Bell projects are among the largest scale experiments. It was reported that Bell Atlantic has offered teleworking as an option of work arrangement available to its 16,000 managers (Bell Atlantic, 1992). The Smart Valley telecommuting project, implemented in Silicon Valley and the Bay Area, has ISDN as the backbone of the communication link for some telecommuters, and other technologies such as shared-whiteboard and video-conferencing. Most of these studies concluded that teleworking must be voluntary, and benefits such as higher job satisfaction and productivity for the employees, lower office space cost and easier to recruit and retain employees, were observed. Important experience and practical procedures for the implementation of telecommuting programmes are also reported in these studies (Bell Atlantic, 1992, Niles, 1992, and Smart Valley, 1994).

In Singapore, the IT2000 plan calls for the construction of a National Information Infrastructure (NII) to transform the nation into an "Intelligent Island" by the year 2000. Part of this plan envisions the development of a concept called "Anywhere Workplace" which aims at the wide-spread use of information technology so that people can obtain or send information anywhere anytime (NCB 1993). This lays the backbone of infrastructure for teleworking. Demographically, the percentage of information workers in

the labour force has been increasing in recent years due to the changes of industry in Singapore. In addition, the shortage of skilled professionals also encourage companies to tap into the latent labour market, especially the female professionals to participate through working at home, mostly as information workers (Yap, 1990a, 1990b). Taken together, these mean that the pool of teleworkers is on an upward trend and there is potential good for teleworking. According to the Development Guide Plan published by the Urban Redevelopment Authority in Singapore, some re-developed residential areas will have facilities specially designed for teleworking. The potential reduction in trips due to teleworking may also indirectly relieve the burden of increased numbers of cars on the existing road network and this may allow higher level of car-ownership in Singapore (Olszewski and Lam, 1992).

Against this backdrop, a joint research team of NCB and the two universities in Singapore conducted the survey on the current status and potential applications of teleworking in Singapore in October 1993, followed by a second phase survey in August 1994. The results and findings of these two surveys are presented in this paper. The following section gives a brief review of the survey. In Section 3, the survey results, in terms of the overall teleworking practices in Singapore, the potential size of teleworkers, and the perceived benefits and problems, are discussed, followed by the second phase survey results in section 4. Section 5 concludes the paper.

2 The Status of Teleworking Surveys

Three forms of teleworking: teleworking at home with or without formal arrangements and office-on-the-move, are considered in this study. The first two forms of teleworking include those employees who work at home instead of office during office hours either with or without formal arrangement from the companies. The third form of teleworking refers to the employees who perform office tasks at a distant location other than office or home.

The status of teleworking survey consists of two phases. The first phase² was conducted in October 1993 and it

focussed on the current status and potential of teleworking in Singapore (Yap et al, 1994), while the second phase was conducted in August 1994 as a follow up interview to companies which have reported existing teleworking practices in the first phase. A stratified random sampling methodology was used in the first phase survey. Sectors employing a high proportion of information workers who are more likely to adopt telework were chosen. These included sectors such as business services, banks, insurance, publishing, and travel services. Selected multinational manufacturing companies were also included as they were likely to adopt some form of teleworking programmes of their overseas parent companies. The valid samples contained a total of 868 establishments employing 10 or more employees in 9 different sectors. The samples in second phase survey consisted of selected companies based on the results obtained from the first phase.

The questionnaire was designed to capture two types of information: namely, the current status of teleworking in the establishments, and their potential needs and perceived benefits and problems of telework. For the first type of information, questions such as the type of activity performed by the organisation, total number of employees, current status of each of the three forms of telework (currently practising; plan to introduce in less than 2 years; and plan to introduce later than 2 years; would like to explore), were asked. The second type of information was provided by the organisations on the number of employees and estimated number who could possibly telework for 22 occupation categories of information workers, and the perceived rating of potential benefits and potential problems in implementing a teleworking scheme.

3 Current Status and Potential of Teleworking in Singapore

A total of 630, out of 868, completed questionnaires were returned, yielding a response rate of 72.6%. The distributions of the responding establishment by employment size and by sectors are shown in Table 1.

Sector	Valid Samples	Response	Percent
Business Services	339	237	69.9
Banks	165	117	70.9
Social & Community Services	68	42	61.8
Tourist & Travel	49	33	67.3
Insurance	66	53	80.3
Publishing Services	54	43	79.6
Statutory Boards	46	40	87.0
Manufacturing	62	51	82.3
Others	19	14	73.7
Total	868	630	72.6

Table 1. Sample and Response Rate by Sectors

² For a copy of the questionnaire, please contact Survey Research Unit, National Computer Board, Singapore 0511.

3.1. Overall Teleworking practices

The current status of teleworking in Singapore is shown in Table 2, in which the results are categorised based on the forms and status of telework. About 1.7% of the responding organisations indicated that they have formal teleworking arrangements; 4.6% telework informally; and 9.5% are practising office-on-the-move. A total of 12.2% of the responding organisations are found to have some teleworking arrangement, regardless of the form.

These findings are very encouraging considering that teleworking is a relatively new concept that has not been actively promoted. While formal teleworking is still rare, almost 5% of the responding organisations have informal arrangements and almost 10% are practising office-on-the-move. It is likely that over time, some of these will formalise their arrangement. It is also encouraging to note that regardless of the form of telework, 3% of the responding organisations have plans to introduce teleworking within the next 2 years, with another 2.4% planning to do it later than 2 years. In addition, another 25.9% indicated that they would like to explore teleworking but had no plans to do so.

If the responses are further categorised into employment size and business sector, the results indicated that the proportion of companies currently practising telework does not vary much with employment size. The proportion of companies that would like to explore telework increases, whereas those that have no plan for telework decreases, with

3.2 Potential Size of Teleworkers

Telework is applicable to information workers who collect, generate, process and use information. Based on the Singapore Standard Occupational Classification and overseas experience, 22 groups of occupation that are most likely information workers were identified. Responding organisations were asked to give the number of employees who fall into each of the occupational groups, as well as the number of employees in each group who could possibly telework.

Overall, about 18.2% of the information workers could telework. The proportion of potential teleworkers is about 70% of journalists, followed by more than 30% of computer programmers and analysts, consultants, financial/market/business analysts, insurance agents, marketing personnel, and travel agents. Less than 10% of architects, clerks and secretaries, researchers, real estate agents, and stock brokers could telework.

The total work force in Singapore is about 1.5 million people in 1992. Approximately 43% of the work force in Singapore can be classified as information workers (Olszewski and Lam, 1992). If 10% of these information workers could telework, this would translate into a total of 65,000 potential teleworkers. This percentage benchmark is adopted from overseas studies (DOT 1993) which have found that about 5 to 10% of information workers in countries such as the USA could possibly telework. Even if only 5% of the information workers become teleworkers, the

Forms of Telework	Currently Practising (%)	Plan to Introduce		Would Like to Explore (%)	Unlikely (%)	Total (%)
		<2 Years (%)	>2 Years (%)			
Working from home: formal arrangement	1.7	1.7	1.9	21.6	73.1	100.0
Working from home: informal arrangement	4.6	2.2	1.9	20.2	71.1	100.0
Office-on-the-move	9.5	1.4	1.0	18.1	70.0	100.0
Teleworking: regardless of form	12.2	3.0	2.4	25.9	56.5	100.0

Table 2. Current Status of Teleworking in Singapore

employment size. In terms of business sectors, organisations currently practising telework are mainly in the sectors of tourist and travel, publishing services, statutory boards and manufacturing.

The distribution of responses across different business sectors varies with different forms of teleworking. Most of the tourist and travel sectors are currently practising office-on-the-move arrangement of teleworking, while business services, banks, publishing, manufacturing and statutory boards are mostly practising teleworking at home. Most of the statutory boards, insurance, tourist and travel, business services, manufacturing are the sectors that express the strongest interests in further exploring teleworking.

potential pool of teleworkers is 32,500.

3.3 Perceived Benefits and Problems

Six potential benefits were identified:

- 1) increased productivity,
- 2) improved worker retention,
- 3) easier to recruit workers,
- 4) reduced sick leave,
- 5) increased worker satisfaction, and
- 6) reduced office space.

The importance of benefits was rated on a five point scale ranging from 1 = "Not at all" to 5 = "Very significant". A higher value of the mean rating signifies greater perceived benefit. Table 3 shows the average

Perceived Benefits	Formal	Informal	Office-on-the-move
Increased productivity	2.98	2.99	3.13
Improved worker retention	3.26	3.12	3.02
Easier to recruit worker	3.11	2.92	2.80
Reduced sick leave	2.61	2.52	2.35
Increased worker satisfaction	3.39	3.31	3.32
Reduced office space	3.43	3.24	3.13

Table 3. Average Ratings of Perceived Benefits of Telework

ratings. The results show that increased productivity and reduced office space were viewed as the two main benefits of teleworking, while organisations with informal telework arrangement also perceived increased worker satisfaction and improved worker retention as significant benefits. For those practising office-on-the-move, increased productivity and increased worker satisfaction are the main benefits. Easier recruitment of workers and reduced sick leaves are generally perceived as less significant benefits. Generally, organisations that are currently practising telework rated increased productivity higher than the other organisations. This implies that organisations not practising telework are less sure of productivity improvement as a benefit.

The respondents were also asked to rate perceived problems associated with teleworking. The five point scale ranged from 1 = "Not a problem" to 5 = "Serious Problem". Nine potential problems were identified:

- 1) limitation of existing technology,
- 2) data security,
- 3) access to paper documents,
- 4) salary/pay issues,
- 5) adequate supervision,
- 6) performance evaluation,
- 7) training/upgrading,
- 8) interaction with colleagues/clients, and
- 9) cost of implementing.

The average ratings are shown in Table 4.

The main perceived problems for organisations currently practising either formal or informal arrangement of telework are data security, inadequate supervision, and interaction with colleagues and clients. For those practising office-on-the-move the main perceived problems are cost of implementation, interaction with colleagues/clients, data security and access to paper documents. It was found out

arrangement and office-on-the-move. This may be due to the fact that the former probably have taken more effort to plan and implement the telework arrangement. Another significant finding is that organisations currently practising telework generally perceive less problems than those that are not practising. This finding suggests that most of the problems perceived by those not practising telework actually turn out to be less serious than expected.

4 Teleworking Experiences of Selected Companies in Singapore

As reported in the results of first phase survey, there are only a few companies presently practising teleworking in Singapore. The second phase survey was therefore conducted to find out some of the details regarding the teleworking arrangement in those companies. It was found out that at least three organisations have introduced teleworking for a variety of reasons. In the case of a large local commercial bank, teleworking was adopted for computer-related operations, with a view to speed up problem response and improve organisational communications. Although the management felt that one other major reason for adopting teleworking was the availability of technology, it turned out that teleworking helped a great deal in retaining at least one valuable staff. Since the major concern to the bank was data security, the management painstakingly undertook an in-depth study and trial run to test the soundness of the security procedures. For the bank's application programmers with 24-hour stand-by duties, the installation of the teleworking facilities allowed them to have a preliminary assessment of any computer problems that might crop up at their regional computer centre in Singapore. This arrangement was

Perceived Problems	Formal	Informal	Office-on-the-move
Limitation of existing technology	2.48	2.51	2.46
Data security	3.32	3.32	3.29
Access to paper documents	3.28	3.30	3.26
Salary/pay issues	2.39	2.42	2.47
Adequate supervision	3.14	3.15	3.10
Performance evaluation	2.86	2.94	2.83
Training/upgrading	2.85	2.81	2.81
Interaction with colleagues/clients	3.44	3.46	3.39
Cost of implementing	3.21	3.23	3.28

Table 4. Average Ratings of Perceived Problems of Telework

that organisations currently practising formal teleworking generally perceive less problems than those with informal

especially helpful as the application programmers needed