

# Telecommuting: comparing Singapore to Southern California

M.B. Khan

*College of Business Administration, California State University, Long Beach, Long Beach, CA 90840-8506, USA*

Lai Lai Tung\*

*Information Management Research Centre, School of Accountancy and Business, Nanyang Technological University, Nanyang Avenue, Singapore 639798*  
Email: ALLTUNG@NTU.EDU.SG

Efraim Turban

*College of Business Administration, California State University, Long Beach, Long Beach, CA 90840-8506, USA*

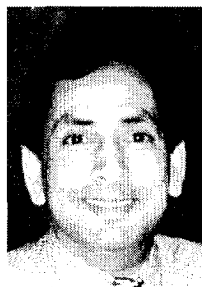
This paper presents the results of a sample survey conducted both in Singapore and in Southern California regarding the extent of use of telecommuting. The results indicate that telecommuting is used significantly more in California than in Singapore. However, this situation may be changing due to the recent interest in telecommuting in Singapore.

The study also identified the major motivators and drawbacks for the use of telecommuting as perceived by managers in both countries. In general, the perceptions regarding individual motivators and organizational motivators and drawbacks differ between the two countries. There is a consensus regarding individual drawbacks.

The paper includes a description of the telecommuting driving forces in both countries, which may be used to explain the differences between the countries.

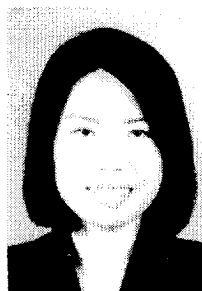
Keywords: Telecommuting, teleworking, motivators (of telecommuting), drawbacks (of telecommuting)

\*Corresponding author.

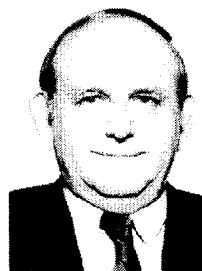


**Dr M.B. Khan** is Chairman and Professor of the Information Systems Department at California State University, Long Beach. He teaches management information systems, information systems management and application programming. His research interests are information systems management, information systems education, and information systems personnel. His research results have been published in *Information & Management*; *Journal of Computer Information Systems Management*; *Journal of Information Systems Management*; *Journal of Systems Management*; *Journal of Global Information Management*; *International Journal of Management*, and *Industrial Engineering*. He has authored four books and is a contributing author of two texts.

Professor Khan's prior experience includes several years of systems and management consulting for state government and industry, and four years of software management at Texas Instruments. He has a bachelor's degree in metallurgical engineering from East Pakistan University of Engineering and Technology, a master's and a doctorate degree in industrial engineering from Texas A&M University.



**Dr Lai Lai Tung** is a Senior Lecturer and an Associate Director of the Information Management Research Centre (IMARC) at the School of Accountancy and Business, Nanyang Technological University, Singapore. Dr Tung received her undergraduate degree in Accountancy from the National University of Singapore in 1985 and her M.B.A. and Ph.D. in MIS from Indiana University in 1989 and 1992, respectively. Her research interests include Groupware, Group Support Systems, Expert Systems, Electronic Commerce, and the impact of Information Technology (IT) on organizations. Her papers have been published in international MIS journals, refereed conference proceedings, as well as in special-interest IT books. She has recently co-written several IT case studies of various organizations' innovative use of IT in Singapore.



**Dr Efraim Turban** (MBA, Ph.D., University of California at Berkeley) is a professor of Information Systems at California State University, Long Beach. Prior to joining CSULB, Dr Turban was a distinguished professor at Eastern Illinois University. Dr Turban also taught at UCLA, USC, Florida International and Lehigh University. Recently, he was a visiting professor at Nanyang Technological University, Singapore.

Of his many books, the most known are DSS and Expert Systems (Prentice-Hall), Fundamentals of Management Science (R.D. Irwin), Applied Artificial Intelligence and Expert Systems (Macmillan), Neural Networks in Finance and Investment (R.D. Irwin) and Information Technology for Management (Wiley).

Dr Turban authored 80 papers in journals such as Management Science, Operations Research, MIS Quarterly, Journal of Operations Management, Decision Support Systems, Omega – International Journal of Management Science, Computers and Operations Research, and Journal of MIS.

Dr Turban has worked several years in industry (General Electric) and he provided consulting services to many corporations and governments. His current activities are in various Southeast Asia countries.

His research interests are in the applications of emerging technologies to Management Support Systems. His current work is in the areas of Group Support Systems, Internet, Telecommuting, and Electronic Commerce.

## 1. Introduction

One of the most interesting changes in business practices which is facilitated by information technology (IT) is telecommuting, namely doing work in places other than the corporate offices. Telecommuting refers to a form of work arrangement involving the use of computers and telecommunication technologies that allows employees to substitute telecommunication for physical transportation, thereby permitting them to do the job at a remote work site [21, 22]. Telecommuters can live in their preferred location and substitute electronic communication for physical travel [2,15–17]. Telecommuting is perceived as a means of reducing organizational overhead and improve individual and organizational productivity (e.g., see [3] for the results of a survey of 1022 executives).

The notion of telecommuting, also known as working at home, working on the road, and working from anywhere, is not new. In fact, some other popular options, besides those mentioned above, include: working at a corporate satellite office, working at a telework centre, space renting, and working from a client's office [19]. In addition, with more people subscribing to and accessing the Internet each day, more people will be working via that environment anytime, anywhere as well. Increasingly, the traditional way of doing business is being replaced by newer concepts such as 'floating offices', 'virtual offices', or 'mobile offices', which are established whenever and wherever convenient.

Telecommuting has been on the rise during the 1990s and it is expected to rise even more rapidly in the future. A major driving force in the spread of telecommuting is the increased availability of cost-

effective supportive information technologies [4,5,18, 19]. The tasks performed by telecommuters are expanding. While the early telecommuters performed mainly repeated transactions (such as processing insurance claims), today's telecommuters can perform at home, or on the road, many of the tasks that they do at the office [7].

IT-supported telecommuting has been in practice for over 15 years. However, the concept became popular in only a few countries. Of 274 recent publications found in an ABI Inform search, over 85% are related to four countries: Australia, Canada, the UK, and the USA.

Lately, however, we witnessed an increased interest in the topic in countries such as Finland, Japan, Hong Kong, and Singapore [12,18].

Telecommuting is a fundamental change in management practices. If it is done on a large scale, it can be considered a major *business processes reengineering* effort, which may change the structure, climate, and operations of organizations [1,11]. It is also reasonable to expect that the attitudes towards telecommuting, and the practices used, will differ among countries. To investigate such differences, the researchers conducted a comparative study in two countries on the edges of the Pacific Rim: Singapore and the USA.

The purpose of this paper is to present the findings of the survey, to compare the results, and to analyze them. The paper is divided into the following parts: a) the driving forces in Singapore, b) research issues, c) driving forces in California, d) methodology, e) results, f) comparison and discussion of the results, and g) conclusions.

## 2. The driving forces of telecommuting in Singapore

The Singapore government has implemented, starting in 1995, several programs designed to encourage Singapore-based companies to *globalize their businesses* in order to compete with other companies in global markets. The globalization of economic markets means that competition is intensified and businesses have to be even more productive in order to excel or even to survive. Employees of global companies have to travel extensively, and 'work' in places other than their offices.

In addition, as Singapore companies begin to globalize, the management style of these organizations is being changed to reflect the changing business envi-

ronment. The need to save time and money by not traveling and the changes in management style may increase the attractiveness of telecommuting [6,10].

Singapore has a *tight labor market*. Therefore, telecommuting may enable workers, who have difficulty coming to the office or keeping to a nine-to-five schedule, to continue to work rather than retire. This is especially important for women who frequently leave the workforce after having a child. Indeed, Singapore's National Computer Board [13] has reported that organizations which are currently not utilizing but interested in telecommuting, ranked "improved worker retention" and "easier to recruit workers" as second and third most important perceived benefits of telecommuting in a survey conducted in 1994 ("improved productivity" was ranked first).

Singapore has identified many women who can work but are currently not in the workforce as the main avenue for getting additional employees to solve the labor shortage. It appears that many female workers cannot work because of family commitments or because they cannot be at the office five/six days a week from eight or nine to five. Telecommuting offers them work flexibility. Yap and Tng [22] surveyed the attitudes of Singaporean female computer professionals toward telecommuting. Of the 459 respondents, 73% were in favor of telecommuting. It is interesting to note that most females surveyed would prefer to work at home one to three days a week and at the office the other days, instead of working at home all the time. They prefer to telecommute only in times of need, such as when they have to attend to young children.

Singapore is also a *land-scarce* country. As a result, office space is difficult to come by and it is expensive to rent. For organizations which are using telecommuting, either on a formal or informal basis, reduced required office space is perceived the second most important benefit of telecommuting (after increase in productivity, [13]).

In recent years, the Singapore government has implemented several policies to *control and reduce traffic congestion* on the roads. For instance, the car population in Singapore is controlled by a Vehicle Quota System. In this system, people are bidding on permits to use a car. Olszewski and Lam [14] used a forecasting model, with two alternative telecommuting adoption scenarios (low adoption versus high adoption), to predict the reduction in demand for travel within Singapore. They estimated that the annual reduction in vehicle trips, by the year 2010, can reach 4.83–

11.08%, depending on the extent of telecommuting adoption. In addition to reducing traffic congestion, telecommuting contributes to a reduction in energy consumption and exhaust emissions, resulting in a cleaner and greener environment, as well as in a lower number of traffic accidents.

With excellent IT infrastructure in place and a high number of computer-literate workers, Singapore is well suited to use *telecommuting*. As the cost of personal computers continues to decline, they become enormously popular at home and in the business settings in Singapore. The PCs are connected to local area networks (LANs) and/or to the Internet and they enable office and remote workers to send messages or transmit work back and forth and use file and database servers, printers, and other peripheral devices.

### 3. Factors driving telecommuting in Southern California

Telecommuting is very popular in Southern California. Approximately ten percent of the employees in the region telecommute at least one day a week according to a 1994 study by a group that tracks commuting for the state. This translates into 126,000 people telecommuting each day. In a study by Kosmont & Associates [8], it was found that Los Angeles County is home to more companies with telecommuting programs than any other county in the United States.

About 85% of telecommuters work from home and the rest work in telecenters, where companies can rent working space, computers, and other equipment for their employees. There were 20 telecenters in Southern California in 1995, serving about 20,000 workers each day, according to Southern California Telecommuting Partnership. This partnership is made up of city and county governments, AT&T, Pacific Bell, GTE, Northern Telecom, and Intel Corp.

There are several factors that contributed to the popularity of telecommuting in Southern California. First, California is the most populous state in the United States. The number of automobiles that are driven by Californians far exceed that in any other state. These automobiles make California the state with the worst level of air pollution. This is especially true for Southern California than its northern counterpart. Any attempt to improve the region's air quality is a welcomed idea. In fact, employers are under pressure from the region's air quality monitoring agency, the Air Quality Management District (AQMD), to re-

duce employee travel and thus contribute to improving the region's air quality. Telecommuting has played and continues to play a significant role in cleaning up the air of the region. It has been reported in 1996 that the region's air quality has been improved probably due to increased telecommuting.

Second, the State of California is a high-tech state. The state is ahead of all the other states in terms of computing technologies. Therefore, any computer-related activity catches on with the state's residents faster than in other states. Telecommuting, being a computer-related activity, has received special attention from both employers and employees.

Third, Southern California highways have one of the worst traffic jam problems in the country. The lack of a widespread public transportation system forces people to drive their own car, making the traffic situation worse. As more and more people are moving into the state, the situation is getting worse. Telecommuting can bring relief to the traffic problem of the region.

Fourth, there is a significant number of single parents in Southern California. Child care is a matter of serious concern to most of these parents. Being able to work at home gives them one less problem to worry about.

Other factors promoting telecommuting in Southern California are increasing flexibility for both employers and employees, higher productivity, better personal satisfaction, better use of time, reduced traffic fatalities, and improved family life.

Generally, many employers and employees prefer telecommuting over working in office environments. Employers like this ideas because of reduced employee absences, lower energy consumption (air conditioning, heating, lighting) and savings on workers' compensation. For example, the City of Los Angeles found in 1994 that telecommuters were absent, annually, two fewer days than their colleagues who work in the office. Overall, the City realized an \$8,000 savings per telecommuter per year on expenses ranging from energy consumption to workers' compensation.

#### 4. Research issues

Four major research issues were investigated in the study:

- a) Finding the extent of telecommuting in a large metropolitan area as well as the level of intention to implement telecommuting in the near future.

- b) Identifying and prioritizing the major determinants of success for the implementation of telecommuting. These include facilitators and inhibitors.
- c) Finding the impact of independent variables such as age, gender, type of organization, and organizational size on the determinants of success (the dependent variables).
- d) Comparing the results of a survey conducted in Singapore with a replicate survey conducted in Southern California.

#### 5. Methodology

A sample survey of telecommuting has been conducted in Singapore and replicated in Southern California. The survey was conducted by using an identical questionnaire.

*Sampling.* Singapore is a small country (2.7 million) in comparison to Southern California (about 12 million). Therefore, there were some differences in the sampling procedures.

- a) *Singapore.* Of the 1000 organizations listed in the Asian Computer Directory of Singapore, 200 were selected at random to receive the questionnaires. Sixty-two valid questionnaires were collected. The responders were mostly middle managers in the functional areas.
- b) *Southern California.* The questionnaire was administered to 132 MBA students who were enrolled at California State University, Long Beach (CSULB) during the 1995 Summer session. All of the participating students work full-time, mostly as middle managers in the functional areas, and their employers represent a cross-section of businesses in Southern California. Thus, the responses can be considered as representative of the Southern California business community.

#### 6. Results

The tables in this section summarize the results of the survey in both Singapore and Southern California.

##### a) *Personal characteristics of the participants*

The personal characteristics of the respondents are summarized in Table 1. The differences are typical to the two cultures. For example, in Singapore there

Table 1  
Individual respondent profile

Dimension	Categories	Singapore	Southern California
Sex	male	89%	60.2%
	female	11%	39.8%
Marital status	married	82%	59.4%
	single	18%	40.6%
Age	25–35	17%	85.4%
	36–45	55%	12.6%
	46–55	28%	2.4%
No. of years of experience	less than 7	10%	53.2%
	7–8	17%	11.3%
	more than 8	73%	35.5%

Table 2  
Organizational profile

Category	Description	Singapore	Southern California
Size of organization	under 50 employees	8.1%	25.2%
	between 50 and 99 employees	22.6%	7.6%
	between 100 and 499 employees	58.1%	27.5%
	equal to or over 500 employees	11.3%	39.7%
Industry type	manufacturing/engineering	9.7%	37.1%
	computer sales/service	40.3%	5.3%
	transport and communication	4.8%	8.3%
	banking and finance	27.4%	12.9%
	wholesale/retail	16.1%	7.6%
	education and training	1.6%	3.8%
Ownership	others		2.5%
	foreign company	9.7%	NA
	sole proprietorship	37.1%	NA
	local company	53.2%	NA

are fewer women in management. Southern California is known as a “singles community” and in Singapore, managers are promoted slower than in California. The Singaporean participants are older; it takes more time to reach middle management positions in Singapore.

#### b) Organizational characteristics

The characteristics of the organizations that participated in the survey are shown in Table 2. There were both more small and more large companies in the California sample. Also, the Singaporean companies were mostly from the computer industry while in California there were some from manufacturing.

#### c) Telecommuting policies

The first research issue deals with telecommuting policies. As can be seen from Table 3, the current use of telecommuting in California is significantly ( $r = 0.00001$ ) higher than that of Singapore (almost twice as high). Also, more companies plan to use telecommuting in the near future.

#### d) Determinants of telecommuting

The determinants of the successful implementation of telecommuting were divided into two categories: facilitators and inhibitors. A similar classification was used by King and Teo [9] in their study of the determinants of strategic use of information technology. The results are shown in Table 4. (1 = strongly disagree, 5 = strongly agree with the corresponding statements).

Notice that in general there is a higher level of agreement in Singapore with respect to all the statements. Notice also that there is more consensus between the managers of the two countries regarding individual factors (especially inhibitors) than organizational factors.

#### e) The impact of the independent variables

Statistical tests were conducted to see if there is any correlation between some of the independent variables and the use of telecommuting (the dependent variable). Independent variables, such as company size and industry type, may be the reason for the dif-

Table 3  
Telecommuting policies

		Singapore	Southern California
Telecommuting policy during office hours	telecommuting in use	21%	38.1%
	telecommuting not in use	79%	61.9%
Likelihood of adopting telecommuting in the near future	very likely	11.3%	15.2%
	likely	17.7%	22.0%
	uncertain	45.2%	22.0%
	unlikely	16.1%	24.1%
	very unlikely	9.7%	16.7%

Table 4  
Ranking of facilitating and inhibiting factors

Facilitators	Score California	Rank	Score Singapore	Rank	Inhibitors	Score California	Rank	Score Singapore	Rank
<i>Individual</i>					<i>Individual</i>				
Time flexibility	3.83	2	4.09	1	Impediment to career growth	3.73	1	4.12 <sup>a</sup>	1
Reduction in child care costs	2.67	4	3.88 <sup>a</sup>	2-3	Social isolation	3.02	2	3.38 <sup>a</sup>	2
Savings in time/cost of commuting	3.89	1	3.88	2-3	Conflicts between work and home	2.9	3	3.03	3
Savings of clothing expenditure	2.63	5	3.41 <sup>a</sup>	4	Increase in equipment cost	2.48	5	2.84	4
Increase in job satisfaction	3.75 <sup>a</sup>	3	2.98	5	Lack of professionalism	2.7	4	2.78	5
<i>Organizational</i>					<i>Organizational</i>				
Ease of recruitment	2.57	5	4.22 <sup>a</sup>	1	Coordination of employees	3.76	2	4.11 <sup>a</sup>	1
Reduction in overheads	3.58	2	3.99 <sup>a</sup>	2	Data security	3.52	4	4.00 <sup>a</sup>	2
Productivity gains	3.72	1	3.75	3	Difficult to control performance	3.79	1	3.87	3
Training of managerial skills	2.77	4	2.68	4	Equipment security	3.21	5	3.68 <sup>a</sup>	4
Higher computer literacy	3.02 <sup>a</sup>	3	2.43	5	Lack of loyalty to company	2.91	7	2.97	5
					Cost of acquiring equipment	3.54 <sup>a</sup>	3	2.95	6
					Legal liability	3.05 <sup>a</sup>	6	2.45	7

<sup>a</sup>Significant difference,  $p < 0.05$ .

ferences detected, rather than geographical location. The tests indicated that there is no significant correlation between the size of the company and the use of telecommuting (as well as the intended use). Similar results were found with respect to industry type. Therefore, we can conclude that the differences are probably the result of the location.

## 7. Discussion and comparison of the results

Overall, it is not surprising that the ranking of the determinants of telecommuting in Singapore differs from the ranking in Southern California. The differences can be explained by the cultural, economic, political, and organizational differences (some of which were described in Sections 2 and 3).

It is not surprising that telecommuting is used significantly less in Singapore. Singapore became interested in telecommuting several years after California. Also, the management style in Singapore is, in general, more autocratic than in California. As a result there may be less trust in employees who work at home.

This situation may not change in the near future, since the likelihood of adopting telecommuting in the near future by companies that are not using it currently, is perceived to be significantly higher in California ( $p < 0.05$ ).

The different ranking of the facilitators and the inhibitors was especially apparent in the following areas:

- a) *Individual facilitators.* Significant differences were reported with respect to: 1) child care (more important in Singapore where women with

children are just starting to join the workforce); 2) increase in job satisfaction is perceived to be more important in California. American workers enjoy more freedom and have more opportunities to enjoy the benefits of working at home; and 3) many Singaporean workers are usually dressed formally, therefore savings on clothing expenditures is more important there.

- b) *Individual inhibitors*. These were small yet significant differences in two areas: both impediments to growth and social isolation were considered to be more important in Singapore.
- c) *Organizational facilitators*. The most important perceived facilitator in Singapore, ease of recruitment, was perceived as the least important in California. During the time of the survey, there was a labor shortage in Singapore while the unemployment rate was high in California. Also, in California, people can move much easier than in Singapore. Computer literacy was considered a significantly more important facilitator in Singapore where the extent of computerization is less prevalent than in California. Other factors were perceived in a similar manner in both countries.
- d) *Organizational inhibitors*. The coordination of employees was perceived in Singapore the most important inhibitor, possibly because of perceived difficulties in controlling employees. Different management styles and cultural environment may explain some of these difficulties. Finally, equipment and data security are considered more important in Singapore, where companies are more closely monitored by the government. As expected, legal issues are perceived more important in California and so is the cost of equipment. (Singaporean companies have more money.)

## 8. Conclusions

The small survey that was conducted on the edges of the Pacific Rim revealed that while there are several differences in the utilization of telecommuting between the two countries surveyed, there are much more similarities. Most of the differences can be explained by cultural, economical, organizational, and technological differences. It would be interesting to expand the study to more countries and also to see how the differences change over time.

Furthermore, as the factor "Impediment to Career Growth" is ranked top as a telecommuting inhibiting factor for both countries, one interesting and important area for future research may be the role of trust and trustworthiness of telecommuters and their supervisors in the diffusion and adoption of telecommuting schemes in an organization.

In conclusion, the major challenge for Singapore is how to motivate companies to increase telecommuting. The government is very interested in such an increase and probably will introduce some incentives in the future. Singapore can learn from California how to utilize telecenters and how to coordinate and control work done at home.

## Acknowledgments

The authors thank Sal Kukalis of California State University, Long Beach for his assistance in data collection and analysis.

## References

- [1] T. Bui et al., Beyond telecommuting: organizational suitability of different modes of telework, in: *Proceedings, 29th HICSS*, Hawaii, January 1996.
- [2] J. Cote-O'Hara, Sending them home to work: telecommuting, *Business Quarterly*, Spring, 1993, 104-109.
- [3] E. Davis, Have modem, won't travel, *Management Review*, April 1995.
- [4] V. Grover and M. Gaslar, Telecommunications technologies: patterns of usage, *Database*, Winter, 1993.
- [5] J. Henning, The promise of PDAs, *Chief Information Officer*, Nov./Dec. 1993.
- [6] M.M. Illingworth, Virtual management, *Information Week*, June 1994, 42-58.
- [7] R. Kalakota et al., Mobile agents and mobile workers, in: *Proceedings, 29th HICSS*, Hawaii, January 1996.
- [8] K. Kaplan, Telecommuting trends hits close to home, *Los Angeles Times*, October 27, 1995, d1.
- [9] W.R. King and T.S.H. Teo, Facilitators and inhibitors for the strategic use of Information Technology, *Information and Management* 27 (1994), 71-87.
- [10] J. Kugelmass, *Telecommuting: A Manager's Guide to Flexible Work*, Lexington Press, New York, 1995.
- [11] A. LaPlante, Teleconfrontationing, *Forbes ASAP*, 1994.
- [12] A. Luukinen et al., Telework arrangements demand in Finland, in: *Proceedings, 29th HICSS*, Hawaii, January 1996.
- [13] National Computer Board, Report on status of teleworking in Singapore, NCB publications, May 1994.
- [14] P. Olszewki and S.H. Lam, Can teleworking help to reduce traffic congestion in Singapore?, *The Straits Times*, 13/9/93.
- [15] J. Richter and I. Meshulam, Telework at home: the home and the organization perspective, *Human Systems Management* 12(3) (1993), 193-203.

- [16] N.A. Solomon and A.J. Templer, Development of non-traditional work sites: the challenge of telecommuting, *Journal of Management Development* **12**(5) (1993).
- [17] J. Stanworth and C. Stanworth, *Telework: The Human Resource Implications*, Institute of Personnel Management, London, 1991.
- [18] L.L. Tung, S. Palvia, C.H. Lee, Y.M. Loy and M.Y. Teng, A study of telecommuting in Singapore: current status and future prospects, in: *Proceedings of the 1995 Pan Pacific Conference on Information Systems*, Singapore, 29 June–July, 1995, pp. 322–331.
- [19] L.L. Tung and E. Turban, Information Technology as an enabler of telecommuting, *International Journal of Information Management* **16**(2) (1996), 103–117.
- [20] J.M. Weiss, Adding vision to telecommuting, *Futurist* **26**(3) (May/June 1992), 16–18.
- [21] C.S. Yap and H. Tng, Telecommuting as an alternative work arrangement, *Singapore Management Review*, NUS, 1989.
- [22] C.S. Yap and H. Tng, Factors associated with attitudes towards telecommuting, *Information and Management* **19**(4) (November 1990), 227–235.