IMPACT OF ATTITUDE ON ADOPTION OF TELECOMMUTING IN ORGANIZATIONS IN PENANG.

by

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ABSTRAK

Kebelakangan ini, kesusasteraan bidang pengurusan sumber manusia dan perhubungan perindustrian dipenuhi dengan perbincangan mengenai penyusunan semula award dan strategi yang bertujuan untuk meningkatkan keberkesanan dan kecekapan sesebuah organisasi. Tetapi, hanya sedikit tumpuan diberikan terhadap bentuk organisasi yang berubah pantas dan sama ada bentuk organisasi yang kita kenali sekarang akan dapat bertahan revolusi pasca industri. Kebanyakan perbincangan dalam kajian terkini mengandaikan secara kasar bahawa kebanyakan pekerja akan terus bekerja di dalam atau untuk organisasi formal atau seumpamanya. Perkembangan terkini dalam teknologi baru dan potensi bagi amalan kerja inovatif yang berhubungkait dengan teknologi baru mulai mencabar andaian itu secara serius.

Semakin banyak syarikat dan individu kini mencuba program berkerja dari rumah membabitkan penggunaan komputer peribadi. Antara perkembangan berkaitan adalah pertumbuhan opsyen kerja yang dikenali sebagai "telecommuting" atau "teleworking". Kaedah alternatif ini dicirikan oleh jarak organisasi dan perkerja dan penggunaan teknologi maklumat yang meluas.

Kajian ini merupakan kajian ulung tentang "telecommuting" dan juga untuk mengenalpasti penggunaannya di Pulau Pinang. Matlamat kajian ini adalah untuk memberi gambaran akan tanggapan pihak pengurusan atasan di dalam organisasi di Pulau Pinang terhadap penggunaan "teleworking". Faktor yang mempengaruhi keputusan sama ada untuk menggunakan atau tidak menggunakan "teleworking" akan juga diutarakan.

'Teleworking" adalah satu tatacara kerja dimana pekerja sama ada sepenuh masa atau sambilan bertugas dari luar organisasi dengan bantuan kemudahan teknologi maklumat.

Pengurusan atasan di dalam kajian ini merujuk kepada CEO dan Ketua/Pengarah Bahagian Sumber Manusia. Skop kajian merangkumi semua organisasi, tempatan ataupun antarabangsa yang beroperasi di Pulau Pinang.

Selain itu, kajian ini juga akan mengutarakan bahawa sikap pengurusan adalah positif di dalam beberapa kes dan negatif di dalam beberapa kes yang lain, tetapi positif keseluruhannya. Kajian ini dilanjutkan untuk mengenalpasti faktor-faktor yang berbentuk sikap dan mengelaskannya kepada kos dan faedah. Kajian ini juga akan mengenalpasti pengaruh faktor moderator yang dipercayai memberi kesan terhadap penggunaan "teleworking"

Didapati juga bahawa kebanyakan eksekutif sanggup untuk "telework". Tempoh purata untuk mula penerimaan pengguna ialah 3.2 tahun. Sikap ini dihubungkaitkan secara langsung dengan penerimaan. Sikap adalah lebih positif jika infrastruktur teknologi maklumat adalah tersedia, dan jika pekerjaan tidak banyak memerlukan penyertaan fizikal. Juga dikenalpasti bahawa kekerapan penggunaan kemudahan/produk "teleworking" dan sejauh mana keperluan "teleworking" di dalam prestasi kerja juga mempunyai kesan moderator yang bererti terhadap penerimaan.

ABSTRACT

Today, human resource management and industrial relations literature is full with discussions concerning award restructuring and strategies designed to improve organisational effectiveness and efficiency. However, little attention has been directed towards the rapidly changing nature of organisations themselves and whether or not organisations as we know them will survive the post industrial revolution. Most discussions in current literature implicitly assume that all employees will continue to work for, and in formal organisations of some kind. Recent developments in new technology and the potential for new innovative work practices associated with this new technology are beginning to seriously challenge this assumption.

An increasing number of companies and individuals are experimenting with work at home programmes involving the use of personal computers. One such development relative to this growth is an extensive work option known as Telecommuting or Teleworking. This alternative way to work is characterised by remoteness to the organisation coupled with extensive use of Information Technology.

This study represents a definitive treatment on Telecommuting as well as exploring its adoption in Penang. The goal of the research is to throw light on the perception of top management of organisations in Penang towards adoption of Teleworking. Factors influencing decision to adopt or not teleworking were also highlighted.

Teleworking is a work arrangement where an employee either on full time or part time basis, works from outside the organisation with the aid of information technology facilities.

Top management as referred to in this study includes C.E.Os and Heads/Directors of Human Resource Divisions. The scope of the study covers all organisations, both multinationals and local companies operating in Penang.

It also highlighted the attitude of management which was found to be positive in some cases and negative in other cases but positive on the average. We further explored the factors that shape attitude and classified them into cost and benefit. It further investigates the influence of some moderating factors which are believed to impact on teleworking adoption.

It was further found that most of the Executives are willing to telework. The mean period of adoption is 3.2 years. Attitude is directly correlated with adoption. Adoption is more likely given a positive attitude if IT infrastructure is available, and if the job requires less physical presence. It was also found that the frequency of usage of teleworking products/facilities, and the extent of need for teleworking in job performance also have significant moderating effect on adoption.

Chapter 1

INTRODUCTION

1.1 Background

Telecommuting, otherwise called Teleworking is the use of personal computers, dedicated word processors or terminals, telephone, fax, e-mail, modem, etc. for work related purposes at a location remote from the organisation: this location may be the employee's home, a satellite or neighbourhood work centre. Employees may practise Telecommuting on a full time or part time basis, although the later mode is more prevalent.

It is generally known that the average time spent travelling in urban centres is increasing tremendously every day in South East Asian Countries (ASEAN), which today has assumed dominance in global urbanisation. Interdependence of accessibility and employability are of particular importance to the lack of easy access to some of the employment centres. Heavy investment on roads, rolling stock and other transport infrastructures has been made in most Asean countries, but yet it has not been possible to meet transport demand.

There is lack of balance between the distribution of population, employment centres and the transportation systems. The main economic activities tend to concentrate in or near the city centre and in a few industrial and commercial zones, with the remainder of the city being devoted to housing and social services.

There are numerous adverse consequences of this pattern. First, separation of centres of employment, services and residential areas imposes longer trips which in turn creates a demand for increased capacity of roads and transport equipment, extended time spent in travelling, high energy consumption, high cost of travelling, and multiplied adverse impacts on the environment. Secondly, shortage of workers may result when those who cannot afford longer trips to work such as pregnant women, nursing mothers, single parents, and disabled persons are marginalised by the pattern. Finally, concentration of movement in central areas and on radial roads lead to traffic congestion and create pressure for provision of new roads and other elements of transport infrastructure which will need huge capital.

Recent technological and organisational development are contributing to spatial reunification of home and work activities (Pendyala, 1992). Modern telecommunication and computer technology allow workers to perform their duties from home, instead of requiring them to journey to and from distant workplaces. Though it is a relatively new practice and is thus used by only a small percentage of the workforce, telecommuting will become much more common in the near future (Handy 1994).

In Malaysia, as cities become increasingly congested, new housing areas are relocating farther away from the city centre while employment centre concentrate or develop in the suburbia or fringe. The mean commuting distance increases in either case resulting in longer journeys to work, associated with:

- Stress.
- Longer travel time.

- Higher transportation cost.
- Increased energy consumption.
- Environmental concern.
- Reduction in available workforce especially among pregnant women, nursing mothers and single parents who cannot afford long trips to work..
- Marginalisation of handicapped from the workforce.
- Pressure on available roads demanding huge investment on road infrastructures.

These are generally believed to lead to inefficiency and lower productivity. According to Kitamura (1990), increases in productivity are due to a number of reasons including reduction in job stress, interruptions, and wasted commuting time. He claims further that studies have found productivity increases of an average of 15-16% (telecommuting) although reliable data is difficult to obtain on this topic because much of the research has been done by companies who have retained the results for market competitive reasons.

From the planning point of view, IT is visualised as vital for the decentralisation of the workplace, businesses and cities. Essentially, an IT network provides the means to perform work practically anywhere without the need to commute or move paper information. With the installation of fibre optics, information technology network can be carried out electronically at an immense speed with more than one transmission on a single line at any one time. Some of the consequences to the society will be considerable reduction in urban traffic pollution, central business district traffic. On the part of the organisation, benefits include; increased worker productivity, increased worker morale, reduced worker turnover, reduced health care costs, reduced office

facility costs, and larger applicant pools for job openings. To the worker, benefits are; reduced expense and stress of commuting, increased opportunities for parents and disabled persons to enter the workplace, more flexibility in work hours, and more potential leisure time (Keklikian, 1990; Mokhtarian 1993).

What then are the views of management regarding teleworking? Why have organisations in Penang and Malaysia by extension not adopted this as an alternative work arrangement given the above pay-offs. What are the factors influencing the decision to adopt or not to adopt this form of work arrangement. Are there any problems in implementing this concept, and how does this work arrangement affect the organisation design? These are some of the questions this research paper will address.

1.2 Problem Statement

The major thrust of this study is to determine the impact of attitude of top management of Organisations in Penang towards adoption of teleworking and the factors influencing the adoption.

1.3 Scope and Significance of Study

This study investigates the perception of top management towards adoption of teleworking in organisations operating locally in Penang. Some of the factors that influence the adoption or non-adoption of this type of work arrangement will also be studied. We correlate their views to that of the findings in the literature review.

It is hoped that at the end of this study, we are able to show the right views of management on the issue. We shall also show the factors that will make them adopt or not to adopt teleworking. Finally, we will show whether or not they will adopt given those factors.

Chapter 2

LIERATURE REVIEW

2.1 Background

The use of telecommunication and computer technology to replace or reduce traditional commuting to workplace is in fact not a new idea of work arrangement. Surprisingly, it is has taken about thirty years for this work option to be appreciated among some developed countries (Nilles 1976). Toffler (1980), introduced the imaginative concept of the "electronic cottage" and telecommuting. Toffler forecast that whole family units would share the benefits of computer technology in the home which would become the centre of both work and play.

Telecommuters most often work in management and service jobs where there is little need for physical interactions with goods and people in the workplace. Most telecommuting occurs on a part-time basis, with part of the work week spent working in the traditional office and other part spent working at home.

2.2 Telecommuting in the world at large

Toffler's vision has quickly become a reality for many workers. Several early predictions suggested that by 1990, as many as 10-15 million Americans could be working from home (Wolfgram, 1984). These early predictions have now been found to be conservative; a 1987 study estimated that there were, in that year, 23 million

Americans working from home with approximately two thirds of these workers retaining direct links with corporations and one third being self employed (Telecommuting Review, 1988). At the World Future Society's conference in 1982, it was predicted by a group of world's leading futurists, that by the year 2000, about one third of the workforce of industrialised countries will be teleworking (Skelly, 1983). In America, the companies involved are widely dispersed geographically. They include; J.C. Penny, Continental Illinois Bank, Control Data Corporation, DMR Group Incorporated, American Guaranty Corporation in Rhode Island, Aetna Life and Casualty Company in Connecticut, New York Life Insurance Company in Manhattan, Financial Data Planning in Miami, and Hoffman and Davis a Chicago law firm, to mention a few.

In Canada, the list includes the Hudson's Bay Corporation and Canadian Pacific Limited of Montreal.

In the United Kingdom, there are nearly 1.27 million telecommuters representing about 4.6% of the UK work force. The average growth of teleworkers was around 15% to 20% per annum (Wood,1991). Rank Xerox and F International are two major organisations practising telecommuting in UK.

Many other European countries like Netherlands, Finland, and Germany have been experimenting with telecommuting in many of their business organisations.

Australia is not left out in this new wave. Although Australia does not register a considerable number of companies experimenting with teleworking like United

States, England and Canada, however, few corporate examples are available at this time. In the state of New South Wales in Australia alone, a recent report indicated that some 130,000 individuals now work from home and a rapidly growing percentage of these are information workers. Organisations involved in teleworking include, Telecom Australia, Australian Securities Commission, Thomas Nationwide Transport (TNT), Esso, Shell etc. (Wood, 1993).

In the Island of Singapore, skilled labour shortages, growing ageing population, traffic congestion problems, family matters and heavy road construction and maintenance cost, puts into perspective the obvious implications of a thoughtful consideration of telecommuting, not as an alternative work option alone, but also as a policy instrument built into the management vision of the country.

Teleworking in Japan is not really a viable option because of the high cost of residences in urban areas around cities like Tokyo. In addition, the homes are so small in many instances that it is difficult to accommodate home office. Not astonishingly therefore, Japan has experimented much more with satellite offices as opposed to home telecommuting. They have also explored the concept of resort offices which links both work and leisure together for extended period by applying teleworking principles. The Satellite and resort offices being operated in Japan were Shiki satellite office, Kumamoto resort office, Mitsubishi materials satellite office to mention but a few (Spinks, 1991).

2.3 Teleworking Models

Buckinger (1994) stated that a standard approach to teleworking in organisations has not been adopted. However, a close examination of the way in which the companies cited above have implemented it within their organisations suggest to us that the variety of forms found constitute a rather novel way of categorising organisations into a fourfold classification scheme. This proposed typology is now offered.

Model 1: Clerical personnel working from home on a part-time basis.

The potential impact of telecommuting on the design of the organisation of the future is not clearly understood by many commentators. Typically, telecommuting is discussed only in terms of selected clerical personnel within an organisation working from home, usually on word processing activities, for part of their working week. This most commonly used though some what conservative in approach has been adopted by the Continental Illinois Bank in the United States where the staff have been doing word processing activities at home for several years. Here dictation draft work goes to the Teleworker, is returned physically by courier and the final work is completed by on-site banking staff but the telecommuter remains an employee of the organisation (Forbes Magazine 1984). This same approach was also used by the New York Life Insurance Company and Financial Data Planning in Florida where female workers who chose not to return to work after childbirth, were given the opportunity to telecommute to reduce work backlog (Jarret, 1994) This approach is the one most commonly considered by individuals or organisations contemplating Telecommuting experiments. The work arrangement is often very inflexible, the work itself repetitive,

and in some cases similar to an 'electronic sweatshop', in that it often employs women with young children, working at home, without sound industrial relations protection.

Model 2: Professional personnel working from home on a full time basis/part-time basis while still remaining a company employee.

Another common approach to Telecommuting is found typically within professional organisations where one or more of the senior executives may choose to relocate permanently away from the head office. This approach too, is becoming common place in North America and is typified by Hoffman and Davis a Chicago based law firm. David Hoffman, a partner with a passion for skiing, has moved his home into Telluride, Colorado where he consults with his partners by phone and sends reports to the office using a portable computer and modem. According to a recent report, Hoffman is one of 7 million Americans who Telecommute to their offices via computer, telephones and couriers. Although most of these hold much lower positions in their organisations than Hoffman does, the number of Telecommuters at the rank of top executives and professionals is growing rapidly (Business Week, October 1986). With this approach, work arrangements are usually flexible and ad-hoc; trust is implicitly implied.

Model 3: Independent Telecommuting sub-contractors *(particularly computer programmers and analysts).*

Telecommuting and the general trend towards self employment and work autonomy has in our view provided the impetus for a radical new perspective on organisational

design which has been explored in Europe and elsewhere, a perspective that may have a major impact on the design of the "future" organisation. Perhaps the best known example at this time is Rank Xerox in England who conducted experiment aimed at setting up staff as Telecommuters in independent small business enterprises situated out of London where overhead costs are considerably lower. The experiment known as networking now involves in excess of 43 people. Xerox aimed to reduce the high white collar costs, facilities costs such as rent, rates, light and heat, security and fringe benefits such as cars, insurance schemes etc. They argued that it was more cost effective to introduce Teleworking rather than move to another site or redesign the office. Only those persons with clearly defined objectives and units of output could participate in the scheme. Another fundamental reason for this scheme was that Xerox found that many staff were severing ties with company to become self employed entrepreneurs. Their approach to Teleworking enabled many of these people to satisfy their entrepreneurial desires while working in what is almost an entrepreneurial relationship with the company. Here the Telecommuter is no longer a company employee but changes his or her status to that of a sub-contractor. In order to prevent "feather bedding" i.e. please Xerox rather than producing truly competitive output each of these satellite companies must not depend on Xerox for more than half of it's work. Price standards are clearly determined and job costing has been introduced. Equipment is leased or borrowed from Xerox. These companies have registered as limited companies and a networking contract is formed with them by Xerox. Xerox maintains informal contact with these networkers and invites them to social events. In addition, a self-help association was formed. It is interesting to comment on some of the secondary effects of this Teleworking system. Back at the head office there was considerable enrichment of the jobs of the core workers or the

non-Telecommuters. And, increased responsibility and enhanced career paths for core employees were major results of the experiment. (Brennan, 1984).

Model 4: The total Telecommuting organisation.

Perhaps the ultimate impact of telecommuting upon the organisation of the future can be illustrated by reference to a multinational European based company called F International. This is a computer consulting company with head office in England that specialises in designing integrated office information systems, evaluating hardware and software, converting existing systems, creating internal documentation systems, providing programming services, and helping management apply personal computers to business operations. The company now employs more than a 1000 freelancers in three countries: the United Kingdom, the Netherland and Denmark. Structurally, it is a flat pyramid with few layers of management between the Managing Director and the consulting employees. About 200 of the mainly female staff are on salary, the rest on a contract basis. Here the Telecommuter, functioning as a sub-contractor, in the company. The companies are organised on a regional basis and typically a region has about 100 employees - they believe that small is beautiful . Work is measured in units called 'chunks', a 'chunk' , being equivalent to about a week's work (Shirley 1986).

2.4 Telecommuting and Organisation Design

Each classification above could be located on a continuum of organisational design that ranges from traditional/structured design at one extreme to innovative/unstructured at the other.

Figure 2.1: Continuum of Organisation Design

The first model may reflect a return to Taylorism, with potential exploitation of out-workers, whereas the fourth represents the "organic" structure (Burns & Stalker,1961) and the liberation of outworkers through advances in communications technology. Another important grouping criterion is whether or not the Telecommuter remains an organisational member or functions as an independent sub-contractor. What is not clearly understood at this stage in the literature is the immense potential contribution that Telecommuting could make to new forms of decentralised and unstructured organisations- the organisations of tomorrow. Although recent literature in organisation theory makes reference to Federated organisations whereby a number of satellite organisations are loosely coupled (Handy 1985) under a corporate umbrella, it is our contention that this literature has not as yet fully recognised the immense contribution that teleworking, in combination with home working, could make to such organisational structures. Clearly, research on telecommuting as a technological innovation could contribute to our understanding of the effects of new technologies on organisational structures.

2.5 The Impetus of Teleworking

Several reasons have been furnished by experts to show the motives behind these ways of work arrangement. The drive for one country to adopt telecommuting could

differ significantly from that of another. This is not surprising given that countries face peculiar problems and needs to address these problems specifically. America's major drive for implementing telecommuting is mainly transportation based, Japan's major drive is to avoid the high cost of central business district. The Scandinavian countries used teleworking as a measure to push competitiveness and effect development in the rural vicinity. In Australia, it is used as a tool to effect changes in the social structure with respect to family and rural development. Among the European union, the implementation of telecommuting is made popular following benefits derived from transport related issues.

Table 2-1: Countries and their major telecommuting drivers

countries	major telecommuting drivers
USA	transportation related issues
Japan	high cost of Central Business District (CBD)
Scandinav-ian nations	to push up competitiveness and effect rural development
Australia	tool to effect changes in the socail structure with respect to family and rural development
EU	transportation related issues
Singapore	labor shortages +transportation related issues
Malaysia	as with Singapore

(Self summary)

Finally, though telecommuting has not been experimented in Malaysia, research is presently in gear in this area. However major drivers has been identified as;

advancement and penetration of IT, concentration of economic activities and move for spread, travel congestion, environmental degradation, potential and limitation of women workforce, heavy investment in transportation infrastructure, and long distance commuting.

2.6 Teleworking: cost-benefit appraisal.

A report (Sumner 1986) identified the following major parameters of work time innovations in the late 1980's. First, such work time innovations are used in organisations of all sizes, in a wide variety of public and private organisations. Secondly, these work time options are becoming permanent fixtures in some organisations.

The brief case examples cited above are beginning to satisfy these criteria and demonstrate clearly the rapid growth of Telecommuting as one important worktime option for contemporary information societies. Other indicators of the development include the establishment of Telecommuting consultants such as Electronic Services Unlimited, Gil Gordon Associates (Business Week, October 1986) and the formation of a USA National Association of Cottage Industries (Wolfgram, 1984).

However, despite all this interest and experimentation, as yet little systematic empirical information is available on the major costs and benefits of Telecommuting. Although the literature is quite extensive, what is written appears to represent very subjective opinion and/or speculation on the potential advantages of Teleworking (see

for example Hamilton, 1987; Business Week , 1986; Datamation, September, 1986). An examination of this literature has led the writer to suggest that costs and benefits could be meaningfully ordered into a taxonomy.

Any cost-benefit analysis of course can be approached from a number of different perspectives. Those associated with any specific work time option could be grouped under broad commonly used cost classifications such as the impact of the work time option upon administrative costs, labour market effects, social and lifestyle effects, working condition effects and productivity effects (Wood, 1985). Alternatively, the cost-benefits of Telecommuting could usefully be categorised under the criterion of 'who benefits'; the individual, the organisation, or finally the broader society, or some combination thereof. Although it is beyond the scope of this paper to discuss all the potential costs and benefits that have been identified in the literature, an attempt is now made to classify the major ones incorporating this 'who benefits' perspective. We believe that such a framework may be beneficial to both researchers and policy makers working in this area.

Table 2-2: Taxonomy of the Costs and Benefits of Telecommuting.

The individual perspective

Potential Benefits

- Less travel time and more effective use of work time.
- Gains in flexible life scheduling to accommodate a new
- balance between work, family and leisure.
- Increased opportunity for a dual income family.
- Maternity benefits and related child care savings.
- Retention of self esteem associated with working.
- Saving on petrol, parking fees, business lunches, formal
- work clothing and related costs.
- Less stress and a more casual work atmosphere.
- Increased opportunities for community involvement.
- Increased family contact and ability to care for family
- illnesses.
- Increased taxation concessions.
- Lifestyle alternative.

Potential Costs.

- Isolation from the organisation .
- Lack of social interaction and stimulation from peers.
- Lack of access to informal communication networks.
- Lack of emotional support from peers.
- Lack of visibility affecting career advancement and development.
- May undermine team project synergy.
- Without adequate legal and industrial legislation it may lead to the development of the 'electronic sweatshop'.
- The potential to overwork and engage multiple contracts may increase work stress and burnout.
- Lack of participation in organisational decisions and meetings.
- Less personalised supervision.

The organisational perspective

Potential Benefits.

- Reduction of operational overheads especially accommodation.
- Productivity improvements due to increased work efficiency.
- Better turn around times and around the clock use of computer facilities.
- Improved recruitment and retention of skilled personnel.
- Improvement in quality of work life programmes.
- Stress reduction and improved work quality due to better match between work habits and bio-rhythms.
- Reduced absenteeism and related costs.
- Company more able to pursue Affirmative Action policies such as employment of the physically handicapped.
- Less investment in human capital required should the Telecommuter return to work in the traditional organisation as compared to hiring a new recruit.

Potential Costs.

- Problem of data security and confidentiality.
- Negative union reactions to Telecommuting and telescabbing.
- Problem of monitoring work output, administration and lack of supervision.
- Problem of providing technical and logistical backup.
- Threat to established work procedures and employee reluctance to change.
- Telecommuters rights in the workplace relative to traditional work patterns etc.
- Distinction between standard on-site employees and telecommuters.
- Method of payment of Telecommuters
- On site time requirements.
- Non applicability of Telecommuting to certain individuals or groups.

The societal perspective.

Potential Benefits.

- Directly facilitates the decentralisation of worksites.
- Creation of employment opportunities.
- Contributes towards a more equitable population spread.
- Improved environmental impacts. Telecommuters can leave congested cities and live in lower density and more attractive environments.
- Teleworking can improve urban environments by reducing petrol consumption, pollution, traffic congestion, and high way accident rates.

Potential costs.

- May keep minority groups such as physically handicapped workers out of mainstream society.
- May lead to a dual structured economy as is the case with inventory supply companies and their large industrial parent companies in Japan.
- May lead to an international labour price war among information workers.
- Resistance to change issues.

(Tabulation of Fortin 1986; Hamilton 1987)

The above framework is offered as a useful guide to identify future research activities. However, it needs to be emphasised that each category is not necessarily mutually exclusive as factors that benefit the individual may directly or indirectly benefit both the organisation and/or society thus many combinations of interactions multiple effects are possible.

2.7 Emergence of teleworking in Malaysia: Analysis of major drivers :

In Malaysia, teleworking is a new development. The work force in the various business sectors are still commuting to the conventional workplaces for their primary tasks. However, factors such as advancement and penetration of IT, concentration of economic activities, travel congestion, environmental degradation, women workforce potential and limitation, heavy investment in transportation infrastructure, and long distance commuting have paved the attention to study the possibility of adopting teleworking in Malaysia. Apparently, IBM, American Insurance of Associates (AIA), Grand Softlink Computers, Motorola, and Texas Instruments are likely teleworking trend setters in Malaysia.

2.7.1 Information technology- Advancement and penetration:

Although high-tech equipment is not a necessity for telecommuting, it enables a much wider range of jobs to be performed outside the traditional office (Stuart, 1995). The effective application and exploitation of information technology for the national socio-economic growth are now at a critical stage. The increasing use of information technology is the result of several factors. The mass production of computer parts has pushed the price of these products down to a very affordable level. This decline in cost factor has an effect of allowing even smaller firms or organisations and homes to utilise new technologies for their daily needs. Moreover, the abolition of 10% sales tax on computers, software and accessories in Malaysia has helped consumers not only to possess a computer but also increase the marketing of computers in the nation. Another important factor is that the adoption of information technology by an

organisation would usually encompasses more than one application. An example is the use of personal computers in an office for word processing, data management or storage, graphics and related applications.

The telephone penetration rate, considered one of the basic telecommunication services, in Malaysia was 8.8 people per telephone as at 1995 which figure has improved immensely today. Given this, communication has become easier and cheaper.

Table 2-3: Telephone Penetration Rate in Asean Countries in 1995

Country.	People per Telephone
Hong Kong	1.6
Singapore	2.0
Malaysia	8.8
Thailand	29
Philippines	52
Indonesia	127
Vietnam	NA

Source: Oracle, New Straits Times, 1995.

2.7.2 Concentration of economic activities.

The level of urbanisation in Malaysia had increased from 26.8% in 1970 to 34.2% in 1985, and had reached 50.6% of total population in 1991. The current level of urbanisation has exceeded the estimated figure of 45% by the end of 1995 according to the Sixth Malaysia Plan (1991-1995). Based on the future trends of urban development, it is anticipated that about 10.8million of total population in Peninsular

Malaysia will live in the urban areas (Abu Bakar Jaafar, 1994). The corresponding level of urbanisation will stand at 59.8% with an average growth rate of 5.2% by the year 2000.

The magnitude of development in most of the Malaysian cities would further spur the traffic chaos in and around the core urban centres. One of the strategies being considered against this trend is to relocate urban activities that generate high traffic volumes to areas outside the central business district (CBD). Thus, it would allow for a balanced development in major cities like Penang, Kuala Lumpur, and Johor Bahru without stifling the private investment interest. The proposed new Putrajaya administrative town is one of the ongoing project which apparently exemplify this trend.

2.7.3 Travel congestion:

Resulting from automobile dependence is urban traffic congestion, an incessant feature of every major city in the world (Brindle, 1994). The morning and evening peak hour traffic congestion are regular routine in almost every city. The only major difference among the cities lies in the degree of congestion. In Malaysia, the degree of congestion in the urban areas has been becoming more intense. This is attributed mainly to the increase in income level and car ownership which have resulted from the continuous economic growth (8.5% per annum).The average vehicles registered in Malaysia till date is 7.21 million vehicles of which motor car constitutes 2.43 million (34%), motor cycles 4 million (56%), buses 34,771 (0.4%) commercial vehicles 0.5 million (6.3%) and others 0.28 million (3.3%). The total number of vehicles

registered in Klang Valley (Kuala Lumper-12%; and Selangor-16.4%) were 2.04 million (28.4%) while Johor was 1.07million (14.4%) (Source: JPJ Figures, 1995).

Table 2-4: Emission of Carbon Dioxide in the Asean Region in million tonnes

Country	1988	1995	2000*	2005*	2010*	2015*	2020*
Indonesia	111	172	220	301	382	533	684
Thailand	56	105	146	223	258	310	361
Malaysia	38	70	90	125	172	218	264
Philippine	34	50	63	96	131	195	259
Singapore	28	41	47	56	72	96	119
ASEAN	267	438	566	801	1015	1352	1687

Source: New Straits Times, Nov. 21, 1995 * Predicted Value

Table 2-5: Concentration of Suspended particulate among Different Cities in Malaysia.

City	Total Suspended Particulate (tsp) (ug/m^3)	1989	1990	1991	1992	1993
K. Lumpur	TSP	120	110	115	90	85
J. Bahru	TSP	NA	70	130	175	160
George Town	TSP	130	85	120	135	150
Ipoh	TSP	NA	60	105	115	80

Source: Department of Environment, 1993.

2.7.4 Environmental Degradation

Motor vehicle emissions is one of the major sources of urban air pollution. There are nearly 7.21 million motor vehicles registered in Malaysia most of which are mainly concentrated in rapidly growing urbanising areas. Some 200,435 new cars were sold in 1994 (New Straits Times, 1995). The greatest nightmare for urban drivers is that the roads have not expanded to accommodate the growing number of vehicles. The

higher the concentration of motor vehicles on narrow, congested roads, the more intense would be the build-up of pollutants. In the cities within the industrial corridor of Peninsular Malaysia, from Pulau Pinang to Johor Bahru, the quality of air is still very much influenced by the degree of urbanisation and increased traffic volume.

2.7.5 Workforce Limitations

Women constitute nearly 49% of the nation's workforce which was found to be low compared to the developed nation (70%). The average percentage distribution of employment for women has increased from 31% to 35% between 1970 and 1990 (6th Malaysian Plan, 1991-95 report). According to the report in the face of tightening supply of labour force in certain sectors and locations, it is a matter of concern that the involvement of women and the handicapped citizens in economic activities would continue to be inhibited by a number of constraints such as:

1. the dual, and often competing responsibilities of family matter and career restrict the mobility and increased participation of women in the labour market.
2. the working environment is generally not conducive to the sustained employment of working wives and mothers. This limits the training opportunities available and hampers career development. The separation of home from the workplace and fixed hours of work constitute additional drawbacks which preclude prolonged female and physically handicapped participation in the labour market.