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Work Design, Flexible Work Arrangements and Travel Behaviour: Policy Implications

by

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ABSTRACT: This paper examines the assumptions of work design and its impact on how work is conceived and designed, the important linkages to travel behaviour to and from work and subsequent impacts on traffic mix in urban areas. These issues have not been substantively addressed by management or government and are forming a barrier to FWA. The focus of this paper is to look at the broader framework of work design in the context of the emergence of distributed work, diffusion of communications technology, and their influence on introducing *real* flexibility into work and its potential impact on travel behaviour. Specifically the study investigates the extent to which place, distance and time, the limiting dimensions in travel behaviour, serve as a major barrier to flexible work design and work scheduling. Flexible work arrangements will only become a reality by developing acceptable employment policies both at government and corporate levels. The paper concludes by analysing two policy options.

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Introduction

This paper is about the assumptions of work design and its impact on how work is conceived and designed, the important linkages to travel behaviour to and from work and subsequent impacts on traffic mix in urban areas. It is argued that the way work is conceived is instituted in processes of work design. Work design, defined as the interrelationship of work tasks, workers and workplace routines, moderates the relationship between distributed work and environmentally responsive travel behaviour. Conventional models of work design are largely inadequate for handling flexible work arrangements (FWA). To date, flexible work arrangements have been introduced with little consideration for their relevance to existing work organisation. Introducing flexibility into the work organisation has not only far reaching implications for working patterns among workers, skill levels and retention, performance and productivity, recruitment and selection, training, worker health, autonomy and commitment but also for modifying travel behaviour to and from work. These issues have not been substantively addressed by management nor government and are forming a barrier to FWA. An increasing number of studies (e.g. Mahmassani et al 1993, Mahmassani and Chen 1992) have focused on the role of the employer in influencing workers' opportunities to participate in flexible work arrangements. However the focus of this paper is to look at the broader framework of work design in the context of the emergence of distributed work and diffusion of communications technology, its influence on introducing *real* flexibility into work and its potential impact on travel behaviour. Place, distance and time, the limiting dimensions in travel behaviour, serve as a major barrier to flexible work design and work scheduling.

The emergence of distributed work

The spread of business activities in time, place and distance is more and more prevalent in organisations as management disperse production and distribution processes over distance, both nationally and internationally. In the past, management sought to locate their business activities with a view to minimising costs associated with distance, given the existing or anticipated information flows (Charles 1981). Although decentralised business activities and managerial practices have been conducted for some time in western society, the emergence of new telecommunications technologies has radically enhanced management's capacity to distribute their work processes throughout a metropolitan area and beyond the urban fringe. Distributed work has come about due to an increasing perception that information is a significant economic resource as well as the practical consequences of conducting business over distance (Salomon and Schofer 1988; Warf 1989). With the increasing dispersal of business activities, FWA, such as telecommuting, are more relevant today than ever before (Gray, Hodson, and Gordon 1993).

The flexibility associated with information technologies presents a number of opportunities to develop new, more humane organisational forms and work practices leading to a higher quality of work life (Brewer 1993) including travel to and from work. Distributed work is the closest so far to realising a 'virtual' work organisation amongst managers, workers and technology, enabling them to perform work which may be at variance spatially and temporally with each other. For example, distributed work opens

up new work contexts, such as access to other organisations (e.g. network organisations and strategic alliances), workplaces (e.g. home, car, telecentre) or work sites (e.g. customer service outlet) (Venkatesh and Vitalari 1992). However, it is easier for management to accept changes in individual jobs, i.e. allow exceptions, than it is to tolerate modifications in work group arrangements or in organisational control structures since such modifications intrude on managerial territory.

As information technology makes work and customer activities more location-independent, distributed work will prove a greater incentive for employers in creating flexible forms of work scheduling, particularly telecommuting, which modifies the travel behaviour of workers (RTA Teleworking Pilot Project 1993/94). In many nations, governments are calling for better managed enterprises to provide greater organisational flexibility and improved employee relations (Karpin 1995). Organisational flexibility is highly significant in the face of intense competition and increased labour costs which are placing pressure on management and unions to raise productivity, increase flexibility and quality of outputs (Porter 1990). Distributed work is one way of addressing these initiatives providing management is prepared to engage in flexible work redesign and scheduling (Brewer 1993, 1994, 1995; Brewer and Hensher 1997b; Harrison 1994).

The choice to distribute work processes or not depends on management's *capacity* and *willingness* to operate and manage internal, inter-workplace and inter-organisational relationships and communications in the broadest sense. *Capacity* refers to organisational flexibility in terms of restructuring operations, redesigning work, changing technologies and assisting people in relocating business activities to take advantage of transport and telecommunications networks (McKay 1988). *Willingness* is a function of managerial ideology, reflected in the design and implementation of information technology and associated work practices and content. The particular design of work processes and organisational context moderates the relationship between distributed work and environmentally-responsive travel behaviour.

Travel behaviour and FWA

In pre-industrial times, the distance between work and home was relatively small. With the growth of urbanisation and the widespread availability of the car, the *distance* between work and home has increased, although *time* between work and home remains constant. The result today is traffic congestion, air and noise pollution, continued growth in the consumption of limited fuel resources, the use of valuable land for expressways and parking as well as the inequities experienced by those without adequate access to transportation. The transportation literature is replete with proposals to overcome these problems, including developing more efficient, convenient and comfortable public transport to attract people away from their cars, with limited impact so far. In Australia, governments in each State have been more active in promoting the efficiency and effectiveness of public transit systems, acclaiming the benefits of each. And yet, the issues of place, distance and time have not been resolved by the designers of public transport. These three dimensions form major travel barriers in selecting the mode and time of travel to and from work in terms of promptness, routing, queuing, safety, proximity, crowding, noise and air pollution.

FWA, such as telecommuting, has direct relevance for travel behaviour and is highly compatible with distributed work processes. Telecommuting, making commuting to and from work less significant, leads to a change in travel behaviour of workers and the subsequent impacts on traffic mix in urban areas. Defined in a transportation context, telecommuting captures the 'telecommunications-transportation tradeoff' (Kraut 1989), as well as the potential generation of complementary travel activities. Telecommuting is not limited to computer-based work and includes cognitive-based tasks such as thinking and writing (Mokhtarian 1991), and usually means a reduction in the number of commute trips. It is not the purpose of this paper to discuss the pros and cons of telecommuting per se but to demonstrate how the opportunity for it or any other form of FWA is limited by work design.

Making the link between travel behaviour and work design

This paper focuses on the potential causal linkages between work design (work organisation), distributed work and travel behaviour (see relationships specified in Figure 1). The importance of these relationships is highlighted by increasing evidence that the greatest potential for reducing greenhouse gas emissions and local air pollution due to the car, in particular, and all passenger transport in general, is through improvements in car technology and flexible work arrangements, the latter defined spatially and temporally in it most broadest sense (Hensher, 1993). The linkage between saved travel due to telecommuting, and possible changing non-work travel activity, is crucial in understanding the contribution of telecommuting to improving air quality and reducing global warming. Despite the fact that very little has been quantified, there is an expanding literature which suggests the potential causal linkages between alternative organisational structure, work organisation, distributed work, travel behaviour, and environmental impact. Although car technology is contributing less pollution in the 1990s than in previous decades, their ever-increasing numbers and the growth in annual kilometres travelled means that improvements in air quality are at risk of being short-lived (Hensher et al 1995).

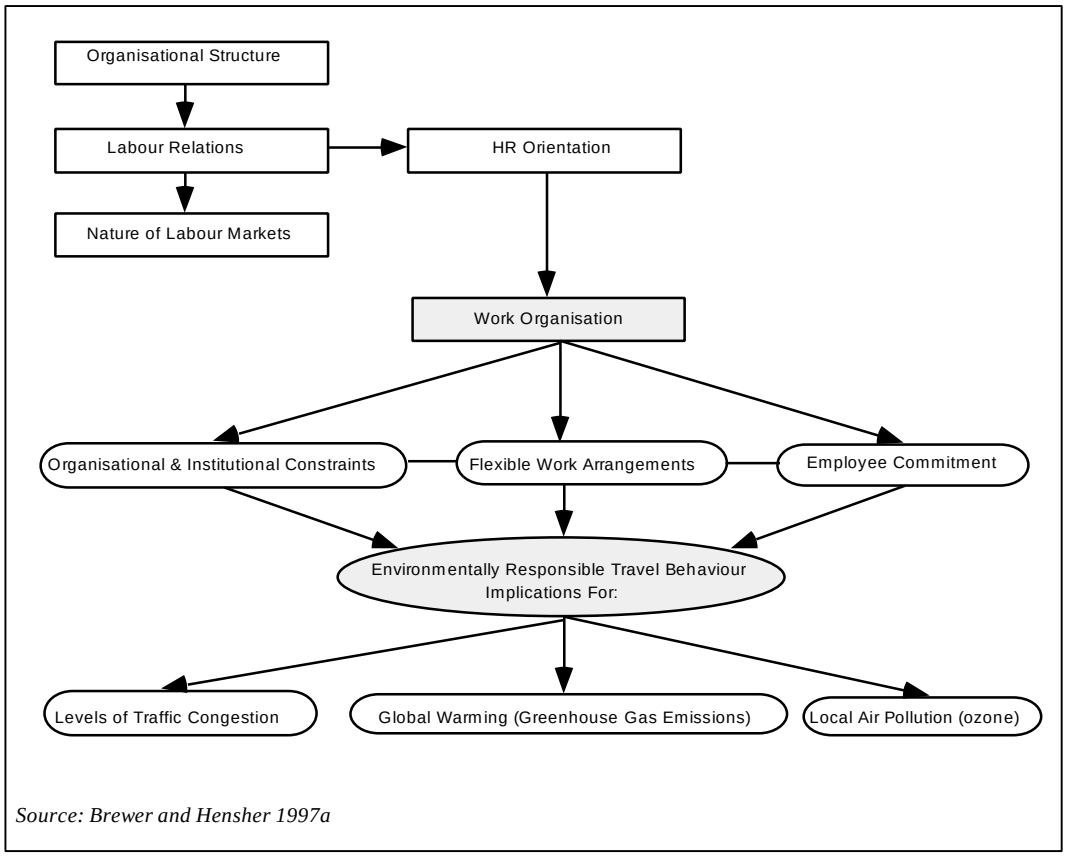

Figure 1: A Schematic Overview of the Major Potential Causall Linkages

Understanding the barriers to FWA and improved travel behaviour

The relationship of flexibility to work design has been a major concern for management and government for almost a decade in Australia. Is management choosing appropriate routes to flexibility? While sometimes the concern for introducing flexibility has not gone beyond the rhetoric, at other times, it has led to the superficial redesign of jobs leading to reclassification or re-grading rather than significantly restructuring work. In part the problem lies in management focusing on certain dimensions of work in isolation to the exclusion of other, possibly more important ones.

Conventional models of work design fail to address the fundamental dimensions that structure work and subsequently lead to its redesign. Part of the reason for this is that still in the 1990s, work design is based on the physical attributes of workers and workplace, which has brought organisations full circle from the days of Frederick Taylor (1964) with all its attendant consequences. In Taylor's times, industry was characterised by management employing principles that assumed that there was only one best way to organise business, work and people. These principles, which had to be measured and quantified, included:

- work was most efficiently done when divided up and assigned to specialists leading to fragmented work practices
- managers and specialists planned work and workers executed it
- processes were standardised including rate of defects/errors
- communication was tightly controlled and hierarchical
- production was organised using long runs
- purpose-built equipment was introduced limiting skill variety and transferability
- use of inventories was widespread
- work was organised and conducted systematically under tight supervision.

It is well documented that Taylorism and Fordism, once hailed as the miracles of industry, have contributed to a progressive narrowing of worker skills and responsibilities (Edwards 1979). In enterprises today, this trend has not been reversed. On the contrary, it has only increased with processes like re-engineering and benchmarking. Under these conditions, the opportunities for introducing FWA is severely limited. The reasons for this primarily involve a conventional view of place, distance and time.

Place, Distance and Time

Place, distance, and time are reflected in the way work is designed and organisation as shown in Table 1 below. Table 1 reflects the conventional view in the work design literature in that firstly *place* is viewed in terms of the perceived need for physical presence of workers, division of labour and the allocation of work to different parts of the workplace and the ownership of work space such as a work station or office. Secondly, *distance* is viewed in terms of proximity in workplace relationships, such as face-to-face interactions amongst coworkers, and the perceived need for control between supervisor and subordinate as well as work output. Finally, *time* is viewed in terms of standardising work tasks as well as the amount of time spent at the workplace linked both to productivity and commitment. Understanding the dimensions of place, distance and time as barriers will provide not only valuable insights into work redesign but also assist directly in introducing FWA.

Table 1: The Significance of Place, Distance and Time to Worker and Work Organisation

	Worker	*Work Organisation*
Place	personal visibility/ or physical presence in workplace	division of labour, functional boundaries & resource allocation
Distance	proximity of interpersonal contact	hierarchical control & direct supervision
Time	amount of time invested at work is indicative of loyalty	work standardisation, amount of time devoted to reaching deadlines is associated with quantity of output and productivity

Implications for FWA

Place

One of the key barriers in rethinking work design is that workers are viewed as passive objects (i.e. a physical appendage to the work process) within the workplace as well as in communication and transport networks. Performing work entails a series of actions in particular situations undertaken by workers in the pursuit of goals (intended/unintended). Preoccupation with 'place' has important skill implications. As place of work becomes less 'visible' through telecommuting, the skills of maintaining the work context may become more visible through co-ordination, co-operation and communication.

Distance

Just as distributing work has 'distance' connotations so do people's capacity to distribute 'themselves' impinge on this notion. In the case of telecommuting, workers are able to distribute themselves, by maintaining intimate real-time contact with co-workers and business associates through an infrastructure of communication and information technologies, making connections potentially intimate. Under this scenario, the nature of distance is changing both in terms of place (i.e. located anywhere) and time (i.e. increased response rate) (Moss 1987, p.536). As time and place have become 'undistanciated' this has implications for work redesign. For example, telecommuting is potentially anti-hierarchical in that it reconfigures work through the communication-information infrastructure to be more 'horizontal' in nature and less vertical. Under these conditions, the managerial hierarchy conflates.

Time

Time is a critical issue in designing work. Time is usually conceived as physical in terms of observance of punctuality, deadlines and is associated with quantity of work output. The investment of physical time is then transformed into an emotional investment in the enterprise and equated with a worker's commitment or loyalty to the organisation. A significant oversight in work design is the psychological and cultural quality of time and its relationship to notions of career, work evaluation and comparability.

The quality of time may mitigate against FWA. For example in Australia, the shift in travel mode from public to private transport and to the car and drive alone has continued for the commute trip, as has the substitution in destinations from central city to suburban centers. Interestingly, the major move to drive alone has been by female workers (Gipps et al. 1996). One explanation for this is the extent to which women, in particular, may have to engage in multi-tripping characterized by setting down and collecting family members, shopping, and attending to household business during their commute trip. In other words, working remotely may not overcome the need to engage in tasks associated with multi-tripping.

Incidence of telecommuting and FWA

For this paper, data was analysed from the Greenhouse Gas Emissions (GGE) study of urban travel behaviour conducted in six capital cities in mainland Australia (excluding Darwin) in 1994 by the Institute of Transport Studies (Hensher, Battelino, Milthorpe & Raimond 1994). The sample was a stratified random of over 1400 households. The current analysis is based on data from 1249 respondents (response rate of 89 per cent) and questionnaires were delivered and collected from each household. Instructions requested that the respondent to be over 18 years of age and directly involved in the household's decision making about where to live and the purchasing of motor vehicles.

Table 2 shows the number of workers who are using FWA where there is company policy to support these options: compressed work week (CWW), flexitime and telecommuting. Table 2 is interpreted row by row, since some respondents have checked more than one FWA strategy where there company offers the full range of FWA options. Twelve per cent of the sample currently engage in some form of FWA. Except in the case of the CWW, the majority of respondents do not take advantage of their company's policy for FWA. It is interesting to note that men are more likely to work FWA than women. The reason for this may include working in organisations which has an FWA policy, the nature of the work, or satisfaction derived from working FWA.

Table 2: FWA by Company Policy and Gender

Actually Work/ Company Policy	*YES Men*	*YES Women*	*NO Men*	*NO Women*
CWW	80.0	24.0	40.0	37.0
%	43.0	12.9	21.5	19.9
Work flexitime	24.0	7.0	110.0	79.0
%	7.2	2.1	33.1	23.9
Telecommute	10.0	1.0	34.0	25.0
%	11.4	1.1	38.6	28.4

17.6% of respondents' organisations support flexitime compared to 14.5 per cent (CWWs) and 5.6 per cent (telecommuting). The trend for flexitime emphasises the conservatism among employers about maintaining standard hours with either an extended period for early and late starts and finishes; or working a condensed week or fortnight rather than considering a more flexible option such as telecommuting. A further 7.4 per cent of the sample are seriously considering telecommuting but the majority (87 per cent) are not, as shown in Table 3.

Table 3: Experience with Telecommuting from Home

	Male	*%*	*Female*	*%*	*Total Frequency*	*Total %*
Have telecommuted	37	3.0	32	2.6	69	5.5
Seriously considering	60	4.8	33	2.6	93	7.4
Not considering	621	49.7	466	37.3	1087	87
Total	718	57.5	531	42.5	1249	100

Travel behaviour

The majority of respondents working the CWW use the car (68 per cent of men and 83 per cent of women) as the main transport mode to commute to work. This ratio is consistent with the overall sample where the use of private car is high (75 per cent) even though less than half (45 per cent) engage in multi-tripping by varying purpose and destination of trip (e.g. dropping and collecting children from school during the work commute). This work travel pattern suggests that mode of transport is not used as a constraint on the CWW. A similar work travel pattern exists for respondents who telecommute.

Work design barriers to telecommuting and CWW

To ascertain perceived barriers to telecommuting and CWW, place, distance and time were translated into a set of work design dimensions for both telecommuting and the CWW as shown in Tables 4 and 5. The six work dimensions in Table 4 - *contact, control, productivity, facilities access, job suitability and company policy*- are the main items of attention for telecommuting.

Table 4: Description of Work Design Dimensions, Description and Question Items for CWW

Work Design Dimensions	*Description*	*Question Items*
People contact (CONTACT)	contact with people (internal and external) necessary to perform work	I prefer the social and professional interaction of the office
Supervisory Control (CONTROL)	supervisor's power over work process(es)	Supervisor makes it difficult
Motivation - Productivity (PROD)	feeling motivated to work away from the office	I cannot get motivated away from the office.
Facilities access (FAC)	access to facilities necessary to perform work at home	I do not have the facilities to perform work at home
Job suitability (SUIT)	perceived prospects of promotion threatened by telecommuting	The work I do is not suited to telecommuting
Company policy (POLICY)	the company does not have a policy to support telecommuting	There is no company policy

The four work dimensions in Table 5 - *extra hours, policy, workload, and job responsibilities*- are the main items of attention for CWW.

Table 5: Description of Work Design Dimensions, Description and Question Items for CWW

Work Design Dimensions	*Description*	*Question Items*
Extra hours (EXTRA)	working extra hours to compensate for 1 day off a week or fortnight	I don't want to work extra hours
Company policy (POLICY)	the company policy is not relevant to employee	The company policy does not apply to me
Workload (WLOAD)	workload cannot be compressed into shorter time frame ie 5 days into 4 days	Workload requires full week coverage
Job responsibilities (RESP)	job responsibilities cannot be compressed into shorter time frame ie 5 days into 4 days	Job responsibilities require a full week's coverage.

Barriers to FWA

Out of the 261 reasons provided by respondents for not engaging in telecommuting, Table 6 shows that job suitability is the most likely perceived constraint on telecommuting (48.3 per cent) followed by facilities access (10 per cent). Of those respondents reporting that job is unsuitable, 79 per cent are full-time workers and 43 per cent are managers or professionals.

Table 6: Reasons For Not Engaging Telecommuting

Work Design Dimensions	*Male*	*%*	*Female*	*%*	*Total*	*%*
People contact (CONTACT)	5	1.9	9	3.4	14	5.3
Supervisory Control (CONTROL)	3	1.1	0	0	3	1.1
Motivation - Productivity (PROD)	2	0.8	1	0.4	3	1.1
Facilities access (FAC)	26	10.0	17	6.5	43	16.5
Job suitability (SUIT)	126	48.3	65	24.9	191	73.2
Company policy (POLICY)	4	1.5	3	1.1	7	2.7
Total	166	63.6	95	36.4	261	100.0

From the 163 reasons provided by respondents for not engaging in the CWW, Table 7 shows that company policy is the most likely constraint perceived by both men and women for not engaging in the CWW followed by inability to condense workload into a 4 day or 9 day fortnight. While company policy is the reason cited for not engaging in the CWW, many respondents did not take advantage of FWA when company policy allowed for this (see Table 2).

Table 7: Reasons For Not Engaging CWW

Work Design Dimensions	*Men*	*%*	*Women*	*%*	*Total*	*%*
Extra hours (EXTRA)	13	8.0	12	7.4	25	15.3
Company policy (POLICY)	73	44.8	36	22.1	109	66.9
Workload (WLOAD)	18	11.0	5	3.1	23	14.1
Job responsibilities (RESP)	2	1.9	4	2.5	6	3.7
Total	106	65.0	57	35.0	163	100.00

Towards FWA

The current generation of workers are facing a new variant of work organisation, raising new questions about the treatment of place, distance and time in work design. The essence of the problem now is that past assumptions of work organisation focused on the *form* of work such as task standardisation, observance of punctuality, and supervisory control and ignored the *substance* of work such as the psychological quality of place, distance and time. FWA places a greater emphasis on the *substance* of work whereby place and distance are not as easily defined as they are in the conventional model of work design, and time becomes virtual reality. Under these conditions, FWA fundamentally changes the organisation of work and the employment relationship.

Changing work organisation is crucial to moving towards FWA. The historical and narrow emphasis on place, distance and time in organising work has discouraged thinking about work which is conducted beyond workplace and out-of standard worktime. The existing definition of place, distance and time

- are situated deep within organisational and work practices, making them less readily observable
- reside within existing power bases (e.g. management and unions) in the workplace, and
- are linked to the worker's desire to protect their interests and job security.

It is time to redefine these critical work design dimensions in order to bring about organisational change to support FWA. Real change would mean a fundamental rethinking of the principles that organise work.

Policy Options

In this paper, place, distance and time, when translated into work practice choices, are perceived by workers as constraints on FWA in terms of job suitability and access to facilities to work from home in the case of telecommuting, and in the case of CWW, company policy. FWA will only become a reality by developing acceptable employment policies both at government and corporate levels. The following two policy options are considered.

Option A: government and corporate approaches to FWA

Option A brings us to the crucial issue of how genuine much of the interest in FWA really is, and the extent to which support for it is likely to be transformed into action. At present, there is a contradiction between government and corporate policies of employment and work. Government policies appear to be confined to the rhetoric of flexibility in the light of continuing labour market regulation. Corporate policies, while favouring market deregulation are met with resistance by the conservatism of management with a bias towards the bureaucratisation of the internal labour market. Both these trends work as barriers to work redesign. This paper has argued that work design is central to the reality of any options that can be usefully implemented as FWA.

Despite these trends, the conventional model of work organisation is being eroded. Firstly, standard working hours is changing. In Australia, for example, approximately 52 per cent of managers and administrators and 31 per cent of professionals use some form of flexible start and finish times compared to 28 per cent of clerical staff and 14 per cent of sales personnel (ABS 6342.0 1993). Secondly, the managerial hierarchy is being challenged by organisational change promising empowerment and autonomy both for individuals and work groups. Thirdly, the office as the principal location of work is changing as telecommunications and information technology are becoming miniaturised and portable, and work can be performed anywhere - plane, airport, car, hotel, home, or telecentre. All these changes are perceived as bringing forward changes in the degree of control over the workforce. The emphasis is now on the total behaviour of the worker, including travel behaviour, and not just the ‘productive work’ aspects of it.

The real barrier to redesigning work is that it is easier to distribute work, technologies and leave labour market policies and agreements unchanged. An effort needs to be made

to adapt government and corporate policies to a distributed work context. In a world where gaining competitive advantage is the ultimate, FWA is a better solution to reinventing organisations than the downsizing strategies of the past. Seeking international competitive advantage requires the skills, knowledge and commitment of an enterprise's workforce. In this respect, the workforce and economic consequences of FWA are significant.

Option B: treating FWA as an organisational change strategy

On the wide issue of long-term significance of FWA, it is still too soon to evaluate its effectiveness. To date, the number of organisations in which FWA is implemented, either as a pilot scheme or otherwise, is limited. There is evidence of an increasing number of organisations who are successfully pursuing some form of FWA (Atkinson 1997). In the United States, some estimates project that by 2005 about 25 per cent of the workforce will be engaged in distributed work (Noe et al 1997). At the very least, there is also anecdotal evidence of workers finding telecommuting not only a satisfactory way to work but also experiencing benefits from saved commuting time. Further, there is greater attention being paid to managing people through 'family-friendly' corporate initiatives of which FWA is a key strategy. Similarly, there is a strong link between FWA fostering a greater understanding by the employer of its potential role in modifying travel behaviour and its impact on the potential reduction of traffic congestion and enhancement of air quality. There is a real incentive here for employers to demonstrate good corporate citizenship.

Employing Option B provides a further incentive in that the effectiveness of FWA relies on a strategic business focus requiring a consideration of organisational structure, style, strategy and culture. All of these dimensions require a focus on work design and work practices. With Option B, management need to develop guidelines for implementing change. Guidelines need to address issues such as standard work time, work location and work redesign so as to exploit much needed organisational flexibility. The questions become: what kinds of jobs are suited to alternative work arrangements as work becomes more distributed and information-based? Is management prepared to invest in remote work facilities either home-based or centre-based (eg. telecentres)? What are the incentives for doing so?

Research in progress (Brewer and Hensher 1997b) suggests that there is considerable degree of unawareness about FWA and in particular, telecommuting. The findings from the GGE study show that only 12 per cent of workers took up the FWA option when the organisation provided the opportunity. The real problem may lie in the complex decision making process between supervisors and workers in not understanding the benefits both to the organisation and to individuals. As with any organisational change program, there needs to be a certain amount of education so that managers and workers understand FWA, the options available to them, the incentives, and its impact on their work and personal lives. Once the educational process is complete, consideration needs to be given to a number of issues:

- potential participation by existing employees
- equity between workers taking up an FWA option and those who do not

- costs of providing office infrastructure including compliance with health and safety issues, workers compensation and taxation
- tradeoff costs with savings on office space
- introducing performance measurement based on management by objectives, a concept that has been in the management literature for close to 50 years.
- potential gains in motivation and/or worker output
- potential retention of highly skilled workers
- re-engineering the organisation not only technically but also focusing on the logic of interrelated tasks labelled 'jobs'
- potential access to new labour markets
- potential impact on the travel behaviour and the commute trip to work
- introducing group ware technologies to incorporate teamwork with remote membership and to ensure that people are contactable and accountable
- assessment of FWA projects in terms of cost-effectiveness for addressing an array of issues, for example, embracing the most efficient way to use resources to attain business objectives that cannot be easily designated as income.

Changes in work design need to be accompanied by supporting human resource (HR) practices. There is a clear advantage for the organisation when there is a coherent combination of corporate policies, HRM strategies and work practices (Guest 1987 Schuler and MacMillan 1984). For example, when business disperses production and work practices subsequently change, strategies need to be in place to allow workers to take advantage of the increased flexibility such as telecommuting. Despite an HR policy advocating telecommuting for workers, this opportunity is frequently blocked by supervisors having a narrow view of place, distance and time. The competitive benefit of telecommuting will eventuate not from a 'quick fix' solution but a more appropriate conception and implementation of work design.

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