

Work Design: the Real Barrier to Flexible Work Scheduling and Travel Behaviour

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Abstract:

With the growth of urbanisation and the widespread availability of the car, the distance between work and home has increased. 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. As urbanisation has increased, management have relocated business activities with view to minimising costs associated with distance. This trend has occurred with the emergence of new telecommunications technologies, radically enhancing management's capacity to distribute their work processes. With the increasing dispersal of business activities, flexible work scheduling and particularly telecommuting are more relevant today than ever before. Distributed work renders the virtual work organisation a reality, enabling managers, workers and technology to perform work which may be at variance spatially and temporally. Moreover, distributed work provides a real opportunity to once again "minimise the distance" between work and home. However if past definitions and assumptions of work and organisation are used to guide the design of future work, the opportunities for flexibility will be lost. This paper argues that the design of work processes and organisational context moderates the relationship between distributed work and environmentally responsive travel behaviour.

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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 scheduling. 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 flexible work scheduling. 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, flexible work scheduling, 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 1996; 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 flexible work scheduling

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.

Flexible work scheduling, 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 flexible work scheduling 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 its 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).

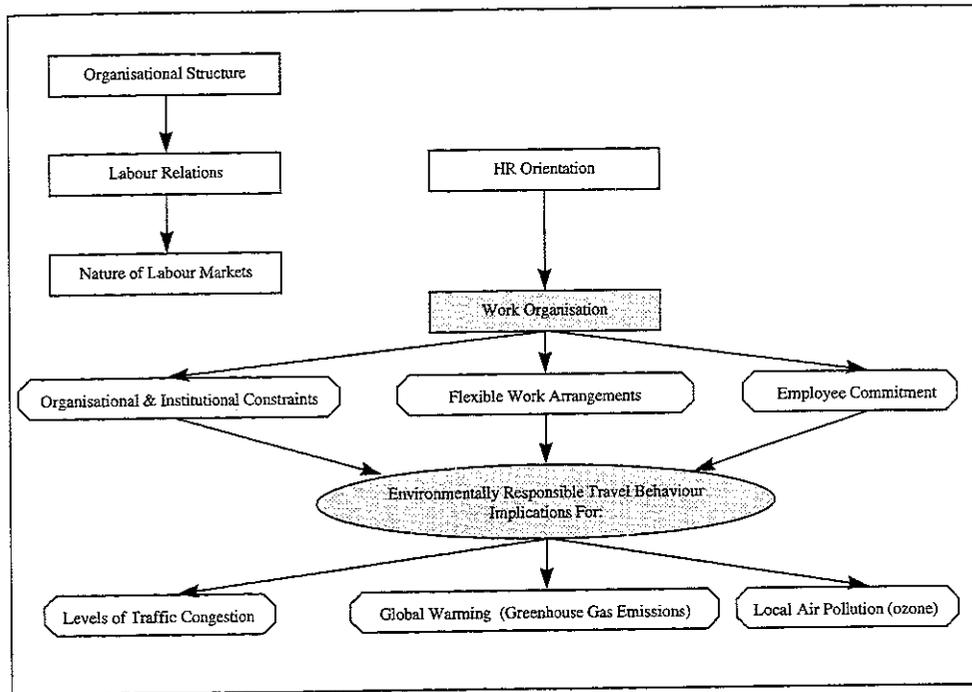


Figure 1: A Schematic Overview of the Major Potential Causal Linkages (source: Brewer and Hensher 1996)

Barriers to flexible work scheduling 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 flexible work scheduling 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. In a 'Taylorist' view of work design, *place* is important 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. *Distance* is important in terms of proximity in workplace relationships, such as face-to-face interactions amongst co-workers, and the perceived need for control between supervisor and subordinate as well as work output. *Time* is important in terms of standardising work tasks as well as the amount of time spent at the workplace linked both to productivity and commitment. The Taylorist view of these dimensions is summarised in Table 1. Understanding the dimensions of place, distance and time as barriers will provide valuable insights into work redesign and the introduction of flexible work scheduling.

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

	Travel	Work	Organisation
Place	limits: personal & landuse	personal	division of labour, functional boundaries & resource allocation
Distance	kilometres	interpersonal contact	hierarchical control & direct supervision
Time	duration	commitment	work standardisation, deadlines in terms of productivity & output

Place

One of the key barriers in rethinking work design is that workers are viewed as passive objects (ie a physical appendage to the work process) within the workplace as well as communication and transport networks. Performing work entails a series of actions in particular situations undertaken by workers in the pursuit of goals (intended/unintended). Work tasks are designed contingent on workers being physically located in particular places at specific times.

Within conventional models of work design, workers are seen as being in a given context that is 'position in time and place which is exactly definable' (Lenntorp 1976, p 12). In work organisations, an example of a defined context is 'secretary' which is denoted by a position title, an occupational category, an organisational grade, gender and physical location. These dimensions of 'secretary' create a rigid boundary in terms of who performs the work, how, when and where it is performed. The boundaries become fixed and official.

However this aspect of work design overlooks an important dimension of being human, that is, people's capacity to both shape and reshape their contexts, contracting or expanding the boundaries of action and significance. In other words, being a 'secretary' can mean different things depending upon how the incumbent perceives and interprets the role as well as the perceptions and interactions of significant others in the workplace. The incumbent changes in time and space at the same time reconstructing the role associated with changes in work and technological design and access to increasing power.

The issue of boundaries is important in realising flexible work scheduling, where place may need to be viewed as 'articulated moments in networks of social relations and understandings' rather than as an office located in a particular place (Massey 1993 p 66). After all, the rationale for introducing telecommunications and information technology enables people to 'distribute' themselves (McLuhan 1964) and not be tied to

place. Communications technology potentially erodes territorial boundaries in the physical, although not in the political, sense

The concept of boundary is important in terms of the distribution of personal capacity leading to workers questioning where they 'draw the line' in regard to their personal investment to the organisation in terms of time, workload and commitment.

The preoccupation with 'place' as a dimension of work design has led to the failure to exploit virtual reality and consider out-of-work place and out-of-work time. The idea of the detachment of the 'person' from the workplace and the integration of person within communication networks challenges conventional models of work design

Distance

Just as distributing work has 'distance' connotation 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 p536). As time and place have become 'undistanced' this has implications for work design. Under conventional models of work design, social interaction and cooperation, (regarded as essential elements in most jobs) depend on 'proximity'. More significantly, modifying proximity leads to changes in the power and authority relationships particularly between supervisors and subordinates for a vast array of managerial practices e.g. managing enterprise change and resistance. Power is based on accessibility not proximity. 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 standardised tasks, work and office hours, deadlines and linked to productivity, output and loyalty. Time is also equated with a worker's investment in work such as the number of hours spent at the workplace. This investment of physical time is then translated into an emotional investment in the enterprise and equated to a worker's commitment or loyalty to the organisation. A significant oversight in work design is that time is also qualitative in terms of how a worker uses time, regardless of institutional constraints, denoting its temporal character.

Instead of relying on past ways of designing work, there is a need to understand the fundamental dimensions of work design which centre on place, distance and time which pose opportunities and constraints in moving towards flexible work scheduling. These

dimensions of place, distance and time limit the way managers and workers imagine how work can be done as well as the way they design business practices, organisations, communication technologies and perceive the link with travel behaviour.

Towards flexible work scheduling: conclusions

The current generation of workers is facing a new variant of work raising new questions about assumptions of place, distance and time in relation to work. The essence of the problem now is that past assumptions of work design focused on the *form* of work such as technology, work hours, and deadlines and ignored *substance* such as the capacity of the internal workforce. Distributed work places a greater emphasis on the *substance* of work whereby place and distance are relatively meaningless and time becomes virtual reality. Under these conditions, the employment relationship is transformed.

Since the conditions of virtual reality are more stochastic than deterministic, workers need to be able to respond to and counteract the unexpected. To achieve this, workers need a solid repertoire of knowledge and skill, to act on their own initiative with a minimum degree of supervision, and be committed to high performance. Virtual reality leads to the substitution of managerial prerogative by an 'information preserve'. Access to the 'information preserve' is immediate and boundaryless fundamentally reshaping the design of work.

Rethinking work design is crucial to moving towards flexible work scheduling. The emphasis on place, distance and time by conventional ways of thinking about work has discouraged work redesign that occurs both within workplace and worktime and out of workplace and worktime. Place, distance and time

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

The outcome of conventional approaches to work design is that there is little regard for the social organisation of the work and the *implicit* employment contract, based on loyalty, so important for introducing flexible work scheduling (Brewer 1993). Commitment is diminished when workers are organised in this way, distanced from management and treated as 'cogs in the system', readily substituted if they fail to perform as required. The conventional employment relationship is already eroded by downsizing as increasingly people are working in diverse contractual relationships and work contexts.

The advent of communication and information technologies e.g. the Internet and electronic mail, makes this more feasible by providing workers with new ways of performing work in terms of communication, information-gathering, and decision

making. The idea of considering together the detachment of 'workers' from the workplace and their simultaneous integration within communication networks, challenges conventional work design and managerial hierarchy.

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 disperse production and distribution processes over distance 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.

The future of telecommuting

Information and telecommunications technology, environmental issues, legal, demographic and economic forces are changing the way people not only work but also the way they think about work. Management is beginning to appreciate that to remain competitive and to address the interests of workers, alternative ways to perform work need to be considered.

The notion of the virtual organisation leads to quite a different future for commuting to work than conceived even in the recent past. For telecommuting, the required technology already exists and will only be advanced with video phones and new technology. Telecommuting is economically feasible, since most information work can be performed at remote locations with many people finding this mode to be an acceptable way to work. If instituted on a broad scale it can have a significant impact on energy consumption, transportation patterns, and urban development (Nilles 1991; Hensher 1993). One particularly important implication of telecommuting is that it would enable people who have disabilities and/or without access to transport to work.

The assumed negative impacts of alternative work scheduling, particularly telecommuting, include the psychological and professional deprivation of face-to-face interaction, information-saturation, the need to sustain emotional distinction between work and home life, the dependence on visibility as recognition for performance and promotion, and obvious union concerns about a virtual workplace. These concerns will be short-lived if the relationship between distributed work and telecommuting is better understood. This relationship may lead to a 'shrinking' of organisational and inter-organisational relationships rather than, as is often assumed, distance them. People's perceptions and subjective impressions of the organisation, both conventional and virtual in terms of time, place and distance, are highly significant as to whether alternative work scheduling becomes more successful in specific business contexts than it currently is.

Few are prepared to acknowledge the benefits of alternative work scheduling such as retaining skilled workers, greater use of contract workers, better productivity with an emphasis on performance outcomes and subsequent reduction in recruitment and selection costs. Research on distributed work practices in the United States suggests that people boost their productivity up to 16 per cent (Eisman 1995, US Department of Transportation 1993). However, there is still much ambiguity surrounding productivity measurement. Associated with this is the ability of management to restructure workplaces horizontally, promoting teamwork and accountability necessary for distributed work processes to be effective. Access to training and appropriate telecommunications are essential (Schweizer 1993).

Different market and industry segments, based on their approach to workforce and environmental issues, may be a significant predictor of distributed work processes and alternative work scheduling. A better understanding of the internal constraints of organisations such as organisational structure and managerial policies, including human resource policies and practices as well as external constraints such as union policies and agreements and how these, in turn, influence worker commuting activity, and consequently non-commuting travel activity, is required.

A more effective analysis of place, distance and time in processes of work design needs to take place and how these dimensions impact flexible work scheduling. These issues will lead to a better understanding of the potential role of telecommuting in modifying travel behaviour, spatially and temporally, and its impact on a range of measures of performance of urban areas such as the enhancement of air quality, increased accessibility, reduced traffic congestion, and increased traffic safety.

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