Adoption of Remote Work Arrangements:
An Initial Analysis

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Abstract

Information technology is facilitating the implementation of a variety of different types of remote work arrangements (RWA), such as telecommuting, satellite offices, and virtual offices. While organizations are increasing their use of these new work arrangements, there has been no research on how the decision is made to adopt a particular type of work arrangement. In this study, we investigate this question by first identifying three variables which are expected to influence this decision: i) the motivation, or business reason for adopting the remote work arrangement, ii) the jobs of the employees who will be working in the remote location, and iii) the information technology furnished by the firm for remote workers. We investigate the influence of these variables through field research conducted in 19 firms in the Atlanta area and present the findings. We also identify important managerial and organizational issues which arise in the remote environment and should be explored further: i) managerial control and coordination of remote workers, ii) support for informal communication, iii) technological support for distributed remote workers, and iv) maintaining the remote worker's identity with the firm.

1. Introduction

Information technology (IT) enables flexibility in the physical location where work is performed. Increasingly, organizations are adopting work arrangements where the worker spends some part of the time in a location remote from management and co-workers and performs work activities using IT. Telecommuting, a remote work arrangement where the employee works at home by substituting telecommunications for transportation to the office, grew 20 percent in the U.S. between 1990 and 1992 reaching a total of 7.9 million [4]. Recently organizations have implemented other remote work arrangements where employees spend time at customer and client locations, in addition to the home. For example, organizations such as IBM [14], AT&T [28], and Arthur Anderson [33] are implementing "hoteling" or "virtual office" arrangements where workers do not have permanent office space at a corporate location.

While organizations are increasing their use of remote work options, there has been no research on how firms choose to adopt a particular type of remote work arrangement. In this paper, we identify variables which are expected to affect this decision: i) the motivation, or business reason for adopting the remote work arrangement, ii) the jobs of the employees who will be working in the remote location, and iii) the information technology furnished by the firm for remote workers. . We investigate the influence of these variables through field research and present our findings. This research was conducted through interviews in 19 firms in Atlanta, Georgia which have implemented different types of remote work arrangements. We also identify additional organizational and managerial needs which arise in the remote environment, i.e., managerial control and coordination of remote workers, support for informal communication, technological support for distributed remote workers, and maintaining the remote worker's identity with the firm.

The paper is organized as follows. In section 2, we review relevant previous literature on remote work arrangements. The design of the field study is presented in Section 3. Findings from field research are presented and discussed in section 4. Additional research issues identified in this field study are discussed in section 5. The paper is concluded in section 6.

2. Previous research on remote work arrangements

Research on remote work arrangements thus far has been of an exploratory nature and has largely examined the individual in the telecommuting environment (for a review of this literature see [8, 9]). The assumption in these studies has usually been that as the technology becomes available, new work arrangements are enabled which could have a profound effect on the worker and society in general, e.g., transportation patterns [23]. Under these assumptions, the research has primarily focused on the decision of the worker to telecommute [e.g., 35, 25] and various social aspects of

118

this decision, e.g., attitudes toward work, [see 2, 26], and impact on home life, [see 6].

Previous research has mainly examined telecommuting, however, other types of remote work arrangements have also been discussed (for a description see [8,9]). Workers may be located at their home, at a satellite office, a neighborhood office [24, 25], or a mobile location [5]. These remote work arrangements can vary in several characteristics: i) ownership of the location where the work takes place (e.g., customer owned or employee owned), ii) the dispersion of the work group [3] and resulting coordination costs [8], and iii) the frequency of work in the remote location, i.e., the worker may spend all or only part of her time working at the remote location [29].

There is evidence from previous research that organizational variables, i.e., the motivation for implementation of the remote work arrangement and the job of the remote worker, and information technology variables play a role in the adoption of the remote work arrangement. Prior research, however, has not examined the linkage between these variables and the adoption of a particular type of RWA. In the following sections, we will discuss the previous research on these variables and the expected influence of these variables in our study.

2.1 Motivation for implementation

The motivation for implementation is the business reason for adopting a remote work arrangement. In studying remote work, many authors have examined the reasons why organizations are interested in this option for their employees. The primary reasons cited in the literature as motivation for the introduction of remote work programs are: i) to retain or attract qualified employees [13, 22, 11, 20, 25, 30, 27], and ii) to reduce costs, e.g., to lower the costs of office space by using less space or less expensive office space [31, 13, 12, 15].

Olson [25] also found that organizational interest in telework was spurred by the possibility of productivity improvements. Gordon [11] found that firms used telecommuting to increase customer responsiveness, e.g., provide extended customer service hours by allowing employees, who would not come into the office during the night, to work at home from 11:00 p.m. to 7:00 a.m.

We expect that managers will choose to adopt different types of remote work arrangements depending on the business reason for adoption. For example, firms cannot reduce office space costs if workers are in a remote location only part of the time and still retain office space at the central location.

2.2 Jobs of remote workers

The jobs of telecommuters have been examined in previous research in an effort to identify common characteristics [24, 21]. Characteristics identified include a requirement for concentration in large blocks of time [2, 21, 16, 24], and little face-to-face (FTF) contact with others or the ability to plan FTF contact [21, 19, 24]. The jobs of telecommuters in these studies have primarily been in Information Systems (IS), e.g., programmers, systems analysts [see 24, 16, 2] and data entry clerks [24]. A variety of different job types were represented in a telecommuting pilot project in Southern California, including planners, accountants, data and support services employees, and government and public affairs employees [21].

Recent popular press articles [e.g., *Business Week, The Wall Street Journal, Fortune, The New York Times*] indicate that participants in "virtual office" or "hoteling" arrangements are usually sales [1, 14, 28] or service workers [14], consultants [33], or other travel-intensive staff [1]. Unlike the telecommuters examined in previous research, these jobs require a high degree of FTF contact with people in a variety of different locations.

We expect that the characteristics of certain jobs will make them suitable for a particular type of remote work arrangement. For example, the jobs of workers who are at home full-time are expected to require less FTF communication than the jobs of workers who are in "hoteling" or "virtual office" arrangements. It follows then that the job of the remote worker will influence the choice of remote work arrangement to be adopted.

2.3 Information technology

It is acknowledged that remote work arrangements would not be feasible for most workers without the support of information technology [35, 25, 19]. In early studies, Olson [24] and Kraut [19] conclude that while information technology facilitates new forms of work arrangements, it will not be a driving force in their adoption. Olson [24] and Kraut [119] agree that organizational and individual factors will play a more significant role in the adoption of remote work arrangements than information technology factors.

In a more recent study, however, Venkatesh and Vitalari [35] found that information technology variables played a significant role in the choice of the worker to perform supplemental or after-hours work at home. Computer owners worked more supplemental hours than non-computer owners and there was a significant positive relationship between ownership of a modem and the number of supplemental hours worked. The evidence from this study indicates that the influence of information technology variables on the adoption of remote work arrangements is significant and should be investigated further.

We expect that information technology variables will influence the choice of adoption of a particular type of remote work arrangement. For example, the information technology furnished to remote workers is expected to differ depending on characteristics of the remote work arrangement, e.g., whether the worker is at the remote location on a full-time or part-time basis.
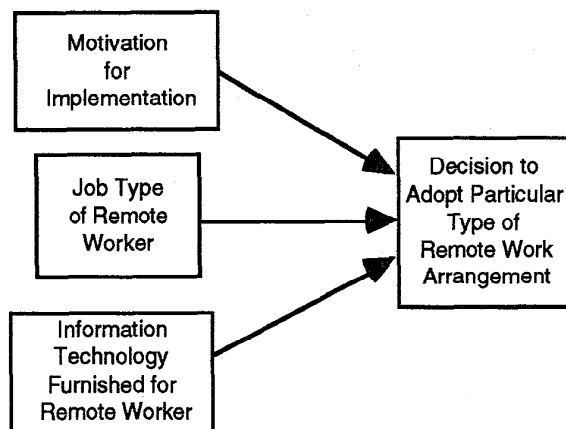
119

Figure 1 - Research model

3. Design of field study

In this section, we discuss the research model and research methodology used in this field study.

3.1 Research model

The research model for this study (see Figure 1) follows from the discussion in Section 2. We propose that three variables will affect the decision of a manager to adopt a particular type of remote work arrangement. These variables are: i) the motivation, or business reason, for implementation of the remote work arrangement; ii) the jobs of employees working in the remote arrangement; and iii) the information technology furnished for remote workers by the employer.

3.1 Research methodology

To investigate these variables, interviews were conducted by telephone with firms in the Atlanta area. The firms contacted were identified through *The Atlanta Business Chronicle's* ranking of the 25 largest (by revenue) High Technology Companies and the 10 largest (by revenue) Public Companies. Also, two federal government agencies and a university were contacted. An additional 10 firms which had expressed interest in establishing telecommuting or other types of remote work programs were identified by a consultant in the Atlanta area and were contacted for interviews. During the interviews, 8 additional firms were identified and contacted.

A total of 56 firms were contacted and 43 agreed to participate. In 31 companies, the interviews were conducted with managers in the human resources department. Participants were first asked if the firm had any work arrangement where employees worked in a remote location using information technology. If the firm did not have any remote work arrangements, the interview was terminated. In the remaining 12 companies, managers who were involved in the establishment of the remote work program were contacted directly.

Respondents in 19 firms did have some type of remote work arrangements and agreed to answer further questions. The results of these interviews are discussed in Section 4. In the interviews, respondents were also asked open-ended questions about the implementation of the remote work program. The intent of this phase of the interview was to identify additional organizational and managerial needs in the remote environment. The results of this phase of the research are discussed in Section 5.

4. Field study results

Based on the field interviews, the types of remote work arrangements implemented by firms were classified as part-time or full-time (see Table 1). In part-time RWA's, the employee retains an office at the central location. Work is performed at a remote location either on an infrequent basis, up to one or two days per month, or more routinely, one or more days per week. In this sample, the remote work location was always the home. Eleven companies were identified which had implemented part-time work-at-home programs.

120

Table 1 - Type of remote work arrangements reported by firms
full-time vs. part-time

	Part-Time Remote Work Arrangements	Full-Time Remote Work Arrangements
Firms Reporting Type of Remote Work Arrangement	11	13

Table 2 - Type of remote work arrangements reported by firms
single-site vs. multi-site

	Remote Work Arrangements Single- Site		Remote Work Arrangements Multi -Site
	Home Office	Satellite Office	
Firms Reporting Type of Remote Work Arrangement	7	1	12

Thirteen companies were identified which had implemented full-time remote work arrangements. In this situation, the employee did not have dedicated office space at the corporate location. Full-time RWA's can be further categorized as single-site or multi-site as shown in Table 2. Eight companies were identified which had implemented single-site RWA's. In 7 of the single-site RWA's, employees worked at home full-time. One firm had established remote work locations at non-traditional satellite offices, i.e., the geographic location of the office is chosen to keep it within convenient commuting distance for the employees who work there [8]. In these offices, employees worked with a small number of co-workers and were remote from management. Twelve companies had implemented multi-site remote work arrangements, i.e., employees worked at multiple locations, such as customer or client locations, with their home as the base work location.

4.1 Motivation for establishing remote work arrangements

The reasons reported for establishing remote work arrangements are shown in Table 3. In part-time work arrangements, 73% of respondents reported that allowing workers to spend some time at home provided a benefit, e.g., enabled flexibility for the employee in balancing work and personal activities. Fifty-five percent considered that part-time work at home allowed employees to work more productively, away from the distractions of the office.

Environmental concerns, e.g., increases in air quality from reduced traffic, were mentioned as a benefit of telecommuting by 27%. However, environmental concerns were never given as the sole reason for establishing a remote

work program. Respondents in 18% of firms reported that the adoption of a part-time RWA was expected to affect the managerial and cultural norms of the participating work groups, e.g., managers would learn to trust employees and manage more objectively in this environment and employees would learn to work more independently. Respondents in two firms reported that telecommuting enabled night work without opening the central office.

In implementing full-time remote work arrangements, the primary reason given was to reduce or contain costs, usually of office space (see Table 3). For instance, as a group added workers, employees were given the choice to work at home. The need to add space for additional employees was then eliminated. One firm also used remote work programs as a method of reducing costs of salary by changing workers from full-time compensation to a contract basis. In three instances, respondents reported that the firm allowed employees to work at home on a case-by-case basis to accommodate personal needs or short-term disabilities. For the one firm which implemented satellite offices, the motivation was to provide additional office space at a reduced cost. The firm calculates that it is saving $100,000 a year.

In the full-time multi-site remote work arrangements, employees were often out of the office much of the time and respondents reported that office space for these workers was an unnecessary expense. In addition, three contacts reported that employees would be motivated to spend less time in the office and would increase their "face time" with customers. Two firms had re-engineered business processes enabling work to be done directly from customer locations eliminating the need for the employee to work at the central location.

Table 3 - Motivation for implementation

	Part-Time RWA Home Office (11 Total)	Full -Time RWA Single- Site		Full-Time RWA Multi -Site (12 Total)
		Home Office (7 Total)	Satellite Office (1 Total)	
• Provide Employee Benefit	73%			
• Increase Employee Productivity	55%			25%
• Environmental Concerns	27%		100%	
• Change Organizational Culture	18%			
• Allow Night Shift w/o Opening Office	18%			
• Reduce Cost of Office Space		71%	100%	58%
• Increase Work Force w/o Addn'l Office Space		14%		17%
• Reduce Cost of Employee Compensation		14%		
• Accommodate Employee's Personal Needs		43%		8%
• Retain Skilled Employees		14%		
• Increase "Face-Time" with Customer				25%
• Re-Engineer Business Process				17%

The primary motivations reported for implementing remote work arrangements were similar to that found previous research, i.e., provide an employee benefit and reduction in the costs of office space. As expected, there were variations in the motivation for implementation which seemed to influence the choice of remote work arrangement which was adopted. For example, a reduction in the costs of office space was mentioned in full-time remote work arrangements but not in part-time programs. There were also indications that feedback was occurring in this relationship. For example, one firm implemented a part-time remote work program as a precursor to later implementing a full-time program.

4.2 Jobs of remote workers

The jobs of remote workers are shown in Table 4. In the part-time work arrangement, jobs were professional and usually required some time in isolation for writing or other creative work, e.g., IS personnel (55%), writers (18%), and scientists (18%). Respondents in 7 firms indicated that a number of employees who performed "information work" were allowed to telecommute on an individual basis, e.g., to accommodate specific needs of the employee.

In full-time single-site remote work arrangements, the majority of respondents reported that workers in a home office were in positions where they had extensive telephone interaction with customers, i.e., telephone customer service support (43%), telephone customer sales (14%), or technical sales support (28%). Workers in the satellite office were telephone customer sales representatives.

The remainder of workers in home offices were in jobs which required extensive computer use. Respondents in two firms reported workers in IS positions participating in this work arrangement and one firm reported data entry positions

participating. In one firm, the respondent reported the participation of personnel in data entry positions.

Most participants in multi-site remote work arrangements were in jobs which required extensive FTF interaction with people or work with equipment or facilities in a variety of different locations. Respondents in 83% of firms reported sales representatives and 17% reported consultants working in remote work arrangements The contact in one firm reported the participation of Community Development Representatives, whose job required FTF meetings with external clients in many different communities. Contacts in three firms reported field technicians as participants while one firm reported quality control and safety inspectors.

As shown in Table 4, there was little overlap between the jobs found in different types of work arrangements. However, within the different types of work arrangements, there did seem to be common characteristics between the jobs. This evidence indicates that variations in the characteristics of jobs of remote workers did influence the choice of remote work arrangement adopted. In implementing remote work arrangements, firms seemed to recognize that certain employees perform work activities more productively outside the traditional office environment. For example, work which requires concentration can be done more productively away from the distractions of the office in the home office, and work which requires customer contact can be done more productively at customer locations.

122

Table 4 - Jobs of remote workers

	Part-Time RWA Home Office (11 Total)	Full Time RWA Single Home Office (7 Total)	Site Satellite Office (1 Total)	Full Time RWA Multi -Site (12 Total)
• IS	55%	28%		
• Scientists	18%			
• Engineers	9%			
• Procurement Managers	18%			
• Writers	18%			
• Misc. Information Workers	64%	28%		
• Telephone Customer Service Support		43%		
• Telephone Customer Sales		14%	100%	
• Technical Sales Support		28%		
• Data Entry		14%		
• Field Technicians				25%
• Sales Representatives				83%
• Consultants				17%
• Quality Control Inspectors				8%
• Safety Inspectors				8%
• Community Development Representatives				8%

Table 5 - Information technology furnished for remote workers

	Part-Time RWA Home Office (11 Total)	Full Time RWA Single Home Office (7 Total)	Site Satellite Office (1 Total)	Full Time RWA Multi -Site (12 Total)
• No Equipment or Telecommunications Furnished for Employee	64%	28%		8%
• Additional Telecommunications Furnished for Employee	36%			
• Equipment & Additional Telecommunications Furnished for Employee	27%	100%		100%
• Additional Telecommunications Trunks			100%	

4.3 Information technology furnished for remote workers

Firms used different strategies for providing information technology to remote workers as shown in Table 5. In the part-time work arrangements, 64% of the companies did not furnish hardware or additional telephone lines for the workers. These companies did often furnish minimal software to enable remote access. Thirty-six percent of respondents indicated that employees were reimbursed for the expense of an additional telephone line to their home but no equipment was provided. Twenty-seven percent indicated that the company would provide a computer and an additional telephone line for the employee's home office.

All full-time remote work programs furnished some employees computers, software, and an additional telephone line. These firms seemed to see a trade-off between the cost of technology and the cost of office space. However, in 28% of the firms with single-site work arrangements and 8% with multi-site work arrangements, some workers were not furnished any equipment or telecommunications. In all of these situations, respondents reported that when the work arrangement was established at the employee's request, the firm would not incur any expense, e.g., purchase equipment for the employee. But if the employer requested the

123

employee to work away from the office, then the necessary tools for performing the job were furnished by the employer.

In the satellite office environment, the company makes considerable use of telecommunications services, such as Automatic Call Distribution (ACD) to direct calls to the satellite office. The company is also experimenting with the use of Integrated Services Digital Network (ISDN) lines which provide simultaneous transmission of data, voice, facsimile, graphics, and video.

In the multi-site remote work arrangement, employees were usually furnished with substantial technology which allowed the portability necessary to perform their jobs, e.g., laptop computers, pagers, portable phones, fax modem, fax machines, extra telephone lines. One manager in a full-time multi-site program expressed concern about this expense: "I do not believe I am really reducing my costs; I am substituting technology costs for the cost of office space. I am not sure there is a real financial saving because the equipment and the software must be constantly upgraded."

The strategies used by firms in providing information technology for remote workers varied with the type of RWA being implemented, particularly with respect to part-time and full-time RWA (see Table 5). There was evidence that the strategy for providing information technology also depended on the motivation for implementation, i.e., equipment was furnished by the employer if the employer requested the employee to work at home but was not furnished if the employee requested the opportunity to work at home.

5. Additional research areas for remote work environment

During the interviews, several managerial and organizational issues were identified where future research should be conducted. The following sections summarize these issues: managerial control and coordination of remote workers, informal communication, technological support for distributed remote workers, and maintaining the remote worker's identity with the firm.

5.1 Managerial control and coordination of remote workers

In remote work arrangements, workers become more independent in the performance of their work activities. Managers, however, are still responsible for directing the activities of these workers and for the output which they produce. Managers had to develop new techniques for controlling and coordinating remote workers. The following are some examples of these new techniques:
* In one firm, voice-mail was designated as the pre-determined communication link between worker and manager. Workers were instructed to check their voice-mail boxes at least once a day so that communication could always be established on at least a daily basis.

* Before the worker's day at home, workers and managers agreed on the work to be accomplished.
* Managers designated days when all workers had to be in the office and could not work at home. On these days, group meetings were held and managers knew workers could be contacted.
* Workers and managers agreed on set days when the employee would work at home, e.g., every Wednesday.
* Workers were required to keep their manager's electronic calendar up-to-date with telecommuting days.

Consistent with indications from previous literature [15, 17], several organizations reported that remote management created more work for managers initially due to increased work in coordinating remote workers. However, the long term effects of this change remain unexplored. Future research should be conducted to develop tools and techniques for remote management, including the use of information technology to coordinate remote workers, e.g., coordination software or Lotus Notes™.

5.2 Informal communication

An important component of the establishment and maintenance of the informal organizational structure is physical proximity of workers [7, 10]. Informal, ad hoc communication between employees is important to organizations to "accomplish work, transmit organizational culture and knowledge, and maintain the loyalty and good will of their members" [7]. In the remote environment, employees have less opportunity for contact with peers in the organization. Therefore there are fewer opportunities for socialization with peers and for development of the informal structure of the organization. In this sample, a variety of methods were used to facilitate continued interaction between distributed group members.
* In both part-time and full-time remote work arrangements, scheduled weekly or quarterly FTF group meetings were held. In one case, the firm felt that maintaining relationships between employees was so important that distributed workers came to quarterly meetings, even if employees had to fly to the meetings.
* In full-time programs, some form of office, usually shared with other workers, was often provided for remote workers to spend time in the office and maintain relationships with peers.
* The manager of the satellite office had designated 'bonding days' when satellite office workers spent time working at the central location explicitly to maintain relationships with employees at that location.
* In one firm, a group of co-located workers whose jobs involved unstructured collaboration were being distributed to remote locations. To facilitate interaction in the remote environment, the manager

124

was looking at the use of electronic bulletin boards or Lotus Notes™.

An important future research area in remote work arrangements is the support for unstructured, informal communication between distributed workers. While management can schedule social opportunities for workers, the use of technology to facilitate informal communication should also be explored. For example, Sproull & Keisler [32] found that organizational policies encouraging the use of E-mail could increase the sociability and organizational attachment of distributed workers. Also, new technologies, e.g., the use of *Cruiser* ™ video technology which allows distributed workers to 'drop in' on each other [7], may be needed to increase informal social opportunities in the remote environment.

5.3 Technological support for remote workers

Support for the technical needs of the worker in all remote environments was important in a number of firms. The remote work environment increases the technological dimension of the job; workers become more responsible for the use and maintenance of their equipment. Firms responded to this change in several ways:

- Establishing help desk or designated employees to help with technical problems.
- Furnishing guidelines for employees on software purchases and methods for remote access to corporate facilities.
- Some amount of technical training was given.

There was no clear indication from firms whether this level of support was adequate for workers or if one type of support was more effective than another. It seems clear that some additional technical support is needed in order for remote employees to be able to work effectively. Future research should be conducted to determine the technical support needs of remote employees and how best to take care of these needs.

5.4 Maintaining the remote worker's identity with the firm

Maintaining the employee's identity with the firm was important to three organizations in this survey which had implemented full-time remote work arrangements. Respondents were concerned that remote workers who did not have an office would have less identity with the firm. Several strategies were used to facilitate the remote employee's identity with the firm.

- In one firm, workers continued to have business cards and a business address, even though they did not actually report to this location.
- Another firm required all employees to come in to the central location for four hours per week to maintain some contact with the firm, and the manager and co-workers.

Future research should be conducted to determine the efficacy of these strategies. In addition, the long term consequences of remote work arrangements on the worker's commitment and identity with the firm should be investigated.

6. Conclusion

In this paper we have identified variables which affect the decision to adopt different types of remote work arrangements. We have reported findings from field research conducted in 19 firms in the Atlanta area which indicate support for our hypotheses. Through this field research, we have also identified important managerial and organizational issues that arise in the remote work environment and should be explored further.

We did not explore relationships between the variables which we identified. For instance, we expect that the motivation for implementation will be affected by other aspects of information technology such as the information architecture of the firm. We also did not explore other variables which may have affected the decision, such as firm industry characteristics and size. These variables and interactions between them will be explored in future research.

These findings are based on qualitative interviews in firms in one area of the United States so generalizability may be limited. Some firms in the study indicated that the Olympics being held in Atlanta in 1996 provided impetus for them to implement remote work arrangements although it was not their primary motivation. Therefore, generalizations about the number of firms which have implemented remote work arrangements should also be undertaken carefully.

This research represents an important first step in systematically investigating new ways of working which are facilitated by information technology. Future research validating these findings empirically and expanding the investigation to a broader geographic area will be valuable.

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125

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