Abstract

Today’s telecommuting workforce encompasses all categories of workers including managers, professionals and other knowledge workers. While organizations have the choice of mandating telecommuting or offering it as an option, individuals also have the choice of participating or not when telecommuting is optional. This research investigated whether individual factors, such as age, skills, identification with organization, or job category influenced these individuals’ decisions to telecommute or not. A survey of telecommuters and non-telecommuters was conducted in two large work groups working for a high technology organization. Job category and gender showed a significant difference between telecommuters and non-telecommuters. Age, years with organization, and computer skills did not show significant differences. Reasons provided by respondents for opting not to telecommute are discussed. In addition, a comparison of perceived productivity, performance, sense of personal control, and satisfaction between telecommuters and non-telecommuters was performed. Differences were found between telecommuters and non-telecommuters in their ratings of personal control and productivity. The paper concludes with suggestions for practitioners and recommendations for future research. © 1999 Published by Elsevier Science B.V. All rights reserved.

Keywords: Distributed work; Telecommuting; Individual characteristics; Telecommuting outcomes; Telecommuting objectives; Propensity to telecommute

1. Introduction

Working from home instead of going to an office is not a new phenomenon. Two major characteristics, however, differentiate today’s homeworkers from those of the ‘cottage industry’: first, they typically have a communication link to their office, and second, more and more of them are knowledge workers such as professionals and managers. Recent studies have defined telecommuting as working away from the traditional office using computers and telecommunications facilities to maintain a link to the office [3]. The reasons for the growth of this phenomenon, and the interest it has generated in recent years, are found in its expected benefits. Some of those discussed in the literature include increases in productivity, increases in job satisfaction, lower turnover rates, savings of office space, increased flexibility and improved employee morale, to name only a few. Few organizations, however, have been able to objectively measure these expected benefits.
Early telecommuting research often warned of the potential of exploitation for workers involved in this type of work arrangement [6, 7, 8, 18, 20, 21, 24]. Workers were said to have less bargaining power with their employers when they were forced to work at home instead of at an office. Conversely, employers were believed to make this arrangement available as a fringe benefit to those employees who were said to have strong relative bargaining power. For example, today many employers advertise the possibility of telecommuting as a benefit of employment in their efforts to recruit professionals (this is especially evident for jobs advertised on the Internet). So while mandated telecommuting can be seen as a potential negative arrangement for some workers, optional telecommuting could be regarded as a benefit.

1.1. Purpose of the study

The process of selecting telecommuters often starts with the organization identifying jobs which can be done in a remote setting, then selecting individuals within these jobs who can work from home [11]. In an optional telecommuting arrangement, employees will then self-select themselves as telecommuters. In other words, telecommuting is not necessarily the favored choice for every employee.

To better understand the characteristics that differentiate individuals who decide to telecommute from those who opt not to, a survey of organizations was conducted. Two main questions motivated this research. First, when telecommuting is offered as an optional work arrangement, why do individuals select to or not to participate, and what factors influence their choice. Second, once individuals self-select their work setting when telecommuting is optional, are there differences between their perceived productivity, performance, sense of personal control, and satisfaction.

Section 2 will present the background for this research to clearly delineate the study. It is followed by a short review of relevant literature. The methodology and data analysis sections will then describe the actual study. The next section is the discussion, which includes suggestions for practitioners and recommendations for research, and is followed by a short conclusion.

2. Background

A research framework was proposed [3], which suggests that four categories of variables impact the likelihood of success of a telecommuting arrangement: organizational, individual, work, and technology characteristics. Variables in the organizational characteristic category include objectives of the organization for establishing a telecommuting program, the culture of the organization, and the organizational control mechanisms. Objectives of individuals participating and their skills make up the individual characteristic category, while communication requirements and coordination mechanisms are discussed within the work characteristics category. Finally, the technology characteristics include the actual technologies, and the physical telecommuting environment (the home office), and security issues.

The framework was investigated in an empirical study that looked more in depth at the fit between work characteristics like coordination and communication, and technology characteristics such as the levels of information system and communication technologies available to telecommuters [4]. The model was supported by the data for those variables selected. The study did not, however, look at variables in the individual characteristic category within the framework. Moreover, it recognized that individual characteristic variables may have an impact on telecommuting outcomes, and that they should be investigated in future research. Accordingly, the variables of interest in the present research are those that are particular to individuals but for which they have minimal control. Factors considered include age and gender of respondents, years of work with the organization, years of computer usage, years of computer ownership, and job category.

3. Literature

Telecommuting is not a new concept since the term was coined more than two decades ago [22]. As such, there has been a lot written on the topic, but mostly in the practitioner literature. In terms of empirical research, there are still few published studies investigating the determinants or the impacts of telecommuting. This section reviews some of these
studies in the two areas of interest to the present research: individual characteristics in telecommuting, and telecommuting outcomes.

3.1. Individual characteristics

Once organizations have established whether they can, and want to, implement telecommuting, they have to identify potential telecommuters. Even if some employees are potential telecommuters, they may not be interested in such a work arrangement for fear that it may hinder their careers. Reasons described in the literature for individuals to decide to telecommute include family obligations like child or elderly care [9, 23]; flexibility and control over work schedules; reduced commute time; less interruptions; and, cost savings through lower or no transportation, lunch and business clothing costs.

Specific skills may be required of telecommuters. Besides basic computer knowledge, they must have self-sufficiency, reliability and communication. Self-sufficiency involves being able to work and solve problems independently, having the ability to concentrate in a non-work setting, good planning capabilities, and good time management skills. Work must be done within deadlines and time must be available to meet both work and family obligations.

3.1.1. Age, gender and job category

The telecommuting and teleworking literature discusses a variety of factors believed to have impacts on whether individuals will be successful at working away from the office. The age of individuals, however, has not been discussed as either affecting successful involvement in telecommuting or individuals. One could argue that it is not the age of individuals but their longevity with their organization that will affect their propensity to telecommute. Conversely, gender has often been discussed as a clear determinant of telecommuting potential. Females were said to be more at risk of being forced into telecommuting arrangements to maintain their schedule flexibility for child or elderly care. In addition, many writers discuss the greater probability of exploitation for women who must work at home for lower wages. However, this may be related more to job category where clerical workers tend to have less bargaining power with their employers than professionals do [6, 7, 8, 18, 20, 21]. It has also been recognized that the job type (clerical vs. professional) can change whether an employee gets increased or decreased autonomy [24].

As this research tries to identify individual factors that affect workers’ propensity to telecommute if they have the option to, it is expected that both gender and job category should be significantly different between telecommuters and non-telecommuters. Conversely, it is expected that there should be no differences in age between the two types of workers. These expectations are presented in hypothesis form below.

H1: There will be no significant difference between the age of telecommuters and the age of non-telecommuters.

H2: There will be a significant difference between the gender of telecommuters and the gender of non-telecommuters.

H3: There will be a significant difference between the job type of telecommuters and the job type of non-telecommuters.

3.1.2. Years with organization

One of the greatest fear of managers with employees telecommuting is that they will shirk their responsibilities and not perform the way they would in the office environment [15]. This results from a long established organizational culture where employee management is performed by scanning for physical presence. It usually takes a lot of time to change this entrenched culture, and it requires new mechanisms of control in organizations. In addition to not being able to manage the remote workers, many managers fear that the employees will lose their identification and commitment to their employer [11]. Many organizations who started telecommuting programs have therefore established a minimum number of years of working with the company (so that the organizational culture is well learned) before individuals are permitted to telecommute [1].

Although the number of years of work for an organization may affect which individuals are selected to telecommute from an organizational point of view, in an optional setting where individuals make this choice for themselves, the number of years in the
organization should not influence these individuals’ choices.

**H4:** There will be no significant difference between the number of years in the organization for telecommuters and the number of years in the organization for non-telecommuters.

### 3.1.3. Individual skills

There are a variety of skills that individual telecommuters need to learn, which can be broadly categorized as technical (e.g. computer skills) and behavioral (e.g. time management). Since today’s telecommuters, as defined in this research, typically have an electronic link to their office, it is necessary for them to have at least basic computer skills. The number of years of computer usage is one indicator, albeit imperfect, of computer skills. Another indicator used in this research is the length of time an individual has had access to a personal computer in his or her home environment. This is believed to be an appropriate surrogate measure of computer skills since individuals with personal computers tend to learn by themselves or decide to attend courses because they do not have the handy technical support available at the office. In the case of knowledge workers whose main job is the manipulation of information, as in the present research, it is expected that individuals who telecommute and those who do not will have similar computer skills, as it is a requirement for their job.

**H5:** There will be no significant difference between the number of years of computer usage of telecommuters and the number of years of computer usage of non-telecommuters when both types of workers are knowledge workers.

**H6:** There will be no significant difference between the number of years of computer ownership of telecommuters and the number of years of computer ownership of non-telecommuters when both types of workers are knowledge workers.

### 3.2. Outcome criteria

There are potentially three levels of outcomes for telecommuting: societal, organizational and individual [3, 30]. Examples for society include improved air quality, reduced future environmental risks, or energy conservation. Examples for organizations are increased productivity, improved morale, decreased absenteeism, or reduced facility and overhead costs. Examples for individuals include increased schedule flexibility, improved quality of work life, reduced commute and clothing costs, increased job satisfaction, or reduced stress.

As this research investigates individual characteristics in telecommuting, the study focuses on outcomes measured at the individual level, the unit of analysis for the research. The two most commonly measured outcome criteria in telecommuting are satisfaction and productivity [16]. Accordingly, they were used in the current research. Two additional measures for this study were performance and personal control. Performance was used to account for the many additional factors that can impact and bias productivity measures. Personal control was selected because it has been recognized as a major issue with professional workers [26].

#### 3.2.1. Productivity

Many researchers and writers have predicted or reported increases in productivity for telecommuters. Reasons for this include working at peak efficiency hours, reducing interruptions, providing an environment for work requiring high levels of concentration, reducing time spent telecommuting, reducing incidental absence, etc. It is obviously an outcome of great interest to organizations. Productivity tends to be influenced by many environmental factors [10], and is even more difficult to accurately measure in the case of knowledge workers [13].

In telecommuting, research has been most often measured in terms of respondents’ perceived increases or decreases in productivity. Typically telecommuters are asked if they feel their productivity is higher or lower than at the office [16, 25, 31]. Given that most of the literature describes higher productivity for telecommuters (a recent survey published by Investor’s Business Daily on April 8, 1998 reports 30% greater productivity for telecommuters), it is believed that even when employees self-select to be telecommuters they should experience higher productivity.

**H7:** Telecommuters will report significantly higher productivity levels than non-telecommuters.
3.2.2. Performance

In contrast to productivity, performance is not output oriented, although it is often linked directly to productivity in research [10]. Typically, it can be measured by quality of outputs, job knowledge, leadership, judgment, innovation, goal setting or teamwork, among others. In the traditional office setting, performance was in large part established by scanning for employee’s presence, and through direct and indirect observations [27, 28]. Indeed, it has been shown that when obtaining conflicting visual and non-visual data about performance, managers tend to be more influenced by the visual data [19].

Performance has rarely been discussed in telecommuting literature. Some researchers caution that performance cannot be evaluated the same way between telecommuters and non-telecommuters [29]. Others find that satisfaction with telecommuting does not seem to be related to performance [25]. This is similar to the results of overall studies that find no significant relationship between job satisfaction and job performance. Because of the lack of measures in similar studies, the items for the present research were derived from Becker et al. [2] who studied the relationships of commitment to performance. As for productivity, it is expected that employees who elect to work from home should experience higher levels of performance.

**H8:** Telecommuters will report significantly higher performance levels than non-telecommuters.

3.2.3. Personal control

All individuals tend to desire more autonomy and control over their work [14]. Knowledge workers tend to have more control over their own actions [31]. Personal control is a major incentive used by organizations in keeping their best employees, and is also one of the major reasons for setting up remote work arrangements. It is a ‘psychological construct reflecting an individual’s beliefs, at a given point in time, in his or her ability to effect a change, in a desired direction, on the environment’ (p. 165) [14].

Again, there are few studies that evaluate levels of personal control as perceived by telecommuters [31]. Some suggest that if a job is complex and requires autonomy, working at home can increase individuals’ self-control over their work [24]. It is therefore expected that telecommuting would increase the sense of personal control.

**H9:** Telecommuters will report significantly higher personal control levels than non-telecommuters.

3.2.4. Satisfaction

Many researchers and business writers argue that telecommuting should increase workers’ satisfaction with their job. Satisfaction is when a worker ‘responds with positive rather than negative feelings to his/her job and job-related experiences’ (p. 232) [5]. Telecommuters may experience dissatisfaction if they have poor working conditions and problems with their equipment, and if they have limited possibilities to interact with others [17]. There may be a link between the number of days a person is telecommuting and his or her satisfaction with the arrangement [5].

There are many studies that ask respondents if they are satisfied with their telecommuting arrangement [16, 17, 25, 31], or some aspect of the arrangement [32]. While the literature varies on whether employees will feel satisfaction or not, it is expected that in a mandatory arrangement telecommuters may feel more dissatisfaction. In an optional arrangement, however, telecommuters select their work environment and should be satisfied with it. Given the numerous discussions in the literature about the potential increased satisfaction for telecommuters, it was expected that satisfaction with work environment would also be greater for telecommuters than non-telecommuters.

**H10:** Telecommuters will report significantly higher satisfaction levels than non-telecommuters.

The individual characteristic variables were measured to investigate if they had an effect on who opted to telecommute when it was offered as an optional work arrangement. This was followed by an investigation of the reasons individuals chose not to telecommute. The final analyses in this research were conducted to compare the perceived outcomes for telecommuters and non-telecommuters.

4. Methodology

A questionnaire measuring individual factors and outcome criteria was developed and tested. The survey
instrument was mostly created from a combination of existing measures in information system, communication and industrial psychology research. The researcher also created one item for performance, personal control and productivity measures. Two questions were also reversed for this research (no reversed items were found in the literature, although recommended in designing surveys [12]. The items were not identified to respondents as representing specific constructs (like productivity for example), and were randomly ordered on the questionnaire. Each outcome criterion was measured by more than two items. An annotated copy of the survey instrument with sources for items is included in Appendix A. For the purposes of this research, individuals were considered telecommuters if they worked at home instead of the office at least one day a week. In addition, they had to be involved with this work arrangement for at least three months. Respondents who identified themselves as non-telecommuters were asked, in a separate section, to provide reasons why they decided not to telecommute.

The survey instrument was pre-tested to identify unclear or confusing wording, to establish the approximate amount of time required to fill the survey, and for initial analyses of the measures. Some items were reworded and some instructions were re-written for clarity. The measures were then pre-tested a second time. All items showed variance, and respondents indicated that the wording of the survey and other face validity items were not problematic.

**Pilot:** Data was gathered during the spring and summer of 1997. When the researcher obtained 35 data points the instrument was subjected to reliability and unidimensionality analyses with Cronbach’s $\alpha$ and factor analysis. The scales showed high reliability (0.80 and 0.94), and no major problems with unidimensionality were identified. Data collection then continued until enough observations were obtained.

**Sample:** Managers from local organizations were contacted for this study. Of those who agreed to participate, two managers with work groups where telecommuting was optional agreed to participate in this particular research. Each manager provided a list of all the employees they supervised. Every individual in the work groups received a copy of the survey in a sealed envelope with a letter of introduction, instructions and a pre-addressed return envelope.

<table>
<thead>
<tr>
<th>Work group</th>
<th>Surveys sent</th>
<th>Surveys returned</th>
<th>Response rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>88</td>
<td>33</td>
<td>38%</td>
</tr>
<tr>
<td>2</td>
<td>80</td>
<td>43</td>
<td>54%</td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
<td>76</td>
<td>46%</td>
</tr>
</tbody>
</table>

The two work groups belonged to a large high technology organization. The principal objective of the managers for allowing telecommuting as a work option was to increase workers’ satisfaction. The secondary objective was to increase productivity. Table 1 provides some statistics on the size and response rates for the work groups.

### 4.1. Scale analysis

After all data were collected, the survey was subjected again to tests of validity and reliability. SAS/PC was used to compute Cronbach’s $\alpha$ to assess the internal consistency of each scale. These reliabilities were 0.80, 0.91, 0.88, and 0.82 for productivity, performance, personal control, and satisfaction, respectively. Confirmatory factor analysis was also performed on the scales to ensure unidimensionality. Following this analysis, only two of the three items for productivity loaded properly, while three of five loaded properly for performance. In addition, the three items for personal control loaded properly, and three of four items for satisfaction did. Items with improper loadings were dropped from further analysis. The ratings for all questions measuring a same variable were then averaged to create the final score for that variable [28]. Before averaging questions, the two items that were reverse coded (questions 5 and 10) were converted to the same rating scales as the other items.

### 5. Data analysis

Responses from the surveys were coded and entered into Excel spreadsheets for data analysis. Five of the returned questionnaires had missing data. The remaining surveys were used for analysis. Table 2 provides some descriptive information on the two work groups.
5.1. Gender

For the remainder of the analyses, groups 1 and 2 were combined since they were from the same organization. As can be seen from Table 2, the proportion of females in the total sample is 23% (16 on 71), and the proportion of females in the telecommuters sample is 32% (12 on 38). A chi-square test was performed to verify if gender was significantly different between telecommuters and non-telecommuters. The resulting chi-square statistic is 3.831, giving a significance level of 0.050. This suggests that gender did have an impact on workers’ decision to telecommute or not in this sample, providing support for hypothesis 2.

5.2. Age, years with organization, and skills

In order to establish the degree to which these individual factors, if at all, affected the choice of telecommuting when it was available to employees, demographic information were compared for telecommuters and non-telecommuters. The means for the various characteristics reported by the two types of workers were tested for statistical differences using one-way ANOVA tests. Table 3 presents the demographics for the two work groups, as well as the \( p \)-values for the tests.

On average, all respondents had typically worked with computers for an extended period of time, but had owned personal computers for fewer years. This is true for both work groups. The large number of years of computer usage is easily explained by the nature of this organization, a high technology firm.

Overall, these individual characteristics collected here did not highlight any variable as being constantly and significantly different between telecommuters and non-telecommuters for these work groups. Hypotheses 1, 4, 5 and 6 were therefore supported. That is there are no significant differences between telecommuters and non-telecommuters with respect to age, number of years with the organization and computer skills as measured by number of years of computer usage and ownership.

5.3. Types of jobs

As previously discussed, some researchers believe that clerical workers are at a disadvantage while professionals are favored in terms of bargaining power with their employers. Similarly, the literature suggests that telecommuting is not for everyone, and that individuals with certain jobs should not be allowed to telecommute. To investigate if job category has an impact on workers’ propensity to telecommute, respondents were asked to identify their current job titles. Most of them worked primarily with the ‘creation, manipulation, and dissemination of information’, and could therefore be described as ‘information workers’ (p. 8) [32]. Job titles were categorized according to the scheme proposed by Watson-Fritz et al. [32] as staff functions, line functions, IS staff, sales, supervisory, customer service or clerical.

\[
\begin{array}{|c|c|c|c|c|}
\hline
\text{Sample size} & \text{Total} & \text{Telecommuters} & \text{Non-telecommuters} & F \text{ Value} & p\text{-Value of F-ratio} \\
\hline
H1 & Average age & 40.8 & 40.7 & 40.9 & 0.02 & 0.90 \\
H4 & Average years with organization & 12.8 & 13.1 & 12.5 & 0.08 & 0.78 \\
H5 & Average years computer usage & 18.3 & 18.3 & 18.3 & 0.00 & 0.98 \\
H6 & Average years PC ownership & 8.6 & 8.5 & 8.8 & 0.08 & 0.78 \\
\hline
\end{array}
\]
The largest group of workers among the respondents was by far IS staff with titles like systems analyst, systems administrator, systems engineer, systems programmer, and help desk specialist. Levels such as associate, senior or advisory accompanied all of these titles. The supervisory category included the title section manager. Line functions was represented by the title consultant, while the only job in the clerical category was staff specialist. There were no staff function, sales or customer service job titles in this sample. Table 4 shows the breakdown of respondents per category.

The proportion of non-telecommuters to respondents in the IS staff category (40%) is close to the proportion on non-telecommuters in the total sample (46%). The supervisory category, however, shows a clear categorization as non-telecommuters. This was to be expected since managers typically have to remain at the office to manage employees. Even when these supervisors are given the opportunity to telecommute, they typically prefer not to. This belief that managers should not telecommute may be entrenched in corporate culture.

A chi-square test for statistical difference was performed on this data. The resulting statistic is 10.890, giving a significance level of 0.012. These results indicate that job category was significantly different between telecommuters and non-telecommuters. This is clearly showed by the supervisory category where no supervisors are in the telecommuter category. However, these results must be interpreted with caution because the expected counts for some of the cells in the chi-square test were less than 5.

5.4. Non-telecommuting choice

Respondents who indicated that they were not involved with telecommuting were asked to identify reasons why they selected not to participate in this work arrangement. Table 5 presents a summary of the reasons presented. Individuals often listed more than one reason for not wanting to telecommute. Some of the additional comments provided by respondents for each reason mentioned are summarized below.

Table 4
Job types of respondents

<table>
<thead>
<tr>
<th>Job type</th>
<th>Telecommuters</th>
<th>Non-telecommuters</th>
<th>Total</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff function</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Line function</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>IS staff</td>
<td>38</td>
<td>25</td>
<td>63</td>
<td>89%</td>
</tr>
<tr>
<td>Sales</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Supervisory</td>
<td>0</td>
<td>6</td>
<td>6</td>
<td>9%</td>
</tr>
<tr>
<td>Customer service</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Clerical</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>33</td>
<td>71</td>
<td></td>
</tr>
</tbody>
</table>

Table 5
Reasons for not participating in telecommuting

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not available as an option</td>
<td>6</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Inappropriate home office environment</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Lack of appropriate equipment at home</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>More productive at the office</td>
<td>5</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Need to share information with colleagues</td>
<td>6</td>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>Need to socialize with colleagues</td>
<td>5</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Others</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>
5.4.1. Not available as an option

Even though all individuals were said to have the right to telecommute in the two work groups, one individual noted that he was still in training, while two others suggested that as section managers they could not telecommute. The other five individuals in this category did not specify any details about why telecommuting was not available as an option to them.

5.4.2. Inappropriate home office environment

Comments in this category varied significantly. Three individuals noted that having small children at home (and dogs) made it impossible to work efficiently. For example, one noted:

“Children demands for parent time too unbearable while trying to work... even though other parent there”

Two others in this category specified the lack of appropriate office space in their home. One even noted that:

“Am not willing to carve out a portion of my house for home office”

Finally, two individuals mentioned lack of appropriate equipment in this category (which belongs to the next category). The needs specified included higher processing power, better workstations, and ISDN connections.

5.4.3. Lack of appropriate equipment at home

Three individuals indicated that lack of appropriate equipment at home made them prefer to work at the office. The specific requirements included more powerful equipment and faster connections. For example, individuals noted that:

“Office equipment provides multiple resources...”, “the modem link is slower and unreliable” and, “connection to mainframe is still slow (14.4 kb) and not stable enough - I’m constantly having to re-connect to mainframe”.

5.4.4. More productive at the office

Many individuals indicated that working at the office allowed them to be more productive than working at home. Four individuals mentioned that the office allows for more ‘on the spot’ communication when the need arises, and that this affects their productivity tremendously. Some of the comments describe this well:

“I believe that in a support environment (which is what I work in), that it is essential to be able to access other people as a resource whenever needed, if they are not in “general office area”, you cannot access them when you need to”, and “Most emergency requests involve someone “dropping by” the office to ask for help, cannot wait for telephone or mail response”

Finally, one individual noted that ‘documentation is readily available at work’, another reason for being more productive at the office.

5.4.5. Need to share information with colleagues

By far the largest category of reasons not to telecommute is the need to share information with colleagues. Most individuals who highlighted this suggested that a large part of their job is attending meetings and exchanging ideas. Some individuals consider this communication with others to be part of the learning process in organizations. For example,

“I learn more at the office – more people to reference” or “have a new job responsibilities and need to be in the office – will be discussing telecommuting once I don’t rely on peers as much”

5.4.6. Need to socialize with colleagues

The need to socialize with others was mentioned as often as being more productive at the office for not telecommuting. However, this was never marked by any individual as the only reason not to telecommute. Interestingly, few additional comments were made here.

5.4.7. Others

A few individuals added other reasons not to telecommute to those outlined above. This was a ‘catch all’ category. Some of these other reasons include:
“Will start telecommuting within the next 6 months” and “My house is for living, not for earning a living”.

Two individuals in leadership positions noted the special demands of being in such a position towards helping others. One of them noted: “I consider this option both a benefit for the company and employee. In fact in most cases I think the employee is more productive by telecommuting”,

while the other stated that:

“As a technical lead for the group I’m in, I am required to be at work to attend meetings for projects I’m involved with and to be available to provide assistance to others…”.

5.5. Telecommuting outcomes

There were four outcome criteria measured in this study. It was expected that there would be a significant difference between telecommuters and non-telecommuters. To test whether there were differences between the two types of workers in rating these outcome criteria, \( t \)-tests for equality of means were performed on the sample. The results are shown in Table 6.

From the results presented in Table 6, it can be seen that only productivity and personal control were statistically different between telecommuters and non-telecommuters at the 0.05 level of significance. Using a 0.10 cutoff would make performance also statistically different between the two groups. For satisfaction, however, there are definitely no statistical differences between the two groups. With these results, hypotheses 7 and 9 were supported by the data while 8 and 10 were not. Table 7 presents a summary of all hypotheses tested and whether they were supported on not.

<table>
<thead>
<tr>
<th>Scales (1–7)</th>
<th>Average for all (n=71)</th>
<th>Average for telecommuters (n=38)</th>
<th>Average non-telecommuters (n=33)</th>
<th>( T ) statistic</th>
<th>( p )-Value of ( t )-test</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H7</strong> Productivity</td>
<td>5.99</td>
<td>6.23</td>
<td>5.69</td>
<td>2.085</td>
<td>0.041</td>
</tr>
<tr>
<td><strong>H8</strong> Performance</td>
<td>5.83</td>
<td>6.04</td>
<td>5.56</td>
<td>1.715</td>
<td>0.091</td>
</tr>
<tr>
<td><strong>H9</strong> Personal control</td>
<td>5.68</td>
<td>6.03</td>
<td>5.26</td>
<td>2.801</td>
<td>0.007</td>
</tr>
<tr>
<td><strong>H10</strong> Satisfaction</td>
<td>5.85</td>
<td>5.88</td>
<td>5.82</td>
<td>0.303</td>
<td>0.763</td>
</tr>
</tbody>
</table>

6. Discussion

6.1. Individual characteristics

The first research question investigated which individual factors influence workers’ choice of telecommuting when it is offered as an option by their employers. None of the factors measured, with the exception of job title and gender, showed statistically significant differences between telecommuters and non-telecommuters. For ‘Years of Computer Usage’ and ‘Years of PC Ownership’, the sample was biased since respondents worked for a high tech firm and typically had to use computers to perform their job. As such, the range of responses for those questions was not as large as it could have been in a non high tech company.

Although ‘Age’ has not been discussed in telecommuting literature, ‘Years with Organization’ has often been mentioned in the context of impact on corporate culture. Many researchers have written that since corporate culture and know-how is spread through contacts between employees, only employees with a certain number of years of employment should be allowed to telecommute [1, 18]. This characteristic was not found to be statistically different between the two groups. It must be remembered, however, that in this situation it was the employees’ choice not to telecommute, not the organization’s. Interestingly though, some individuals self-selected not to telecommute for this very reason as highlighted by their comments to the “need to share information with colleagues” reason not to telecommute.

As far as job category and gender are concerned, there were differences between non-telecommuters and telecommuters. This supports what has been written in the literature for these two variables. Some of the managers also indicated in the general comment section of the survey that they had problems with managing employees who were telecommuting.
6.1.1. Reasons for choosing not to telecommute

The three reasons most often mentioned for choosing not to telecommute were the need to share information with others, being more productive at the office, and the need to socialize with colleagues. When looking at the additional comments made regarding those reasons, two major themes emerge. First, respondents clearly highlight the need to access other individuals for solving problems, sharing information and learning. Second, they often suggested that technology available was not sufficient to support this need. Using the phone or electronic mail simply is not the same as face-to-face ‘dropping-by’ meetings. While some individuals see these impromptu meetings as essential in performing their job, telecommuters often wrote in their general comments that they felt more productive at home because they were not interrupted all the time by these impromptu meetings. Basically, it seems that individual personality plays a major role in viewing the importance of impromptu meetings in performing one’s job.

Telecommuters often feel that they lose visibility and career momentum. This may be due to missing out on casual interactions that often make the difference between moving upward or not. Even electronic mail and bulletin boards have been found to be poor substitutes for face-to-face meetings at the office [8, 9]. Being a good communicator is therefore a crucial skill since keeping regular and effective contacts with customers and colleagues, both formal and informal, is of prime importance and helps reduce the sense of isolation.

6.2. Telecommuting outcomes

The four outcome criteria were expected to be rated higher by telecommuters than non-telecommuters. Two of these, productivity and personal control produced the expected results. Satisfaction and performance did not, however, differ significantly between telecommuters and non-telecommuters. For satisfaction, we could argue that having made the choice of their work setting, individuals tended to be satisfied with it. The performance was not significantly different at the 0.05 level, but could be considered significant if a cutoff level of 0.10 was used. Productivity describes how much more an employee feels he or she can do at home than at the office. As discussed, fewer meetings and interruptions seem to be key reasons for greater productivity of telecommuters. Performance, on the other hand, has to do with the quality and timeliness of work done. So while individuals may feel they definitely do more work at home, they may less decidedly feel they also produce better work at home. Finally, personal control was the most significantly different outcome between the two groups. Since flexibility of work schedule is one of the prime reasons for deciding to telecommute, there is no surprise in having telecommuters rate their personal control level higher than non-telecommuters.

6.3. Suggestions for practitioners

There are various recommendations that can be made to increase the number of workers who decide to telecommute when it is optional. These recommen-
dations also apply to what should be provided to telecommuters when they are forced to telecommute. Three categories of changes can be made: structural changes, technology changes, and procedural changes. Structural changes could be done to the office environment to promote information sharing through a very open structure. This would allow telecommuters to have the quiet environment at home, and the “sharing” environment at the office. New reporting structures may also be implemented for telecommuters to be grouped in certain work groups with managers comfortable with this and where non-telecommuters are assigned to groups where most individuals work at the office five days a week.

Technology changes, which could promote information sharing, include phone conferencing or video conferencing capabilities for home workers, or sometimes simply faster bandwidth and higher processing power at home. Procedural changes can probably be more easily implemented, and at less costs. An example of a simple procedure to implement is to require all telecommuters to be available between certain hours (on the phone) when at home. Another example would be to reserve one day a week when no one is allowed to telecommute (not an option for organizations wishing to save on office space) so that meetings can be easily scheduled. Finally, creating regular ‘get-togethers’ (especially important for mandated telecommuting groups), or creating special electronic bulletin boards (or web pages) with general information about what is happening in the work group could help individuals working at home feel part of the team. Even with all these changes, however, some individuals will never be happy as telecommuters because going to work is an important part of their lives, it is the way for them to make the difference between working and living.

6.4. Recommendations for research

We are just starting to empirically measure the impacts of telecommuting on users and organizations, and we need a better understanding of how technology and technology usage affect the outcomes of this new work setting. There are more research issues to be investigated and discussed than could fit into a few manuscripts. Based on the limitations of the current study, however, some recommendations can be made for follow up studies, which will confirm, contradict, or complete the results obtained here. Although this was not done by design, this study was limited to a sample of mostly professionals and managers in an information technology organization. Future research investigating non-professional employees could significantly add to the knowledge gained from this study. One of the contributions of the present research is that it investigates part of the research framework developed by Belanger and Collins [3]. The framework suggests that, among other things, individual characteristics should fit with organizational, technology, and work characteristics. As such, future studies could investigate some of the individual characteristics described in the present manuscript in relation to other variables proposed in the framework.

7. Conclusion

Researchers and writers have discussed telecommuting for a long time. While it has gained increasing attention in recent years, more empirical research is needed, both qualitative and quantitative. We need to start measuring the impacts of this work setting on individuals, organizations and society. This is important for organizations in general, but even more for those where telecommuting is mandated and where individuals have limited choices if they want to work. This manuscript presents many reasons individuals chose not to telecommute. These are important starting points towards a better understanding of the impacts of this new work setting on individuals. While the results of this study have limited generalizability to high-technology firms, they highlight the need for further empirical research to better understand the impacts of telecommuting on individuals and organizations.

Appendix A

Measurement details

[The printed instrument contained more pages than this condensed version].

7.1. Demographic variables

1. What is the name of the organization/company you currently work for?
2. What is your age? ________

3. Circle your gender: F or M

4. How many complete months have you been working for this organization?
   (For example, if you have been working 2 and a half months, please write 2 months) ______ years and ______ months

5. How many years have you or your household owned a personal computer? ______ yrs.

6. How many years have you been working with computers? ______ yrs.


8. Do you consider that the use of a computer is necessary to perform your job?
   Circle the appropriate answer: YES or NO

   **Definition of telecommuting**
   Work done only during normal office hours at a site other than the normal work site.

   Work done after hours is not considered telecommuting.

   9. Are you currently involved in a telecommuting arrangement, either part or full time?
   Circle the appropriate answer: YES or NO (if NO, go to Section A.2)

   9b. On average, how many days per week are you involved in telecommuting? ______ days

   9c. How many complete months have you been telecommuting (part or full time)?

7.1.1. If you are a telecommuter, skip this section

   If you are not involved in a telecommuting arrangement, but have the opportunity to be involved with one, please share with us the reasons you have decided not to telecommute:

   □ Telecommuting is not available to me as an option.
   □ Inappropriate home office environment. Specify: ______
   □ Lack of appropriate equipment at home. Specify: ______
   □ More productive at the office.
   □ Need to share information with colleagues.
   □ Need to socialize with colleagues.
   □ Other: [Several lines included for outlining reasons or providing comments]

7.2. Outcomes of telecommuting

If you are a telecommuter, please place yourself in the context of working at home to answer the following questions. Consider your home office as your work environment.

If you are not a telecommuter, please answer the following questions based on your office environment.

Please circle on the scale at the right (see definitions below) the choice that best represents your situation. Be sure to answer all questions.

(For example, if you have been telecommuting for the past 3 and a half months, please write 3 months) ______ years and ______ months

10. If you have a problem with technology at home, do you have a place to call (technical support)?
   Circle the appropriate answer: YES or NO

10a. How satisfied are you with this support?
   Very Satisfied ______ Satisfied ______ Neutral ______ Unsatisfied ______ Very Unsatisfied ______

[Note: on the questionnaire these questions were not grouped by construct and were listed in a random order.]

1. Productivity [adapted from Venkatesh and Vitalari, 1992; Ramsower, 1985]

I feel that I am not productive in my work environment............ [scale]
My work environment allows me to work efficiently............. [scale]
My work environment allows me to complete a large number of tasks each day [created by author]..... [scale]

2. Performance [adapted from Becker et al, 1996]
   My work environment allows me to complete tasks in an unsatisfactory manner........... [scale]
   My work environment allows me to complete work in a timely and effective manner...... [scale]
   My work environment allows me to improve my overall work performance.................. [scale]
   My work environment allows me to do high quality work............................ [scale]
   My work environment allows me to meet the expectations of my supervisor in performing my job..... [created by author]..... [scale]

3. Personal Control [adapted from Venkatesh and Vitalari, 1992; Ramsower, 1985].
   My work environment allows me to have control over starting and ending a unit of work........... [scale]
   My work environment allows me to work at my own pace............................. [scale]
   My work environment allows me to have personal control over my job [created by author]..... [scale]

4. Satisfaction [adapted from Venkatesh and Vitalari, 1992 (item 1); Watson-Fritz et al., 1996 (items 2–4)]
   I am satisfied with my work environment................................. [scale]
   My work environment allows me to get help from coworkers when needed........... [scale]
   My work environment allows me to get help from my supervisor when needed.. [scale]
   My work environment allows me to feel like I belong to the office team............. [scale]

7.3. Comments

[Several lines were offered for individuals to write additional comments]

References

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