Telework as a Solution for Senior Workforce: Research at Tallinn University of Technology

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Abstract

Average life span in Europe has increased by more than average pension age. Most of the pension age people have preserved their work ability. This has raised the percentage of younger pensioners compared to the working population. In many countries young people are in a situation where they have to or want to postpone their employment. This phenomenon leads to difficulties in paying pensions. Scientists in many countries are looking for ways to increase the employment in senior workforce. One of the solutions can be teleworking. Telework has become almost a normal part of white-collar workers’ work style. Telework can also provide better working conditions for people with disabilities and young mothers to increase their employment and help them feel useful in society. Telework has not been scientifically widely studied and results of previous research vary.

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1. Introduction

Although working from home has become an ordinary work form for many employees today there is a lack of information about the effects of telework. Not all specialists have similar understanding about telework terminology. Thus the author of this paper has to define clearly the term telework first. Telework is a work carried out outside the central office, involving new technology that permits communication. Although some specialists accept teleworking as only full-time teleworking, the author of this paper sees teleworking even where employees do teleworking only 1 hour a week. Furthermore, partial teleworking has a far more important role for future than full-time
teleworking because it allows companies and employees to be more flexible. For instance, for senior workers telework enables them to do their jobs even in case of commuting difficulties while they have no problems with their mental work ability.

2. Telework

Teleworking has increased along with advancement of information and communication technology. Flexible working places offer benefits to companies as well as to the whole society. Telework simplifies the issues of health and safety for a company: the employer supplies the teleworker only with guidelines for health and safety. In fact, the influence of teleworking is more substantial, for example, in case of flu epidemic when there is a possibility of working from home and counteracting to get sick with the flu. Working from home also helps to minimise traffic jams caused by people who commute every day to office and back home from office.

Teleworking is an area inadequately covered by ergonomists, but ergonomists involved in office innovation could play a meaningful role in safeguarding the worker’s job demands, job resources and well-being (De Croon 2005). Many researchers point to teleworking as a solution to practical problems, to increase employees’ freedom and individual lifestyle (Sturessen 2002). Consequently, it creates prerequisites to a healthy lifestyle.

Teleworking decreases stress situations of workers. Teleworking can alleviate the problem of hypertension. Lundberg and Lindfors (2002) found that blood pressure was significantly higher during work at the office than when teleworking at home.

However, a flexible work place expects employers’ whole trust towards their employees and employees’ willingness to work from home. We have to consider that teleworking willingness is individually variable.

Figure 1. Concept of Working from Home

Source: Eveleens 2006
There is a telework project being carried out in Utrecht, Netherlands to stimulate the local economy, social integration and regional innovation that is funded by European Union. Figure 1 shows a work style concept of *working from home*. In the centre is the basic workplace at home (white ellipse). Within walking distance (light grey ellipse) are additional solutions for networking, learning, innovation and experimenting. Dark grey ellipse shows flexible solutions for a mobile worker, working where s/he wants to be. This concept is the result of analysis of the needs and of new ways of working, including the possibility of working *wherever you are* with the help of ICT. This concept supports the local economy, social integration and regional innovation (Eveleens 2006).

Telework is not only attractive for employees. This perspective is also inviting for the self-employed.

### 3. Telework Terms

The term of *telework* is often referred to using terms like *telecommuting*, *distance work*, *flexiwork*, *mobile work*, *portable work*, *proximity work*, *network work* or *virtual work*. Most recently *e-work* seems to be a popular term and is also widely used. There is no consistent terminology. For instance, some of the terms are synonyms (e.g. *telework*, *telecommuting*). The content of terms varies with different authors. *Mobile work*, *virtual work* and *network work* are technology-centred terms.

*Telework* is working at home or in a satellite office, or a telework centre near home instead of working at the main office or place of business (Glossary of Commonly…).

Often *telework* is also defined as an activity where an employee performs at least part of h/her job tasks outside the actual office where information communication technology plays a central role in this performance.

*Distance work* is work carried out in an appropriate location with the aid of information technology (Pekkola 2000).

*Virtual/Mobile office* – employees equipped with the communication tools and technology needed to perform jobs from wherever they need to be – home, office, customer location, airport, etc. (Telework Basics).

*Hoteling* – shared office space in a company location designed for using on a drop-in basis by employees. Equipped with standard office technology – phones, PCs, faxes, printers, copiers, e-mail, Internet access, etc. Employees either reserve space in advance or drop in to use a cubicle on an as-needed basis (Ibid.).

*Satellite office* – a fully-equipped office location established by the company, normally in suburban locations, where employees can reserve space and work one or more days a week closer to their homes. These satellite offices reduce employees’ commuting time and help ease community traffic congestion (Ibid.).

*Telework centre* – similar to a satellite office, however, space is utilized by employees representing numerous public and private employers. Normally operated independently, employers are charged for the space and services utilized by each employee per day. These centres are located closer to employees' homes than their regular office locations (Ibid.).
4. Telework’s Benefits and Disadvantages

Working from home offers the employee and organization many benefits (Brownson 2004). Advantages and disadvantages of telework for the employees, employers, society and environment are described in (Heinonen 2000). Therefore, telework has an impact on human factors and job satisfaction. It has an effect on the employee-company interaction. From the employees’ point of view the benefits are:

- Savings in commuting time and expenses;
- Strengthening working motivation;
- Flexibility of the working mode;
- Fitting work into own rhythm and situation of life;
- Peace to do work, followed by a higher work efficiency;
- Emphasis on the contents of work;
- Increase in employability.

There are also advantages for employers. Benefits for employers and companies are as follows:

- Lower overhead costs;
- Increase in productivity;
- Keeping the skilled employees and recruiting new ones;
- A better company image concerning environmental issues.

Telework has also a positive impact on the environment. Advantages for the environment and society are as follows:

- Less traffic;
- Decrease in emission caused by fuel consumption and traffic;
- Less consumption of resources;
- Savings in infrastructure;
- Improved local economy.

There are also possible risks involved in teleworking. Disadvantages for employees are:

- Having to reserve space for work at home;
- The health hazards of office equipment;
- The risk of social alienation;
- The risk of burnout;
- The risk of discontinuing a promising career.

Disadvantages for employers are as follows:

- Initial investment expenses;
- Risk concerning data security.

Disadvantages for the environment and society are as follows:

- Scattered community infrastructure;
- Extending domestic telework abroad.

As most of the teleworkers work only a few days a week and usually visit office every week, many of these risks can be minimized. The current research about academic personnel’s telework usage at Tallinn University of Technology showed that the most common form for an individual (70% of respondents) is 1 to 20 hours of telework in a week.
For companies and organisations investments are usually already made by their employees. It is ordinary nowadays to have a personal computer with internet access at home.

Not all employees are capable of working from a distance. An experiment carried out by Mountain Bell (1980) showed that 5 out of 8 managers who experimented working partially from home continued working part of the work time at home even after the experiment. This experiment shows us that telework is not suitable for all cases and ability to work in the telework form varies individually.

5. Telework in Estonia

Telework’s popularity in Estonia has increased rapidly. Only a minority of teleworkers work completely in a telework form. More common is to work part of the time in a telework form.

Working Life Barometer survey (sample of about 1000 individuals) was carried out in Estonia in 2005. According to this, 23% of the working age population was teleworking either sometimes (20% of respondents) or continuously (3%) (Working Conditions in Estonia, 2005). Teleworking has become a normal part of working style. Workers, especially those employed with intellectual jobs, do their work often from home or in a mobile form from a café or simply by sitting on a bench in a city park. The author of this paper has experienced teleworking for 5 years and has worked even in the open air – on the beach, forest etc.

Still 56% of the respondents according to this survey have never tried nor are interested in teleworking. Only 7% of the respondents have never tried but are interested in doing telework. It is clear that not all occupations are suitable for telework. Furthermore, teleworking might not suit for every individual. Also employers might not allow their employees to work from outside the central office.

The same research shows that those who have used teleworking were doing so for on average of 9.5 hours per month. This is slightly more than one workday. 47% of teleworkers used their own ICT (information and communication technology) equipment while 20% used the employer’s equipment and the others used partly their own and partly their employer’s ICT equipment. Even today most of the homes have their PC with internet connection and this can reduce companies’ investments on ICT equipment.

An earlier Estonia’s telework research (Kilemit 2002) showed that 22% of the companies had experienced teleworking (this number was higher in small enterprises) in recent 10 years and 21% of companies still used teleworking. As the definition of telework is not yet very clear to everyone it is hard to compare results of different studies.

The same study reached a conclusion that the mobile form of telework is the most popular in teleworking (52% of companies and 56% of employees). A mobile form of telework usually needs more investments into ICT equipment, but laptops are becoming more popular. 19% of companies are using satellite offices. Partial teleworking seems to be a more common form than absolute teleworking.

According to the same study, 49% of teleworking companies use teleworking in selling, 35% in customer service, 29% in accounting, 22% in designing, 19% in data processing, 14% in consulting, 14% in information technology, 8% in information services, 3% in text processing, 3% in arts, literature and science, and 11% in other occupations. Telework’s popularity in selling has become possible thanks to the PDAs,
pocket PCs that can be connected to internet and because sales agents can send orders to
the main office right from the client’s shop.

63% of teleworkers are male and only 37% are female (Kilemit 2002). There
are no significant differences in the age of teleworkers. 72% of those companies that are
using teleworking think that teleworking has a positive or probably positive impact on
company’s efficiency. None of the non-teleworking companies believed that tele-
working has a positive impact on company’s efficiency (24% believed that the impact is
likely to be positive). 13% of non-teleworking companies expressed their opinion that
teleworking has a negative or probably negative impact on efficiency, while only 5% of
telework-using companies believed that the impact is likely to be negative (none of
telework-using companies believed in the negative impact of telework). It can be
assumed that these positive attitudes can increase telework usage in the future.

The majority of companies found that the main obstacles in teleworking are
lack of control and sophisticated managing and/or lack of job places that would suit to
teleworking. Telework needs employers’ trust in their employees. In the central office
employers can be surer that their employees are doing work during all the working
hours. So teleworking suits better to jobs that have clearly measurable results.

A study in Finland shows a great potential for telework in the future. In Finland
it was estimated that even 20% of the working population were in professions suitable
for telework and about 40% of occupations at least to some extent could be done as
telework in the future (Heinonen 2000).

6. Age Management

Age management has become an important issue in recent years. Average life span has
steadily increased during the last century. Compared to the beginning of the 20th
century, the average life span today due to better health care and working environment
is 20 years longer.

The concept of aging has been constructed on the basis of person’s age –
number of years. It was purely an indication of the number of years. Afterwards, aging
was mostly linked to changes in the organism, and less to chronological age. There are
no aging processes in some animals, e.g. in the hydra or sea anemone. There are over
several dozens of definitions and more than 300 theories of aging. At present, most of
the aging researchers think that aging in the human organism is mainly an accumulation
of damage during a lifetime (Kristjuhan 2002).

People are using 'soft strategies' for postponing years of health (healthy life
expectancy) and so prolonging their life by 0.1-0.3 years every year in developed
countries (Kristjuhan 2006).

In the European Union, the proportion of 50-64 years old workers will be about
35% in 2025, which will be double the size compared to younger workers of 15-24
years of age (17%, Ilmarinen 2002). On the one hand, people tend to live longer, but on
the other hand, ageing and work ability of senior workers’ varies widely individually.
Due to that a raise of the state pension age cannot solve the problem totally.

Ergonomists in Europe are looking for ways to increase employment of senior
workers and to motivate people over pension age to postpone their retirement and to
work as long as they still have preserved their work ability. But still work force
participation rates of aging workers have been declining dramatically in the 1990s and
the actual retirement age in several countries has dropped from 65 to about 60 years. As
a consequence, the dependency ratios are getting critical (Ilmarinen 2002). Postponing
of the state pension age has been slower than increase in average life span as rising of the retirement age seems not to be a popular decision for politicians in parliaments. Pensioners in Europe don’t have remarkable reasons to postpone their retirement as their pensions are high enough to maintain their quality of life.

These facts have led to a process where the number of retired people is increasing rapidly compared to the working population. This can decrease the quality of life of retired people or increase taxes in the future.

Another process that is affecting this issue is about young generation who postpones their start of working career. Many young people prefer to study longer in universities, colleges or schools rather than go to work.

The step from education to working life has moved chronologically further. The increased level of education has demanded that many young people spend additional years on education and extend their study period (Ilmarinen 2006).

Thus the situation where each working person has to feed himself or herself and additionally has to feed through taxes one studying young man or woman and one retired person, can be quite realistic.

As work ability of older people varies significantly, a postponement of the state pension age seems not to be the best solution. The author of this paper is of the opinion that working environment has to improve for senior workforce.

Juhani Ilmarinen from the Finnish Institute of Occupational Health has said that the fact that work ability changes with ageing does not have to mean that work ability decreases with ageing. Many ergonomists have found that some skills even improve together with ageing (Mykletun 2006). The table below shows changes that occur with ageing (See Table 1).

![Table 1. Perceived Age-related Changes in Abilities and Qualities](chart.png)

<table>
<thead>
<tr>
<th>Abilities and qualities that decline with age</th>
<th>Abilities and qualities that increase with age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeing, hearing, memory</td>
<td>Avoiding accidents / mistakes</td>
</tr>
<tr>
<td>Physical strength</td>
<td>Precision and patience</td>
</tr>
<tr>
<td>Speed</td>
<td>Loyalty and independence</td>
</tr>
<tr>
<td>Endurance</td>
<td>Work ethics</td>
</tr>
<tr>
<td>Capacity for change</td>
<td>Responsibility</td>
</tr>
<tr>
<td>Learning abilities</td>
<td>Contact with customer</td>
</tr>
<tr>
<td>Getting things done</td>
<td>Communication skills</td>
</tr>
<tr>
<td>Small number of sick leaves</td>
<td>Problem solving abilities</td>
</tr>
<tr>
<td>Handling PC</td>
<td>Task comprehension</td>
</tr>
<tr>
<td>Creativity</td>
<td>Leadership abilities</td>
</tr>
<tr>
<td></td>
<td>Assessment abilities</td>
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<tr>
<td></td>
<td>Conflict solution</td>
</tr>
<tr>
<td></td>
<td>Judging characters</td>
</tr>
<tr>
<td></td>
<td>Handling stress / strain</td>
</tr>
</tbody>
</table>

Source: Mykletun 2006

Many of these changes that improve with ageing are important qualities for managers, specialists or other white-collar workers. But still a lot of employers tend to think that work ability declines with ageing instead of taking into consideration all the changes that come with ageing.
An earlier study conducted at the School of Economics, Tallinn University of Technology in 2005 showed that work efficiency is higher among senior workers. Professors in the age of 56 to 65 years showed highest productivity. Teachers of this age were the most active also as supervisors of MA and PhD students. The regression equation of publication of articles and age was approximately linear (see Eq. 1).

\[ Y = -0.33 + 0.048a, \]  
where \( Y \) is the number of articles and \( a \) is the age.

There was also a positive correlation between age and wish to work at the university in pension age. Nearly half (42%) of the teachers were interested in working full time, 28% half time, 5% quarter time and 9% at home in pension age.

7. Research Method

From the end of 2005 till the beginning of 2006, the author of this paper, his colleague PhD Ülo Kristjuhan and two bachelor students (Mari Arnover and Kadri Rohulaid) carried out a study at Tallinn University of Technology. The purposes of this study were to measure telework usage in the case of intellectual work, to identify the factors that have influence workers’ telework usage, and to find possible differences in health, age and family between workers who do telework and those who don’t.

The research sample consisted of academic personnel of Tallinn University of Technology. All departments and institutes were participating. Participation in the study was fully voluntary. The questionnaire was available on paper and it was also sent by e-mail to most of the academic personnel. The questionnaires on paper were supplied with an empty envelope with the address on it so that the respondents could easily return their answers. The survey population was 1394 (all academic personnel) and the sample 260 persons (returned completed questionnaires). The representative sample needed to be at least 100.39 respondents (see Eq. 2). As the sample was much bigger than necessary, the results of the study are representative.

\[ n = \frac{t^2 \sigma^2 N}{\Delta^2 N + t^2 \sigma^2} = 100.39 \]
\[ t = 0.95 \]
\[ \Delta = 0.5 \]  

The respondents were also asked to answer the questions about their activity of publishing articles, their age, health issues and their proficiency in working with a computer. There were open questions as well as multiple choices. The respondents could characterise positive and negative sides of telework.

8. Research Results

This study gave quite a good picture of telework usage by employees of intellectual work. One of the main objectives of the research was to measure telework usage among academic personnel. The result was amazing because the number of teleworkers and amount of telework was significantly higher than expected (see Fig. 2).

Telework usage did not vary much by sex (See Fig. 3), but there was a slight difference in the amount of telework per week. Men tend to do telework about 1 hour more than women in a week.
Figure 2. Histogram of Telework Usage (hours per week)

Figure 3. Telework Usage by Sex
Figure 4. Telework Usage by Age (hours per week)

![Graph showing telework usage by age with a linear trend line and R² value of 0.0074.]

Figure 5. Complaints of Tired Eyes

![Bar chart showing complaints of tired eyes across different telework usage categories.]

- For every 10-hour increment in telework usage, the complaints of tired eyes increase by 0.2.
As telework needs help from ICT, it can be expected that younger generation is more eager to use telework than older workers. Contrary to that, senior workers do not need so much support from their colleagues as young employees. There were no significant differences in telework usage by age (see Fig. 4).

This result enables us to argue that telework have no obstacles for senior workforce and senior workers can do telework as well as younger workers.

Next we take a look at health issues. As mentioned before, teleworking should reduce many risks concerning hypertension and stress. Respondents were asked weather or not they had any complaints concerning health. Then the answers from teleworkers were compared to answers from non-teleworkers across every health issue. Results were quite as expected.

Teleworkers had less complaints about tired eyes (see Fig. 5), hypertension (see Fig. 6) and stress (see Fig. 7). Other health issues did not vary significantly. Stress was also perceived less when working from home than working at employer’s office (see Fig. 8).

Figure 6. Complaints of Stress

The main reasons why workers preferred teleworking was better concentration on work and saving costs and time. Better technical conditions and obstacles to commute were not so popular factors (See Fig. 9). It shows that telework suits better to intellectual jobs.

In addition to the above-mentioned factors, some other factors were added by respondents. Three workers said that they have their professional literature at home. Four people said that they have to work from home because of little children. Five respondents said that it is more comfortable to work at home. Six employees complained that there is too much work to do, so they have to work even at home.
Figure 7. Complaints of Hypertension

Figure 8. Perceived Stress Level of Employees outside the Office Compared to Stress Level at the Office
The previously mentioned fact explains why the problems of perceived stress level, hypertension and tired eyes (See Fig. 5, 6 and 7) increase with very intensive telework. This might be due to overworking. Thus teleworking needs a good discipline from worker not to work too much. This is where telework’s flexibility comes into play as risk or disadvantage.

**Figure 9. Factors That Affect Telework Preferences**

There were no significant correlation between telework usage and distance from home to workplace. But there was not one non-teleworker who lived more than 1 hour away from workplace. In Estonia and in Tallinn traffic jams have not become too big obstacles. There were also no significant correlation between telework usage and times an employee visited his/her workplace. It is remarkable that those workers who did telework (even up to 30 hours per week) visited workplace in some cases 5 or even 6 times a week. These workers are overworking or do not plan their work style well.

**9. Conclusions**

Telework can offer many advantages, but it also hides risks. Telework’s impacts should be studied further. Telework is an option not only for senior workers, but also for young mothers and people with disabilities. It helps young mothers to adapt to work life rhythm while being home with a little child.

Telework has an effect on companies’ costs, benefits and efficiency, but there is a lack of empirical data on the economic effect of telework. Telework is widely used in companies and should be studied further from the monetary point of view.
Research at Tallinn University of Technology showed that telework has a strong impact on employees’ health and should be considered as a very powerful factor for organisation and work environment.

- Optimal amount of teleworking seems to be one or two days per week. This ensures that contacts and co-operation with colleagues are maintained and the organisation can work as a team. It also enables workers to concentrate on work.
- Studies conducted at Tallinn University of Technology showed that intellectual work productivity of employees often increases with ageing.
- Telework’s impacts on companies’ efficiency should be studied further.
- In some cases (very old workers, young mothers etc) telework should be combined with part-time working. But according to telework specialists in Europe, many countries in Europe set obstacles to part-time work. This is also increasing earlier retirement.
- Governments in Europe should pay more attention to flexible work style and part-time working.
- Employers should offer more possibilities for teleworking but as telework’s suitability for an employee is individual, the option of teleworking should be accepted by employee.
- Teleworkers and their employers should be provided with more information about telework’s advantages and disadvantages, risks and other impacts.
- Telework can offer solutions to many global problems: shortage of oil, traffic jams, epidemics, air pollution, overcrowded cities.

The study provides us with empirical data and information about telework usage in the case of intellectual work.

References


