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Telework as a Solution for Extending Worklife

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Declaration:

Hereby I declare that this doctoral thesis, my original investigation and achievement, submitted for the doctoral degree at Tallinn University of Technology, has not been presented for any academic degree.

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II. **Arvola**, **R.**, Tint, P., Kristjuhan, Ü. & Siirak, V. 2017. Impact of telework on the perceived work environment of older workers. *Scientific Annals of Economics and Business*, 64 (2), 199-214. **ETIS 1.1.**

III. **Arvola, R.**, Tint, P. & Kristjuhan, Ü. 2017. Employer attitude towards telework in real estate sector. *Proceedings of the 18th International Scientific Conference: Economic Science for RURAL Development 2017*, 27-28 April, Jelgava, pp. 15-22. **ETIS 3.1.**

IV. **Arvola, R.** & Tint, P. Telework usage among white-collar workers in real estate sector. *Scientific Journals of Poznan University of Technology series of "Organization and Management"*, 12 pp., accepted, 2017. **ETIS 1.2.**

V. **Arvola, R.**, Lutsoja, K., Kristjuhan, Ü. & Tint, P. 2017. Telework as an option to postpone the retirement for ageing people? *Safety of Technogenic Environment*, 8, 15-23. **ETIS 1.2**.

The author's contribution to the publications

Article I was written by the author, he took part in the quantitative study (based on the questionnaire) of the employees of Tallinn University of Technology (259 academic staff members) and in the interpretation of the survey results.

Article II was written by the author, he participated in the quantitative research (based on the questionnaire), 107 respondents were involved. The interpretation of the results using t-test to verify the hypothesis was carried out by the author.

Article III was written by the author, he designed the interview guide and conducted the data analysis of the interviews in the real estate sector (11 companies were selected) and the interpretation of the results.

Article IV was written by the author, using the questionnaire for the electronic survey in the real estate sector (127 respondents participated). The author interpreted the data and gave the scientific and safety connected meaning to the statistical analysis; all hypotheses were proved.

Article V was written by the author. The main focus in this paper is on the aging people's telework and retirement intentions in the real estate sector. The hypotheses were generated and mostly proved with the statistical analysis described in the paper. The model describing the different components influencing the telework use is presented in the paper.

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Tallinn, 2018
René Arvola

INTRODUCTION

Throughout history, the human race has had the need to live longer and more healthily. The OECD (2006) have acknowledged that among the world's developed nations the average age of population continues to increase. In the early 2000's the proportion of people over 65 years of age in the total population of European Union stood at 16% (Walker, 2004). According to the recent data this proportion has reached over 19% in 2016 (Eurostat, 2017) The increasing dependency ratio caused by the increasing life span of over 65s has focussed attention on extending worklife. However, since the 1990s, the work force participation rates of aging workers have fallen significantly, thereby placing pension systems under increasing pressure. To meet this challenge the actual retirement age is not increasing at sufficient pace across member states, whilst in several countries, it has even dropped from 65 to near 60 years (Ilmarinen, 2002). Latter crisis in 2007-2008 has provoked reforms in EU pension systems to support extending worklife, including measures for improvement of sustainability of work (Eurofound, 2017).

Since the telework became topical, in the early 1980s, considerable research has been carried out which has analysed this industry from two sides: the employer's position (quantity) and the employee's viewing platform (appeal), with the overall aim to decline the company budget of real estate (Frolick *et al*., 1993; Olson & Primps, 1984) and diminish labor cost (Apgar, 1998; Bailey & Kurland, 2002). However, what has not been investigated to any great extent previously is how telework can also add diversity and enrichment to how work is carried out (Atkyns *et al*., 2002), while also promoting the postponement of retirement and encouraging the engagement of retired people to continue to work.

In recent years, the work environment has experienced substantial alterations regarding the working period, years of service, work organization, nature of occupation, type of employment agreements, and working surroundings (EASHW, 2002; Storrie, 2002). The modifications contain the growth of the retirement age, a rise in regular daily and weekly working hours of self-employed and part-time workers, the "deregulation" of working hours, a rise in temporary and part-time work, an increase in labor rental costs. As well as the need to outsource, subcontract, problematised further by rise in self-employment, a downsizing of premises, increasing capacity demands, and time compression on worker hours. Employers are also faced with increasing employee mobility (multitasking, multi-skilled, flexibility between different workplaces) and telework (EASHW, 2002; EFILWC, 2002, 2009). For some prospective employees, the need for telework as an option is more acute. These groups include the immobilized, those with eldercare accountabilities (a fast growing assembly), soldierly families, and countryside employees (WorldatWork, 2009).

The distribution and mobilization of activities in the corporate value chain (Vartiainen *et al.*, 2007) have increased over recent decades and will continue to do so as organizations seek to reduce costs and get closer to their customers. It is

strongly suggested that the distribution and mobility of work and employees will increase still more and increasingly have a strong influence on workplace design and management. Working in multiple locations, rather than staying in the central office, is predicted to increase. Information and communications technology (ICT) has become a practical necessity almost in all organizations (Joroff *et al*., 2003).

The work ability reform in Estonia that started in 2016 aims at finding opportunities in the labor market for individuals with reduced work ability (Work Ability Reform, 2017). The European Commission indicates that due to the increasing life span of the member states' population, people have to extend their worklife and adapt to new expectations (The Future of Work, 2016). Deferred old-age pension has been introduced in Estonia in order to keep pace with the increasing life span (Social Insurance Board, 2016). This increases the number who are expected to work, whilst also placing greater emphasis on employers to offer more flexible work opportunities for its employees. Estonia is amongst those European countries, where extending worklife is preferred more compared to the EU average. About 40% of employees in Estonia desire to continue working as long as possible, which is significantly different from EU average, ca 20% or e.g. Finland, where only ca 6% desire to extend their worklife to the limit (Eurofound, 2017).

Nowadays work is less related to a particular space, indeed many jobs do not require a frequent physical employee presence. In 2009 and also in 2015 20% of employees in Estonia had worked part or entire work time remotely during last four weeks, meeting with clients or partners were not included (Sotsiaalministeerium, 2017). The number of teleworkers has not increased while telework usage has changed in recent years. The share of employees who work remotely for entire work time has decreased from 17% to to 13% and the share of employees who work remotely less than quarter of their work time has increased from 31% to 43% (*Ibid*.).

Identification of the research problem. Telework, employee location independent working, is well established within the service industry in Estonia and needs no efforts for introduction there. It is particularly suited to knowledge workers, where significant attention does not need to be paid on more manual human factors. However, despite this telework's effects from the employers' perspective remain unclear and underresearched. It is not only the right time to regulate telework at an organizational level, but also explore how telework arrangements in the workplace can appeal to retired office workers, with the aim of extending their worklife. Telework provides flexibility and acts as an attractive tool to improve employment of elderly. The research gap consists in the role of the telework-related human factors contributing to the extending worklife of older administrative knowledge workers. The aim of the study is to find out if it is reasonable to promote telework to postpone employee retirement.

The focus of this study centers on Estonian enterprises within the real estate sector, as well as, for the purposes of comparison, an educational institution that

currently facilitates part-time teleworking. Many people suggest that telework arouses stress in the aging people; therefore, this topic is covered by a separate investigation.

To study improvement possibilities of the telework practice, the following methods were used: questionnaires with employees and interviews with employers.

Topicality of the research is manifested in a substantial matter for Estonia, where the organizations are facing difficulties to find a skilled labor force. Many developed countries are looking towards a solution to the increasing dependency ratio proceeded from lifespan increase. Improvements in work environment are probably the easiest to implement to promote individuals extending their worklife voluntary.

Aims of the study. The aim of the research is to determine the cognitive human factors of telework to influence the postponing of retirement. By understanding the human factors of telework, this will enable employers to make the necessary work arrangements that facilitate the postponing of retirement. The author sets out to test the covering hypothesis that telework can act as a tool for extending worklife. The covering hypothesis was tested with 14 hypotheses.

Research questions:

(1) To what extent do the managers of the organizations see that telework is applicable to employees who might retire otherwise?

(2) What are the circumstances that affect telework utilization for employees who might retire without telework opportunity?

Thesis motivation: This inquiry is based on the qualitative and quantitative study of administrative knowledge workers to provide employers with information that is necessary to improve telework-related work arrangements that can then be used to promote extended worklife.

Research tasks are:

- to determine the desire and reasons to use telework by employees of the educational sector and the real estate sector;
- to determine the human factors related to telework and compiling the conceptual model;
- to conduct interviews with 10 employers from the real estate sector in order to determine employers' attitude towards telework and telework as a tool to postpone retirement;
- to determine the retirement intentions of employees who are eligible for employment within telework;
- to conduct surveys with knowledge workers in order to evaluate telework-related human factors;
- to develop a conceptual model of telework-related personal factors;
- to provide implications for using telework as a tool for extending worklife.

The contribution: current research contributes to the elaboration of a conceptual model that would help the employers to improve their knowledge on telework and to use it for benefiting from the extended worklife. Developed countries experience pressure to the social security budget as the percentage of the retired workers is increasing rapidly. Tools that stimulate the employment of elderly provide relief to that financial pressure from both sides: by increasing the number of taxpayers and reducing the need for state payouts.

The novelty of the research lies in the following:

- the evaluation of telework-related human factors that influence individuals' intentions to postpone their retirement;
- the testing of Kiva questionnaire in the context of telework-related human factors;
- the conceptual model of telework-related personal factors is developed;
- attention is paid to the human factors influencing the decisions by the employer to support telework and extending worklife.

The structure of the thesis includes the introduction, theoretical framework, research methodology, research results and conclusions.

Overview of the approval of research results

All the results from the current study have been published and presented by the authors at the international scientific conferences and doctoral seminars (PhD colloquia), following the acceptance of peer-reviewed submitted abstracts.

- The presentation of "Human factors and telework", October 2005 in Oslo: Nordic Ergonomics Society 37th Annual Conference "Ergonomics as a tool in future development and value creation"
- The presentation of "Employment of senior workers in Estonia", in 2006 in Maastricht: International Ergonomics Association IEA2006 Congress "Meeting Diversity in Ergonomics"
- The presentation of "New Data of Working from Home (Research in Case of Intellectual Work)", in 2007 in Tallinn, Tallinn University of Technology: Seminar "Telework as Solution for Senior Workforce"
- The presentation of "New target group for telework – senior workforce", May 2007 in Stockholm: International Conference "Working with Computing Systems"
- The presentation of "Telework as support to regional development", in June 2007 in Tallinn, Tallinn University of Technology: 3rd International Conference "Baltic Business and Socio-Economic Development"
- The presentation of "Telework as a Tool for Extending Work Life", in 2009 in Tallinn, Tallinn University of Technology: International Conference "Extending the Work Life"
- The presentation of "Workload and health of older academic personnel using telework" (*Article I)*, in May 2015 in Tartu, Estonian University of Life Sciences: The 6th International Conference "Biosystems Engineering 2015"
- The results of the *Article II* ("Impact of telework on the perceived work environment of older workers.") were presented in Tartu in 2016 on the 7th International Conference "Biosystems Engineering 2016"
- The results of the *Article III* ("Employer attitude towards telework in real estate sector") were presented on the *18th International Scientific Conference:* "Economic Science for RURAL Development 2017", in April 2017, Jelgava, Latvia

1. THEORETICAL FRAMEWORK

1.1. Growing importance of work ability

Work has a central meaning in our life. We spend a significant share of our lifetime working. Often, we identify ourself through our job; where often employment provides a sense of well-being (Tuomi *et al.*, 1998). The idea of work ability was assembled in 1981 and along with other determinants it depends on ergonomics and work demands (Ilmarinen *et al.*, 2005). From the ensuing reforms in the flexible work environment, we are able to improve work ability through alluring new labor (Baker *et al*., 2013; Charness *et al*., 2007; Ministry, 2008).

One of the main drivers that affects work ability and pushes individuals to retire is their health. Poor health and decline in work ability induce individuals to give up work. Pond *et al*. (2010) have identified two additional health-related retirement pathways: the pathway that maximizes a finite, precious life; and the pathway that maximizes life after a health care. It is also uncertain if health decline is a cause of retirement (Pond *et al.*, 2010). Several researchers have studied the burnout of workers in today's busy world of work (Weisner & Sutton, 2015; Barros, 2017; Henkens & Leenders, 2010). The results of the investigations show that burnout and retirement intentions are associated, but seem to have partly different predictors. While burnout can generally be explained by the work environment, non-work related factors can also be considered regarding the understanding of retirement intentions. Declining physical strength, speed and endurance are important age-related changes that affect older employees' ability to travel, but at the same time, aging involves advances in many abilities and qualities, e.g. avoiding accidents and mistakes, correctness, patience, trustworthiness, freedom, work ethics, responsibility, problem solving abilities and many more (Mykletun, 2006; Munnell *et al*., 2006; Kristjuhan, 2007). According to some studies, in some cases, employees (academic staff) reach their peak in productivity at the age of 56-65 (Kristjuhan & Arvola, 2006; Kristjuhan & Taidre, 2013).

There are three major explanations why the employers have not shown a more positive attitude in taking steps to retain their older workforce:

1) many employers have still negative views on aging workforce;
2) moderately little is known about the maintenance of aging workers and what the practices are that help to hold them in the worklife in the retiring age;
3) there is a lack of knowledge how to develop and implement precise human resource practices relevant to mature workers (Armstrong- Stassen, 2008).

Studies point to the relationships between the life satisfaction, delaying the retirement (Feldman & Kim, 2000; Kim & Feldman, 2000) and the relationships between the job satisfaction and the postponing of retirement (Dendinger *et al.*,

2005). These studies describe a dual impact where some people benefit from retirement and others from continuing working. Some studies have brought out that retirement can be followed by substantial social problems (Gaβner and Conrad, 2010).

1.2. Telework definition and use

Telework as an idea was first introduced as telecommuting by Jack Nilles *et al*. (Nilles, 1976). The original source of the telework concept is difficult to identify, as references to other authors also exist (Pyöriä *et al*., 2005). Telework is often distinguished as a means of work where information statement knowledge allows workers' admission to work distantly, generally home-based (Sullivan, 2003; O'Neill *et al*., 2014). According to the European Trade Union Confederation, telework is defined as "a form of organizing and/or performing work, using information technology, where work, which could also be performed at the employers premises, is carried out away from those premises on a regular basis" (Implementation, 2006, p. 4). Telework can be conceptualized as an "anytime-anyplace" form of work (Buessing, 2000; Ellison, 2004; Dangelmaier *et al*., 1999). The work involving data processing, accounting, computer programming, design, customer service, quality control, and health care can be completed from the home. In the research that is currently in progress, telework is defined as a "work that is carried out outside the central office (often, on the go and at home), involving new technology that permits communication" (Arvola & Kristjuhan, 2015, p. 741).

Telework is popular because it offers significant benefits for employees, employers and also for society, including the following:

- Less need for commuting;
- Increased flexibility to choose when and where to work;
- Less noise and better concentration on the contents of work;
- Improved company's performance;
- Opportunity to recruit new people;
- Less need for office equipment (Heinonen, 2000; Leung & Zhang, 2017; Sanchez et al., 2007).

When using telework, several risks should be considered. These risks include tendency to exceed working hours (Ojala *et al.*, 2014)) and hazards from ICT devices (Chen & Katz, 2009; Coghill, 2001). Many studies report health risks concerning usage of mobile phones (Repacholi, 2001; Patrick *et al*., 2008), social alienation (Eltayeb *et al*., 2007), burnout, crumbling team spirit, and data security.

The number of employers in the U.S. who allowed their employees to work at least one day per month from home increased from 9.9 million to 12.4 million including contract workers, about one fifth of the total workforce – 28.7 million workers – between 2005 and 2006 (Eyster *et al*., 2008). Many companies, especially in the financial, ICT, and communication sectors, are now offering

telework opportunities (Dychtwald *et al*., 2006). Some companies rely on a "work-at-home model" that has been denoted as an essential or remote workforce. However, the majority of workplaces still do not offer telework opportunities to employees, or if offered, there is a limited scope with respect to the amount of time an employee can work from the home (Potter, 2003).

1.3. Human factors related to telework

Human body and work environment interaction is a complex system involving network of central nervous, automatic nervous, endocrine, and immune system (Raja *et al*., 1996). Social cognitive theory is a widely known model of singular behavior (Chan & Lu, 2004). The origins of the theory lie in the sphere of social learning theory (Bandura, 1986). The theory is based on the idea that environmental influences such as social forces or unique situational features, cognitive and other personal factors, including nature as well as demographic characteristics, and behavior are commonly determined (Compeau & Higgins, 1995). Distinct behavior is influenced by personal factors, which in turn are predisposed to behaviors, which in turn can be driven by environmental and socio-cultural factors.

If we now consider individuals who are close to retirement, or, indeed retired and their physical, cognitive, and emotional qualities, it seems that as age rises, the outlook to ICT changes. A study that observed the connection between practice and outlooks found that those individuals with positive attitudes had more experience with ICT (Wagner *et al.,* 2010). Quantitative studies on the collaboration between the performance and the person are inconsistent. Qualitative descriptions about the impact of computer use on the lives of older adults are usually open-minded (Dickinson & Gregor, 2006). The use of computers leads to greater public acceptance. In terms of the environment-person interface: the environment influences confidently older adults, however the support and training delivered for the system is also important, as it has been found that training leads to higher levels of self-efficacy, confident approaches, and reduced nervousness (Wagner *et al.,* 2010).

The inspiration to telework is imbedded primarily in the expectancy theory (Vroon, 1964), which is presented as:

$$\text{Motivation} = \text{Expectancy} \times \text{Instrumentality} \times \text{Valence} \qquad (1)$$

Expectancy is the employees' self-reflected belief that they hold the mandatory skills to complete the actions necessary to attain desired outcomes. Instrumentality relates to the employees' positions that their performance will result in valence that refers to the individuals' personal expected value of the expected outcome.

Some researchers deal with gender impact on choosing "telework" (Bae & Kim, 2016). Their findings show a positive association between organizational approval of telework and employees' job satisfaction. Female workers are

expected to have a more positive attitude toward teleworking than their male colleagues (Bae & Kim, 2016). Telework is considered one of the most widely employed types of family pleasant policies. It is defined as a work that employees perform for their employers periodically, regularly, or exclusively and that is carried out remotely from home or another location where ICT is used to transfer work to the employer's premises (Hunton & Norman, 2010).

Results of Morganson *et al.* (2010) study indicated that head office and home-based workers had similar levels of work-life equilibrium support and job satisfaction. Therefore it could be argued allowing employees flexibility in choosing their work sites can be related to motivational outcomes.

The current paper focusses on the real estate workers whose work is considered to be "networked" (Garrett & Danziger, 2007), in terms of working regularly from a mixture of home, work and field settings. However if telework proves inappropriate to an employee's job role it can cause work-life inequity when compared to other employee working locations. Specifically in a high stress job, working from home may: not allow workers to discharge work, both mentally and physically (Russell *et al.,* 2009); require working for longer hours (Hill *et al*., 2008). As a result, teleworkers may demonstrate higher levels of stress and burden compared to office-bound staff (Konradt *et al*., 2003; Russell *et al*., 2009; Towers *et al.,* 2006).

Research by George et al (2009) demonstrated that nurses' performance who worked from home compared favourably to those who worked in health care centres. The research found th former were more creative, had more flexible hours and less travelling as advantages, without any disadvantages. A model for investigating telework in accounting (Hunton & Harmon, 2004) argued by that using telework air pollution was reduced and traffic intensity and delays were decreased. Shuttle reduction (individual outcome), job satisfaction, and home satisfaction were also recognised as advantages. The workplace flexibility involves providing employees with the liberty to make choices regarding how, where, when and with whom to engage in work-related tasks (Hill *et al.,* 2008). Telework provides employees with the possibility to work outside the conventional workplace (e.g. the office); it may also enhance the opportunities for flexible work timetables.

Barros (2017) reports about stress of educational workers. Stress refers to external pressure of a physical force that a person is exposed to and which creates tension (Kahn & Byosiere, 1992). Stress may act as a stimulus, a response, or a process between stimulus and response (An Introduction, 2008). Psychosocial stress is individual's mental interpretation of a social situation where this individual perceives there is a lack of resources to overcome this situation (Scott, 2014). Stress with its influence on individual's health is evolving step by step (Reinhold *et al*., 2014). Older employees may face more sources of stress compared to their younger colleagues (Teichmann *et al*., 2004). Psychological stress is sometimes determined by measuring cortisol content in saliva (Kalman

& Grahn, 2004). Good examples have been demonstrated with psychosocial risk at workplaces reduced (Tint *et al*., 2014).

Critics argue that teleworking: leads to higher productivity of work from home (see Hill *et al*., 2003; Pérez *et al*., 2002 for example); reduces needless work-related travel, including the daily commute (Hynes, 2016); has a positive effect on the workers' health (Montreuil & Lippel, 2003). However, there were also the potential for problems identified caused by work station design, long hours and isolation Sharit *et al.* (2009) provide a number of advantages associated with improving the prospects for employment of older workers, for this type of work arrangement. It is a complex dynamic. The organization might not want to invest into education and/or training of older people in new technologies (Freidberg, 2002; Villosio *et al.,* 2008).

The employee's satisfaction is considered to be a key attribute that affects telework adoption (Campbell & McDonald, 2007). It has been found that teleworkers are more satisfied with their jobs (Verive & DeLay, 2006), their job satisfaction is high, because they themselves made the decision to choose teleworking. Nevertheless, full-time home teleworkers' satisfaction can be comparatively lower than satisfaction of teleworkers who work distantly 20-30 percent of their work time (Tremblay, 2002). Despite the higher overall and work satisfaction, teleworkers report lower satisfaction towards their co-workers and promotion compared to non-teleworkers (Igbaria & Guimaraes, 1999).

Telework provides many health benefits that are related to reduced stress from commuting; better work environment by reduced noise, better concentration on work; and conditions that ease balance work and family demands (Montreuil & Lippel, 2003). At the same time, telework may cause increased stress from social isolation, which research indicates is the greatest shortcoming of this work (Di Martino & Wirth, 1990). The work/family border theory focusses on the role of ICT use at home and admits work-family conflict and technostress risks due to the merging of the work and home environment (Zhang & Leung, 2017).

1.4. Telework for new target groups

Telework can be conceptualized as an "anytime-anyplace" form of work (Buessing, 2000; Ellison, 2004). The work involving data processing, accounting, computer programming, design, customer service, quality control, and health care can be performed from the home. Telework shifts work's focus from time and place to its content (Lister & Harnish, 2011). Commuting between workplace and home, which was traditionally seen as a physical movement, is about to become a mental movement from one sphere to another (Österåker, 2003). United States government's telework program sees relevant potential of telework in retaining older and recruiting new employees (Federal, 2016).

As of September 2015, according to Global Workplace Analytics, more than 3.7 million employees work from home in the USA at least half of time (Thorsby, 2015). One of the major complications for people who work at home is that they

do not work 7-8 hours, but significantly more hours per day. A distinct space for one's office helps. Every person works differently, and an excellent condition about a home office is that persons can customise it so that they are as productive and happy as possible. Telecommuting has a growing influence on the commercial real estate sector: telecommuting is on the rise; companies have trimmed costs by reducing their need for physical space. Advantages include the following: fewer employees are required to be on site; improving productivity and retaining employees; stability (work is possible also in extreme weather conditions without leaving home), expanding the talent pool (teleworking provides work opportunities for disabled people, people living in other geographical regions, as well as for single parents etc.) (Hauser, 2014). The author suggests that based on the trends in teleworking, from 2014, 69% of teleworkers from 2014 levels are expected by 2016.

Patrickson (2002) is among the few researchers who has shown interest in the idea of endorsing telework for older workers. It should be pointed out that this is an undereseached area and almost no empirical data exists concerning this topic. In this context, older workers are often referred to as workers over 50 or 55 years of age (Kooij *et al*., 2008). The chance to telework, particularly from home, can offer encouragement for many older workers to delay retirement or re-enter the workforce. Thus, with this possibility, the employers have no need to reflect costs associated with office space and transportation. These options have to be exploited for the older people, including the high-tech demands of telework jobs, the technology skills of older workers, and managers' attitudes toward telework and older workers.

U.S. industries that have actively recruited older workers are those of health care and energy, which already face forthcoming labor shortages. The support for older workers to stay in work is the fact that work environment has become meaningfully less demanding, which has resulted in decreased health and safety risks for older workers (Eyster *et al*., 2008; Villosio *et al.*, 2008).

To increase the scenarios of employing older workers as teleworkers, it is required to make commitments to a number of important issues (Czaja *et al.*, 2006; Sharit *et al.*, 2004). For instance, an effort has to be focussed on the capability for older workers to accomplish technologically based telework tasks, especially as they might concern worker-related characteristics such as trustworthiness, reliability, technology skills, and flexibility (Handy, 1995; Kite *et al.*, 2005).

Telework has been seen as an option for postponing retirement and CEOs' attitude towards support (Arvola *et al.*, 2017a). In the United States, companies see antidiscrimination rules as the main obstacle to promote phased retirement (Johnson, 2011). Employers are interested in supporting older workers with substantial skills to return to work with the help of opportunities like telework (Stapleton & Hyde, 2017). Telework has been suggested as the knowledge work for employees who wish to take early retirement, although they have preserved much of their skills (Bentley & Yoong, 2000; Caldow, 2009; Campbell & McDonald, 2007).

An important encouragement for postponing retirement is income. Employees who take early retirement often face a decrease in income. However, postponing retirement can increase in income, especially if employees can instantaneously receive both a wage and their pension. Earlier studies have paid attention to the income issues, including taxes, regarding retirement and have found that despite income reimbursements it is necessary to provide flexible work to encourage extending worklife (Johnson, 2011). Flexible work arrangements (incl. telework) can benefit low-income older adults (Anderson *et al*., 2013). Results of a study involving 1,400 elderly employees in Japan found that older employees do not want to continue working if their income decreases and that the availability of flexible work places affects future labour market of older workers negatively (Yamada & Higo, 2011).

Although the use of ICT, which is necessary for teleworking, is believed to be challenging for older people, previous research has shown that older people are willing and capable of learning ICT and adopt telework (Sharit *et al.*, 2009). Different training methods exist that are dedicated to telework intention (Venkatesh, 2000; Bayrak, 2012; Peters *et al*., 2004).

Mobile phones are promising tools to improve the quality of work and life also for senior workers (Plaza *et al.*, 2011; Kurniawan, 2007; Oksman, 2006). Hart *et al*. (2008) have noticed that older adults are rapidly catching up with the Internet usage boom. On these grounds, future inquiries are needed that explore the fulfilment of the needs of elderly people to realise the possibility of using mobile phones as work tools (Older, 2012; Selwyn, 2004).

Significant achievements have been gained in applying telework to introduce jobs for the disabled since the dawn of telework (Di Martino & Wirth, 1990). Telework can influence older employees to postpone their retirement and recruit specialists who have challenges to commute between home and office.

1.5. Telework from regional perspective

European policy-makers often highlight telework from the regional development opportunity (Grimes, 2000). Numerous authors (Krugman, 1988; Nuur, & Laestadius, 2009) have shown that since 2000, people who have left their places of birth to towns for work are now returning as the living surroundings in large towns are not favourable (noise, stress, contamination), predominantly not healthy for the young cohort (small children), the accommodation is costly in towns etc. Therefore, young persons and seniors who want more tranquil residencies for living, are returning to their origins. The trend in Latvia currently is that the countryside population is declining because of the lack of exciting jobs in these areas (Vitola & Baltina, 2013). This trend can be challenged with telework promotion.

There are some causal factors for expressing positive or negative attitude to telework at the rural area (Sullivan, 2003): 1) transportation; 2) ICT-equipment level; 3) ICT systems security; 4) distinct factors, like small children or elderly

people who wish to live away from cities; 5) the workplace locality of the partner or husband.

There are problems related to the development of telework opportunities. For example, as mentioned above, the need for childcare requires presence and eliminates attendance in employer's office. This provides afurther opportunity for teleworking (Sullivan & Lewis, 2001).

Technology remains to be a promoter for variations in all areas of business and commerce, and the real estate market is no exclusion (Garebaglow, 2016). The contemporary worker is more mobile and trade can operate anywhere. Although teleworking may not suit all companies, or all employees, many establishments have used telework prototypes with major achievement. This style of work is reducing the amount of office space and is changing the suggestions of what creates an ideal-real luxurious location. In addition to reducing the quantity of agency space a company needs, and re-imagining how that space is used, knowledge is also bringing down obstacles between potential occupants and real estate owners. Changes are made in cloud-effective and real-time property data, which means that many rental undertakings are happening online. Young families may require more space for living, teleworking can help them to base themselves away from the expense of a city centre and buy homes in the countryside or in the suburbs, which will not limit the skilled options for work to them.

1.6. Telework related work arrangements from knowledge management perspective

Globalization, increasing rivalry, changes in demographic structure of population, and development of ICT are the factors that have posed new challenges for organizations in recent years (Wojcak *et al*., 2016; Bajzikova *et al*., 2013).

ICT have largely unfettered employees from the restrictions of a fixed, central work place, enabling ordinary tasks to be across remote locations (Harrison *et al*., 2000). Telework, therefore, has become a more popular and global practice (Davey, 2012; Illegems *et al*., 2004).

Contemporary work environment often involves flexibility for an employee to choose where and when to work. Keeping skilled high-quality employees is important, because an employer may lose a huge amount of money when some of them decide to leave (Bahra, 2001). Many employers allow their employees to decide over the opportunity to use telework.

From the progress perspective, communication between colleagues from time to time is inevitable. In commence, the innovation process is about sharing knowledge (Merrill, 2008). Although a variety of opportunities are open for mediated indirect communication between counterparts, traditional communication modes endure alongside with novel applications. With reference to creating an organization, John E. Tropman (Tropman, 1998) has emphasized the importance of creating informal systems (i.e. opportunities where employees

of various positions, locations etc., within the same organization could get together) where people are engaged in information exchange in the best interests of the organization.

Innovation through knowledge sharing assumes work environment with substantial mutual support by employees and this environment expects considerable managers' interventions (Lin & Joe, 2012). To create successful jobs in 2020, it is required for an organization to consider different generations and accept ICT (Meister & Willyerd, 2010).

Many teleworkers visit the office at least once a week. By combining telework with work in central office, many of the risks can be minimized. The chances and readiness to carry out telework are explicit and one of the main issues that brings the worker close to telework is the distance from home to work. There are other significant factors, like the location of the (nursery) school of children or the feature of info-communication apparatus at home as compared to that at the enduring workplace (Arvola, 2006).

If a skilled employee retires, the company may lose a significant amount of knowledge, skills, experience and relationships. For real estate companies it is important to encourage and promote intergenerational knowledge transfer by creating favourable conditions for that. The mutual exchange model described by Harvey can be implemented for telework. When elderly may need support from workmates regarding ICT, they can share their accumulated job-related knowledge (Harvey, 2012).

2. RESEARCH METHODOLOGY

2.1. Research design

The quantitative studies in safety research began with Heinrich (1941). There is a variety of other quantitative methods in management research from previous studies (Hann & Weber, 1996; George & Bennett, 2005). Qualitative case studies have been established as research methods used since the dawn of the social sciences (George & Bennett, 2005). Case studies are applied extensively in several subject areas, including psychology, sociology, history, economics and management (Yin, 1994; Hunter & Leahey, 2008). The model-centred approach is prevalent in philosophy and social sciences (Arbnor & Bjerke, 2008; Niglas, 2010; Given, 2008).

The methodology of this thesis research is composed of a mixed methods approach, which is appropriate to represent the philosophical position of the investigators (Teddlie & Tashakkori, 2009; Titov, 2015; Paas, 2015). Figure 1 presents the contribution of the study, which combines the quantitative and the qualitative approach; the education sector, the real estate sector and telework in general mental work; employees' and employers' perspective on the research problem. Human factors, well-being, managers' attitude, ICT and retirement are the focus of articles I-V.

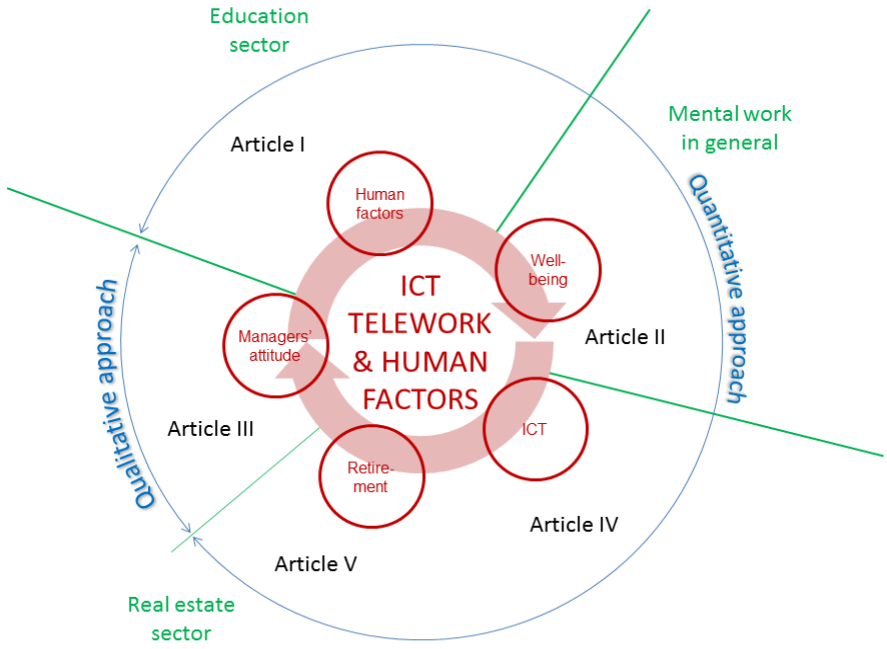

Figure 1. Contribution of the study structured according to Article I-V

The statistical analysis (Kern & Willcocks, 2000; Hatcher, 2013) was chosen as the tool to test the covering hypothesis. Based on the covering hypothesis and literature review, 14 hypotheses were proposed:

H1. Telework users have lower well-being compared to non-users

H2. Telework usage of employees younger than 50 years of age is similar to the telework usage of employees over 50 years of age

H3. ICT usage of employees younger than 50 years is similar to the ICT usage of employees over 50 years of age

H4. Use of ICT devices of employees younger than 50 years is similar to that of employees over 50 years of age

H5. Need for greater freedom influences the employees' decision for teleworking

H6. Need to reduce transportation costs influences the employees' decision to telework

H7. Need for reduced interruption influences the employees' decision to telework

H8. Telework has positive effect on job satisfaction

H9. Job satisfaction has positive effect on employees' intention to postpone their retirement

H10. Telework has positive effect on employees' health

H11. Better health has positive effect on employees' intention to postpone their retirement

H12. Telework has positive effect on employees' intention to postpone their retirement

H13. Majority of employees wish to postpone their retirement because of their insufficient income

H14. Majority of employees would like to share their knowledge and skills with younger colleagues in their old age

Hypotheses H1-H4 were tested in article II, H5-H7 in article IV and H8-H14 in article V.

2.2. Sample and research techniques

For data collection purposes, the following methods were applied: formation of an expert group, questionnaire structure, questionnaire testing and sample selection (Hatcher, 2013; Cooper & Schindler, 2006). Collected data were analysed with the help of t-test and linear correlation. A survey method was selected for data collection and a questionnaire was designed. The questionnaire included questions regarding telework and ICT usage; health and work ability; job satisfaction; attitudes towards retirement; and respondent's demographic profile.

Qualitative approach was applied for the investigation of employers' attitude and is implemented in article III. Sample was compiled from 10 chief executive

officers (CEO) of real estate companies as the nature of the research question needed experts as interviewees. In the beginning, 11 companies were selected, but one CEO was not able to find time for the interview. Semi-structured interviews with open-ended questions supported by prepared interview guide were conducted for data collection. Content analysis with thematic units coding supported by the coding schedule was carried out for data analysis.

Quantitative approach was applied with three surveys targeted to collect knowledge about employee's perspective. Questionnaires were designed by using mainly Likert scale (Likert, 1932).

The first quantitative survey was conducted among academic staff members in Tallinn University of Technology. The research sample consisted of 259 respondents. Response rate was 21%. Sample structure is presented in Table 1. The questionnaire consisted of open-ended and closed-ended questions. Questions included telework-related human factors (e.g. health, telework usage, factors that influence teleworking, personal benefits concerning telework, disadvantages concerning telework) and demographic data. Linear correlation analysis was conducted for data analysis. Table 1 summarizes the research design of the original papers.

Table 1. Survey sample structures

Characteristics	Group	n=259 Survey 1	n=107 Survey 2	n=127 Survey 4
Age	Less than 30 years	35	9	16
	30 to 39 years	43	18	39
	40 to 49 years	44	23	32
	50 to 59 years	60	20	23
	60 to 69 years	54	20	9
	70 years or older	16	15	3
	No response	7	2	5
Gender	Man	144	40	63
	Woman	113	67	64
	No response	2	-	-
Household size	1	17	25	13
	2	69	36	48
	3	59	18	14
	4	46	21	31
	5	15	3	12
	6	8	2	3
	7 or more	2	-	1
	No response	43	2	5

The second quantitative survey was conducted among 107 respondents from different areas in mental work. Nonprobability judgement sampling technique was used to collect responses from a wide variety of areas. Demographic structure of the sample is presented in Table 1. Kiva-questionnaire as an instrument for measuring employee's well-being (Näsman, 2011) was used in the survey. Hypotheses were tested by using the correlation and t-test.

The third quantitative survey was aimed at respondents with higher readiness to telework. Therefore, the questionnaire was designed in electronic format in Google Forms survey application. As a result, responses from 127 respondents were received. Convenient sampling was selected in order to achieve more respondents. Sample structure is presented in Table 1. The questionnaire was tested and link to the survey (incl. cover letter) was sent to Estonia's trade associations in the real estate sector and additionally, directly to some major real estate companies. For the measurement purposes, 76 statements related to the research questions were selected and 7-point Likert scale was used. Questions with multiple choices were also included. ANOVA single factor, t-test and linear correlation analysis were conducted for data analysis and hypotheses testing. Summary of the research techniques and results by the articles is presented in Table 3 (Appendix 10).

Education and the real estate sector were selected for research samples as they have experienced telework for a number of years on a daily basis and it is relatively easy to find people who are approaching to or have reached retirement age working there. In both samples, issues regarding telework and extending worklife are topical. However, the nature of telework usage in both sectors varies to some extent due to the work content.

3. RESULTS

Survey results confirmed the assumption that telework is widely used in knowledge work. Employees themselves mainly make decisions to telework and commonly no basic regulations are set by employers regarding time and place of work of a teleworker.

Interviews with employers revealed their supporting attitude to extending worklife through telework. They see flexibility as the main driver of telework. Experienced employees are highly valued in the real estate sector. Telework suits better to experienced employees as working alone is easier for them as compared to less experienced employees and experienced employees need less help from their colleagues regarding their job-related issues. On the other hand, in many cases, older people have more challenges in ICT use and proximate assistance is considered necessary to their work. According to employers, the main threats of teleworking are: communication between employees is insufficient; possibility of unstaffed office to serve unexpected customers; reasons of employee's poor results can remain unclear.

A survey conducted with academic staff members showed that they preferred teleworking for better concentration on work (51% of respondents testified that it has affected greatly and 21% a little) and saving time and money (47% and 20%). There was no significant difference in telework usage by age and teleworkers had fewer complaints about tired eyes (average score on 1 to 3 point scale for teleworkers was 2.1 and for non-teleworkers 2.4), arterial hypertension (teleworkers' average score was 1.5 and non-teleworkers' 1.8) and stress (teleworkers' average score was 1.8 and non-teleworkers' 2.0).

3.1. Analysis of hypotheses

The covering hypothesis of the thesis was proposed as telework can act as a tool for extending worklife. To test the covering hypothesis, 14 hypotheses were selected. As a result of statistical analysis, the 14 hypotheses proposed in the previous chapter were tested. The results are presented in Table 2.

The hypothesis H1 "Telework users have lower well-being compared to non-users" was not confirmed (Arvola *et al.*, 2017b). There was no statistically significant difference in the employees' well-being depending on their telework usage. Although, average score for teleworkers (7.79) indicated slightly higher level of well-being compared to non-teleworkers (7.74).

The hypothesis H2 "Telework usage of employees younger than 50 years of age is similar to the telework usage of employees over 50 years old" was confirmed. There was no statistically significant difference in the amount of time that is worked remotely depending on age. However, comparison of average mean showed a small difference. Employees under 50 years testified average score 4.57, which indicates slightly more intensive telework compared to 50 over 50 years old (3.77).

The hypothesis H3 "ICT usage of employees younger than 50 years is similar to the ICT usage of employees over 50 years of age" was partially confirmed. While usage of ICT did not vary statistically significantly according to age, there was difference in self-evaluation on individuals' own ICT skills (t=3.098).

Table 2. Statistical analysis of the main hypothesis (*Articles II, IV and V*)

Hypothesis and result	**Categories**	**M**	**SD**	***t*-value**
H1 *Telework users have higher well-being compared to non-users*. Not confirmed	Telework and work stress	7.79 7.74	1.31	-0.167
H2 *Telework usage of employees younger than 50 years of age is similar to the telework usage of employees over 50 years old*. Confirmed	Age and Telework	4.57 3.77	2.37	1.695
H3 *Use of ICT by employees younger than 50 years is similar to that of employees over 50 years of age*. Partially confirmed	Age and ICT usage	7.98 7.02	1.01	3.098
H4 *Use of ICT devices by employees younger than 50 years is similar to that of employees over 50 years of age*. Partially rejected	Age and ICT devices usage	5.04 7.21	1.58	-2.863
H5 *Need for greater freedom influences the employees' decision to telework*. Confirmed	Need for greater freedom and telework	4.06	2.20	2.68
H6 *Need to reduce the transportation costs influences the employees' decision to telework*. Confirmed	Need to reduce transportation costs and telework	2.40	1.81	3.40
H7 *Need for reduced interruption influences the employees' decision to telework*. Confirmed	Need for peace and telework	3.40	2.04	2.43
H8 *Telework has positive effect on job satisfaction*. Not confirmed	Telework and job satisfaction	5.43	1.14	-0.52
H9 *Job satisfaction has positive effect on employees' intention to postpone their retirement*. Confirmed	Job satisfaction and postponing the retirement	5.42	1.63	1.67
H10 *Telework has positive effect on employees' health*. Not confirmed	Telework and health	2.66	1.10	0.23
H11 *Better health has positive effect on employees' intention to postpone their retirement*. Not confirmed	Health and postponing the retirement	2.82	2.02	0.18
H12: *Telework has positive effect on employees' intention to postpone their retirement*. Confirmed	Telework and postponing the retirement	4.82	1.89	13.43
H13 *Majority of employees wish to postpone their retirement because of their insufficient income*. Confirmed	Income and postponing the retirement	5.20	1.76	1.71
H14 *Majority of employees would like to share their knowledge and skills with younger colleagues in their old age*. Confirmed	Intergenerational knowledge transfer and postponing the retirement	4.96	1.64	5.42

The hypothesis H4 "Use of ICT devices by employees younger than 50 years is similar to that of employees over 50 years of age" was partially rejected. The use of desktop computers (preferred more by 50+ respondents), laptops and

smartphones (both preferred more by under 50 years) varied statistically significantly, while use of tablet PC-s was low in both age groups.

The hypothesis H5 “Need for greater freedom influences the employees’ decision for teleworking” was confirmed with the statistics. Although respondents in general solidly did not admit that the need for greater freedom has influenced them to do more work remotely, statistically, teleworkers’ responses differed significantly (t=2.68) from non-teleworkers’ responses.

The hypothesis H6: “Need to reduce the transportation costs influences the employees’ decision to telework” was confirmed. 47.2% of all the respondents expressed the opinion that the need to save transportation costs has influenced them to work remotely, while only 16.5% expressed an opposite opinion. Nevertheless, comparing teleworkers’ responses to those of non-teleworkers, statistically significant (t=3.40) differences were found. Similar results occurred with respondents’ need to save time. Teleworkers’ compliance with the statement ‘desire to save time has influenced them to work remotely’ was different from that of non-teleworkers. The difference was again statistically significant (t=2.99).

The hypothesis H7: “Need for reduced interruption influences the employees’ decision to telework” was confirmed. 55.9% of all the respondents expressed that the need for reduced interruption has influenced their decision on telework. Again, teleworkers responses were statistically significantly different (t=2.43) from non-teleworkers responses.

Hypotheses H8-H14 established the conceptual model, which is described in the following section.

3.2. The conceptual model

Fig. 2 represents the conceptual model based on the theoretical literature in the field of telework and extending worklife. The conceptual model was tested with the statistical analysis and the results presented in the current study *(Article V*). Telework-related personal factors like intergenerational knowledge transfer, job satisfaction, health complaints, income level, telework’s impact on individual’s intentions regarding postponing retirement and their influence on extending worklife were determined and analysed. Relationships in the conceptual model (Fig. 2) were proposed as hypotheses and were statistically tested, by using t-test. Hypotheses H9, H12, H13 and H14 were confirmed, while hypotheses H8, H10, H11 found no support.

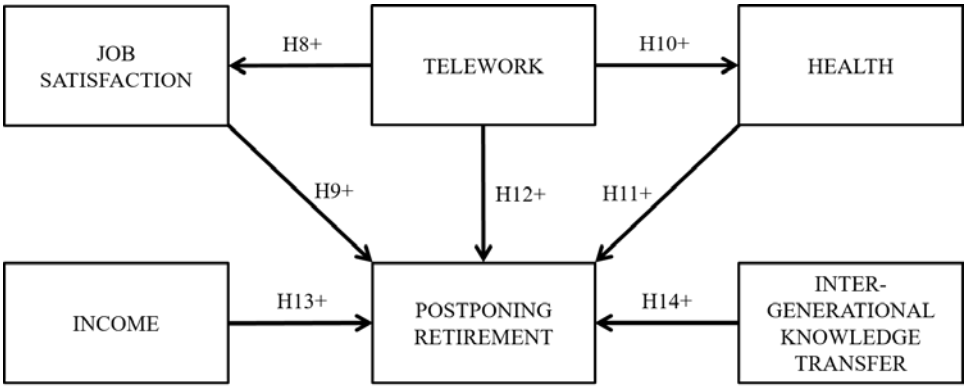

Figure 2. Conceptual model

Fonner & Roloff (2010) have reported teleworkers higher satisfaction level compared to office-based workers. Hypothesis 8 tested telework's influence on job satisfaction. this influence remains unclear (Table 2) because of high general job satisfaction of employees, regardless of their telework habits. No additional job satisfaction derived from telework was expressed by the majority of respondents whose employers allow telework. It can be assumed that working conditions at home do not exceed the work environment in the employers' premises.

There is a debate in scientific literature over telework's impact on individual's health (Montreuil & Lippel, 2003; Sharit *et al*., 2009; Arvola & Kristjuhan, 2015). Telework's impact on employees' health (H10) remained unconfirmed despite the variety in the employees' health status. Therefore, telework's ability to improve health is far from being obvious. It is discussed (Pond *et al*., 2010) if health decline supports retirement. Hypothesis 11 tested the link between health and retirement. There was no statistically approved influence from health towards employees' intention to postpone retirement (H11). It can be explained by Estonia's relatively lower income level in the EU and Estonia's pension regulation, which supports working after legal retirement age by remaining pensions for those employees. Desire to improve economic well-being might appear more essential than health status for the individuals. As it was stated in the interviews by the CEOs of real estate companies in Estonia earlier (Arvola *et al.*, 2017a), the respondents of the survey agreed that the major reason for postponing their retirement is financial.

Satisfaction and retirement relationships are discussed in literature (Feldman & Kim, 2000; Kim & Feldman, 2000; Dendiger *et al*., 2005; Peikkola, 2008; Henkens & van Solinge, 2013) with no clear signs of consensus. Several authors (Johnson, 2011; Yamada & Higo, 2011; Andersohn *et al*., 2013) have discussed over retirement decision with reference to income. According to the results, higher job satisfaction (H9) and income (H13) support extending worklife. White-collar workers in the real estate sector found their job attractive and intended to continue with the same job after reaching the state pension age. As it was mentioned above,

older employees are motivated to postpone their retirement because of their income.

Several authors (Harvey, 2012; Brċic & Mihelic, 2015) have associated intergenerational knowledge transfer with retirement. Employees found that telework (H12) and opportunity to share knowledge with younger colleagues (H14) influences them to extend their worklife. Telework improves work ability by increasing flexibility for the employees to decide over time and place of their work. From the knowledge management perspective and the employees' interests, it is worth emphasizing the importance of sharing their experience with younger colleagues, while random telework has reduced communication between colleagues. Therefore, employees' readiness for knowledge transfer is relevant and needs more attention from employers.

The results of the statistical analysis did not entirely support the assumptions that were set up based on the literature review, but served for encouragement to the employers to see telework as a tool that facilitates extending worklife. Based on the results of the study, it can be concluded that telework as a widely accepted way of work does not provide substantial advantages in the context of job satisfaction and health. However, telework contributes to improved work environment through greater flexibility and extended worklife. In a wide use, telework has a side effect of reduced communication between co-workers. This effect can be avoided by systematic approach to telework arrangements in an organization.

4. DISCUSSION

This thesis research contributes to the previous knowledge on telework for extending worklife purposes. In contrast to previous studies (Haddon & Brynin, 2005) that reported a different demographical profile of teleworkers, the current study found that teleworking is used regardless of age and gender.

It has been found (Kinzl *et al*., 2005) that job satisfaction has positive relationship with opportunities provided to employees by the organization. There are similar opinions regarding telework (Fonner & Roloff, 2010): teleworkers are more satisfied with their jobs than are non-teleworkers, when less contact is beneficial. According to Hrenov *et al*., everything depends on the job character (Hrenov *et al.,* 2017). However, the findings of the current study do not support that idea. It was difficult to find significant differences in satisfaction because job satisfaction found was relatively high regardless of the telework option. It should be mentioned that the limitation of this study is that in the sample, the companies, which accept telework as an opportunity, were dominating.

Several sources have emphasized flexibility that telework enables (Coenen & Kok, 2014; Hill *et al*., 2008; Kossek *et al*., 2006). In their responses, real estate workers supported that idea. However, results of teleworkers and non-teleworkers varied. Obviously, it depends on the employee's situation.

Earlier studies (Peters *et al.,* 2004; St George *et al*., 2009) have found that teleworkers valued time saving, but did not save commuting expenses more often compared to non-teleworkers. The results of the current research revealed that for those workers who use telework, both time and money (saved from reduced commuting) are adequately significant.

Further, working from home sometimes means less noise. This may be particularly important in mental work where some kind of tasks need more concentration. The survey among university academic staff showed that telework is often preferred among academic staff because of less noise.

Postponed retirement due to greater job satisfaction and leisure dissatisfaction was approved by Peikkola (2008). Work-related well-being and decreased availability of leisure would extend worklife by around 0.3 years. In the survey with "bridge employment" (Henkens & van Solinge, 2013) it was found that in the case of elderly people participation, the bridge employees were extremely satisfied with the work mode. The hypothesis "job satisfaction has positive effect on employees' intention to postpone their retirement" was also approved by this thesis research.

According to Peikkola (Peikkola, 2008), the influence of telework on employees' health is positive. Health problems increase with the advancement of worklife and probability to retire. Use of work arrangements can also be limited for the same reason. In addition, the improvement of health has almost insignificant effects on retirement propensities. The hypothesis "telework has positive effect on employees' health" was not confirmed in the current study as no statistically significant difference (t=0.23) was found between the health

complaints of teleworkers and non-teleworkers. The received results do not overlap with some earlier studies (Igbaria & Guimaraes, 1999) conducted when telework was not yet so common and the possibility to use telework was considered as a privilege. Later, contradictory evidence has been found from several studies (Montreuil & Lippel, 2003), which weakens the unambiguous health-telework relation often referred to in the scientific literature. According to a survey carried out among 314 managers from the United States, managers consider employee's health status as the least important factor when deciding whether to allow telework (Sharit *et al*., 2009). Health advantages and risks concerning telework derive from different kinds of characteristics related to work rather than from telework as a work form only. It became evident that health is not anymore, a reason that managers should consider when deciding over enabling telework for employees.

It was found in New Zealand (Pond *et al*., 2010) that health problems induce retirement. The current study disappointed these expectations as the corresponding hypothesis was not confirmed. It can be explained that as low-income level concerned many respondents in this study, other factors could remain in the background. Despite their health situation, elderly in Estonia often postpone their retirement to maintain their income level.

Johnson (2011) has pointed out that flexible work arrangements act as important tools to influence older workers to postpone their retirement. The hypothesis "telework has positive effect on employees' intention to postpone their retirement" was confirmed by the results of the current study.

Older workers often delay retiring for many reasons, for example, they need affordable employer-sponsored health insurance (Rejda, 2015). Income issues are considered often by the elderly employees when deciding over retirement (Yamada & Higo, 2011). The same conclusion was drawn based on the current study. The reasons in high-income countries and low-income countries are different. Many older workers have postponed retirement to decompensate the substantial stock market losses; many retired pensioners experience considerable economic insecurity.

Intergenerational knowledge transfer is important for all counterparts by several reasons and the results show that elderly workers benefit from it (Harvey, 2012). Results from the current study support earlier findings (Brċic & Mihelic, 2015) about older employees' willingness to share their knowledge and skills with their younger coworkers.

5. CONCLUSIONS

The aim of this thesis research was to determine the cognitive human factors of telework that influence the extending worklife. To determine the human factors related to telework and compile the conceptual model, literature was reviewed, cover hypothesis was set and 14 hypotheses were proposed. Three surveys with nearly 500 respondents were conducted among white-collar workers in order to determine the desire and reasons for teleworking and their retirement intentions. 10 interviews were carried out to determine employers' attitude towards telework and telework as a tool to postpone retirement. Statistical analysis was used for testing the hypotheses and the conceptual model.

From the theoretical framework, it can be concluded that telework is seen from several different perspectives, which include telework's advantages and disadvantages to concerned parties, health factors and regional development. Different sources emphasize on different benefits and threats.

The studies testified that telework is widely spread among white-collar workers. The percentage of teleworkers in all surveys was about 80% (78% in survey 1, 88% in survey 2 and 84% in survey 4). Interviews with employers supported that conclusion. On a large number of examples, telework was considered even tacit. An important suggestion is that telework helps to concentrate on the content of the work. Irrespective of age, clearly, knowledge workers use ICT (incl. computers and internet) and there is no evidence supporting the myth that older people have difficulties with ICT, and teleworking is not for older people. All four studies showed that telework is more suitable for experienced employees.

Despite the wide spread of telework, employees in different jobs or industries have different reasons to prefer telework. Academic employees preferred teleworking for better concentration on work (72.6% of respondents) and saving time and money (67.2%). White-collar workers in the real estate sector preferred telework because it offers more freedom (46% of respondents) and reduces commuting time (36%) and costs (16.5%). No significant differences were found in telework usage by age and gender. Academic staff that uses telework, had fewer complaints about health, tired eyes, hypertension and stress.

Although ICT is a rapidly developing area, office workers have long-term experience in ICT use. In the early years of ICT vast growth, a common belief prevailed that young people are more successful working with computers. Current research has challenged that kind of beliefs by showing that mental workers use ICT despite their age. The results showed no statistically significant difference in the usage of ICT, although older employees were using laptops and smartphones less than their younger colleagues. It can be explained by the consideration that current senior office staff have worked with ICT for about a quarter of a century already. Older workers cannot be considered as persons with special needs or challenges regarding working with ICT. All users, despite their age, expect ICT to be designed for them and it is easy to use.

According to the current survey, employees in Estonia in general have a positive attitude towards postponing their retirement. Employees feel positive about working after legal retirement age and until the health conditions enable them to work. In Estonia, state pension is paid regardless of working and it is common to receive extra income by that way. A common opinion was that enabling telework affects employees to work after legal retirement age. State pension regulation that allows employees to maintain their pension while continuing working functions is a substantial incentive for people to extend their worklife.

Main conclusions from the study are as follows:

- According to the study, white-collar workers have good ICT skills and ICT is in constant use; thus, it may be concluded that there is a high potential for telework. However, employers' inactivity regarding telework arrangements is distressing. With little or no interference by employers, telework's potential will not be achieved.
- Telework is often valued for its flexibility. It is important to emphasize that the suitability of telework is individual-based. Distance from home to office and working conditions at home vary largely. Therefore, the decision to telework should remain with the employee.
- The main reasons to extend worklife are the desire to increase the income; satisfaction and fulfilment regarding own work; and desire to be with own workmates.
- Teleworkers who work all their work time remotely can have different problems compared to office workers or teleworkers that spend some time in office with their colleagues. Many full-time teleworkers complain social alienation or mental issues that are caused by lack of social contact during work.
- Age diversity in organizations has a high potential as individuals have different qualities at different ages.

5.1. Thesis contribution

The theoretical contribution of the study is the proposed and empirically tested conceptual model. In the current research, the conceptual model for using telework for postponing the retirement of workers in the shortage of workforce in Estonia has been elaborated. The conceptual model assembles telework-related human factors and extending worklife and can be applied as a human resources management tool for employers that are interested in extending worklife of mental workers. The conceptual model with its results contributes to the existing knowledge that is used for making labor policy. The results could be presented to the Ministry of Social Affairs of Estonia, to fine tune tools in the labor policy and find relief to the lack of skilled workforce.

One of the methodological contributions of the study relies on applying Kiva questionnaire (Näsman, 2011) as a measurement tool in the telework context. The

thesis also contributes to the evaluation of telework-related human factors from the extending worklife perspective. Results received from studies that involved teleworkers from real estate sector and university shed new light on the existing knowledge about retirement intentions; and the reasons and risks concerning telework. The thesis shows the industry influence on telework, which can be seen in the variety of reasons to prefer telework.

5.2. Implications of the study

The current study is focused mainly on part-time telework, where working from the traditional office is combined with working remotely. Research results showed that although employees are often allowed to telework, telework is rarely arranged on an organizational level. There is a strong need for organizational work arrangements concerning work schedules that enable knowledge transfer.

- Telework is widely used because of the benefits that it offers. It was found that employees are usually allowed to telework without any instructions or suggestions. Employers should learn more about telework-related factors and increase employer's involvement in telework arrangements.
- With the widespread of telework, the emphasis on a measurable work results increases. Telework requires measurable goals to be set for employees before their freedom to decide over a place of work is justified.
- Situation with many teleworkers in organisation requires new communication forms (e.g. instant messaging) between employees imposed by employer to converge all virtual team members to the same communication platform.
- Organizations can benefit in the means of knowledge management by taking advantage of age diversity. Intergenerational knowledge transfer offers an opportunity for young and inexperienced workers as well as their older experienced colleagues who can provide mutual help to each other.

As telework also involves disadvantages and risks, the parties involved in telework should pay attention on minimising the negative effect and risk.

- Many disadvantages and risks that telework hides can be avoided by providing employees with telework instructions that explain disadvantages and risks concerning telework.
- Work arrangements concerning telework could be established in organisations to integrate telework as a work form to the work environment.
- Setting office hours for employees who also use telework can be considered to avoid disintegration of teams and insure colleagues' mutual support and synergy in an organization.
- Total telework usually hinders communication and knowledge share in an organization. It is useful to combine telework with work in the office. It is often a dilemma between organisation's work environment and knowledge capital.

To use telework wisely and benefit from extending worklife, it is of essential importance to improve the knowledge of employers and employees on telework matters. Dissemination of knowledge acquired from the current study enables disadvantages of telework (e.g. social alienation and lack of mutual help) to be prevented.

5.3. Validity and reliability of the study

According to Collis & Hussey (2014) validity refers to the extent to which a test measures that the researcher wants it to measure and the results reflect the phenomena under study. They have pointed out two important forms of validity in business research, which are content validity and construct validity.

To ensure high content validity of the surveys all three questionnaires were pre-tested in advance and necessary changes were applied to the questionnaires after pre-testing. Pre-testing involved an expert or few representatives of a sample who answered the questionnaire and provided their own comments at the same time. All comments were saved and considered.

Construct validity refers to the extent to which the results that were obtained from the use of the measure fit the theories around which the test is designed (Sekaran & Bougie, 2013). For ensuring the construct validity, a set of questions were selected to measure the same concept. The correlation of results was analysed during data analysis.

Reliability testifies the accuracy and precision of the measurement and the missing differences if the study was repeated (Collis & Hussey, 2014). Reliability of a measure is an indication of the stability and consistency with which the instrument measures the concept and helps to assess the goodness of a measure (Sekaran & Bougie, 2013). To ensure stability of measures for surveys of the thesis, the influence by the researcher on the answers was minimised. Respondents answered voluntarily to the questionnaires in internet or on paper without researcher's assistance. The respondents remained anonymous when participating in the surveys.

Reliability and validity in qualitative study differs slightly from quantitative study. Reliability in qualitative approach involves category reliability and interjudge reliability. Category reliability relates to the extent to which judges can use category definitions to classify the qualitative data. Interjudge reliability refers to a degree of consistency between coders processing the same data. Validity in qualitative study is the extent to which the research results accurately represent the collected data (i.e. internal validity) and can be generalized or transferred to other contexts or settings (i.e. external validity. (Sekaran & Bougie, 2013)

To increase the reliability and validity of the interview results in the thesis, interview guide was prepared for data collection purposes and coding schedule for thematic units was created for the data analysis.

5.4. Limitations and future research

Current study has several limitations involved. First limitation is addressed on part-time telework. The thesis is designed to study only the telework that where employees work part of their work time remotely from their employer's premises. The thesis did not focus on full-time telework as it is considered to be used less compared to part-time telework. Full-time telework often involves various kinds of jobs compared to part-time telework.

From a methodological perspective, teleworkers were directly investigated mainly by quantitative approach, which is often result oriented searching for patterns and shared assumptions. Whereas a qualitative approach enables the capture of richer, deeper data of a phenomena (Ghauri & Grønhaug, 2005). Qualitative approach was applied to explore employer's perspective on telework.

As the knowledge workers from real estate sector were indicating a high overall job satisfaction regardless their telework usage, its influence on job satisfaction needs more focus in further research. Therefore, it is necessary to involve teleworkers from other industries.

Other limitations concern industry and country features. This thesis results describe situation in the areas where telework has been regarded natural for years. For that reason, the author selected the education and the real estate sector for the study. Although one survey focussed on telework in different areas, it is insufficient for acquisition of complete knowledge on telework for every sector where telework can be feasible. The study is limited with one country, Estonia, with its legislation and well-being level. Telework-related personal factors may act different role by country. It is necessary to investigate the legislation's influence on employee's decision to extend worklife.

In the current study, the importance of telework for aging people is ascertained with scientific methods. These results should be followed by the subsequent study as the second stage from the knowledge management perspective. Through the improvement of knowledge management of employers in particular, it is possible to improve the use of telework.

Telework has experienced significant changes during its availability. ICT as an inseparable part of telework is in fast progress and therefore it is expected that telework-related personal factors stay focused in the future research.

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APPENDIX 1

Article 1

R. Arvola, Ü. Kristjuhan.
Workload and health of older academic personnel using telework**.**
Agronomy Research, 2015, 13(3), 741-749.

Agronomy Research **13**(3), 741–749, 2015

Workload and health of older academic personnel using telework

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Abstract. Aim of the study was to measure telework usage and to explore interactions between health, workload and telework. Telework is work that is carried out outside the central office, involving new technology that permits communication. Work carried out at any time, at any place, has been very common in the case of research institutes and universities. This type of work has advantages and disadvantages for both an employee and employer. The study of telework was carried out in Tallinn University of Technology (TUT) where working at home has been very common for a long time. The questionnaires were sent to academic personnel. The study shows that academic employees preferred teleworking for better concentration on work and saving time and money. There was no significant difference in telework usage by age and teleworkers had fewer complaints about tired eyes, arterial hypertension and stress.

Key words: telework, work hours, diseases, stress.

INTRODUCTION

Telework is work that is carried out outside the central office (often, on the go and at home), involving new technology that permits communication. Concept of telework was first introduced as telecommuting by Jack Nilles in 1976 (Nilleset al., 1976). It has much increased in many developed countries in Europe, America and Asia during the last decades. People have worked in homes from time immemorial. Teleworking hasn't 'invented' any new places to work and principally new problems. It is a complex phenomenon that creates possibilities of a number of issues at present. It is important to redesign work life and support the work ability of older workers so that they are able and willing to work longer than before (Ilmarinen, 2009). Telework may be one of the options that quite easily provide flexibility to work life including older workers. The common myth that has to be dispelled is that older people have more difficulties when working with information communication technology.

Work carried out at any time, at any place, has been very common in the case of research institutes and universities. This practice supports understanding that work does not refer to a physical place, but rather more to a set of activities carried out by people. This type of work has advantages and disadvantages for both an employee and employer. There are also circumstances when teleworking has more advantages or disadvantages. Teleworking proposes new challenges, as it raises the chances of people working in places which are not tailor-made as most workplaces. Many people like freedom to choose the place for work.

However it may reduce the results of work through less control. People who work too many hours from outside the central office experience more stress and health problems. In some occasions there is also threat of decreasing physical activity or overeating which may lead to increase of body weight.

According to common understanding telework usage depends on workers age. Generally, young people are considered to be more interested in working outside the central office by using computers, mobile phones, tablets and internet, but some data (Arvola, 2009) were disproving this well-known position – young people were using less telework compared to their elder colleagues.

The average age of academic staff is relatively high compared to most white-collar workers and it is increasing at present as is the age of all work-force in Estonia. Experienced and qualified academic employees remain on the job for a long time. By law no person may be discriminated on the basis of age in Estonia. While most legal, organisational, psychological and social aspects of telework have been widely studied according to the scientific literature, less attention has been paid to problems connected to the age of academic personnel and the influence on their health (see The Oxford Handbook, 2012).

Sharit et al. (2009) studied managerial experience from a large variety of companies in the United States. The results presented a mixed picture with respect to the employability of older workers as teleworkers, and strongly suggested that less experienced managers would be more resistant to hiring older people as teleworkers (Sharit & Czaja, 2009).

AGEING AND HEALTH

Ageing is an accumulation of various types of damage in organism. A much longer life in healthy and youthful body has been human greatest dreams. Most ordinary people think that it is impossible.

Health depends on workload. High workload of older people is harmful. There is close relationship between biological ageing and age-associated pathologies in humans. Age associated diseases appear as a result of ageing. They develop from ageing changes in the organism. Distinction of ageing from diseases is separating undefinable from undefined (Evans, 1988).

European culture is fixed on eternal youth and middle-age. In official statistics, age-groups are for youth and middle-aged (20–24, 25–29 years etc.) and mostly up to 60 years. All older people are ‘older’. Medical research about older subjects is much rarer compared in people less than 65 years old. As a result of these peculiarities of medical research we don’t know well about hundreds of physiological parameters of older persons. We don’t exactly even know what the best weight and blood pressure is for older people. Many research articles showed that Body Mass Index (BMI) for 65+ should be less than 25 (bigger BMI is worse), but many showed that BMI > 25 is the best for health of older people. In 13 studies, Chapman (2010) found increased mortality only above a BMI of 27–28.5 for 65+.

There is need for experimental and longitudinal studies. Limitation of longitudinal studies on older workers is difficulties for that during years workers change professions and causes of this are very different, sometimes unhealthy working conditions.

SUBJECTS AND METHODS

The study of telework was carried out in Tallinn University of Technology (TUT) where working at home has been very common for a long time. At present many retired professors (emeritus) participate in scientific work of the university at home. The research sample consisted of 259 academic staff members of TUT who were agree to participate and answer questionnaire and whose responses were suitable for analysis. The sample size was enough regarding the representativeness of the survey. Actual sample size is greater than minimum sample size (100,39) that was calculated as following (see Eq. 1) (Arvola, 2006).

$$\begin{aligned} n &= \frac{t^2\sigma^2 N}{\Delta^2 N + t^2\sigma^2} = 100{,}39 \\ t &= 0{,}95 \\ \Delta &= 0{,}5 \end{aligned} \tag{1}$$

The purpose of the study was to measure telework usage to identify the factors that have influence on health. The questionnaire consisted of open-ended (e.g. factors that influence teleworking, personal benefits concerning telework, disadvantages concerning telework) and closed-ended questions (incl. telework usage, about teachers' mastery working with ICT equipment, about the size of their family, about the number and pages of publications and hours spent on scientific work (working with literature, planning and carrying out the research). Data about the time spent commuting between the university and home and about income were also included. Respondents were asked also about their health complaints concerning particular issues (e.g. high blood pressure and stress) on the scale 1–3, where 1 – do not occur, 2 – occurs rarely, 3 – occurs.

The criteria for participating in survey was occupation (holding academic position, e.g. professor, lecturer, researcher). People older than 45 years were considered as older workers. Questionnaires were sent to academic staff by e-mail and by paper. Survey population was 1,253 academic employees in TUT. Questionnaires were sent on paper and by e-mail. 260 questionnaires were completed and returned. 259 of the questionnaires were considered to be suitable for analysis. One returned questionnaire was removed, because the respondent declared significantly more telework hours (70 hours a week) compared to second most intensive teleworker (42 hours a week). Therefore final sample size was 259 and response rate was 21%.

RESULTS AND DISCUSSION

Data from survey in TUT showed that older academic staff is productive (Kristjuhan & Taidre, 2010, 2012, 2013). The productivity was highest in age group 56–65 years. Older academic staff published more articles per year compared to their younger colleagues.

According to telework usage survey in TUT in 2006 teleworking is widespread. There were no significant differences in teleworking usage by gender, but men tend to do 1 hour more telework a week compared to women. Majority (90%) of academic staff members that were 40 years old and younger evaluated their computer skills upper-medium and professional level (Fig. 1). It was 52% in age group over 50 years. But only 12 respondents (that was for instance 5% in age group 61–70 years) said that they can use a little when asked about their computer skills (e.g. 5% in age group 61–70 years). As results show, the vast majority of senior academic staff members do not have significant difficulties concerning working with computers. These survey results help to reject the common belief of elderly and ICT relationships. Academic staff members in TUT use computers regularly for filling their work tasks. Most of the work is organised in the way that the physical place of work do not matter and they have the access to information system and documents from any place that has internet connection.

But as the gathered data was measured through self-evaluation, there is still a possibility that difference in self-evaluation and objective skills still exists. The survey did not provide answer for question if younger employees have higher estimation on their computer skills compared to their elder colleagues.

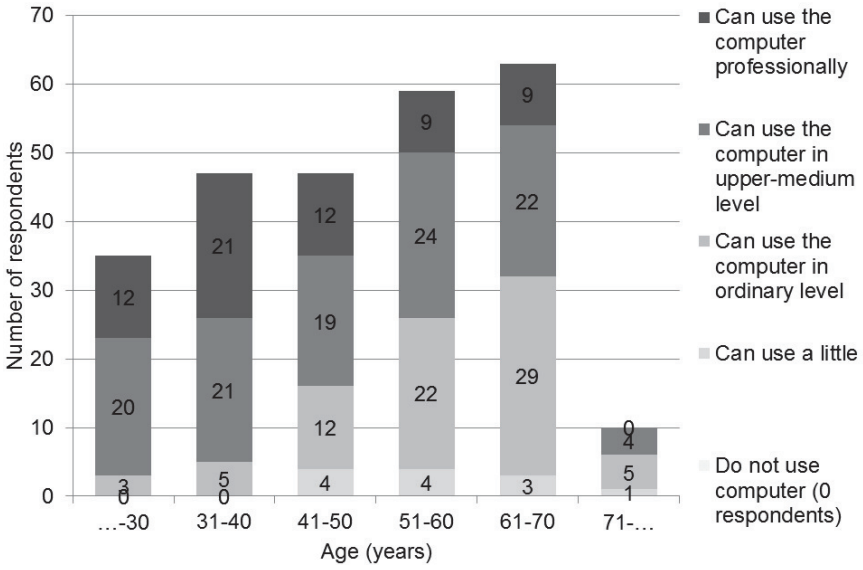

Figure 1. Computer skills self-evaluation (number of respondents) by age.

Present research shows that usage of telework doesn't depend on academic staff members' age (Arvola, 2009). Older academic staff used telework just a little more (see Fig. 2) than younger ones, but no significant correlation exists between age and telework usage. Nevertheless unlike in other age groups it was difficult to find respondents up to 30 years old who use telework more than 20 hours a week. In fact there was only one respondent in the youngest age group (36 respondents in this age group in total) whose estimation on telework usage in a week exceeded 20 hours.

With respect to overall stress level perceived working from office compared to working from outside the office (e.g. from home) the overall stress was perceived more often when working from office (Fig. 3). Most respondents did not perceive stress. 7% perceived higher or rather higher stress when teleworking while 49% respondents perceived lower or rather lower stress.

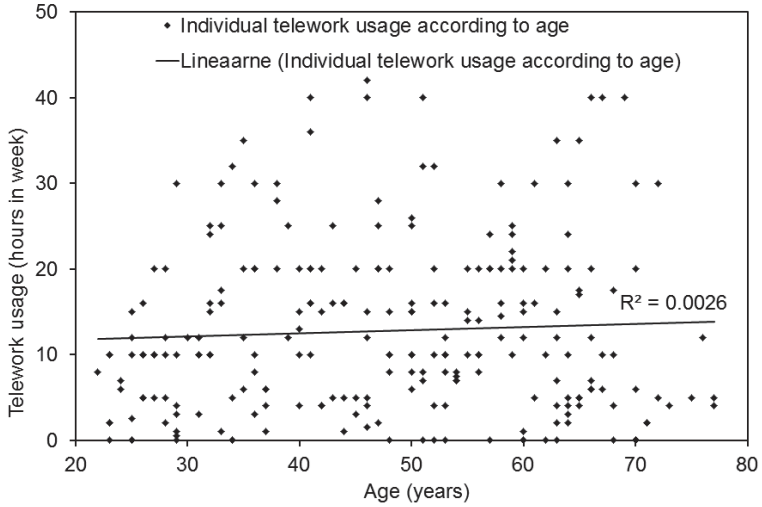

Figure 2. Telework usage and age.

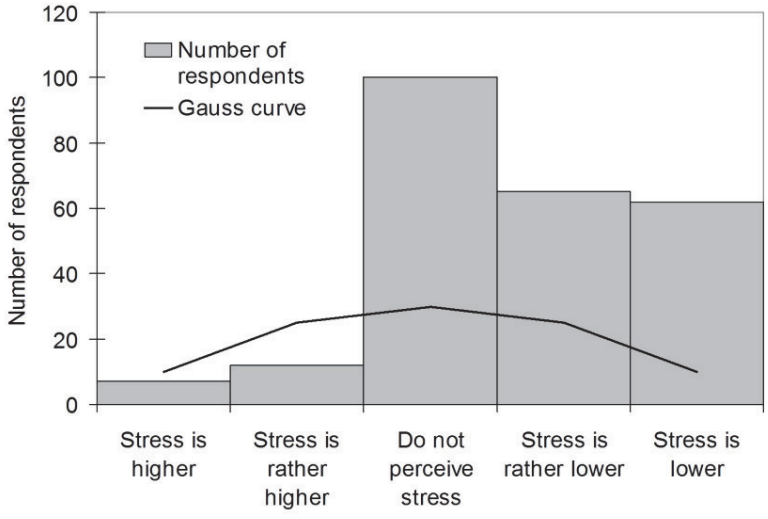

Figure 3. Perceived stress level of employee when working outside the office compared to stress level at the office.

Complaints of stress and hypertension varied according to same pattern by telework usage: non-teleworkers complained the most; respondents that teleworked 1 to 20 hours

per week had least complaints; and teleworking more than 20 hours per week brought a slight increase in complaints that still remained lower compared to non-teleworkers' complaint's level (Fig. 4 and 5). In Figs 4, 5 and 6 X-axis represents number of responses on assessment scale 1–3, where 1 – do not occur, 2 – occurs rarely, 3 – occurs. Telework usage did not caused significant increase in complaints of tired eyes, but as for stress and blood pressure, non-teleworkers had more complaints (Fig. 6). Survey results were not giving solid justification for the increase of complaints that go together with more teleworking.

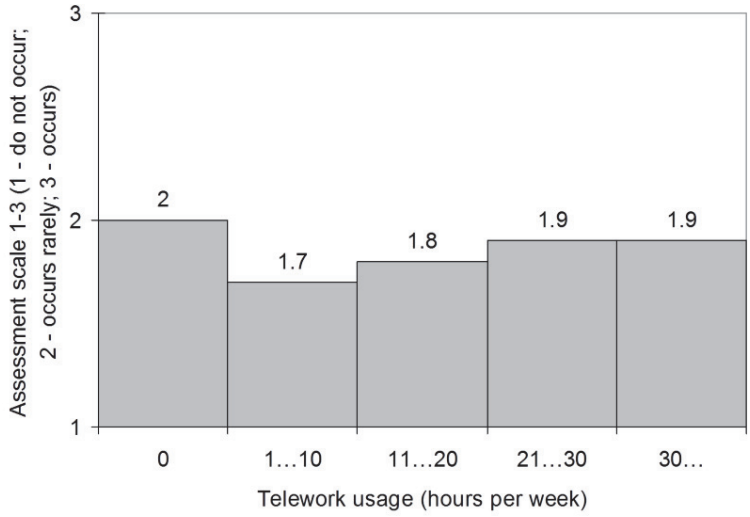

Figure 4. Complaints on stress.

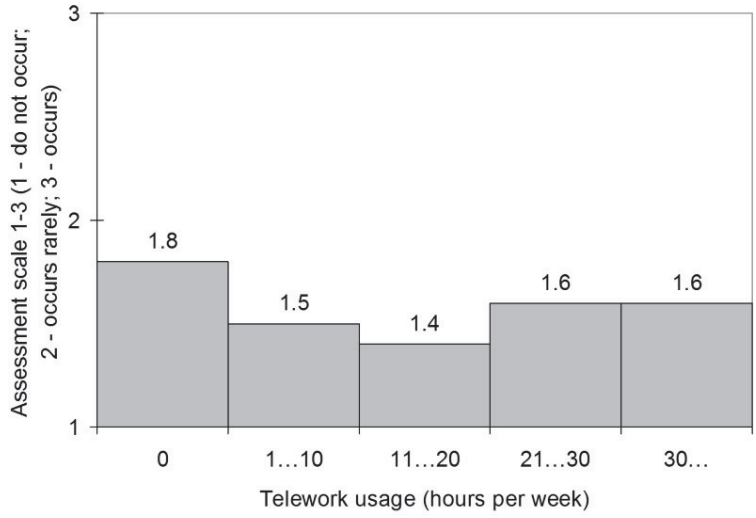

Figure 5. Complaints on hypertension.

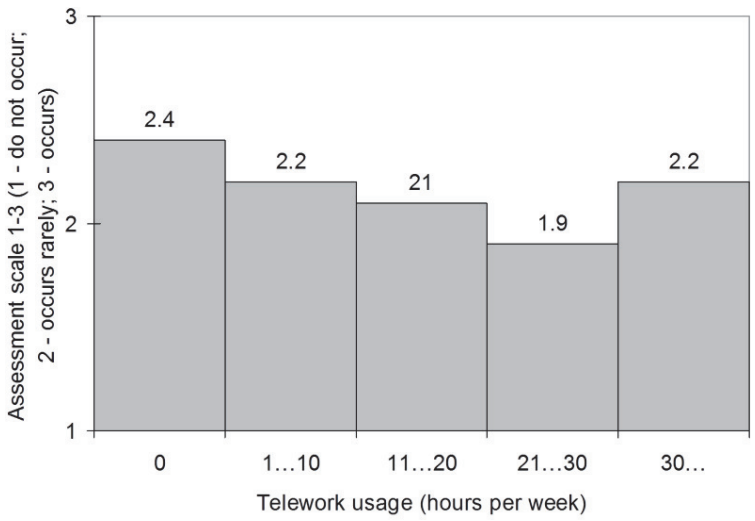

Figure 6. Complaints on tired eyes.

Lifelong employment in universities is enabled only in some countries (e.g. the United States). Second careers are possible for older specialists, including former academic staff, but academics have substantially changed the characteristics of their working activity. They start up their own firms, begin working as consultants and so on. Often these changes result in massive changes in lifestyle that can affect their competitiveness and health. Should specialists older than 65 be working in universities, either full-time or part-time when they want and are productive?

In the past, it was rare to encounter such aged academic staff among faculty members. At present older persons are healthier and the working conditions are better. Older people have more time for work – their children have grown up. This means that they also have more time to rest and recover their work ability.

It is often thought that senior academic staff offer experience, while the young offer new knowledge. However, knowledge is derived from experience. Peak work ability mostly comes earlier, but specialists are employed for their skills when they have yet to reach this peak.

Most specialists are rarely interested in the questions of older healthy (not with decrepit) workers. These questions are mainly new for them. They don't pay attention that there are some overlooked important benefits for employers of the old specialists: accumulated knowledge, work experience and discipline.

In order to telework as good working conditions at home as at traditional workplace are necessary: good posture, body movements to avoid a static position all the time, task lighting, avoiding glare on the monitor. Working conditions can be better at home than in office because of greater flexibility. It is important to keep to a 'work day ritual'. Compared with traditional workplaces the problems of overwork are more probable and workers should not exaggerate. When workers feel tired they can make a pause more easily compared to traditional workplaces. Teleworkers do sometimes agreements with employer on number of telework hours, e.g. in universities of the United States.

Among older academic staff there are more people with disabilities compared to younger ones. Older persons have more health disorders acquired during their lifetime. These disabilities depend on biological ageing, and their living and working conditions. However there is also much positive and these disabilities are mostly not hindrances for teleworkers activity.

The study shows that a majority of academic employees preferred teleworking for better concentration on work and saving time and money (see Fig. 7). There was no significant difference in telework usage by age and telework didn't increase complaints about tired eyes, hypertension and stress. Research of some other authors (Lundberg and Lindfors, 2002) show that blood pressure is lower working at home than at office.

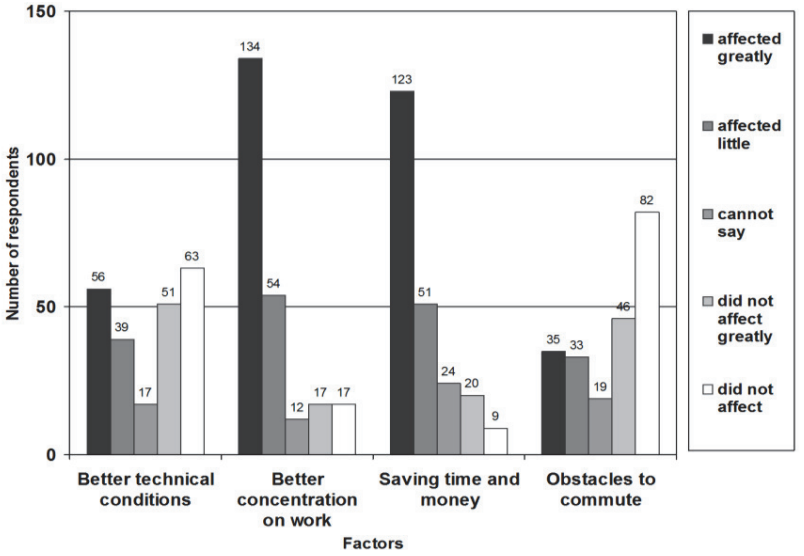

Figure 7. Factors affecting teleworking preference.

CONCLUSION

The study shows that teleworking among academic staff is widespread and for some people even tacit. Irrespective of age academic staff members use ICT (incl. computers and internet) obviously and there are no evidence supporting the myth that older people difficulties with ICT and teleworking is not for older people. Academic employees preferred teleworking for better concentration on work and saving time and money. Factor that had least effect on telework preferences was obstacles to commute. There was no significant difference in telework usage by age and gender. Teleworkers had fewer complaints about health, tired eyes, hypertension and stress. Survey did not explained the reasons why more teleworking hours involve more complaints regarding stress, blood pressure and tired eyes, but as academic staff very often faces heavy work load, it might be caused by simple overwork.

Further research is necessary to provide new knowledge about telework impact on people's life.

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APPENDIX 2

Article 2

R. Arvola, P. Tint, Ü. Kristjuhan, V. Siirak.
Impact of telework on the perceived work environment of older workers.
Scientific Annals of Economics and Business, 2017, 64(2), 199-214.

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Scientific Annals of Economics and Business
64 (2), 2017, 199-214
DOI: 10.1515/saeb-2017-0013

IMPACT OF TELEWORK ON THE PERCEIVED WORK ENVIRONMENT OF OLDER WORKERS

René ARVOLA[*], Piia TINT[**], Ülo KRISTJUHAN[***], Virve SIIRAK[§]

Abstract

Telework has become a natural part of regular work life of employees who use the information communication technology (ICT). Telework has a potential to support postponing retirement for mental workers. The objective of this research was to find out interaction between senior employees' teleworking and well-being. The main research question was – can telework improve elderly employees' well-being? Over 100 respondents from different areas in mental work were involved in a quantitative survey. The results of a conducted survey showed that telework is exaggerated to some extent as teleworkers' well-being (M = 7.79; SD = 1.28) does not diverge from non-teleworkers' well-being (M = 7.75; SD = 1.40). However, telework can be neither underestimated nor taken as interchangeable with traditional work. Therefore, it is necessary to pay attention to telework as a different way of working with its specialties. Systematic approach to telework enables companies to employ elderly by providing diversity of work forms.

Keywords: telework, senior work force, ICT, education in ICT, well-being, employer's support

JEL classification: J14, J26, J28

1. INTRODUCTION

Skilled labour shortage in Estonia was stated already at the beginning of the 21st century (European Commission, 2001). From this time on, the diversity of information communication technology (hereinafter ICT) -equipment has significantly increased. To contribute to the improvement of the shortage of Estonian labour force, it is necessary to support postponing retirement of people (Arvola and Kristjuhan, 2015, p. 741; Ilmarinen,

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2002, p. 17; Sharit *et al.*, 2009). The use of ICT-equipment sometimes causes psychological stress on ageing people and degrading their well-being.

Work-related well-being is often seen as inseparable from work stress. Work stress is a substantial factor to impact work-related well-being (Birdie *et al.*, 2015; Burke, 2002; Chou *et al.*, 2014). There are studies that consider work stress as indicator of a work-related well-being (Moeller and Chung-Yan, 2013).

Originally, stress has referred to as the external pressure of a physical force that a person is exposed to. 'By analogy with physical force, it refers to external pressure that is exerted on a person, which in turn results in tension or 'strain'' (Kahn and Byosiere, 1992). A common approach to stress distinguishes three different meanings: stress as a stimulus; stress as a response; and stress as a mediational process between the stressor (stimulus) and the reaction (response) (Chmiel, 2008, p. 121). Work stress is considered here as work-related stress.

Psychosocial stress can be defined as the result of a cognitive appraisal of what is at stake and what can be done about it (Scott, 2014). To simplify, psychosocial stress results from a perceived threat in our lives (real or even imagined), and discern that it may require resources we do not have. Examples of psychosocial stress include things like a threat to our social status, social esteem, respect, and/or acceptance within a group; threat to our self-worth; or a threat that we feel we have no control over.

Psychological stress and its influence on the health is developing by stages (Reinhold *et al.*, 2014, p. 225). The list of psychosocial stressors for ageing managers is more extensive than that for young ones (Teichmann *et al.*, 2004). As the amount of ICT-equipment is large and increasing and diverse options are offered, from the side of the manager, a good management system is required in the course of telework. An employer (a manager) of over 50 years old needs an ability to assess his (her) own psychological health possibilities not to be over-loaded.

At the same time, a strategy addressing population aging should take advantage of the potential of older people (Ministry of Labour and Social Affairs of the Czech Republic, 2008).

Technology is becoming a larger part of everyone's life, making it easier for any person to do the following: gain access to information about activities and services that meet their interests and needs, learn, engage in paid work and volunteering, find the best prices for products and services. The marketing of technology is generally aimed at the young ("Older people, technology and community," 2012), promoting gimmicky aspects of products that do not interest older people. Digital equipment is designed to attract young buyers who have grown up using technology. Small buttons, fiddly controls and unnecessarily complicated interfaces can all be barriers to older or less adept users. Only half of people aged 60-69 have access to the Internet at home, but this often falls to 17 % among people over 70; the use of ICT-technology by older people is connected with the necessity to have contact with family members or with the obligation if they are engaged in the work process. Our aim is to help the older workers to stay longer in the work process ("Digital Lifestyles: Adults aged 60 and over," 2009).

To what ends the digital participation? Has there been sufficient thought given to digital participation: can it be addressed as the approach developing one of the strongest threats to the people's health and wellbeing, a lack of meaningful social contact and social engagement.

Currently, video is the most descriptive and liberate area of technological development. Using Skype, older people feel close to the family and friends. The e-mail and the voice over Internet calls can enable quick and cheap contact with friends and relatives

across the globe. At the Conference of International Federation on Ageing in Melbourne that focused on the topic of social inclusion and technology, a video was highlighted as a means to help improve people's quality of life ("Older people, technology and community," 2012).

In the Angus Gold project ("Older people, technology and community," 2012) 50+ (2004-2007), 700 participants acquired IT- knowledge, 70% reported using IT for e-mail, 64% for accessing the Internet, and 45% for information acquisition. 44% of the participants were living alone, 40% with chronic illnesses or disabling condition. The group had less than 10% drop-out rate.

Concerning the group aged 55-64, there was a lack of understanding and confidence, combined with security and fears about doing something wrong. Advertising and product development are running against the use of novel IT applications.

It seems that the most of technology is being designed by and for 24-year-old males. Minor part of technology is sensitive to the needs and wants of older people.

A major problem is education, i.e. making sure that there are ways for people to access technology that makes it attractive. Capital purchases like hardware or infrastructure are expensive, but what people want and need is on-going training and support.

Mobile phones are promising tools to improve the quality of life for the elderly. The population of the European Union (EU) is ageing, and indeed, EU is already the world's oldest region. In 2000, there were 61 million people aged 65 and over, composing 16% of the total population (Walter, 2004).

Older people have much higher adoption rate to mobile phones than to Internet usage. Many older people use mobile phones in both leisure and work contexts (Kurniawan, 2007, p. 25). In 2002, about 70 % of Finns aged between 60 and 70 owned a mobile phone (Oksman, 2006, p. 11). Elderly feel themselves safe and secure having a mobile phone: they can live healthier independent life.

Mobile phone is the most radioactive domestic appliance ever invented (Coghill, 2001; Chen and Katz, 2009, p. 179). Therefore, it is necessary to pay special attention to the cases when a person is exposed to the phone for a longer time period.

Most of the world's developed nations are experiencing an increase in the average age of their population (OECD, 2006). Older adults now make up the fastest growing consumer segment of Internet users (Hart *et al.*, 2008, p. 191). The term older worker has been defined in a variety of ways. It could be 'over 40' and also 'over 75' (Wagner *et al.*, 2010, p. 870). In a workplace context, older typically refers to workers over the age of 50 or 55 (Kooij *et al.*, 2008, p. 365).

2. WORK LIFE AND TELEWORK

Three major reasons have been found (Plaza *et al.*, 2011, p. 1983), why the employers do not show higher commitment to retain their mature employees: 1) the consequence of the negative view on mature workers from the side of the employers; 2) indistinctness about the employment practices that would encourage them to remain in the labour force; 3) lack of knowledge about the development and implementation of specific human resources practices relevant to mature workers (Armstrong-Stassen, 2008, p. 336). Many people report in surveys that they wish to continue working after traditional retirement age, their health status at older ages is generally better than in the past and many jobs are less physically demanding (Eyster *et al.*, 2008, p. 1, Munnell *et al.*, 2006, p. 1; Tishman *et al.*, 2012, p. 3).

The drop-out from working life may cause severe social problems (Gaβner and Conrad, 2010, p. 18).

The solutions feasible for elderly people are: telework arrangements, training opportunities for elderly, education of employers on the value of older workers; helping older workers find employment: job and career centres; employment web sites, job fairs, job counselling and changing legislation.

Deferred old-age pension is a type of state old-age pension. Although it is not common anywhere else in Europe, Estonian Social Insurance Board has set the following regulations for motivating retirement postponing (Social Insurance Board, 2015):

– A person has the right to receive a deferred old-age pension at any time after his or her right to receive an old-age pension arises.
– Deferred old-age pension is granted at a later age than the pensionable age.
– The following persons have the right to receive deferred old-age pension:
  - permanent residents of Estonia;
  - aliens residing in Estonia based on temporary residence permits or temporary right of residence.
– Deferred old-age pension shall be calculated pursuant to the procedure for calculation of old-age pensions by increasing the pension by 0.9 per cent for every month, which has passed after the person has attained the pensionable age.
– Deferred old-age pension shall not be granted to a person to whom a state pension has been granted (except a survivor's pension or a national pension upon loss of a provider) pursuant to the State Pension Insurance Act or any other Act.
– Deferred old-age pension is granted for life.
– Upon calculating deferred old-age pension, the pension shall be increased by 0.9 % for every month that exceeds the attained pensionable age.

It is difficult to find one single definition for telework. Multiple terminology is used to indicate telework (e.g. telecommuting, distance work, flexi-work, mobile work, network work). Although Nilles *et al.* (1976), who introduced telework concept, described it as 'telecommuting', stakeholders have adopted 'telework' as a term. And therefore authors of the current paper prefer 'telework' to alternative terms that are sometimes used to denote the similar concept. In this paper, telework is defined as a work carried out outside the central office, involving new technology that permits communication (Arvola, 2006, p. 35). Telework is often applied by working part of the work time remotely, usually from home. Telework is one of the most commonly mentioned strategies to enable older workers to work from home. It saves a great deal of time and stress (Patrickson, 2002, p. 713). From employers' perspective, telework provides strategy for coping with work overload and liberating from fixed temporal work schedules, which have positive impact on company's performance (Sanchez *et al.*, 2007, p. 57).

Competent older individuals have the potential to become teleworkers, but they may need to complete specialized training. The social, medical and psychological aspects have to be taken into account, as elderly may suffer from a loss of earlier mental and psychological capabilities. Nowadays smartphones are available. Smartphones for elderly have to meet their specific needs: there has to be only a small number of functions available and if the smartphone is needed in the work activities, then the employer has to give the possibility to the older people to be trained for the use of smartphones (Selwyn, 2004, p. 382).

There is a tendency to view the elderly as a homogeneous group, but the concept of 'older people' refers to a diverse group: native people and immigrants, individuals with a

university degree and those who have no specific training, and healthy people and frail individuals (Plaza *et al.*, 2011, p. 1985). The elderly think that mobile phones are more accessible than personal computers (PC) and the Internet. Mostly, the mobile phones are considered to improve elderly persons' quality of life. Current trends suggest the society of the future will have more active and healthier older adults who will be physically able to work. The use of mobile phones by elderly will increase in the future, as the younger elderly who have had experience with mobiles in the earlier phases of their lives will continue to use mobile applications as they become retired.

Telework study in six countries that was investigated by Haddon and Brynin (2005, p. 44) who have shown that the net homeworkers are likely to be male, professional and relatively highly paid. PCs homeworkers are of significantly lower social status. Female homework is associated with relatively high-status work and not predominantly with routine, low-paid work.

Some papers have reported health risks from the use of mobile phones (Repacholi, 2001, p. 326; Patrick *et al.*, 2008, p. 3). The health defects are not finally certain, but it is recommended to use the mobile phone not longer than 2 minutes successively.

The computer use by adults is a multi-disciplinary topic by nature; the use of social cognitive theory as a lens was very effective and the investigation showed how the older group has to be inspired (Wagner *et al.*, 2010, p. 870).

Social Cognitive Theory (SCT) is a widely accepted model of individual behaviour (Chan and Lu, 2004, p. 312). The roots of SCT lie in the domain of social learning theory (Bandura, 1986). SCT is based on the premise that environmental influences such as social pressures or unique situational characteristics, cognitive and other personal factors, including personality as well as demographic characteristics, and behaviour are reciprocally determined (Compeau and Higgins, 1995, p. 190). Individual behaviour is influenced by personal factors, which in turn are influenced by behaviours; and behaviour may be influenced by environmental factors while having their own impact on the environment.

A person refers to the older adult, including all of the physical, cognitive, and emotional attributes that make up this individual. It seems that as age increases, the attitude to the computers changes. A study that examined the relationship between experience and attitudes found that individuals with positive attitudes had more experience (Wagner *et al.*, 2010, p. 872). Quantitative studies on the interaction between behaviour and a person are contradictory. Qualitative descriptions about the impact of computer use on the lives of older adults are generally positive (Dickinson and Gregor, 2006, p. 744). The use of computers leads to increased social support. Environment-person interaction: the environment impacts positively on older adults; the support and training provided for the system is also important, training leading to higher levels of self-efficacy, confidence, attitudes, and reduced anxiety (Wagner *et al.*, 2010, pp. 877-878).

The developers of the training systems for ICT for older adults should bear in mind that older adults perceive barriers to their computer use, in particular lack of benefit and lack of motivation. Training courses should create motivation for use. Support personnel should be trained to highlight these points, since older users tend to rely heavily on this service.

Computer-workers are under pressure, as increasing amounts of work have to be done within limited time. Stress is not only a feeling that shapes well-being. It changes functions in the body: release of a variety of hormones, increased breathing, quickened pulse, and the production of more stomach acid. Computer work causes social problems: it distracts an individual from the normal social or family relations and this in turn may lead to depression

(Eltayeb *et al.*, 2007). The interaction between the body and the work environment is complicated and four important systems (central nervous, automatic nervous, endocrine and immune) are involved in this network (Raja *et al.*, 1996).

The question: is it possible to reduce the physical and psychosocial risk at workplaces by speaking with people, training them and solving the problems regarding the issues of their complaints. Kiva questionnaire was used in order to investigate psychosocial and physical working conditions at computer-equipped workplaces for 295 workers (Tint *et al.*, 2014, p. 231). The results showed that in constant workplaces (where workers were divided into two groups: under 40 years and ≥40 years, the scores in the questionnaire were from 6.5 to 8.95, the lowest scores were obtained for the question 'does the workers enjoy the job?' (6.5), 'the superiors are good' (6.8) and 'the possibility to influence their own job content' (6.8).

The high-performance liquid chromatography method (HPLC Water Alliance with UV detection) was used to determine cortisol in saliva (Kalman and Grahn, 2004, p. A43). The cortisol content in saliva is one of the indicators of psychological stress. Saliva samples were collected three times during the day: in the morning (8-9), at noon (12-13) and in the afternoon (16-17). Each participant was asked to hold special sampling tubes 'Salivette' in their mouth for three minutes. The samples were analysed by the Laboratory of Hygiene and Occupational Diseases in Riga Stradins University (Tint *et al.*, 2014, p. 233). The results of the measurements of cortisol in saliva of Estonian computer-workers showed that the level of cortisol is decreasing during the day. The changes in the cortisol levels in the three investigated offices were between 10.3 to 4.1 nmol/l, from which one is situated in the countryside. The workers in the last one were more stressed at the beginning of the workday and the stress level decreased intensively during the day compared with the capital computer-equipped offices. The reason could be that the knowledge of ergonomics is poorer in the countryside than in the capital.

In addition to the main objective authors of the current research were also interested in finding out which ICT devices over 60-year workers use and do they consider the information acquired through these devices useful or have they developed an attitude to quit some of the devices because of the great flood of useless information.

Older individuals' (workers') life can be improved if they are engaged in the telework.

3. MATERIALS AND METHODS

Kiva (Näsman, 2011, p. 34) questionnaire composed of seven questions and a self-validated questionnaire to investigate telework possibilities (based on the questionnaires available in the scientific literature) was used to measure well-being and investigate stress factors arising from the relationship between the employees and employers at the workplace.

The Kiva questionnaire characterizes the well-being of workers at work. The ratings were given in a 10-point scale (1- not at all, 10- very much so, certain or well). The Kiva questionnaire is composed of seven questions:

1. Have you enjoyed coming to work in the last weeks?
2. I regard my job meaningful
3. I feel in control of my work
4. I get on with my fellow-workers
5. My immediate superior performs as superior
6. How certain are you that you will keep the job with this employer?
7. How much can you influence factors concerning your job?

Telework and ICT usage was also measured in a 10-point scale (1- not at all, 10- very much so, certain or well). For measuring telework, the following questions were selected:

1. How much of your work time do you work outside the employer's workplace?
2. To what extent do you want to work outside of the employer's workplace?
3. To what extent do you perceive stress when working in the office compared to working outside the employer's workplace?
4. If it is totally up to you, to what extent do you want to work only in the employer's workplace?
5. To what extent have the following factors influenced you to work outside the office? Factors: better technology; better opportunity to concentrate; saving in time; saving in money; difficulties to move; flexibility to work whenever desired.
6. In case, if it is totally up to you, to what extent would the following factors influence you to work outside the office? The same factors that were listed in the previous question.

The following questions were asked to measure ICT usage (in 10-point Likert scale):

1. In your own opinion, how skilled are you in computer use?
2. To what extent do you perceive a need for learning anything regarding computer?
3. To what extent do you like to work with a computer?
4. How much do you use computer for working?
5. To what extent is computer necessary in your work?
6. How much do you use computer for activities unrelated to your work?
7. To what extent do you use the following ICT devices and applications for your work? Devices and applications that were listed: PC, laptop, tablet PC, smart phone, MS Outlook, MS Office, social networks.

In addition to that, respondents were also asked about their demographic profile (incl. age, gender, education, size of household and presence of children and disabled persons in household)

The research questions were:

1. Can telework improve elderly employees' well-being?
2. Does ICT usage diverge at different ages?

Based on these research questions, five hypotheses were postulated:

H1*: Telework users have higher well-being compared to non-users.*

H2*: Telework usage of employees younger than 50 years of age is similar to the telework usage of employees over 50 years old.*

H3*: ICT usage of employees younger than 50 years is similar to the ICT usage of employees over 50 years of age.*

H4*: ICT devices' usage of employees younger than 50 years is similar to the ICT devices' usage of employees over 50 years of age.*

H5*: Presence of underage, pre-school age or disabled persons influences telework usage.*

IBM SPSS statistics 22.0 and T-test were used to verify the hypothesis.

Telework is a form for workers with ICT and only for these people, telework can be considered as an alternative to the traditional office work. Nonprobability sampling and convenience sampling were chosen. The purpose was to collect answers from respondents who work with computers most of the time and whose work tasks enable them to work outside of the traditional office. Therefore, authors of the current paper asked people who

met the predetermined criteria to participate with filling the questionnaire. Our survey involved wide-scale ICT users. However, among respondents those who do not use telework were also found. Though a convenience sample has no controls to ensure precision, it may still be a useful procedure and often one will take such a sample to test ideas or even to gain ideas about a subject of interest (Cooper and Schindler, 2006, p. 424).

Employees that do mainly mental work from different business areas were selected as the target group for the survey. Sample size was aimed at least 100 respondents. Nonprobability judgment sampling technique was used to collect responses from wide variety of areas. Respondents were selected from different organisations, including companies, non-profit organisation, government institutions, educational sector and self-employed. Sample size was 107 respondents and the data was collected during two weeks on January 11-22, 2016. Majority of the respondents received a paper copy questionnaire, but in a few cases, the questionnaire was sent and returned by e-mail if the respondent asked for this option. Questionnaire was available in Estonian and all the respondents were from Estonia. There were no people who refused to participate.

There were more women (62.6%) represented than men (37.4%) in the sample. About half of all the respondents (55 respondents) were older than 50 years and 35 of them were at least 60 years old. Sample structure by age is described in the following table (Table no. 1).

Table no. 1 – Age structure of sample

Respondent's age	Frequency	Percent	Cumulative Percent
<30	9	8.4	8.4
30-39	18	16.8	25.2
40-49	23	21.5	46.7
50-59	20	18.7	65.4
60-69	20	18.7	84.1
>69	15	14.0	98.1
Not available	2	1.9	
Total	**107**	**100.0**	

Regarding education of the respondents, a great majority of respondents had higher education (77.6%) or secondary education (19.6%). Only one respondent had basic education (0.9%). This kind of educational background can be justified with common education of an office employee who is the main potential for teleworking.

Senior employee according to the current study is a person who is at least 50 years old. Setting border to 50 years is quite common in other studies regarding ageing work force (Ilmarinen, 2001).

For distinguishing teleworkers from non-teleworkers question 'How much of your work time do you work outside the employer's work- place?' with 10-point scale was used, where '1' indicated 'not at all' and '10' indicated 'whole work time'. Respondents that answered '3' to '10' were considered as teleworkers, because partial telework form is far more common nowadays compared to full time telework. Working mainly with computers was required for qualifying into the research sample. As a result, all respondents were using computer for work related tasks and the vast majority of the respondents (90%) used computer for most of their work time.

4. RESULTS AND DISCUSSION

Current research results reveal that respondents perceived slightly more work stress when working outside employers' workplace but there was no strong correlation found between work stress and teleworking.

Work stress level that was measured by using Kiva method had no significant correlation with teleworking time nor intention to telework. Therefore, according to the study, work stress level of teleworkers is not different from non-teleworkers.

Our hypotheses were tested by using correlation and 2-tailed T-test. Independent Samples T-test was used to verify the hypothesis.

Hypothesis 1 (H1)

It was not supported that telework users have higher well-being compared to non-users. Tested hypothesis was H1: Telework users have different well-being level compared to non-teleworkers. Results of Kiva questionnaire pointed out: it cannot be concluded that teleworkers' well-being is significantly different compared to non-teleworkers (p-value = 0.868; t = -0.167).

Respondents' self-evaluation on work stress according to question 'To what extent do you perceive stress when working in the office compared to working outside the employer's workplace?' showed little difference. When working in the office teleworkers perceived less stress (average score 6.3) compared to non-teleworkers (average score 6.1). According to Kiva method average scores in majority of questions showed higher well-being for teleworkers compared to non-teleworkers (Table no. 2).

Table no. 2 – Comparison of well-being evaluation of teleworkers and non-teleworkers

Factor	Teleworkers	Non-teleworkers
Enjoyment of coming to work	7.8	7.8
Importance of job	8.4	8.1
Control over work	8.0	7.5
Getting on with fellow-workers	8.8	8.8
Immediate superior's performance as a superior	7.4	7.7
Certainty to keep the job	7.0	7.6
Ability to influence factors concerning job	7.2	6.6
Total	**7.79**	**7.74**
N	***72***	***28***

Note: Kiva method, mean value in 10-point scale where greater value refers to greater well-being and less stress.

However, teleworkers' average score showed higher stress concerning certainty to keep the job and immediate superior's performance as superior. Nevertheless, it cannot be concluded that telework improves well-being, because differences between teleworkers' and non-teleworkers' answers regarding well-being were insignificant.

Hypothesis 2 (H2)

Telework usage of employees younger than 50 years of age is similar to the telework usage of employees over 50 years old. Tested hypothesis was H2: Telework usage of employees younger than 50 years of age is different from telework usage of employees over

50 years old. Results cannot confirm statistically significant (α = 0.05) difference between telework usage of employees that younger and older than 50 years (p-value = 0.093; t = 1.695). Therefore, hypothesis was supported: the conclusion is that telework usage of respondents over 50 years and respondents under 50 years do not diverge.

However, significant differences (p-value = 0.009; t = 2.647) were found in willingness to work outside of the employer's workplace. Younger employees (mean value 5.9) were more willing to telework compared to over 50 years old employees (mean value 4.5).

The result support findings from an earlier study among academic staff, indicating the absence of correlation between telework usage and age (Arvola and Kristjuhan, 2015).

Hypothesis 3 (H3)

It was partially supported. Tested hypothesis was H3: ICT usage of employees younger than 50 years is different from ICT usage of employees over 50 years of age. ICT usage of employees younger than 50 years is similar to the ICT usage of employees over 50 years of age regarding how much respondents use (p-value = 0.111) and how important is (p-value = 0.523) the computer for their work tasks. It was also revealed that attractiveness of working with computers (p-value = 0.803) did not vary significantly between mentioned age groups.

On the other hand, difference of respondents' self-evaluation on their skills regarding ICT was statistically significant (p-value = 0.003; t = 3.098). Younger employees' self-evaluation (mean value 8.0) outstripped self-evaluation of 50+ employees (mean value 7.0). In addition to self-evaluation, results (p-value = 0.002; t = 3,161) showed statistically significant difference regarding usage of ICT for activities that are not related to work. Younger employees (mean value 7.0) use computer more often for activities that are not related to work compared to older employees (mean value 5.6). Altogether, results cannot confirm significant difference between ICT usage of employees younger and older than 50 years.

For many years, ICT is considered to be something where young people have advantage, but as current results relied on respondents' self-evaluation, it needs further research to find out if self-evaluation is objective method to assess ICT skills. Even more, as ICT has become a natural part of life, we may expect that acquired ICT experience of older people could give them an advantage compared to young people.

Hypothesis 4 (H4)

ICT devices' usage of employees younger than 50 years is similar to the ICT devices' usage of employees over 50 years of age. Hypothesis was rejected partially. Regarding desktop computers (p-value = 0.005; t = -2.863), laptops (p-value = 0.004; t = 2.961) and smartphones (p-value = 0.024; t = 2.293), there were statistically significant differences in usage between the age groups younger than 50 and 50+. However, surprisingly this was not found regarding to the tablet PC (p-value = 0.521; t = 0.644), MS Outlook (p-value = 0.793; t = 0.263), MS Office (p-value = 0.082; t = 1.754), and social networks (p-value = 0.461; t = 0.740).

Hypothesis 5 (H5)

Presence of underage, pre-school age or disabled persons in the family influences telework usage. Hypothesis was not supported. Results cannot confirm statistically significant difference between teleworkers and non-teleworkers regarding presence of underage (p-value = 0.369; t = -0.969), pre-school age (p-value = 0.468; t = -0.800) or disabled persons (p-value = 0.547; t = 4.303).

Presence of underage, pre-school age or disabled persons did not affect telework usage. Further research is necessary, as there were only 10 respondents who had disabled persons in their household. Four of them did not use telework.

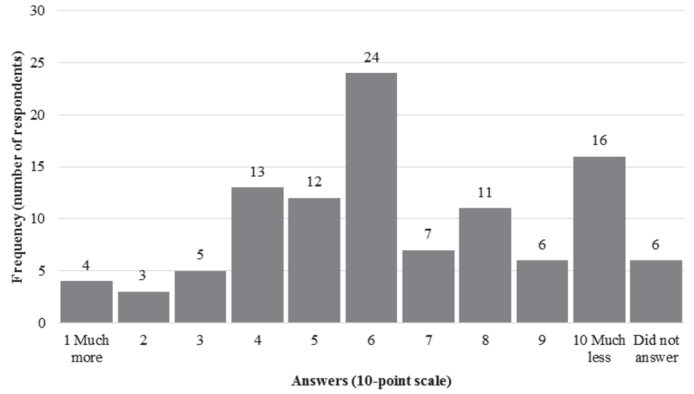

Figure no. 1 – Perceived work stress when working at workplace compared to teleworking

Respondents perceived slightly more stress when working outside an employer's workplace (mean = 6.26) (Figure no. 1). These results differed from the results of a study conducted among academic staff in Tallinn University of Technology in 2006 (Arvola and Kristjuhan, 2015). According to the study among academic staff, majority of the academic staff members perceive less stress when working outside the office.

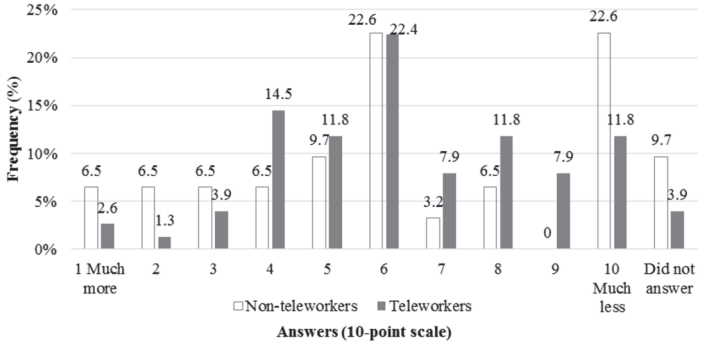

Figure no. 2 – Perceived work stress when working at workplace compared to teleworking, a comparison of teleworkers and non-teleworkers

For defining the extent of telework, the following question was asked: 'How much of your work time do you work outside the employer's workplace?' Respondents were provided with answers on a 10-point scale, where '1' indicated 'Not at all' and '10' as 'Whole work

time'. In the analysis, as teleworkers were considered the respondents who answered 3 to 10 to the question. Non-teleworkers were defined as respondents who answered 1 or 2. Teleworkers' and non-teleworkers' perceptions on work stress depending on workplace (in or outside the employer's office) did not vary significantly (Figure no. 2), which may be considered as a surprising result. Nevertheless, it can also lead to the assumption that one's decision to telework may not be a free choice, but to some extent, a situation forced.

At the same time, there was a correlation (R = 0.577) between a 'want to do telework' and a 'want to do telework in case if it is up to the employee to decide'. The results also pointed out correlation (R = 0.508) between 'time that was spent on telework' and a 'want to work from outside of the employer's office'.

Table no. 3 – Well-being by age

Factor	Younger than 50 years	50 years or older
Enjoyment of coming to work	8.0	7.7
Importance of job	8.5	8.2
Control over work	7.6	8.0
Getting on with fellow-workers	8.8	8.8
Immediate superior's performance as a superior	7.0	7.8
Certainty to keep the job	7.8	7.0
Ability to influence factors concerning job	7.4	6.8
Total	**7.85**	**7.75**
n	***50***	***49***

Note: Kiva method, mean value in 10-point scale where greater value refers to greater well-being and less stress.

There was also a correlation (R = 0.258) found between the perception of the work stress at employer's workplace compared to teleworking and intention to work only in employer's workplace. Employees who perceived less stress when working outside the employer's office agree easily to work outside the employer's workplace only.

Well-being according to age was also analysed (Table no. 3). Greatest difference was about certainty to keep the job. Younger employees were more certain that they would keep the job with this employer. But younger employees' judgement on their immediate superior's performance as superior was lower than the older employees' judgement. This immediate superior's performance received lowest score from the younger employees.

Older employees in comparison, felt more stress regarding the ability to influence the factors concerning their job. Ability to influence factors concerning job received lowest score in 50+ age group.

5. CONCLUSIONS

Although ICT is a rapidly developing area, office workers have long-term experience in ICT use. In the early years of ICT vast growth, a common belief prevailed that young people are more successful working with computers. Our survey has challenged that kind of beliefs. It can be explained by the consideration that current senior office staff has worked with ICT for about a quarter of a century. Older workers cannot be considered as persons with special needs or challenges regarding working with ICT. All users expect ICT to be designed for and around humans despite their age.

One of the strategies to reduce work stress for employees and improve their well-being is to reduce factors that act as a source of work stress situations. Regarding telework, these are not always the same factors for every person. The results show that people perceive working from home in different ways. Some people feel more stress when working from home and therefore telework should be considered as a voluntary option instead of work style that is stated by the employer. From the stress avoidance perspective, the decision to telework should be discussed with the employer, but the final decision should be made by the employee.

Regarding the older staff, telework can usually be discussed if an employee has substantial work experience with ICT. With remarkable experience, the place of work becomes less important. Unlike younger colleagues, experienced employees need less support from others, but risk for social alienation remains. From the knowledge transfer perspective it is still important to maintain the option for employees with different experiences to meet each other from face to face. However, the final decision for teleworking should be made by the employee again. The employer can provide the information regarding telework and favour the decision by enabling teleworking, which in turn helps to prolong the employment of senior specialists.

The results of the current study reveal that the former belief that ICT involvement of old and younger office employees differs, is untrue. This finding might encourage stakeholders of ageing workforce to consider telework as one of the measures for increasing employment among ageing workforce.

To hold ageing persons longer in the working activities needs multifunctional advanced ICT learning programs. Particular projects for entrepreneurship for persons over 50, for example, across Estonia are needed. It is required to publicize the project all around Estonia, to organize training schools (in summer) for people over 50 who do not have computer skills.

Mobile phone use does not depend on the age of the users, which is supported by the other authors as well (Plaza *et al.*, 2011, p. 1979). In contrast, the use of a computer is not so frequent. Only a small part of people over 63 (in the retired age) can afford the use of smart-phones and tablets. In addition, it is not only because of lack of the resources. The tablets are used by people who have used them earlier or who have been advised to use them by their family members.

Future research should emphasize the profiles of a telework user, as there is still lack of knowledge regarding the total workload of a teleworker compared to a non-teleworker. Results of these studies may show is telework popular for those employees whose workload is relatively high.

It is also necessary to have more qualitative information about the reasons why people choose telework as their mode of work. It is important to find out how telework can be used as a tool to facilitate more people to choose the possibility to postpone their retirement, which is necessary for avoiding ageing catastrophe.

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APPENDIX 3

Article 3

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EMPLOYER ATTITUDE TOWARDS TELEWORK IN REAL ESTATE SECTOR

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Abstract. Telework usage is increasing together with wide spread of information communication technology (ICT). White-collar workers are familiar with working from outside of the regular workplace, e.g. from home or when travelling. Nevertheless, the employers' attitudes towards teleworking vary in a large extent and the companies have different rules concerning enabling teleworking to their employees. Purpose of the study was to find out managers' attitudes towards telework and how they perceive factors that are related to telework of older employees. Special interest is paid on senior employees, who are more experienced and therefore more independent when choosing their way and place to work. Interviews with chief executive officers (CEO) from 10 real estate companies from Estonia were conducted to collect primary data for this study. The results: telework in real estate companies is ordinary; CEOs see flexibility as the main benefit of telework; the main threats that were indicated by CEOs, were: a) communication between employees is insufficient, b) there is nobody in office sometimes, c) reasons of employees' poor results remain unclear. From one side, telework suits better to the experienced employees as working alone is easier for them compared with less experienced employees and they need less help from colleagues regarding their job-related issues; from the other side, the older people have more challenges with using ICT.

Key words: telework, real estate sector.
JEL code: J14, J26, J28, J62

Introduction

Telework as a concept was first introduced as telecommuting by Jack Nilles (Nilles J., 1976). Telework is often defined as a way of work where information communication technology (ICT) enables employees access to work remotely, usually from home (Sullivan C., 2003). According to the European Trade Union Confederation, telework is defined as a form of organizing and/or performing work, using information technology, where work, which could also be performed at the employers' premises, is carried out away from those premises on a regular basis (Implementation, 2006). In current research, telework is defined as a work that is carried out outside the central office, involving new technology that permits communication (Arvola R. *et al*., 2015). Working from home offers a lot of benefits to the employees and employers. For employees the benefits could be: savings in time and expenses; strengthening of working motivation; flexibility of the working mode; fitting work into own rhythm and situation of life; peace to do work etc. From the viewpoint of the employers, the benefits, the advantages are: lower overhead costs; increase in productivity; keeping the skilled employees etc. There are also advantages on less impact on the environment: less traffic; decrease in emission caused by fuel consumption and traffic; less consumption of resources; savings in infrastructure; improved local economy etc. Some of the authors bring out the disadvantages for the employees connected with telework: having to reserve space for work at home; the health hazards of office equipment; the risk of social alienation; the risk of burnout as the work continues at home endlessly. The disadvantages for the employer are as follows (Heinonen J., 2000): risk concerning data security, initial investment expense etc. Most of the teleworkers visit their office at least once a week, so many of the risks can be reduced. The possibilities and willingness to carry out telework is individual and one of the main factors that incline the worker towards telework is the distance from home to work. There are other important factors, like the place where the (nursery) school of children is located or the quality of info-communication equipment at home and they are much better at the permanent workplace (Arvola R., 2006).

There are examples from the foreign literature (Krugman P., 1988; Nuur C. & Laestadius C., 2012) that since 2000 the people who have left their places of birth to the bigger cities for work, are now coming back as their living conditions in

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big towns are not good (noise, stress, pollution), particularly not healthy for the young generation (small children); the housing is expensive in the cities etc. Therefore, young people and also elderly who want more silent places for living, are going back to their roots. The tendency in Latvia is yet that the proportion of rural population is decreasing because of the lack of challenging jobs in the countryside (Vitola A. & Baltina I., 2013). Here, telework can help. According to research, there are some work procedures that are better organized on the permanent workplace, like copying, scanning and printing services. Therefore, the company has to invest in the beginning of the telework organization, but afterwards the investments will stabilize. There are advantages and disadvantages of telework. The Latvian research (Vitola A. & Baltina I., 2013) showed that the majority of working age people in cities as well as in rural areas is willing to be involved in telework.

There are some determining factors for "yes" or "no" to telework or for developing the telework at the rural area (Sullivan C., 2003): 1) transportation; 2) ICT-equipment level; 3) ICT systems security; 4) individual factors, like small children or elderly people wish to live away from towns; 5) the workplace location of the partner/husband.

Generally, the authors point out that home-based telework appears to be as one of the major areas where the new technology has the potential to change people's daily practices and thereby create better life quality to the individual (Vitterso J. *et al*., 2003).

There are many problems connected to the development possibilities of telework. For example, as said above, the responsibilities for childcare would restrict participation in conventional on-site work. This gives the advantage to telework (Sullivan C. & Lewis S., 2001). There are some sources that deal with the gender influence on choosing "telework" (Bae K.B. & Kim D., 2016). The results showed the positive relationship between the organizational adoption of telework and the employees' job satisfaction. Female workers are likely to have a more favourable attitude toward teleworking than their male counterparts (Bae K.B. & Kim D., 2016). Telework in particular is one of the most widely implemented types of family friendly policies. It is defined as "periodically, regularly, or exclusively overforming work for their employers from home or another remote location that is equipped with the appropriate computer-based technology to transfer work to the central organization" (Hunton J.E. & Norman C.S., 2010).

Results of Morganson *et al.* (2010) investigation showed that the main office and home-based workers had similar high levels of work-life balance support and job satisfaction. Thus, allowing employees flexibility in choosing their work locations is related to positive outcomes.

The current paper is concentrated on the real estate workers whose work is "networked" (Garrett R.K. & Danziger J.N., 2007) in such a way that they regularly work in a combination of home, work and field contexts. Unfortunately, telework can be a source of work-life imbalance. Especially, in high stress jobs, working from home may not allow workers to escape work, both mentally and physically (Russell H. *et al.,* 2009). Telework enables workers to continue working for longer hours (Hill E.J. *et al*., 2003). As a result, teleworkers may experience increased stress and overload (Konradt U. *et al*., 2003; Russell H. *et al*., 2009; Towers I. *et al.,* 2006).

Technology continues to be a catalyst for change in all areas of business and industry, and the real estate market is no exception (Garebaglow S., 2016). Today's worker is more mobile and business can operate anywhere. While telecommuting may not be a viable option for all companies or for all employees within the company, many organizations have utilized

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remote work models with great success. This mode of work is reducing the amount of office space and is changing the dynamics of what constitutes an ideal-real expensive location. In addition to reducing the amount of office space that company needs, and re-imagining how that space is used, technology is also bringing down barriers between potential tenants and real estate owners. Developments in cloud-effective and real-time property information, which means many leasing activities, are taking place online. As young families want more space for living, they retreat to suburban and exurban homes and this will not limit the professional options for work to them.

As of September 2015, more that 3.7 million employees work from home in the U.S. at least half of time, according to Global Workplace Analytics (Thorsby D., 2015). One of the biggest problems for people working at home is that they do not work 7-8 hours, but they work 24 hours per day, 7 days per week. A special space for your office helps. Everyone works differently, and the great advantage of the home office is: it can be personalised so that people become as productive and happy as possible. Telecommuting has a growing influence on commercial real estate sector: telecommuting is on the rise; companies have trimmed costs by reducing their need for physical space. Fewer employees are required to be on site; improving productivity and retaining employees; continuity (work is possible also in extreme weather conditions, not go out from home), expanding the talent pool (teleworking gives the possibility to work for disabled people, living in other geographical regions, as well as for single parents etc.) (Hauser D., 2014). The author suggests that from 2014 based on the trends in teleworking, a 69 % increase of teleworkers from 2014 levels is expected by 2016.

Problems: 1) What are the main factors that are considered by the employers when they consider telework in their company?

2) Is telework seen as a tool for extending work life of older employees?

Aim and tasks of the research to solve the problem: are ageing people eager to work further when reaching the retirement age if telework is proposed to them as the mode of work?

Novelty and topicality of the research: the work topic is very topical for Estonia, where the work-force is decreasing. Are older workers (with the experience in the real estate field 10 years and more) more appreciated by the employers than very young workers or even students in the shortage of workforce?

The problem was solved by the qualitative study in 10 real estate companies from Estonia. The analysis of the interviews with the CEOs of these real estate companies was used.

A great number of real estate companies have experienced telework for many years. Therefore, the real estate sector was selected as a focus for the current research.

Research questions: (1) To what extent the managers of the real estate companies see that telework is applicable for senior employees?

(2) What are the circumstances that affect telework utilization for senior employees?

Research method

Qualitative approach was applied for solving the research questions.

Data for the research were collected by the semi-structured interviews. An interview guide with open-ended questions was prepared.

Content analysis was applied. Thematic units were used for coding and the coding schedule was as follows in Table 1.

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Table 1

Coding schedule

No	Topic
1	Share of teleworkers in the company
2	Assessment on possibility to apply telework in the company, that interviewee represents
3	Time that employees work remotely
4	Importance of employees' presence in the office
5	Management's attitude towards teleworking
6	Employees' attitude towards teleworking
7	Existence of senior employees in the company
8	Attitude towards employees who postpone their retirement with the help of telework
9	Senior employees' ability to cope with telework
10	Senior employees' motivation to postpone their retirement

Table 2

Sample description

Interviewee	Company size (number of employees)	Approximate amount of teleworkers
1	65	0
2	40	0
3	35	25
4	150	10
5	70	20
6	20	15
7	15	3-4
8	12	0
9	25	23
10	30	0

Source: interview transcriptions

Sample was compiled from 10 chief executive officers (CEO) of real estate companies as the nature of research question needed experts as interviewees. In the beginning, 11 companies were selected, but one CEO was not able to find time for the interview. Company profiles are described in Table 2. Information about demographic profile of interviewees was not collected because it is less important information in expert interviews. Only company size was asked in the interview.

Interviews were conducted from September to November 2013. Each participant was introduced with telework definition before the interview.

Interviews were in face-to-face form and each interview lasted about two hours. All interviews were recorded and later on transcribed.

Research results and discussion

Interviews revealed that managers' experiences and attitudes vary in a large scale. Some CEOs said that their experience with telework has shown rather undesirable results, while others expressed that the place of work does not matter much. None of the CEOs said that telework in their company has been imposed by the employer.

The following results were derived from the analysis of the interviews by the topics presented in Table 1.

1. Share of the teleworkers in the company

Share of teleworkers among all employees also varied. One CEO said that in their company it is almost impossible to do telework because the nature of the job requires the presence and telework is conceivable only in some rare cases.

There were also companies where telework is feasible, but it is not supported by the company and the presence in office is required, except when meeting with the clients at sailing objects etc. These CEOs also had previous experience with telework in their company. One CEO who did not favour telework, expressed his own opinion that employees in their company seem to prefer working in their office together. However, majority of CEOs recognized that many or even prevailing majority of the employees are teleworkers as they work remotely a part of their work time. Recently mentioned interviews with particular CEOs revealed that the decision for teleworking is made by the employee and accepted by the employer.

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2. Assessment of possibility to apply telework in the company

As mentioned above, telework cannot be utilized in every job or company. In the current research, there was one company, whose profile was entirely related to the real estate maintenance and majority of the jobs in this area are difficult to adapt for teleworking.

Others admit that it is possible. Some interviewees justified their resistance to telework with lack of control, social contact or with their earlier experience.

Interviewee 3: */…/ "we do not control people and we cannot know what they actually do and where they actually are."*

Interviewee 6: *"You can communicate with people and exchange your thoughts, because this work needs colleague's opinions, even on price levels. Therefore, this immediate contact is also good as well as having a cup of coffee together in the mornings".*

Interviewee 10: *"We have had years ago people who have wanted it (telework) and we have allowed these people to use it, but the economy requires to measure the results and they do not show that working from home is expedient, effective, lucrative or more profitable compared to being out from home at the office".*

Nevertheless, most of the interviewees stated that telework is not only possible but also a natural work mode in their sector. It was also seen as an advantage to provide flexibility, which is considered to be important for customers.

Interviewee 2: *"The reason why we use telework is to adapt to new circumstances and flexible use of working-time is one of the valued benefits in real estate broker's work".*

Many interviewees expressed that telework needs special attention by stakeholders and its impact is wider than only employee's individual result.

Interviewee 9: *"If it is organised in the company so that there are certain times when people need to get together and they know what they do and to whom and how they provide service to, then I think it is very OK".*

They also referred that telework suits individually. Even those interviewees who did not support telework generally, admit that telework is suitable if an employee is experienced.

Many interviewees indicated that together with telework there is one "important aspect" connected with the image of the company that needs to be settled: some of the customers want to visit the company's office without warning and it needs to be taken care of that there is always somebody present and available.

3. Time that employees work remotely

Interviewees altogether estimated that the share of work time when employees work remotely is 30 % to even 90 %. A common assessment was that employees work at least half of their work time remotely. Exception was one company that stated that telework generally couldn't be applied in their company.

4. Importance of the employees' presence in the office

Prevailing opinion was that employee's work results are more important than being present. It was also common to suppose that for older and experienced employees' presence is less important than for younger employees.

Some interviewees see employees as entrepreneurs and therefore it is up to employees to decide over how they work and the company cannot forbid telework. They also pointed out that telework is common in real estate sector.

At the same time, some interviewees referred to the importance of communication and direct contact in team.

Interviewee 3: *"Firstly, information goes around here and secondly it motivates people and thirdly, according to training, because /…/ there are million different situations, then from each situation it is learnt case by case".*

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5. Management's attitude towards teleworking

Some interviewees said that they do not support telework. One admitted that managers in their company do not share the same views on telework.

Compared to telework opposition, the majority of the interviewees liberally tolerate telework, letting employees to decide over their work form. Two interviewees mentioned telework's individual suitability. One of them told that telework can be supported only if work results show the improvements due to that and the other interviewee emphasized on telework's unsuitability for younger and inexperienced employees.

One CEO said that for an owner it is pleasant to work in the same office with others rather than to work remotely even if it is possible.

There was no sign of attitude that some companies impose telework for their employees.

6. Employees' attitude towards teleworking

Interviewees expressed their opinion about employees' attitude. Two interviewees said that employees' opinion is not considered. One of them added that telework issue was discussed already within their recruitment process.

Two interviewees who supported telework, reported employees' attitudes that were different from them. One told that older employees prefer working from office because they do not feel comfortable with ICT while telework is preferred by their younger colleagues. The other interviewee expressed some disappointment regarding the issue. Interviewee said that employees' attitude is unfavourable, because employees would like to see more colleagues in the office, but at the same time, it happens sometimes that there is nobody in the office on Friday.

Half of the interviewees communicated positive attitude towards telework by employees.

7. Existence of the senior employees in the company

Majority of the interviewed companies had about 10 % of employees that were at least 50 years old.

There was only one company with employees without any worker who is 50 years or younger. Nevertheless, the same company had earlier positive experience with over 70 years old worker, whose work results were the best in the company.

8. Attitude towards employees who postpone their retirement with the help of telework

Only one interviewee reported that in their company it would be impossible to use telework regardless of age.

Rest of the interviewees expressed at least in some extent positive attitude towards enabling teleworking for the older employees.

Some interviewees said in the retirement context that telework is not suitable for every employee and this is individual, but the prevailing attitude was rather favourable.

All examples that interviewees gave regarding telework, as an option to postpone retirement, were exclusively positive. It is important to point out that among them were two interviewees who did not support telework in general, but, as an option for older employees, it was considered to be benefit for the company.

One interviewee added exception for these older employees who had no experience in real estate sector.

Interview 6: *"But I do not approve the training of a new one and I am negative about it".*

Several interviewees emphasized that company benefits a lot if an employee postpones retirement and telework is suitable for the experienced employees.

Interviewee 9: /…/ *"I believe that in some target groups pension-aged people are more trustworthy".*

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Interviewee 7: /…/ *"because loyalty and personnel stability are great values".*

Interviewee 2: *"Experienced worker's continuing is in a favour compared to new ones".*

9. Senior employees' ability to cope with telework

Opinions were divided. One common view was that telework, as it requires ICT use, is usually more challenging for older people. However, at the same time some of them added that the situation is improving. Others were positive about the older employees' coping with telework, but most of them still had to admit that older people have more challenges regarding ICT. Several interviewees pointed out that these ICT usage problems would be easier to solve from office than remotely.

10. Senior employees' motivation to postpone their retirement

A common opinion was positive and the majority of interviewees mentioned additional income as the main reason.

Interviewee 8: *"Estonian pension is as it is".*

Other reasons were brought out only by two interviewees.

Interviewee 7: *"I believe so, because real estate brokers' work enables communication with people and /…/ keeping active in life and I think for these reasons to do something, /…/ is the reason why people still continue to work".*

One of the interviewees added that older employees seem to enjoy their work and being with the others.

Interviewee 10: *"/…/ at this time as a manager I watch how nicely younger and older workers communicate with each other, then at least the pension-aged employees were excellent".*

Discussion, conclusions, recommendations

The majority of interviewees did not see that the form of working (i.e. teleworking) had significant impact on work results. Some managers see that the disadvantages of telework do not outweigh the flexibility created by telework. Main threats concerning teleworking that interviewees pointed out were reduced social contact and communication between employees and reduced productivity, that were also described by Heinonen (2000). Current results did not support same circumstances (i.e. transportation, ICT-equipment level etc.) that were described by Sullivan (2003).

Although some interviewees pointed out that the older people have more challenges concerning ICT that is crucial for teleworking; attitude that prevailed, was following: when an employee is experienced and decides to continue working in telework form in retirement age, manager's reaction is positive.

Some pointed out that older employees are more experienced compared to younger ones and therefore more efficient when working alone.

Analysis of interviews led to conclusions:

1) telework in real estate companies is widely used;
2) CEOs see flexibility as the main benefit of telework;
3) main threats that were indicated by CEOs were: (a) communication between employees is insufficient, (b) possibility of having nobody in the office to serve unexpected customers, (c) reasons of employee's poor results remain unclear;
4) (a) on the one hand, telework suits better to experienced employees as working alone is easier compared to less experienced employees and they need less help from the colleagues regarding their job-related issues; (b) on the other hand, older people have more challenges with using ICT.

Later survey (n=73; carried out by the authors of the current paper) among employees from real estate companies in Estonia in 2017 showed that telework is still widely used by employees, mainly because it provides more freedom for employees. Less than 10 % of respondents were not using telework at all.

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Telework was considered a popular incentive to support postponement the retirement.

Authors see great potential in intergenerational knowledge transfer in both directions regarding work arrangements in companies where telework is relevant.

Following suggestions were made:

1) senior employees need more training regarding ICT;
2) it is also important to set work arrangements that enable social contact, including mutual help of colleagues and knowledge transfer from more experienced to less experienced workers.

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APPENDIX 4

Article 4

R. Arvola
Telework usage among white-collar workers in real estate sector.
Scientific Journals of Poznan Univerity of Technology series of "Organization and Management", 2017, 12 pp, accepted.

ZESZYTY NAUKOWE POLITECHNIKI POZNAŃSKIEJ
Nr Maszyny Robocze i Pojazdy Rok

1,7 cm

René Arvola*, Piia Tint*

TELEWORK USAGE AMONG WHITE COLLAR WORKERS IN REAL ESTATE SECTOR

Telework has become a common form of work for white-collar workers in recent years. Although the number of telework studies increases, there is still a lack of knowledge regarding telework – as the opportunities for this mode of work are developing rapidly. The purpose of the current study is to find out the spread and drivers of telework in real estate sector. Current research uses empirical data from a survey with 127 respondents who work for real estate companies in Estonia. Data were collected through a quantitative questionnaire during 2017. Three hypotheses were presented regarding the drivers for the employees. The study confirmed that employees in real estate sector use telework in order to save commuting time and costs; and to have more freedom and privacy. The results show that only a small number of employees have remained untouched by the telework. Based on the current study on information-communication technology (ICT) and mobile devices' daily use, telework has a high potential in the real estate sector. The decision to work remotely is usually made by workers themselves and therefore the main drivers for teleworking have been employee-centred. It is necessary to educate employees and employers concerning the advantages and risks connected with telework. That would contribute to introducing telework's potentials and suggestions to them.

Key words: telework, telecommuting, ICT use, office work, real estate sector.

1. INTRODUCTION

The modern workplace is becoming increasingly reliant on distributed work arrangements, in which employees work part-or-full-time from home, coffee shops, satellite offices, and elsewhere rather than at a unified scenes [1]. Telework was considered as an innovative work establishment form for new decentralized assemblies already in 1999 [2]. The flexibility of telework in both time and site of task performance has to make it possible to take benefit of this work administration for economy affordability. Organisations increasingly introduce workplace flexibility practices that provide flexibility with regard to where or when the employee works [3]. Telework has a positive effect on the new creation development

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presentation through enabling knowledge distribution, cross-functional cooperation and inter-organisational participation.

Telework has been suggested as a means to reduce unnecessary work-related travel, including the daily commute. Telework occurs when information communication technologies (ICTs) are applied to enable work being accomplished at a distance from the location where results are needed [4].

Private sector companies have rather big savings from telework [5]. At IBM, 40 % of its 386,000 global employees do not have a traditional office and many tens of thousands more work outside their offices at least some of the time. Since 1995, office space has been reduced and the savings have been to 100 million dollars. Sometimes it is forgotten, that the public sector is the largest industry, employer, landowner and tenant in the world. For example, if only a small percentage of the 1.8 million U.S. Federal employees were equipped to perform their jobs outside the office, cost savings in real estate, related to capital assets, and utilities could number in the tens of billions. The IBM case study [5] include how telework adaption depends upon a systematic, cross-discipline approach to real estate management, human resources, finance, and information technology. Many people already work at locations other than the office. With a little more support and an overall strategy, office space can be drastically reduced.

To the question, where people work instead of their workplace, the 1st option was home (63 %) and the 2nd option was car (40 %) [6]. Who wants to work from home? Only 21% said they would not be interested at all. There are also some groups of people for whom telework as a possibility is more critical. These include the disabled, those with eldercare responsibilities (a rapidly growing group), military families, and rural workers. There are different opinions on telework effectiveness [7-10]. From that viewpoint the research question is: how effective is telework in different work activities?

The aim of the paper is to find out the spread and drivers of telework in combined with traditional office work: on the example of real estate sector.

2. THEORETICAL BASIS

Telework (telecommuting) can be conceptualized as an “anytime-anyplace” form of work [11, 12].The work involving data processing, accounting, computer programming, design, customer service, quality control, and health care, can be performed from home. The number of employers who allowed their employees to work at least one day per month from home, increased from 9.9 million to 12.4 million. If contract workers are included, then about one fifth of the total workforce, 28.7 million workers were teleworking between 2005 and 2006 [13]. Many companies, especially in the financial, information technology, and communication sectors, are now referring to the knowledge management of different size of enterprirses [14]. Also the advanced systems for improvement the working environment conditions have got more importance [39]. Some companies rely on a “work-at-home model” that has been referred to as a virtual or remote workforce. However,

majority of workplaces do not offer telework opportunities to employees, or if offered, there is a limited scope with respect to the amount of time an employee can work from the home [15]. The concern for retaining older workers through the telework arrangement was voiced by the head of the U.S. government's telework program: "With fierce competition for human capital and a retirement wave, telework provides a work style to retain older workers and recruit younger workers looking for flexibility" [16]. There are very few empirical studies that have analysed the perception differences of telework benefits and barriers in industrial and service companies [17].

Telecommuting practices and their environmental and organisational performance impacts have stimulated research across academic disciplines. Although telecommuting trends and impact projections are reported, few true longitudinal studies involving large organisations have been conducted [18]. Telework has been one of the most vaunted areas of opportunities for rural areas by European policy-makers [19] arising from the new ICTs. The difference in employee perceptions between the adopters and non-adopters of telework suggests that the latter lack confidence in their firm's broader human resource management practices to adopt appropriately to the requirements of effective telework implementation [20].

The work/family border theory [21] has been worked out to investigate the role of ICT use at home in shaping the characteristics of work/family borders (i.e. flexibility and permeability) and consequently influencing individuals' perceived work-family conflict, technostress, and level of telecommuting. The results showed that the more people used ICT to do their work at home, the greater they perceived their work/family borders flexible and permeable. Low flexibility and high permeability, rather than the use of ICT at home, had much stronger influences on increasing family-to-work conflict. The work-to-family conflict was significantly and positively associated with technostress [22, 23].

There are different training methods for telework. Using a game-based training method facilities the training process by increasing users intrinsic motivation resulting in increased intention to use the technology [24-26].

According to Potter [15], the main reason why telework is not extensively used in most organisations is due to the premium that first-line supervisors and middle managers place on the "socialization aspects of the workplace" as a basis for confirming whether the worker is meeting performance standards and adapting to corporate culture. Other contributing factors include difficulty in ascertaining the economic benefits of such programs and a lack of training regarding how to best manage telework.

There are a lot of advantages that the employers obtain using telework [27]:

a) Evaluate the extent to which home-based work can reduce traffic congestion and greenhouse gases in their communities
b) Solve regional issues as outbound workforce migrations, talent shortages, and labour force mismatches
c) Encourage population to work and shop where they live

d) Help understand the role that work-at-home programs could play in transportation demand management, energy conservation, and greenhouse gas emissions
e) Increase productivity.

ACS (American Community Survey) [27], is a nationwide survey conducted annually by the U.S. Census Bureau. ACS data showed that employee WAH (work-at-home) population grew 61 % between 2005 and 2009. WAH by class of worker shows that the Federal Government growth has been up to the 400 % during 2005-2009. The original driving force for WAH among federal workers was the threat of a bird flu pandemic. Swine Flu and other crises have bolstered the government's resolve to make telework necessary. Other meanings about the benefits and the concerns associated with telework have become more clearly articulated from the perspectives of both the employer and the employee [11, 15, 20]. For employers, some of these benefits include an increased labour pool (to include older people and people with disabilities) and enhanced recruiting potential; improved retention of qualified staff; less sick leave and absenteeism; reduced costs for office space and parking; heightened productivity, improved customer service and improved organisational image. The concerns for organisations: the negative effects on activities requiring teamwork (considerations in 2003, without Skype), less control over data security (2003, the security systems have improved up to 2017), less control greater ambiguity with respect to legal issues governing work at home, such as worker injuries or health risks [15].

John Berry announced [27]: 'Presenteeism, the practice of sitting at one's desk without working, can be just as problematic as absenteeism. I am an adamant supporter of telework because workers in an effective telework program can only be judged by their results'. Most employees who work at home have at least a college degree, and a significant percentage have a postgraduate degree.

Study in IBM in 2001 with over 5000 respondents (incl. traditional, virtual and home office employees) found little evidence for telework's negative business effect [23]. This study also brought out that although perception was that telework had enhanced employee's productivity, the direct comparison showed no significant difference between teleworkers and traditional office workers.

3. HYPOTHESES

Greater freedom and flexibility for employees constitute to the common benefits that are mentioned regarding telework. Workplace flexibility is the ability of workers to make choices influencing when, where, and for how long they are engaged in the work-
influencing when, where, and for how long they are engaged in the work-related tasks, but these are depending from several characteristics: individual; home and family; workplace; community etc. [28].

Flexible work schedules and telework are often integral because of mutual influence between them [3]. Telework causes flexibility in work schedules and flexible work schedules give rise to telework.

Flexibility that telework offers, broadens options for companies to attract new employees. Staffing is more effective because flexibility of telework can be marketed as an advantage [17]. Telework allows more flexible alteration to the market situations, where and when to work [29].

Flexibility exists, when employees are capable to choose where and when to work. Survey results among 245 United States educated professional employees concluded that employees' positive well-being is determined by the type of access to telework, formal access to telework will not ensure positive well-being for employees and therefore, informal flexibility practice is necessary [22].

The following hypothesis was proposed:

H1: Need for greater freedom influences the employees' decision for teleworking

One of the telework benefits according to literature is reduced commuting time and costs [30-33]. In many studies, commuting time was found to have a large positive effect on telework. It is often so, that the reduced commuting time is the most valuable benefit compared to direct transport costs. However, the Dutch survey with 1335 respondents found that teleworkers did not save commuting expenses more often compared to non-teleworkers [26]. On the environmental level, telework can reduce pollution of the air caused by less traffic [4]. The second hypothesis was proposed as follows:

H2: Need to reduce transportation costs influences the employees' decision to telework

Teleworking may offer better working conditions for mental work when there is less noise compared to traditional office [10, 34]. Telework enables to increase work efficiency by providing peace to do work [35]. Often traditional offices do not allow possibilities for concentrating. Telework study among 259 academic employees in Estonia showed that better concentration on work is one of the top reasons for teleworking [7]. The third hypothesis was proposed as follows:

H3: Need for reduced interruption influences the employees' decision to telework

4. MATERIAL AND METHODS

There are different possibilities to collect the information, where and when people work. For example are they travelling to work (travel costs and time) or are they not travelling at all [27]? The real estate sector was selected in the current study as the object for research whereas the majority of the workers in this area have experienced working remotely for many years.

Research methods used were formation of the expert group, sample selection, questionnaire structure, avoiding teleworkers and non-teleworkers bias, trust-building practices for gaining respondent cooperation and veracity, data collection and analysis [18].

TABLE 1

SURVEY SAMPLE STRUCTURE (n=127)

Characteristics	Group	Frequency	Share of respondents (%)
Age	Less than 30 years	16	12.6
	30 to 39 years	39	30.7
	40 to 49 years	32	25.2
	50 to 59 years	23	18.1
	60 to 69 years	9	7.1
	70 years and older	3	2.4
	No response	5	3.9
Gender	Man	63	49.6
	Woman	64	50.4
Education	Basic	1	0.8
	Vocational	15	11.8
	Secondary	12	9.4
	Higher	97	76.4
	No response	2	1.6
Position	Real estate agent	42	33.1
	Real estate appraiser	21	16.5
	Real estate manger	17	13.4
	Project manager	8	6.3
	Managing director	6	4.7
	Other	16	12.6
	No response	9	7.1
Personal status	Single	12	9.4
	Cohabiting	49	38.6
	Married	51	40.2
	Divorced	8	6.3
	Widow(er)	4	3.1
	No response	3	2.4
Household size	1	13	10.2
	2	48	37.8
	3	14	11.0
	4	31	24.4
	5	12	9.4
	6	3	2.4
	7	1	0.8
	No response	5	3.9

In order to test the hypotheses, a questionnaire was designed. A survey was selected as a data collection method as the aim was to involve at least 100 participants. The questionnaire covered areas that are related to telework and factors that according to the theories may influence telework or may be influenced by telework. These areas involved usage of ICT for work-related and non-work-related tasks; telework rate; reasons for working remotely; future intentions regarding telework; health issues; and demographic profile.

For the measurement purposes, statements regarding the research questions were performed at 7-point Likert scale [36]. For the questionnaire, 76 statements were selected. In addition to the statements, 19 questions with multiple choices were added. In total filling in the questionnaire was planned to take 20 minutes to achieve higher response rate.

A questionnaire was designed for electronic survey in Google Forms survey application. Web-survey was selected with the purpose to expose questionnaire for the employees in real estate sector who use ICT and internet and therefore have higher readiness to telework. Questionnaire was tested before the launch. Link to the survey together with cover letter was sent to three trade associations in Estonia that unite real estate sector companies and some major real estate companies. In prior, an accord for dissemination of the survey link by the leaders of the trade associations and companies was achieved. Data were collected in 2017 from January to March. As a result, 127 respondents participated. Sample size met the expectations.

Convenient sampling was selected in order to achieve larger sample. Sample structure is presented in Table 1.

ANOVA single factor, t-test and linear correlation analysis was conducted for statistical analysis of the data [37].

5. RESULTS

The survey results confirmed all three hypotheses.

Hypothesis H1. Need for greater freedom influences the decision of employees to telework.

Although respondents in general solidly did not admit that the need for greater freedom has influenced them to do more work remotely (Fig 1), teleworkers' responses differed statistically significantly (t=2.68) from non-teleworkers' responses. Hypothesis was supported.

Hypothesis H2. Need to reduce the transportation costs influences the employees' decision to telework.

47.2 % of all the respondents had the opinion that the need to save transportation costs has not influenced them at all to work remotely (Fig. 1), while only 16.5 % were in the opposite opinion in some degree. Nevertheless, comparing teleworkers' responses to non-teleworkers' ones, statistically significant (t=3.40) differences were found. Similar results occurred with respondents' need to save time. Teleworkers'compliance with the statement 'desire to save time has influenced them to work remotely' was different from non-teleworkers'. The difference was again statistically significant (t=2.99).

Hypothesis H3. Need for reduced interruption influences the employees' decision to telework.

55.9 % of all the respondents expressed that the need for reduced interruption has not or rather has not influenced their decision to telework (Fig. 1). Again, teleworkers responses were statistically significantly different (t=2.43) from non-teleworkers responses.

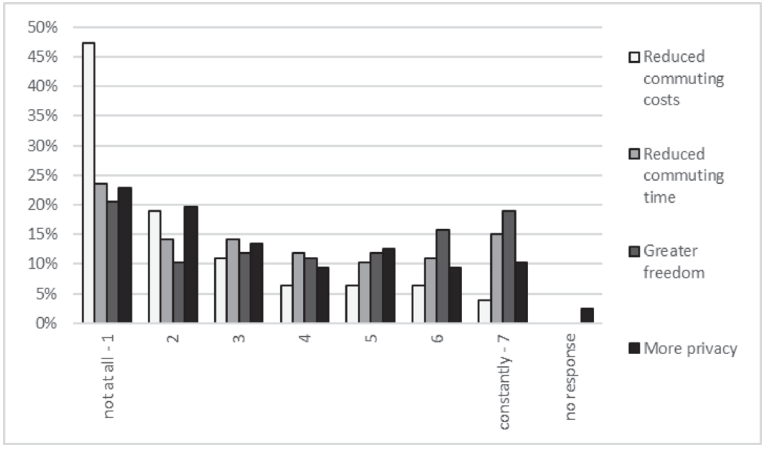

Fig. 1. Factors that influenced respondents' decision to telework. Based on survey results.

However, it can be said that teleworkers have chosen to work remotely based on their own choice. For 76 % of all respondents teleworking has been their free choice and only 13 % of respondents acknowledged that teleworking has not been their own decision. Mainly they admitted that working conditions at home are not better compared to office. However, 44 % of respondents admitted that working remotely is less nervous. All respondents had a workstation at employer's office, too.

Telecommuting is very common in real estate workers' practice, as they have so the free choice, how, where and when to work. 85 % of respondents used telework at least in some extent and 12 % teleworked the majority during their work-time. Only 15 % of respondents were non-teleworkers. Respondents' self-evaluation on their computer usage skills was high. On one to seven point scale, the mean average for all the respondents was 5.49. They had also a positive attitude towards ICT. On one to seven point scale, the mean average was 6.04. A common opinion was that they have adequate skills for computer use (mean average on one to seven point scale was 6.17).

Most of the respondents were used to communicating using the ICT achievements. All respondents were using laptop or PC for work-related tasks constantly (95 % 'agreed totally' and 5 % 'rather agreed' with the corresponding statement). Smartphone was relatively less important. 9 % of the respondents did not use smartphones; although a majority (55 %) stated themselves as the constant users. In contrary to laptops, PC-s and smartphones usage, the using of tablet computers for work related tasks was unusual (66 % do not use them at all and only 7 % of the respondents declare a constant use of tablet computers for work-related tasks).

Fig. 2 shows the variety of the work-related tasks that the respondents perform with computers. It can be concluded that the employees in real estate sector fill different types of computer-related tasks. Only blogging and editing webpages stood out as a rare task (45 % are concerned 'not at all'). Surprisingly social media was not as popular tool for communication with colleagues or customers as it was expected. Still, 29 % of all the respondents used it 'constantly' and 38 % at least 'in some extent' for work- related communication.

For communication with colleagues and customers white-collar workers prefer cell phones and e-mail (mean average on one to seven point scale was 6.08 and 5.90), followed by face-to-face communication (4.28), instant messaging applications (3.21) and SMS (2.70). Social networks and blogs (2.13) and desktop phones were used (1.84) the least. Small usage of desktop phones and active use of cell phones and e-mails indicate to electronic work, which can easily be carried out remotely as well. Relatively high importance of face-to-face communications, which is difficult to substitute totally by ICT, demonstrates that in real estate sector telework can be applied only to a part of the work duties.

6. Discussion

In recent years, information technology has had a profound effect on human resources (HR) processes and practices. Relatively little research has examined its effectiveness, and most of the existing studies have assessed the degree to which these new systems enable organisations to reach their HR goals of attracting, motivating and retaining employees. The limitations: a) use one way communication systems, b) are impersonal and passive, c) do not always allow for interpersonal

interaction, and d) often creates an artificial distance between individuals and organisations [38]. The paper offers the directions for future research and practice.

Several sources have emphasized on flexibility that telework enables [3, 22, 28]. Responses that real estate workers gave supported that idea. However, results of teleworkers and non-teleworkers varied. Influence depends on employee's situation.

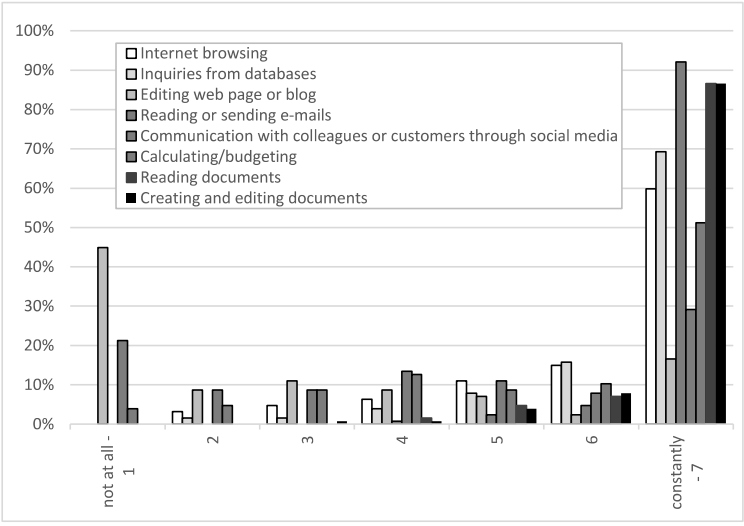

Fig. 2. Work-related tasks that are performed with computer. Based on survey results.

An earlier study of Peters [26] found that teleworkers valued time saving, but did not save commuting expenses more often compared to non-teleworkers. The results of the current paper revealed that for those workers who use telework, both, time and money (saved from reduced commuting) are adequately significant.

Sometimes working from home can be quieter. This may be particularly important in a mental work where some kind of tasks need more concentration. Survey in university showed that telework is often preferred among academic staff because of less noise [7]. According to the current study, a large number of respondents expressed that telework offers more privacy compared to office work.

The aim of the study was confirmed. Results showed that telework is widely used. Although testing of hypothesis gave expected results, it was also evident that these factors have individual influence on employees' teleworking. Not everybody

has the will to telework, but employers should consider work arrangements concerning telework.

7. CONCLUSIONS

Survey results revealed that telework is very common among white-collar workers in real estate sector. As they have good skills in working with ICT and ICT is in constant use, it may be concluded that there is a high potential for telework. However, employers' inactivity regarding telework arrangements is distressing. With little or no interference by employers telework's potential will not be achieved. As it is common to work part of the time remotely, office hours should be considered and arranged in a way to avoid disintegration of teams and insure colleagues' mutual support and synergy in organisation.

It is also important to note that the suitability of telework is individual. Distance between home and office, working conditions at home and other conditions may vary largely. Therefore, the decision whether and how much to use telework should be made by employees themselves.

The main conclusions from the investigation approved by the statistical analysis were:

1. Telework offers much more freedom compared to the employer's office
2. Telework reduces commuting time and costs for filling work tasks
3. Telework helps to focus the attention to the content of work.

Work arrangements considering above presented results can improve work efficiency and create higher customer satisfaction.

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APPENDIX 5

Article 5

R. Arvola, K. Lutsoja, Ü. Kristjuhan, P. Tint.
Telework as an option to postpone the retirement for ageing people?
Safety of Technogenic Environment, 2017, 8, 15-23.

Telework as an Option to Postpone the Retirement for Ageing People?

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***Abstract* – Developed countries are concerned about financial problems that are caused by people's continuously extending life span. Telework can be seen as a tool of influencing the senior employees to postpone their retirement. Current research uses empirical data from a survey with 127 respondents that work for real estate companies in Estonia. Results show that a great number of older people who are currently working with information communication technology (ICT) agree to work longer if they can use telework. It is necessary to educate employees and employers about the disadvantages and risks concerning telework as well as introducing the potential of telework.**

***Keywords* – office work, retirement intentions, senior employee, telework.**

I. INTRODUCTION

Since the beginning of telework research in early 1980s, a wide range of studies has examined telework from two perspectives: the employer's outlook (supply) and the employee's viewpoint (demand): to decrease the cost of real estate (Frolick *et al*., 1993; Olson, 1984) and reduce the labor costs (Apgar, 1998; Bailey & Kurland, 2002).

During recent years, the work environment has undergone significant changes regarding working time, years of employment, work organization, type of employment, work organization, type of employment contracts and working conditions (EASHW, 2002; Storrie, 2002). The changes include increase of retirement age, increase in daily and weekly working hours, "deregulation" of working hours, temporary and part-time work, labour leasing, outsourcing, subcontracting, self-employment, down-sizing of enterprises, increased workload and time pressure on workers. Another change in the work environment includes an increased workers mobility (multitasking, multi-skilled, mobility between different workplaces) and telework (EASHW, 2002; EFILWC, 2002, 2009). Some of the workers' groups are more susceptible to the changes, including the elderly workers (EFILWC, 2002). The percentage of elderly workers has risen because of higher retirement ages and is 43.5 % according to the European Agency for Safety and Health at Work.

There are also some groups of people for whom being able to telework is more critical. These include the disabled, those with eldercare responsibilities (a rapidly growing group), military families, and rural workers. (WorldatWork, 2009).

The ageing of population and of workforce causes a number of important problems for governments, business and workers. The older workers could be employed as home-based teleworkers. Before making decisions, several issues have to be considered: the study of Sharit *et al*. (2009) gives recommendations for improving the prospects for employment of older workers for telework. In a study involving performance of a simulated e-mail based telework customer service job, the findings indicated that the older (66 to 80) participants were capable of learning the task, and with practice over a four-day period, able to closely match the performance of people 50 to 65 (Sharit *et al.,* 2004). The findings also suggested that older adults might require an increased emphasis during training on use of any task-related technologies, and that an increased consideration might be needed to the workspace design factors. Common myths that older people are less able or less willing to learn the performance of technological tasks are not supported in the literature (Charness *et al*., 2007).

There are different opinions of telework efficiency (Arvola et al., 2016, 2017a, 2017b; Kristjuhan & Arvola, 2006). One of the possibilities of telework for older people is the accounting profession that has grown exponentially in recent years. The investigations in this area are limited. Telework behavior Model (TBM) that addresses the interaction of various psychological effects, individual consequences, and organizational outcomes is presented by Hunton and Harmon (2004). Nowadays new and new internet opportunities for participation in employment appear, for example, the Facebook and Linkedin (Baker *et al.,* 2013). For people with disabilities, as well as the aging, increasingly interacting online, these systems give more possibilities to find a new job or give the strength to continue working in the retirement age.

Based on the previous, the research question is: how effective is telework to postpone the retirement age?

The aim of the research is to determine the human factors of postponing the retiring age. How important is it in the current workforce decline situation to supply the job market with some additional workers in the retirement age? The investigation is carried out by the example of the real estate sector.

II. THEORETICAL BASIS

The motivation to telework is rooted primarily in the expectancy theory (Vroon, 1964), which is presented as:

Motivation = Expectancy x Instrumentality x Valence (1)

Expectancy is the employees' self-reflected belief that they hold the requisite skills to complete actions necessary to attain desired outcomes. Instrumentality relates to the employees' positions that their performance will result in valence referring to the individuals' subjective expected value of the hoped outcome.

There are three major reasons why the employers have not been more proactive in taking steps to retain their mature employees: 1) many employers have still negative views on ageing workforce; 2) we know relatively little about the retention of ageing workers and what are the practices that help to hold them in the work life in the retiring age; 3) there is a lack of knowledge about how to develop and implement specific human resources practices relevant to mature workers (Armstrong- Stassen, 2008).

Patrickson (2002) is one of the few that have even entertained the idea of promoting telework for older workers, and almost no empirical data exist on this topic. The opportunity to telework, especially from home, can offer an incentive for many older workers to delay retirement or re-enter the workforce; so with this possibility, the employers have no need to consider costs associated with office space and transportation. These possibilities have to be maximized for the older people, including the technological demands of telework jobs, the technology skills of older workers, and managers' attitudes toward telework and older workers.

The industries in the U.S. that have actively recruited older workers are health care and energy, which already face imminent labor shortages. The support for older workers to stay in work life is the fact that the work environment has become significantly less physically demanding, which has resulted in decreased health and safety risks for older workers (Eyster *et al*., 2008; Villosio *et al*., 2008).

What are the important issues that need to be resolved to improve the prospects of employing older workers as teleworkers? (Czaja *et al.,* 2006; Sharit *et al*., 2004). The focus has to be oriented on the capability for older workers to perform technologically based telework tasks, especially as they might concern worker-related attributes such as trustworthiness, reliability, technology skills, and adaptability (Handy, 1995; Kite *et al*., 2005).

Telework (telecommuting) can be conceptualized as an "anytime-anyplace" form of work (Buessing, 2000; Ellison, 2004). The work involving data processing, accounting, computer programming, design, customer service, quality control, and health care, can be performed from home. The number of employers who allowed to work their worker at least one day per month from home, increased from 9.9 million to 12.4 million for contract workers, and about one fifth of the total workforce – 28.7 million workers - between 2005 and 2006 (Eyster *et al.,* 2008). Many companies, especially in financial, information technology, and communication sectors, are now offering telework opportunities (Dychtwald *et al.,* 2006). Some companies rely on the "work-at-home model" that has been referred to as a virtual or remote workforce. However, majority of workplaces do not offer telework opportunities to employees, or if offered, there is a limited scope with respect to the amount of time an employee can work from home (Potter, 2003).

Mobile phones are promising tools to improve the quality of work and life also for elderly (Plaza *et al.,* 2011). In this field, preliminary investigations are needed to satisfy the needs of elderly people, giving them the possibility to use mobile phones as work tools.

Some sources, investigate the burnout of workers in today's busy world of work (Weisner & Sutton, 2015; Barros, 2017; Henkens & Leenders, 2010). The results of the investigations show that burnout and retirement intensions are related but appear to have partly different predictors. While burnout can generally be explained by the work environment, non-work related factors enhance the understanding of retirement intentions.

III. CONCEPTUAL MODEL AND HYPOTHESIS

Fig. 1 represents the conceptual model based on the current study measuring telework-associated factors, such as inter-generational knowledge transfer, job satisfaction, health complaints, income level, impact on postponing individual's retirement etc. The conceptual model is relying on the theoretical (literature based) and previous research of the authors of this paper. Several hypotheses were proposed to set up the conceptual model.

The employee's satisfaction is considered to affect telework adoption (Campbell & McDonald, 2007). Teleworkers are more satisfied with their jobs (Verive & DeLay, 2006). Teleworkers' job satisfaction is high, because the decision to choose teleworking is usually made by the teleworkers themselves. Nevertheless, full-time home teleworkers' satisfaction can be relatively lower than satisfaction of teleworkers who work remotely 20-30 percent of their work time (Tremblay, 2002). Despite of the higher overall and work satisfaction, teleworkers report lower satisfaction towards co-workers and promotion compared to non-teleworkers (Igbaria & Guimaraes, 1999).

There are studies aimed at relationships between the life satisfaction, postponing retirement (Feldman & Kim, 2000; Kim & Feldman, 2000) and the relationships between the job satisfaction and the postponing of retirement (Dendinger *et al*, 2005). These studies describe a dual impact when some people benefit from retirement and others from the continuing working.

Telework provides many health benefits associated with reduced stress from commuting; better work environment due to reduced noise, better concentration on work; and conditions that make easier balancing the work and family demands (Montreuil and Lippel, 2003). At the same time, telework may cause an increased stress from social alienation, which in teleworkers' opinion is the greatest disadvantage of telework (Di Martino & Wirth, 1990).

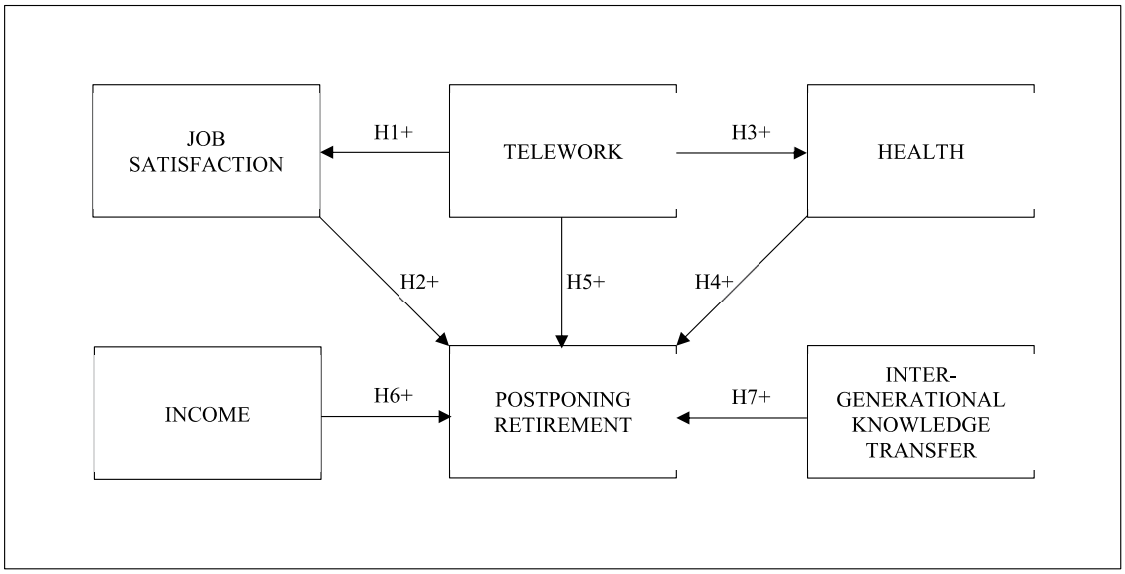

FIG.1. CONCEPTUAL MODEL (PROPOSED BY AUTHORS)

One of the main drivers to push individuals to retire is their health. Poor health and decline in work ability induce individuals to retire. Pond *et al.* (2010) have identified two additional health-related retirement pathways: the pathway that maximises a finite, precious life; and the pathway that maximises life after a health scare. It is also disputed if health decline is the cause of retirement (Pond *et al*, 2010).

There has been a significant success in applying telework to introduce jobs for the disabled since the dawn of telework (Di Martino & Wirth, 1990). Declining physical strength, speed and endurance are important age-related changes that affect older employees' ability to commute, but at the same time the aging involves improvements in many abilities and qualities, e.g. avoiding accidents and mistakes, precision, patience, loyalty, independence, work ethics, responsibility, problem solving abilities and many more (Mykletun, 2006).

Although the use of ICT, which is necessary for teleworking, is believed to be challenging for older people, previous research has shown that older people are willing to and capable of learning ICT and adopt telework (Sharit *et al*, 2009). Telework has been seen as an option for postponing retirement and CEOs' attitude regarding it is supporting (Arvola *et al.*, 2017a). In United States, companies see antidiscrimination rules as the main obstacle counteracting to promote a phased retirement (Johnson, 2011). Employers are interested in supporting older workers with substantial skills to return to work with the help of opportunities like telework (Stapleton, 2017). It has been suggested that telework can be considered for employees in knowledge work who wish to take early retirement, although they have maintained much of their skills (Bentley & Yoong, 2000; Caldow, 2009; Campbell & McDonald, 2007).

An important incentive for postponing retirement is income. Employees who take early retirement often face a decrease in income. However, postponing retirement gives an increase in income and sometimes elderly employees simultaneously receive wage and pension. Earlier studies have paid attention to the income issues, including taxes, regarding the retirement and found that in spite of income benefits it is necessary to provide a flexible work to encourage extending work life (Johnson, 2011). Flexible work arrangements (incl. telework) can benefit low-income older adults (Anderson *et al*., 2013). Research with 1,400 elderly employees in Japan found that older employees did not want to continue working if their income decreased and that availability of flexible work places affected future labour market of older workers (Yamada & Higo, 2011).

If an experienced employee retires, company may lose a significant amount of knowledge, skills, experience and relationships. For real estate companies, it is important to encourage and promote intergenerational knowledge transfer by creating favouring conditions for that. Mutual exchange model described by Harvey can be implemented regarding telework. When elderly may need support from workmates regarding ICT, they can share their accumulated job-related knowledge (Harvey, 2012).

Following hypotheses were proposed:

H1: Telework has positive effect on job satisfaction.

H2: Job satisfaction has positive effect on employees' intention to postpone their retirement.

H3: Telework has positive effect on employees' health.

H4: Better health has positive effect on employees' intention to postpone their retirement.

H5: Telework has positive effect on employees' intention to postpone their retirement.

H6: Majority of employees wish to postpone their retirement because of their insufficient income.

H7: Majority of employees would like to share their knowledge and skills with younger colleagues in their old age.

IV. Material and Methods

There are different possibilities to collect information about where and when people work: are they traveling to work or are they not travelling at all (Lister & Harnish, 2011).

For data collection purposes, the following methods were applied: formation of expert group, questionnaire structure, questionnaire testing and sample selection. Collected data was analysed with the help of ANOVA single factor, t-test and linear correlation. A survey method was selected for data collection and a questionnaire was developed. The questionnaire included questions regarding telework and ICT usage; health and workability; job satisfaction; attitudes towards retirement; and respondent's demographic profile.

For the measurement purposes, 76 statements related to the research questions were selected and 7-point Likert scale (7-completely agree; 1-completely disagree) was used. All questions with Likert scale were also provided with an option 'cannot say' for the occasion if a respondent has no opinion or experience on this particular question. By providing this option, the authors took care of the possible errors that could appear if respondents with no personal opinion regarding the question would select '4' as their response from the middle of the provided 7-point scale. That would have made impossible to distinguish neutral opinions (i.e. where a respondent has both arguments, pro and contra, equally) from no opinion. There were also 19 questions with multiple choices regarding the respondents' demographic data to evaluate the sample.

In order to collect possible data not covered by topics provided by the authors, an opportunity was provided to add any comments or thoughts related to a topic of the questionnaire. The comment box was placed at the end of the questionnaire after questions.

The survey was aimed to the respondents with a higher readiness to telework and therefore the questionnaire was designed in electronic format in Google Forms survey application. The questionnaire was also reviewed by the expert from the real estate sector who made many useful suggestions. The prepared questionnaire was tested and a link to the survey (incl. cover letter) was sent to the Estonia's trade associations in real estate sector and also directly to some major real estate companies.

Real estate sector was selected as they have experienced telework already for years on a daily basis and it is relatively easy to find also older people working there.

Data collection was carried out January to March 2017 and involved responses received from 127 respondents. Convenient sampling was selected in order to reach more respondents. The sample structure is presented in Table I.

TABLE I

Survey sample structure

Characteristics	Group, years	Frequency	Percentage
Age	under 30	16	12.6%
	30 to 39	39	30.7%
	40 to 49	32	25.2%
	50 to 59	23	18.1%
	60 to 69	9	7.1%
	70 and older	3	2.4%
	No response	5	3.9%
Gender	Man	63	49.6%
	Woman	64	50.4%
Education	Basic	1	0.8%
	Vocational	15	11.8%
	Secondary	12	9.4%
	Higher	97	76.4%
	No response	2	1.6%
Position	Real estate agent	42	33.1%
	Real estate appraiser	21	16.5%
	Real estate manager	17	13.4%
	Project manager	8	6.3%
	Managing director	6	4.7%
	Other	16	12.6%
	No response	9	7.1%
Personal status	Single	12	9.4%
	Cohabiting	49	38.6%
	Married	51	40.2%
	Divorced	8	6.3%
	Widow(er)	4	3.1%
	No response	3	2.4%
Household size	1	13	10.2%
	2	48	37.8%
	3	14	11.0%
	4	31	24.4%
	5	12	9.4%
	6	3	2.4%
	7	1	0.8%
	No response	5	3.9%

ANOVA single factor, t-test and linear correlation analysis were applied for statistical analysis and hypothesis testing (Hatcher, 2013).

V. Results

Statistical analysis provided following results.

Hypothesis 1: *Telework has a positive effect on job satisfaction*.

Based on the results of T-test analysis, the hypothesis cannot be confirmed (t=-0.52). One of the reasons is that the respondents were mainly quite satisfied with their job (M=5.43; SD=1.14). Respondents expressed their satisfaction also on specific factors: promoting their employer (M=5.66; SD=1.33); satisfaction with working schedule (M=6.01; SD=1.09); pleasantness of job (M=6.04; SD=0.99); and importance of the job (M=5.72; SD=1.29). The other reason might be that telework has become a natural part of work-style. It would be useful in future to have a wider variety of jobs involved in the investigation in order to observe different satisfaction and different telework adoption levels.

Hypothesis 2: *Job satisfaction has a positive effect on the employees' intention to postpone their retirement*.

Based on T-test, the hypothesis was confirmed (t=1.67). Respondents' wish to work after legal retirement age as their work offers them satisfaction and interest (M=5.42; SD=1.63). Satisfaction and interest as a reason for postponing retirement

was mentioned as the second most important reason after the insufficient income.

Hypothesis 3: *Telework has a positive effect on the employees' health*.

Hypothesis was not confirmed as there was no statistically significant difference (t=0.23) between health complaints of teleworkers and non-teleworkers. Teleworkers' health complaints did not differ from non-teleworkers' health complaints in any age group. It can be seen that telework as a work form has no benefit compared to traditional work form concerning health. However, it can be as well stated that telework has no adverse impact on health compared to traditional work and can be taken as an interchangeable alternative.

Hypothesis 4: *Better health has a positive effect on the employees' intention to postpone their retirement*.

The hypothesis cannot be confirmed. Respondents' intentions regarding retirement were not affected by health. The same result appeared for all respondents and for older workers separately. When health complaints were analysed in connection with the retirement intentions using correlation analysis, the highest correlation (r = -0.24) was obtained for headache. In 50+ years group the highest correlation (r = 0.22) was for chronic fatigue. This result, although as an extremely weak, is surprising by being positive as it was expected that people with more health complaints did not consider postponing their retirement. Opinions divided quite equally into two groups (M=2.82; SD=2.02) based on whether the respondents would retire after legal retirement age because of their health status. These responses also prevent from confirmation of the hypothesis as health status has no effect on the retirement intentions.

Hypothesis 5: *Telework has a positive effect on the employees' intention to postpone their retirement*.

Based on the T-test results, the hypothesis was confirmed (t=13.43). 20 respondents completely agreed (53 rather agreed) that enabling telework affected them to postpone their retirement. 13 respondents were neutral and 22 could not answer. 14 respondents disagreed completely and 5 respondents rather disagreed. The respondents who completely disagreed included people indifferent about telework and people who would not like postponing their retirement. Mean average is 4.82 and the standard deviation SD=1.89 (the coefficient of variation is 39.2 %).

57 % of respondents admitted that telework had an effect on their decision to postpone retirement. When analysing respondents who are already beyond the legal retirement age, only one of them did no telework at all. One elderly employee did telework only a minimum part of the work time. Four elderly employees said that they were teleworking most of their work time and five elderly respondents were working half of their work time remotely. It clearly shows that telework is a substantial factor that affects people's decision to extend their work life.

Hypothesis 6: *Majority of the employees wish to postpone their retirement because of their insufficient income*.

Hypothesis was confirmed (t=1.71). Desire to increase the income (M=5.74; SD=1.59) and insufficient income (M=5.20; SD=1.76) were number one and number three important reasons that the respondents named as affecting them to extend their work life. 56% of respondents indicated the insufficient income and 70 % of them indicated the desire to increase income as the reason that affects or rather affects their decision to continue working after legal retirement age. Together they make financial reasons the most important factor that affects employees' decision to postpone the retirement. Nine out of all 11 respondents beyond legal retirement age agreed that desire to increase income had made them to work after legal retirement age.

Hypothesis 7: *Majority of the employees would like to share their knowledge and skills with younger colleagues in their old age*.

Hypothesis was confirmed as a result of T-test (t=5.42). Respondents' attitude towards intergenerational knowledge transfer in general was positive (M=4.96; SD=1.64) and the majority (54 %) would like to devote their work time in older age to share their knowledge and skills with younger work mates. In 50+ age group the opinions were similar (M=4.91; SD=1.81).

The overall attitude towards postponing the retirement was supporting. A majority (55 %) of the respondents felt positive about extending their work life (M=4.83, SD=2.06) after the state pension age. Despite the retirement age and pension, 57 % of the respondents expressed that they would continue working after the state pension age (M=4.84; SD=2.14). It can be explained through the retirement regulations and the average income level in Estonia. People who continue working after the state pension age maintain their state pension in addition to their salary. This is very important incentive for elderly to postpone their retirement as average income level in Estonia is clearly below EU average. Similar results appeared when asked about respondents' opinion whether they wanted to continue working as long as their health allows. 57 % felt positive about this statement (M=4.79; SD=2.28). Even more, 78 % were positive about the people's decision to continue working after the state pension age (M=5.79; SD=1.45). The respondents despite their age supported solidly (91 %) the idea that people who work after the state pension age should receive pension (M=6.48; SD=1.23).

The respondents shared relatively similar opinions about optimum age for retirement (M=65.83; SD=9.64) from jobs that are similar to their own job. A vast majority of the respondents did mental job and it was physically less demanding. Their opinion about their own retirement age was a little lower (M=63.82; SD=9.89). It expresses rather more values in society than real individual intentions. When respondents have no any constraints (e.g. financial, health etc.), their opinion about when they would retire was more conservative (M=62.21; SD=14.07) but the responses varied relatively more.

The respondents were asked to express their opinion on the decline of the work ability. They had relatively the same meaning regarding the start of work ability decline (M=60.79; SD=9.31). The respondents' own judgement on the peak of

their work ability varied from less than 30 to over 70. 52% of the respondents said that their maximum work ability was or would be at the age 30 to 39. 25% of the respondents judged that their peak was or will be between 40 and 49.

The respondents had an opportunity to add any of their comments or thoughts at the end of the questionnaire. 16 respondents (13%) used this opportunity and wrote about their opinion. Several respondents brought out that aging had different effect on the employees' work ability. It was mentioned by one respondent that legal retirement age should be applied individually, taking into account the employee's health and profession. If taking into consideration that the sample consisted mainly of skilled professionals making up a substantial share of telework target group, they also pointed out that telework adoption among elderly employees is also individual and it would be a mistake to make equal conclusions on ICT skills of elderly employees.

33-year old male respondent wrote: "*For example, a 83-year old man who is interested in technology uses tablet PC and smart phone successfully, which is not executable for some elderly people or does not interest them.*"

One of the respondents whose work mates are mainly middle-aged and elderly brought out that for elderly skilled professionals using ICT is not so big obstacle as they have used it for many years already but more often some people regardless of age experience many difficulties when working (e.g. ICT and communication skills, language barrier etc.).

VI. Discussion

Kinzl *et al*. (2005) concluded that job satisfaction had a positive correlation with opportunities provided to employees by the organization.

The hypothesis **H1** (Telework has positive effect on job satisfaction) was not confirmed in the current study. One reason of this outcome might be that the work with computers at home and in the office have both advantages and disadvantages of equal level. There are other opinions also (Fonner & Roloff, 2010): teleworkers are more satisfied with their jobs than office-based workers are due to lesser contacts.

The hypothesis **H2** (job satisfaction has positive effect on employees' intention to postpone their retirement) was approved by the authors of the current paper. Postponement in retirement due to a greater job satisfaction and leisure dissatisfaction were approved also by Peikkola (2008). The well-being at work (and decreased utility from leisure) would postpone the retirement by around 0.3 years. In the survey with "bridge employment" (Henkens & van Solinge, 2013) it was found that in the case of elderly people's participation in this project the bridge employees were extremely satisfied with the work mode.

The hypothesis **H3** (telework has positive effect on employees' health) was not confirmed in the current study as there was no statistically significant difference (t = 0.23) between health complaints of teleworkers and non-teleworkers. Peikkola (2008) came to the same conclusion. The health problems are concentrated at the end of the working career when the employee is likely to retire in any case. Well-being at work policies can also be of limited use for the same reason. Health improvement has almost insignificant effects on retirement propensities, too. The received results do not overlap with some earlier studies (Igbaria & Guimaraes, 1999) conducted when telework was not yet so common and the possibility to use telework was considered as a privilege. Later, contradictory evidence has been found from several studies (Montreuil & Lippel, 2003), which weakens the unambiguous health-telework relation often referred to in scientific literature. According to a survey carried out among 314 managers from the United States, managers consider employee's health status as the least important factor when deciding whether to allow telework (Sharit *et al*., 2009). Health advantages and risks concerning telework derive from different kind of characteristics related to work and not from telework as a work form only. It became evident that health is not anymore a reason that managers should consider when deciding over enabling telework for employees.

The results of the hypothesis **H4** (better health has a positive effect on employees' intention to postpone their retirement) are connected with the hypothesis H3. These results were not expected as Pond *et al*. (2010) have found earlier in New Zealand that health problems induced the retirement. It can be explained that since low income level is concerned by many respondents in current study, other factors could remain in background. Despite their health situation, elderly in Estonia often need to work to maintain their income level.

The hypothesis **H5** (telework has positive effect on employees' intention to postpone their retirement) was confirmed by the authors of the current paper and also earlier (Arvola, 2006). Johnson (2011) has pointed that flexible work arrangements act as important tools to influence older workers to postpone their retirement.

The hypothesis **H6** (the majority of employees wish to postpone their retirement because of their insufficient income) was confirmed. The income is a substantial factor to postpone the retirement in the current study in Estonia. As it was stated by CEOs of real estate companies in Estonia earlier (Arvola *et al*, 2017a), the survey respondents agreed that the major reason for postponing their retirement was financial. Older workers often delay retiring for a number of reasons, for example, they need an affordable employer-sponsored health insurance (Rejda, 2015). Income issues are considered often by the elderly employees when deciding whether to retire or not. (Yamada & Higo, 2011). The reasons in high-income countries and low-income countries are different. Many older workers have postponed retirement to decompensate the substantial stock market losses; many retired pensioners experience considerable economic insecurity.

The hypothesis **H7** (the majority of employees would like to share their knowledge and skills with younger colleagues in their old age) was confirmed. The other authors came to the same conclusion (Brċic & Mihelic, 2015). Intergenerational knowledge transfer is important for all counterparts for several reasons and the results show that elderly workers benefit from it (Harvey, 2012).

VII. Conclusions

The nature of work has progressed through three overarching phases since the dawn of time: at first, most work was performed by individuals or small groups at suitable locations, the employers travelled long distances to survive; centuries later, a great deal of work was performed collectively at central cities where materials and labourers were concentrated and resources were employed in a transformative manner. Third phase – virtual work – is a hybrid extension of the earlier two phases where work can be performed at convenient locations by individuals or small groups while the output is transferred to a central location via electronic impulses (Hunton & Harmon, 2004).

According to the current survey, the real estate sector employees in Estonia in general have positive attitude towards postponing their retirement. Employees see flexibility as an essential benefit of telework. Employees feel positive about working after legal retirement age and until health allows. In Estonia, the state pension is paid regardless of working, and it is common to receive extra income in that way. The main reasons to work after legal retirement age are: desire to increase the income; satisfaction and fulfilment regarding own work; and desire to be with own workmates. A common opinion was that enabling the telework affects employees to work after legal retirement age. As more than a half of all respondents expressed opinion that enabling the telework affects their decision to postpone their retirement, it may be concluded that telework has a significant role in extension of work life.

The state pension regulation that allows employees to maintain their pension while continue working functions as a substantial incentive for people to postpone their retirement. The older employees are willing to share their knowledge and skills with their younger colleagues. Intergenerational knowledge transfer here is beneficiary for elderly teleworkers as well when meeting challenges in use of ICT. Work arrangements that take into account these circumstances can be implemented by managers. Telework needs more intervention by managers. When combining telework wisely with presence in office, many threats of telework (e.g. insufficient communication between employees and hindered inter-generational knowledge transfer) can be removed.

VIII. Future Research

To use telework more and thus encourage the ageing people to postpone their retirement, it is urgently important to raise the knowledge of employers and employees on telework matters. In the current study, the importance of telework for ageing people is proved scientifically. It is the first stage in the effort. The knowledge management is the second stage. These two parts are interconnected. Improvement of the knowledge management, particularly by employers, will allow to improve the use of telework through work arrangements related to telework. The effect of these work arrangements needs to be measured after implementation.

It became evident that it is also necessary to involve other sectors or occupations into similar surveys. Some hypotheses could not be confirmed because of low variability in responses. For instance, the majority of respondents were satisfied with their job. The results could be different if other type of work were in focus, e.g. those who work in the sitting position all the workday (accountants) and very dependent on the computer. The real estate sector and the teachers are more moving and free, not chained to the computer. Focusing on professionals had its disadvantage since education does not vary much among skilled white-collar workers.

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APPENDIX 6

The questionnaire, *Article I*

Telework research among personnel of Tallinn Technical University
Dear academic or hourly paid worker,

If you already have filled in the current questionnaire electronically we thank you and there is no need to fill it this time. We kindly ask you to answer weather you use telework or not. Filling this questionnaire takes approximately 10 minutes. The results of this questionnaire will be used to improve work environment. Please mark the correct answer in every question. This survey will be carried out among the hole personnel of Tallinn Technical University. Your personal data will be kept anonymous.

Thank you in advance,
René Arvola, Ülo Kristjuhan, Mari Arnover, Kadri Rohulaid

In current questionnaire following expressions will be used:
Telework *– a work carried out outside of the central office, involving new technology that permits communication (e.g. Internet, extranet, e-mail, telephone, cell phone etc).*
Scientific work *– working with literature, planning and carring out the research*
Spare time *– time for family, interests, sports etc.*

1.How many hours do you telework? _____ Hours per week

2.What has influenced you to telework? Evaluate each version

	affected greatly	affected little	cannot say	did not affect greatly	did not affect
a)Better technical conditions *(better internet connection, table, chair etc)*	☐	☐	☐	☐	☐
b)Better content on work *(less noise, privacy etc)*	☐	☐	☐	☐	☐
c)Saving time and money	☐	☐	☐	☐	☐
d)Obstacles to commute	☐	☐	☐	☐	☐
e)Other reason (please name it:_____)	☐	☐	☐	☐	☐

3.Are you willing to work only in office provided by employer? Not in telework form

☐ Yes ☐ In case of better work and wage conditions ☐ Can not say ☐ No

☐ Other circumstances, please name these:_____

4.Working outside central office means...

☐ More stress ☐ Rather more stress ☐ Don't feel stress at all ☐ Rather less stress ☐ Less stress

5.Which health problems you complain of? Evaluate each version

	Occurs	Occurs rarely	Do not occur
a)Cough	☐	☐	☐
b)Sleeping disorder	☐	☐	☐
c)Pain in heart	☐	☐	☐
d)Voice problems	☐	☐	☐
e)Pain in shoulders	☐	☐	☐
f)Chronic tiredness	☐	☐	☐
g)Pain in back	☐	☐	☐
h)Depression	☐	☐	☐
i)Pain in neck	☐	☐	☐
j)Anxiety	☐	☐	☐
k)Head ache	☐	☐	☐
l)Tiredness of eyes	☐	☐	☐
m)Flu or cold	☐	☐	☐
n)Pain in muscles or joint aches	☐	☐	☐
o)Stress	☐	☐	☐
p)Aching eyes	☐	☐	☐
q)Overweight	☐	☐	☐
r)High blood pressure	☐	☐	☐
s)Other health problem:_____	☐	☐	☐

6. How do you evaluate your computer skills?

☐ Do not use computer ☐ Can use a little ☐ Can use the computer in ordinary level

☐ Can use the computer in upper-medium level ☐ Can use the computer professionally

7. How do you evaluate your working conditions in the office and outside of the ordinary rooms? Mark the version, where the working conditions are <u>better</u>?

	In office	Outside office	No difference
a)IT equipment	☐	☐	☐
b)Table and chair	☐	☐	☐
c)Privacy	☐	☐	☐
d)Lack of redundant noise	☐	☐	☐
e)No draugh	☐	☐	☐

	In office	Outside side	No difference
f)Ventilation	☐	☐	☐
g)Dust	☐	☐	☐
h)Humidity	☐	☐	☐
i)Lighting	☐	☐	☐
j)Chemicals	☐	☐	☐
k)Temperature	☐	☐	☐

8.Are you in contact with dangerous chemicals?

☐ Yes, constantly ☐ Yes, rarely ☐ No

9.How many times you visit your workplace at employer's office? _____ times per week

10.Which kind of communication tools you use to communicate with colleagues or students?

	Often	Rarely	Do not use
a)Telephone	☐	☐	☐
b)Cell phone	☐	☐	☐
c)E-mail	☐	☐	☐
d)Internet based communication software (MSN, Skype, ICQ jt)	☐	☐	☐
e)Face-to-face communication	☐	☐	☐
f)Other ways of communication, mention_____	☐	☐	☐

11.Would you like to communicate with colleagues……?

☐ More often ☐ More rarely ☐ Communicate often enough

12.Does your employer (Your direct superior) …?

☐ Supports teleworking ☐ Apathetic towards teleworking ☐ Objects to teleworking

13. Do you prefer to work at home more often?

☐ Yes, certainly ☐ Rather yes ☐ Can not say ☐ Rather no ☐ Definately no

a)If you answered yes, please describe the reasons?_____

_____

b) If you are using the distant working, please describe the benefits of teleworking? _____

_____

14.Which negative sides do you see concerning telework?_____

_____

15.How many scientific publications have you published during last year? Mark the number of pages

☐ Have not published ☐ up to 1 pg ☐ 1-10 pg ☐ 11-50 pg ☐ Üle 50 pg

16.How many hours do you spend on scientific work per week?

☐ Up to 1 hour ☐ 1-10 hours ☐ 11-25 hours ☐ 26-40 hours ☐ More than 40 hours

17.How many hours spare time do you have per week? _____hours

18.Your personal data:

a)Gender: ☐ man ☐ woman

b)Age: ____years

c)Marital status: ☐ married ☐ single, divorced or widow

d)Warded in household (elders, handicap): ☐ is warded ☐ no warded

e)Children in household:

☐ No children ☐ Are pre-school children ☐ Are school children ☐ Are grown-up children

f)Members in household: ____

g)Occupation:

☐ Professor ☐ Associate professor ☐ Senior researcher ☐ Leading researcher ☐ Researcher

☐ Teaching assistant ☐ Lecturer ☐ Senior teacher ☐ Teacher ☐ Lecturer working in other company ☐ Other, mention_____

h)Faculty or institute:

☐ Civil engineering ☐ Power engineering ☐ Humanities ☐ Information technology

☐ Chemical and materials technology ☐ Economics and business administration ☐ Mechanical engineering

☐ Science ☐ Kuressaare college ☐ Virumaa college

☐ Tallinn college ☐ Institute of Geology ☐ Institute of Cybernetics ☐ Institute of Marine Systems

☐ Other faculty or institute, mention_____

i)tenure in academic institution ___ years

j)How much time does it take for you to get to work?

☐ Up to 15 minutes ☐ 15-29 minutes ☐ 30-60 minutes ☐ over 1 hour

k)Income per capita in household:

☐ up to 3000 kroons ☐ 3000-6000 kroons ☐ 6001-9000 kroons ☐ 9001-12 000kroons ☐ over 12 000 kroons

Thank you!

APPENDIX 7

The questionnaire, *Article II*

Dear respondent! With this questionnaire Tallinn University of Technology measures relationship between employees' telework and stress. Your response helps to improve work arrangements in organisations in order to extend worklife of senior specialists. It is extremely important that you express your own personal opinion instead of common positions. Your responses will be used in a generalized form and will not be associated with your person. Please select the answer that best suits to your opinion.

1. Have you enjoyed coming to work in the last weeks

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

2. I regard my job meaningful

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

3. I feel in control of my work

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

4. I get on with my fellow-workers

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

5. My immediate superior performs as superior

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

6. How certain are you that you will keep the job with this employer?

1 2 3 4 5 6 7 8 9 10

Not at all — Certain

7. How much can you influence factors concerning your job?

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

8. How much of your work time do you work outside the employer's workplace?

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

9. To what extent do you want to work outside of the employer's workplace?

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

10. To what extent do you perceive stress when working in the office compared to working outside the office?

1 2 3 4 5 6 7 8 9 10

Very much — Not at all

11. If it is totally up to you, to what extent do you want to work only in the employer's workplace?

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

12. To what extent have following factors influenced you to work outside the employer's workplace?

a) Better technology

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

b) Better opportunity to concentrate

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

c) Saving in time

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

d) Saving in money

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

e) Difficulties to move

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

f) Flexibility to work whenever desired

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

13. In case, if it is totally up to you, to what extent would the following factors influence you to work outside the office?

a) Better technology

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

b) Better opportunity to concentrate

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

c) Saving in time

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

d) Saving in money

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

e) Difficulties to move

1 2 3 4 5 6 7 8 9 10

Not at all — Very much

f) Flexibility to work whenever desired

1 2 3 4 5 6 7 8 9 10

Not at all Very much

14. To what extent have following factors influenced you to work from the employer's workplace?

a) Better technology

1 2 3 4 5 6 7 8 9 10

Not at all Very much

b) Better opportunity to concentrate

1 2 3 4 5 6 7 8 9 10

Not at all Very much

c) Better opportunity to communicate with fellow-workers

1 2 3 4 5 6 7 8 9 10

Not at all Very much

d) Less loneliness

1 2 3 4 5 6 7 8 9 10

Not at all Very much

e) Better opportunity to get help from fellow-workers

1 2 3 4 5 6 7 8 9 10

Not at all Very much

f) Better opportunity to help fellow-workers

1 2 3 4 5 6 7 8 9 10

Not at all Very much

g) Better opportunity to keep work and leisure off

1 2 3 4 5 6 7 8 9 10

Not at all Very much

15. In your opinion, how skilled are you in computer use?

1 2 3 4 5 6 7 8 9 10

Unskilled Excellent

16. To what extent do you perceive a need for learning anything regarding computer?

1 2 3 4 5 6 7 8 9 10

Not at all Very much

17. To what extent do you like to work with computer?

1 2 3 4 5 6 7 8 9 10

Not at all Very much

18. How much do you use computer for working?

1 2 3 4 5 6 7 8 9 10

Not at all Very much

19. To what extent is computer necessary in your work?

1 2 3 4 5 6 7 8 9 10

Not at all Very much

20. How much do you use computer for activities unrelated to your work?

1 2 3 4 5 6 7 8 9 10

Not at all Very much

21. To what extent do you use the following ICT devices and applications for your work?

a) Desktop PC

1 2 3 4 5 6 7 8 9 10

Not at all Very much

b) Laptop

1 2 3 4 5 6 7 8 9 10

Not at all Very much

c) Tablet PC

1 2 3 4 5 6 7 8 9 10

Not at all Very much

d) Smart phone

1 2 3 4 5 6 7 8 9 10

Not at all Very much

e) MS Outlook

1 2 3 4 5 6 7 8 9 10

Not at all Very much

f) MS Office (MS Word, MS Excel, MS PowerPoint etc.)

1 2 3 4 5 6 7 8 9 10

Not at all Very much

g) Social networks (Facebook, Twitter, Instagram, Google+ etc.)

1 2 3 4 5 6 7 8 9 10

Not at all Very much

22. Your age? _____ years

23. Your gender? Man / Woman

24. Your education? _____

25. Your household size? _____ members in household

26. Number of underage persons in your household? _____ under 18 year old child(ren) in household

27. Number of children in your household? _____ Under 7 year old child(ren) in household

28. Are there any disabled persons in your household, who need care? Yes / No

APPENDIX 8

The interview guide, *Article III*

Interview guide

Telework – work that is carried out outside the central office, involving new technology that permits communication.

Questions concerning telework:

- How much does your company employ?
- How many employees use telework in your company?
- How do you assess the feasibility of implementing telework in your company?
- If your company has resources for telework, what kind of resources your company use?
- Does your company allows employees to use telework?
- How much of their work time your employees work remotely?
- What costs do you see concerning the implementation of telework?
- What expenses have already been incurred in your company that allow teleworking?
- How can your company benefit from the use of telework?
- How much do you think the use of telework would save company's costs?
- How important is the employee's physical presence in the office? Why?
- How likely and serious do you think the use of telework can cause problems with communication and, in this context, problems with teamwork?
- How important is the direct communication between the superior and the subordinate to you? If there is experience, is it hard to do with telework?
- What metrics do you use to measure the work results of your employees?
- Since teleworking is highly likely to result in the removal of documents and work equipment from the workplace, how much is the risk of leakage or loss of confidential data?
- How likely are you to realize this threat? How great do you evaluate this damage would be?
- In your opinion, how difficult is it to monitor the results of the teleworkers and time of their presence?
- Does enabling telework mean to allow employees to select the time to work?
- What is the attitude of the company's management towards teleworking?
- What is the attitude of the company's employees towards teleworking?

Questions concerning telework for senior employees:

- How many employees have reached retirement age in your company?
- How many of your company's employees will reach retirement age in the next five years?

- How many senior (50+) employees does your company have?
- What is your attitude when a retired or soon-to-be-retired employee continues to work remotely?
- Does your company favour the fact that the soon-to-be-retired employee will continue to work remotely?
- Does your company prefer to hire senior employees to new employees?
- Are the strengths of the aging workforce (avoiding mistakes and learning from them, accuracy, patience, loyalty, independence, work ethics, responsibility, stress tolerance, etc.) over the benefits of hiring a new employee?
- Is it challenging for senior employees to get along with telework?
- What is your opinion to the claim that the use of telework by older people is difficult because of their ICT barrier?
- How likely is it to you that the difficulty of telework for older people is in time adapting to change and result in lower quality of work and delays in projects?
- In your opinion, would older employees agree to continue working on the same position but in the form of telework?
- Are soon-to-be-in-retirement-age employees in your company motivated enough to postpone the retirement?
- In your opinion, do senior employees prefer shorter work time or other alternatives to the telework?
- Do you consider that the soon-to-be-in-retirement-age employee should be interested in the possibility of telework?
- Should the company itself offer telework opportunities to soon-to-be-in-retirement-age employees?

APPENDIX 9

The questionnaire, *Articles IV and V*

Dear respondent!

Tallinn University of Technology is conducting a telework survey. In this survey telework is work that is carried out outside the central office at least part of the work time, involving new technology that permits communication. The survey is intended to measure telework usage in real estate sector and its relationships with work environment. Your response helps to improve work arrangements in organisations in order to extend work life of senior specialists. It is extremely important that you express your own personal opinion instead of common positions. Your responses will be used in a generalized form and will not be associated with your person. Filling in the questionnaire takes about 15 to 20 minutes.

Thank you in advance,
René Arvola, Tallinn University of Technology

Please indicate the answer that best describes your agreement on the following statements about you. If you can not give an opinion on this claim, make a note in the 'Can not say' box.

Statements	1-Do not agree	7- Totally agree	Can not say
ICT usage			
1. I use computer (PC or laptop) constantly for my work	**1 2 3 4 5 6 7**		□
2. I use tablet PC constantly for my work	**1 2 3 4 5 6 7**		□
3. I use smart phone constantly for my work	**1 2 3 4 5 6 7**		□
4. Computer (PC or laptop) is essential for my work	**1 2 3 4 5 6 7**		□
5. Tablet PC or smartphone is essential for my work	**1 2 3 4 5 6 7**		□
6. I often use the computer to browse the internet for my work	**1 2 3 4 5 6 7**		□
7. I often use the computer for querying from databases for my work	**1 2 3 4 5 6 7**		□
8. I often use the computer for editing web page or blog for my work	**1 2 3 4 5 6 7**		□
9. I often use the computer for reading and sending e-mails for my work	**1 2 3 4 5 6 7**		□
10. I often use the computer to communicate with colleagues or clients through social media (incl. Facebook) for my work	**1 2 3 4 5 6 7**		□
11. I often use the computer for budgeting or calculations for my work	**1 2 3 4 5 6 7**		□
12. I often use the computer to read documents for my work	**1 2 3 4 5 6 7**		□
13. I often use the computer to draft documents for my work	**1 2 3 4 5 6 7**		□
14. My computer skills are excellent	**1 2 3 4 5 6 7**		□
15. I have sufficient skills to use computer for my work	**1 2 3 4 5 6 7**		□
16. I like using computer or smartphone for my work	**1 2 3 4 5 6 7**		□
17. I use mostly immediate meetings to communicate with my colleagues and clients	**1 2 3 4 5 6 7**		□
18. I use mostly telephone to communicate with my colleagues and clients	**1 2 3 4 5 6 7**		□
19. I use mostly mobile phone to communicate with my colleagues and clients	**1 2 3 4 5 6 7**		□
20. I use mostly SMS to communicate with my colleagues and clients	**1 2 3 4 5 6 7**		□
21. I use mostly e-mails to communicate with my colleagues and clients	**1 2 3 4 5 6 7**		□
22. I use mostly instant messaging (e.g. Viber, WhatsApp, Facebook Messenger, Skype etc.) to communicate with my colleagues and clients	**1 2 3 4 5 6 7**		□
23. I use mostly social media or blog to communicate with my colleagues and clients	**1 2 3 4 5 6 7**		□
24. I often use computer or smart phone for activities not related to my work	**1 2 3 4 5 6 7**		□
Telework			□

25. I work remotely for most of my work time	**1 2 3 4 5 6 7**	□
26. I often work overtime	**1 2 3 4 5 6 7**	□
27. My health condition have influenced me to work remotely	**1 2 3 4 5 6 7**	□
28. Desire to save commuting costs have influenced me to work remotely	**1 2 3 4 5 6 7**	□
29. Desire to save my time have influenced me to work remotely	**1 2 3 4 5 6 7**	□
30. My economic status have influenced me to work remotely	**1 2 3 4 5 6 7**	□
31. Desire to have more freedom have influenced me to work remotely	**1 2 3 4 5 6 7**	□
32. Working remotely has not been my free choice, it is an inevitable situation	**1 2 3 4 5 6 7**	□
33. Desire to have more freedom has influenced me to work remotely	**1 2 3 4 5 6 7**	□
34. Desire to have more privacy has influenced me to work in employer's premises	**1 2 3 4 5 6 7**	□
35. Better working conditions at home have influenced me to work remotely	**1 2 3 4 5 6 7**	□
36. Better working conditions at employer's premises have influenced me to work at employer's premises	**1 2 3 4 5 6 7**	□
37. Absence of workplace has influenced me to work remotely	**1 2 3 4 5 6 7**	□
38. Compared to the present, I would prefer to work more time remotely	**1 2 3 4 5 6 7**	□
39. Working conditions at my home are significantly better compared to the working conditions at employer's premises	**1 2 3 4 5 6 7**	□
40. Working remotely is significantly more peaceful and less stressful	**1 2 3 4 5 6 7**	□
41. Compared to employer's premises, I have better conditions to concentrate at home	**1 2 3 4 5 6 7**	□
42. I would never agree to work only in employer's premises	**1 2 3 4 5 6 7**	□
43. I desire to work more time remotely and less from employer's premises in future	**1 2 3 4 5 6 7**	□
Health and work ability		□
44. I follow a healthy lifestyle	**1 2 3 4 5 6 7**	□
45. My physical activity is sufficient	**1 2 3 4 5 6 7**	□
46. I often have problems with sleep	**1 2 3 4 5 6 7**	□
47. I often have chronic fatigue	**1 2 3 4 5 6 7**	□
48. I often feel pain in the heart	**1 2 3 4 5 6 7**	□
49. I often have back pain	**1 2 3 4 5 6 7**	□
50. I often have headache	**1 2 3 4 5 6 7**	□
51. I often have tired eyes	**1 2 3 4 5 6 7**	□
52. I often have high blood pressure (over 140/90 mm Hg)	**1 2 3 4 5 6 7**	□
Job satisfaction		□
53. I am completely satisfied with my job	**1 2 3 4 5 6 7**	□
54. I would recommend the organisation that I work for, as a good place to work	**1 2 3 4 5 6 7**	□
55. I am completely satisfied with my present time schedule	**1 2 3 4 5 6 7**	□
56. I like the work I do a lot	**1 2 3 4 5 6 7**	□
57. I find my work to be important	**1 2 3 4 5 6 7**	□
Attitude towards retirement		□
58. I definitely desire to work in retirement age	**1 2 3 4 5 6 7**	□
59. Despite the retirement age and pension I desire to continue working as long as I can	**1 2 3 4 5 6 7**	□
60. In my opinion individuals should continue working as long as their health conditions allows	**1 2 3 4 5 6 7**	□
61. I support working after retirement age	**1 2 3 4 5 6 7**	□
62. I completely support the position that pension should be paid also to the individuals who continue working after retirement age	**1 2 3 4 5 6 7**	□

63. My insufficient income influences me to work after retirement age	**1 2 3 4 5 6 7**	□
64. Desire to increase my income has influenced me to work after retirement age	**1 2 3 4 5 6 7**	□
65. Desire to see my fellow workers has influenced me to work after retirement age	**1 2 3 4 5 6 7**	□
66. Satisfaction with my job has influenced me to work after retirement age	**1 2 3 4 5 6 7**	□
67. I desire to work after retirement age because my job is a mission to me	**1 2 3 4 5 6 7**	□
68. My health condition is the reason why I do not desire to work after retirement age	**1 2 3 4 5 6 7**	□
69. My health condition is the reason that makes impossible to commute from home to work	**1 2 3 4 5 6 7**	□
70. The desire to be away from my unpleasant job influences me not to work after retirement age	**1 2 3 4 5 6 7**	□
71. Desire to have more freedom influences me not to work after retirement age	**1 2 3 4 5 6 7**	□
72. Desire to enjoy my free time influences me not to work after retirement age	**1 2 3 4 5 6 7**	□
73. Desire to spend more time on other activities (e.g. taking care of children, voluntary work, hobbies) influences me not to work after retirement age	**1 2 3 4 5 6 7**	□
74. Enabling working remotely influences me to work after retirement age	**1 2 3 4 5 6 7**	□
75. I desire to spend more time on sharing my work-related knowledge and skills in older age	**1 2 3 4 5 6 7**	□
76. I have experienced age discrimination	**1 2 3 4 5 6 7**	□

77. What is the best age for retirement for people that do similar work that you do? Give age in years. ___

78. If there are no other restrictions (e.g. financial constraints, health conditions), when would you retire? Give age in years. ___

79. At what age you consider that it is reasonable to retire? Give age in years. ___

80. In what age in your opinion does work ability starts to decline for people who do the work similar to you? Give age in years. ___

81. In what age in your opinion does work ability starts to decline for people who do the work similar to you, but opposite gender? Give age in years. ___

82. In your opinion, what age was, is or will be the peak of your work ability?

1) Up to 30 years
2) 30-39 years
3) 40-49 years
4) 50-59 years
5) 60-69 years
6) Over 70 years
7) Can not say

Demographic profile

83. Your gender: man / woman

84. Your age in years: ___

85. Are you a pensioner? yes/no

86. Your county: Harjumaa / Hiiumaa / Ida-Virumaa / Jõgevamaa / Järvamaa / Läänemaa / Lääne-Virumaa / Põlvamaa / Pärnumaa / Raplamaa / Saaremaa / Tartumaa / Valgamaa / Viljandimaa / Võrumaa

87. The area where you live is: urban / country

88. **Your nationality:** Estonian / Russian / Ukrainian / Belorussian / Finnish / Other
89. **Your education:** Basic / Secondary / Vocational / Higher
90. **Your position:** real estate manager / real estate service manager / real estate agent / real estate appraiser / other __
91. **Your personal status:** single / cohabiting / married / divorced / widow(er)
92. **Household size:** ___
93. **Do you have pre-school children in your household (0-6 years)?** yes/no
94. **Do you have school age children in your household (7-18 years)?** yes/no
95. **Do you have disabled person(s) who need care in your household?** yes/no

If you have any thoughts or comments during the respond to the questionnaire, you may kindly add them here:

_____

APPENDIX 10

Summary of the original papers

Table 3.Summary of the original papers (composed by the author)

Original papers	Objective	Methodology and data	Results and contribution
I Workload and health of older academic personnel using telework	To measure telework usage and to explore interactions between health, workload and telework	The survey was carried out among Tallinn University of Technology academic staff members (n=259) where telework has been common for a long time. Questionnaire focussed on telework usage, workload, and health.	The study showed that teleworking among academic staff is widespread and sometimes even tacit. Academic employees preferred teleworking for better concentration on work and saving time and money. Irrespective of age, academic staff members use ICT obviously and there was no significant difference in telework usage by age. Teleworkers had fewer health complaints.
II Impact of telework on the perceived work environment of older workers	To find out interaction between senior employees' teleworking and well-being. The main research question was if telework can improve well-being of elderly employees.	Survey sample involved 107 respondents from a variety of areas and was selected by judgement sampling method. Well-being was measured with the Kiva-questionnaire. Several questions about telework and information-communication usage were asked for analysis.	The results showed that telework as a less stressful work form is exaggerated to some extent as teleworkers work-stress does not divert from non-teleworkers work-stress. However, telework can be underestimated or taken as inter-changeable with regular work in a traditional workplace. Teleworkers' stress level (7.79) did not differ from that of non-teleworkers' (7.74). Getting on with fellow-workers was 8.8 for both investigated groups (teleworkers and non-teleworkers).
III Employer attitude towards telework in the real estate sector	Purpose of the study was to find out managers' attitudes towards telework and perception of human factors related to	Semi-structured expert interviews with 10 chief executive officers of real estate companies from Estonia were conducted to collect primary data. Content analysis with	It is common to have telework in real estate companies. CEOs see telework as an excellent opportunity to support extending worklife of skilled office employees. Managers see flexibility as the main benefit of telework. They also brought out several threats regarding telework. From the one

	telework of older employees. Study focussed on telework and retirement inter-actions.	thematic units coding was applied.	side, telework is better suited to the experienced employees as working alone is easier for them compared with younger employees and they need less help from colleagues regarding their job-related issues; from the other side, the older people have more challenges using ICT.
IV Telework usage among white-collar workers in the real estate sector	The purpose of the current study is to find out the spread and drivers of tele-work in the real estate sector.	Web survey method with convenient sampling and quantitative approach was selected. Sample (n=127) consisted of respondents who work for real estate companies in Estonia. Questions covered mainly telework usage, health and future intentions regarding retirement.	The study confirmed that the employees in the real estate sector use telework to save commuting time and costs and to have more freedom and privacy. The results revealed that only a small number of employees have remained untouched by telework. The decision to work remotely is usually made by workers themselves and therefore the main drivers for teleworking have been employee-centred.
V Telework as an option to postpone the retirement for aging people	The purpose of the study is to propose and test the conceptual model with seven hypo-theses that cover telework and retire-ment intentions.	The same data as in Article IV	According to the current survey, real estate sector employees in Estonia in general have positive attitude towards postponing their retirement. The main reasons for working after legal retirement age are: desire to increase the income; satisfaction and fulfilment regarding own work; and desire to be with own workmates. A common opinion was that enabling telework affects employees to extend their worklife.

CURRICULUM VITAE

1. Personal data

Name	René Arvola
Date and place of birth	15.08.1978, Estonia
E-mail address	Rene.Arvola@Eesti.ee

2. Education

Educational institution	Graduation year	Education (field of study/degree)
Tallinn University of Technology	2002 - …	Business administration, PhD
Tallinn University of Technology	2002	Business Administration, M.A.
Tallinn University of Technology	2000	Business Administration, B.A.
Paide Co-Educational Gymnasium	1996	Secondary education

3. Language Competence

Language	Level
Estonian	Native language
English	Upper Intermediate

4. Special Courses

Period	Educational or other organisation
2001	"Management of Occupational Health Risks" Tallinn University of Technology
March 2006	"Age Management: Working After 60+" Finnish Institute of Occupational Health
9-20 March 2009	"Quantitative research methods" Tallinn University of Technology
Apr-May 2010	"Planning questionnaire survey" Tallinn University of Technology
Oct-Dec 2010	"Scientific Writing" Tallinn University of Technology

5. Professional Employment

Period	Organisation	Position
2017-…	Tallinn University of Technology, Department of Business Administration	Lecturer

2009-2016	Tallinn University of Technology, Chair of Marketing	Lecturer
2002-2011	Tallinn University of Technology, Chair of Marketing	Acting Head
2002-2004	Tallinn College of TUT	Lecturer
2001-2009	Tallinn University of Technology, Chair of Marketing	Assistant
2001-2002	Tallinn University, Faculty of Social Sciences	Lecturer
2001	Tallinn University of Technology, Chair of Marketing	Extraordinary Lecturer

6. Selected Papers

Arvola, R. 2009. Telework as a Tool for Extending Work Life. In: Kristjuhan, Ü. & Arvola, R. (eds.). *Extending the Work Life. Collection of Articles*, 110−115. Tallinn University of Technology Press.

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Arvola, R. 2008. Kaugtöö kui lahendus vanemale tööjõule. Naat, E. (ed). *Kaugtöö kojutulek*, 72−82. Kärdla: Arhipelaag.

Kristjuhan, Ü. & **Arvola, R.** 2008. Tallinnas toimunud töövõime pikendamise sümpoosionil vaadati tulevikku. *Eesti Töötervishoid*, 4, 14.

ELULOOKIRJELDUS

1. Isikuandmed

Ees- ja perekonnanimi	René Arvola
Sünniaeg ja -koht	15.08.1978, Paide
Kodakondsus	Eesti
E-posti aadress	Rene.Arvola@Eesti.ee

2. Hariduskäik

Õppeasutus (nimetus lõpetamise ajal)	Lõpetamise aeg	Haridus (eriala/kraad)
Tallinna Tehnikaülikool	2002 - …	filosoofiadoktor
Tallinna Tehnikaülikool	2002	majandusteaduste magister
Tallinna Tehnikaülikool	2000	sotsiaalteaduste bakalaureuse
Paide Ühisgümnaasium	1996	keskharidus

3. Keelteoskus (alg-, kesk- või kõrgtase)

Keel	Tase
Eesti keel	Emakeel
Inglise keel	Kõrgem kesktase

4. Täiendusõpe

Õppimise aeg	Täiendusõppe korraldaja nimetus
2001	“Tööterviseriskide haldamine” Tallinna Tehnikaülikool
märts 2006	“Vananemise haldamine: Töötamine pärast 60+” Soome Töötervishoiu Instituut
9.-20. märts 2009	“Kvantitatiivsed uurimismeetodid” Tallinna Tehnikaülikool
apr-mai 2010	“Ankeetküsitluse planeerimine” Tallinna Tehnikaülikool
okt-dets 2010	“Teaduspublikatsioonide kirjutamine” Tallinna Tehnikaülikool

5. Teenistuskäik

Töötamise aeg	Tööandja nimetus	Ametikoht
2017-…	Tallinna Tehnikaülikool, Ärikorralduse instituut	Lektor

2009-2016	Tallinna Tehnikaülikool, Turunduse õppetool	Lektor
2002-2011	Tallinna Tehnikaülikool, Turunduse õppetool	Õppetooli hoidja
2002-2004	TTÜ Tallinna Kolledž	Lektor
2001-2009	Tallinna Tehnikaülikool, Turunduse õppetool	Assistent
2001-2002	Tallinna Ülikool, Sotsiaalteaduskond	Lektor
2001	Tallinna Tehnikaülikool, Turunduse õppetool	Erakorraline lektor

6. Valitud artiklid

Arvola, R. 2009. Telework as a Tool for Extending Work Life. In: Kristjuhan, Ü. & Arvola, R. (eds.). *Extending the Work Life. Collection of Articles*, 110−115. Tallinn University of Technology Press.

Arvola, R. & Eveleens, W. 2007. Telework as support to regional development. *Baltic Business and Socio-Economic Development*, 3rd International Conference Baltic Business and Socio-Economic Development. Tallinn Estonia, June (17), 2007. Sepp, J. (ed.). 18-19. Tallinn: Tallinn University of Technology.

Arvola, R. 2007. New target group for telework - senior workforce. *Computing systems for human benefits: Working with Computing Systems*, Conference in Stockholm 21-24 May 2007. Stockholm.

Arvola, R. 2007. New Data of Working from Home (Research in Case of Intellectual Work). In: Kristjuhan, Ü. & Arvola, R. (eds.). *Telework as Solution for Senior Workforce*, 13−27. Tallinn University of Technology Press.

Kristjuhan, Ü. & **Arvola, R**. 2006. Employment of senior workers in Estonia. *Proceedings of IEA2006 Congress "Meeting Diversity in Ergonomics"*. Maastricht, *10-14 July*, Pikaar, R.N., Koningsveld, E.A.P. & Settels, P.J.M. (eds.), Elsevier.

Arvola, R. 2006. Telework as a solution for senior workforce: research at Tallinn University of Technology. *Working papers in economics* (TUTWPE) / Tallinn University of Technology, School of Economics and Business Administration, 19, 35−49.

Arvola, R. & Kristjuhan, Ü. 2005. Human factors and telework. *Proceedings of NES2005 Ergonomics as a tool in future development and value creation, Nordic Economics Society 37th Annual Conference 10-12 October 2005.* Oslo, 66−69.

Arvola, R. 2008. Kaugtöö kui lahendus vanemale tööjõule. Naat, E. (ed). *Kaugtöö kojutulek*, 72−82. Kärdla: Arhipelaag.

Kristjuhan, Ü. & **Arvola, R.** 2008. Tallinnas toimunud töövõime pikendamise sümpoosionil vaadati tulevikku. *Eesti Töötervishoid*, 4, 14.

ABSTRACT

Telework has provided flexibility to the work environment in the context of time and place of work for employees. In addition, telework can offer a solution for a recent problem that is accompanied by a continuously extending lifespan. This problem results in increasing pressure on the pension system. This inquiry argues that this can be relieved if telework is applied as one of the tools contributing to the extending worklife. This thesis titled "Telework as a solution for extending worklife" is written on the basis of five scientific papers published (2015-2017) or accepted in the journals ETIS 1.1 and 1.2 or Conference Proceedings (ETIS 3.1).

The summary contains 51 pages, includes two figures and three tables. The main parts of the thesis are: introduction, materials and research methodologies, results and conclusions.

A set of research methods were employed in the study. Both quantitative and qualitative approaches were used. Non-probability judgement and convenience sampling techniques were applied for the quantitative approach. Data were collected through three surveys (Articles I, II, IV and V) and ten semi-structured expert interviews (Article III). Collected quantitative data were analysed with statistical analysis by using linear correlation, ANOVA single factor and t-test. Content analysis and thematic units coding were applied for the analysis of qualitative data.

The novelty of the thesis lies in the evaluation of telework-related human factors that influence individuals' intentions to extend their worklife. A conceptual model of extending worklife was proposed that evaluates telework-related human factors, which according to existing literature, might influence employees' decision to postpone their retirement.

The main result of the work is a versatile approach of how it is possible to integrate telework and the supporting factors for extending worklife into one whole system. The conceptual model was worked out and the connections between different human and social factors that influence the postponing retirement were statistically tested with the hypotheses. Four hypotheses (H9, H12, H13 and H14) in the conceptual model were confirmed. Hypotheses H8, H10 and H11 found no support. Confirmed hypotheses verified the importance of job satisfaction (t=1.67), telework (t=13.43), income (t=1.71) and intergenerational knowledge transfer (t=5.42) for extending worklife.

It is argued to support a work environment that is favourable to extending worklife, reasonable work factors should be influenced by policy makers and employers. In Estonia, one of the substancial incentives is the possibility to have the state old-age pension in addition to the work salary. Working after legal retirement age is widespread in Estonia.

Four different studies conducted focussed on the following targets:

- Telework usage among university academic staff members as mental workers. Respondents were from Tallinn University of Technology.

- Telework and well-being among mental workers in a variety of areas. Kiva questionnaire was applied for measuring well-being. Respondents were selected from Estonia on a judgement sampling basis.
- Employers' perspective on telework as a tool for extending worklife. All the employers that were interviewed were selected from the real estate sector.
- Employees' intentions to extend worklife with the help of telework. Respondents of the survey were the employees of the real estate companies.

As a result, it can be stated that telework is used by white-collar workers regardless of their age and gender. These studies demonstrated that telework is used intensively and the employers are liberal regarding telework issues. Telework, mainly seen as a supplier of flexibility for work environment, is carried out by full initiative and wisdom of the employer without considerable systematic approach. Employees' well-being and regional development is improving, but the full potential of telework innovation has not been achieved. With a systematic approach to telework, it is possible to improve team synergy, customer service and knowledge capital.

The conceptual model sheds new light on the existing knowledge of telework-related human factors. The research could not confirm all the hypotheses that were set based on previous literature. According to the conceptual model, telework's influence may be overrated from some perspective that is described below. The conceptual model highlighted telework's role in extending worklife that has been unnoticed earlier. Telework offers flexibility, yet the current studies referred to telework's insufficient or indistinct influence on job satisfaction and health. However, telework's influence on the intention to extend worklife turned out to be positive. In the shortage of experienced and skilled specialists, reasonable work arrangement in combination with labor policy can offer answers to this problem. In addition to that, telework can participate in the promotion of intergenerational knowledge transfer in an organization by mutual help between older (experienced in professional matters) and younger (familiar with the use of the latest ICT) colleagues.

These studies also support the common position described in the earlier literature, whereby telework offers economy in commuting time and cost, flexibility, less stressful work environment, better conditions for concentration, and occasionally some relief in health issues.

Since the creation of the telework concept, the reasons, reach and consequences of telework have faced changes. Telework is closely related to the exploitation of ICT, which is in rapid development. Telework-related human factors are also worth exploring in the future.

KOKKUVÕTE

Kaugtöö kasuks töökeskkonnas peetakse peamiselt paindlikkust töötaja jaoks, kellel on võimalik ise valida töö tegemise aega ja kohta. Samuti võib kaugtöö pakkuda lahendust viimase aja probleemile, mis kaasneb jätkuva eluea kasvuga. See probleem seisneb kasvavas surves pensionisüsteemile, mida võib leevendada kaugtöö rakendamine ühe tööiga pikendava meetmena. Doktoritöö "Kaugtöö kui abinõu tööea pikendamiseks" on koostatud viie teadusartikli põhjal, mis on avaldatud (2015-2017) või vastu võetud ETIS 1.1 ja 1.2 ajakirjades või konverentsikogumikes (ETIS 3.1).

Ülevaateartikkel koosneb 51 leheküljest, mis sisaldab kaht joonist ja kolme tabelit. Uurimuse põhiosadeks on: sissejuhatus, uurimismeetodid, tulemused ja järeldused.

Uurimuses kasutati mitut uurimismeetodit. Rakendatud on nii kvantitatiivset kui ka kvalitatiivset lähenemist. Kvantitatiivsete andmete kogumisel kasutati mittetõenäosuslikku sihipärast valimit ja mugavusvalimit. Andmed koguti kolme küsitluse (Artiklid I, II, IV ja V) ning kümne poolstruktureeritud ekspertintervjuu (Artikkel III) abil. Kogutud kvantitatiivseid andmeid analüüsiti statistilise analüüsi abil, mis sisaldas lineaarset korrelatsiooni, ANOVA ühefaktorilist dispersioonanalüüsi ja t-testi. Temaatiliste üksuste kodeerimisega sisuanalüüsi kasutati kvalitatiivsete andmete analüüsiks.

Töö uudsus seisneb kaugtöö-alaste inimesega seotud tegurite hindamises, mis mõjutavad isiku tööea pikendamise kavatsusi. Töötati välja pikema tööea kontseptuaalne mudel, mis hindab kaugtöö-alaseid inimesega seotud tegureid, mis varem ilmunud uuringute põhjal võiks mõjutada töötaja pensionilejäämise edasilükkamist.

Töö põhitulemusena on mitmekülgselt uuritud, kuidas oleks võimalik lõimida terviklikuks süsteemiks kaugtöö ja tööea pikendamist toetavad tegurid. Töötati välja kontseptuaalne mudel ning hüpoteeside abil kontrolliti seoseid erinevate sotsiaalsete ja personaalsete tegurite vahel, mis aitavad pensionile jäämist edasi lükata. Neli hüpoteesi (H9, H12, H13 ja H14) kontseptuaalses mudelis leidis kinnitust ning kolm (H8, H10 ja H11) jäid kinnitamata. Tõestatud hüpoteesid kinnitasid tööga rahulolu (t=1.67), kaugtöö (t=13.43), sissetuleku (t=1.71) ja põlvkondadevahelise teadmussiirde (t=5.42) olulisust tööea pikendamise seisukohast.

Tööea pikenemist toetava töökeskkonna tagamiseks tuleb poliitikakujundajatel ja tööandjatel luua õiged tingimused. Eestis on üheks peamiseks stiimuliks töötavale pensionärile töötasule lisaks säilitatav pension. Pensioniealisena edasi töötamine on Eestis laialt levinud.

Uurimuse raames viidi läbi neli uuringut, mis keskendusid järgmistele objektidele:

- Kaugtöö kasutamine ülikooli akadeemiliste töötajate kui vaimse töö tegijate seas. Valim koosnes Tallinna Tehnikaülikooli teadlastest ja õppejõududest;

- Erinevate valdkondade vaimse töö tegijate kaugtöö ja heaolu vahelised seosed. Heaolu mõõtmiseks kasutati KIVA küsimustikku. Valimi moodustamisel kasutati vaimse töö tegijaid Eestis, kes valiti välja sihipärase valimi meetodil;
- Tööandjate vaatenurk kaugtööle kui tööea pikendamise vahendile. Kõik tööandjad, keda intervjueeriti, valiti välja Eesti kinnisvara ettevõtete hulgast.
- Töötajate kavatsused tööea pikendamise osas kaugtöö abil. Küsitluse valimi moodustasid vaimse töö tegijad Eesti kinnisvara valdkonna ettevõtetest ja organisatsioonidest.

Töö tulemusena võib väita, et kaugtöö kasutamine valgekraeliste töötajate hulgas ei erine oluliselt vanuseliselt ega sooliselt. Need uuringud annavad pildi, mille kohaselt kaugtööd tehakse intensiivselt ning tööandjad on kaugtöö reguleerimisel liberaalsed. Kaugtööd, mida nähakse töökeskkonnas peamiselt paindlikkuse pakkujana, korraldavad arvestatava süsteemse lähenemise puudumise tõttu töötajad täielikult omal initsiatiivil, tuginedes isiklikule tarkusele. Sel moel mõjutab mõningal määral kaugtöö töötajate heaolu ning ka regionaalne areng paraneb, kuid kaugtöö uuenduste potentsiaal jääb täies ulatuses siiski kasutamata. Koos järjekindla lähenemisega kaugtööle on võimalik täiustada sünergiat meeskonnas ja klienditeenindust ning parandada teadmiste kapitali.

Töö tulemusena valminud kontseptuaalne mudel heidab uut valgust olemasolevatele teadmistele kaugtöö-alastest inimesega seotud teguritest. Uurimus ei leidnud kinnitust kõigile varasemate uuringute alusel püstitatud hüpoteesidele. Kontseptuaalse mudeli järgi on kaugtöö mõju mõne vaatenurga alt isegi ülehinnatud. Mudel tõstis esile seni varju jäänud kaugtöö potentsiaali tööea pikendamisel. Kaugtöö pakub küll suuremat paindlikkust, ent uurimuse tulemused viitavad sellele, et kaugtöö mõju tööga rahulolule ja töötaja tervisele on vähene või ähmane. Sellegipoolest selgus, et kaugtööl on oma osatähtsus tööea pikendamise kavatsuste kujunemisel. Kogenud ja oskustega spetsialistide nappuse korral võib sellest kitsikusest välja aidata arukas töökorraldus käsikäes tööjõupoliitikaga. Lisaks sellele võib kaugtöö olla osatäitja organisatsiooni põlvkondadevahelises teadmussiirdes vanemate (kogenud eriala asjatundjate) ja nooremate (kursis viimase aja infokommunikatsiooni tehnoloogiaga) kolleegide vahelise vastastikuse abistamise kaudu.

Läbiviidud uuringud toetasid ka varasemates uuringutes toodud üldist seisukohta, mille kohaselt kaugtöö võimaldab aja ja raha kokkuhoidu transpordis, paindlikkust, stressivabamat töökeskkonda, paremaid keskendumisvõimalusi ning mõningal juhul ka leevendusi tervisehädadele.

Kaugtöö kontseptsiooni sünnist alates on kaugtöö põhjused, ulatus ja kaugtööga kaasnev olnud muutumises. Kaugtöö on tihedalt seotud infokommunikatsiooni tehnoloogia kasutamisega, mis areneb pidevalt. Seetõttu on ka tulevikus mõtet uurida personaalseid tegureid kaugtöö kasutamisel.