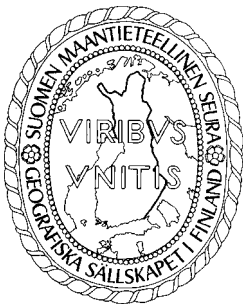
Distance between home and workplace as a factor for job satisfaction in the North-West Russian oil industry

MATTIAS SPIES



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This paper investigates in a combined theoretical and empirical approach the interrelatedness of job satisfaction and distance between home and workplace under long-distance commuting conditions. After discussing the concepts of long-distance commuting and job satisfaction on a theoretical level, the focus is on the situation of employees working in Russia's oil industry. The empirical analysis is based on questionnaire data from a survey that captures employees' experiences in an oil company, which operates in the Komi Republic and Nenets Autonomous District. The paper reveals factors influencing the perception of and dealing with commuting distances reaching up to several thousand kilometres. The influence of differences in the organisation and length of shifts and in the compensation for travel expenses is analysed in detail. Ultimately, the goal of this research is to find out whether or not commuting distances face upper constraints concerning employees' job satisfaction and to discuss potential implications for developments in remote areas. The results show that growing commuting distance does not necessarily cause lower job satisfaction. Instead, a more important factor in this respect is the organisation of long-distance commuting in a way that meets the understanding and needs of the involved employees and gives room for individual coping strategies.

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Introduction

Distance is a shaping feature of the Russian North, as well as of most other remote parts of the world. It is usually viewed as imposing costs and having frictional effects on economic activities and hence, necessitates efficient coping strategies. These preconditions have led to the development of long-distance commuting as an important element of natural resources exploitation in remote areas around the world. The distances that the employees cover during the journeys between their home and workplace make daily commuting unfeasible. On-site accommodation and compact work-schedules characterise workers' everyday experience on duty, while long resting periods at home after the end of each work turn act as highly regarded rewards. Distances of several thousand kilometres and even commuting between different continents are reasonable within this setting.

Long-distance commuting is widely applied and has social, political and economic consequences for the employees and their families, companies and communities. There is, however, surprisingly little concrete research done attempting to unravel the underlying structures and patterns of interrelated factors (Storey 2001b). Storey (2001b) argues that studies on long-distance commuting involve too many assumptions and hypotheses, but too few supporting (or rejecting) proofs based on primary field research. One frequently presented assumption is a generally high job satisfaction among long-distance commuters, usually explained with financial incentives and abundant free time (for example Houghton 1993; Tykkyläinen 1996). However, the concept of job satisfaction includes various other factors that raise the question if these

two motives alone are conclusive for understanding such a complex matter.

This article attempts to unravel the influence of one very particular and inherently geographical aspect of long-distance commuting affecting the job satisfaction of employees: distance. Other potentially influencing factors, such as development disparities in the home regions of the employees and different living conditions, are not considered. The argumentation is based on a survey among employees of a Russian oil company working on a remote production site in the Nenets Autonomous District. Within an increasingly intensive discussion on the real costs of the Soviet policy for populating the north with a large and permanent population, long-distance commuting, or the *vakhtovyi* method in Russian, is considered a promising and efficient alternative. The Russian experience of labour mobility is thus worth a thorough examination, with an additional look on the meaning of distance in the Russian context of a vast geographical territory. This paper introduces an example for the application of the *vakhtovyi* method in Russia. It aims to contribute to a better overall understanding of long-distance commuting by providing well-founded knowledge on underlying factors based on a combined theoretical and empirical approach.

Research question

When commuting distance covers several thousand kilometres, the issue cannot be addressed in the same way as in traditional daily mobility behaviour. Does distance actually matter at all regarding the employees' choices of employment and perception of their work situation? Employment opportunity and job accessibility seem to be independent from the spatial connectedness of home and workplace. On the other hand, Tykkyläinen (1996) has demonstrated strong attachments of long-distance commuters to their home environments and showed that home atmosphere and lifestyle cannot be transferred to other places. Therefore, it is reasonable to assume that the degree of remoteness and separation from the home environment influences the subjective perceptions of long-distance commuters. Long physical distance narrows down the possibility of returning home by complicating journey arrangements and increasing travel time. Therefore, one has to understand not only the absolute space but also relative or individually perceived views on distance (Janelle 2001). The rationale of this paper is to unravel whether distance between home and workplace is an important element of job satisfaction in long-distance commuting and furthermore, if it can be extended without facing upper constraints?

Case study and data

This study is based on a survey conducted among the employees of the ZAO SeverTEK oil company in late 2004. The firm was established in 1996 to exploit oil deposits in the tundra of the Komi Republic and the Nenets Autonomous District, northwest from Usinsk. It was originally owned in equal shares by two oil companies, the Russian Lukoil and the Finnish Fortum. However, since autumn 2005, Lukoil has been the sole owner of SeverTEK. The construction of all production facilities was completed in summer 2005 and full production was achieved shortly after.

The total oil reserves of SeverTEK are estimated at 30–40 million tons and an annual yield of 2.5 million tons is targeted. The oil is transported via a company-owned pipeline east to the Kharyaga terminal and from there to the markets via pipelines owned by Lukoil and Transneft (Fig. 1). Possible shortages in the pipeline transportation may cause reduction in overall future oil production of SeverTEK and hence, may turn out to be a serious problem for the enterprise (Hanna 2004).

The main production facilities of SeverTEK are currently at and around the South Shapkino oil field. At South Shapkino, there are laboratories, a processing plant for enhancing the quality of the produced oil, a heliport and the accommodation buildings for the employees. In November 2004, SeverTEK had a staff of 589 individuals, 320 of which were workers. A significant part (166) lives in the Usinsk region; five live in Moscow and the majority (418) come from other regions of Russia (SeverTEK 2004). Accordingly, most employees commute to Usinsk for their work duties. Table 1 summarises some personal information on the employees. The workforce is dominantly male, rather work-experienced and lives with a partner, usually with children.

The majority of the employees are flown from Usinsk to the South Shapkino oil field and are accommodated there for their work period. Nearly all of the 320 workers and part of the administration and research staff work at the field in two shifts. The usual rotation is 15/15 (15 days work

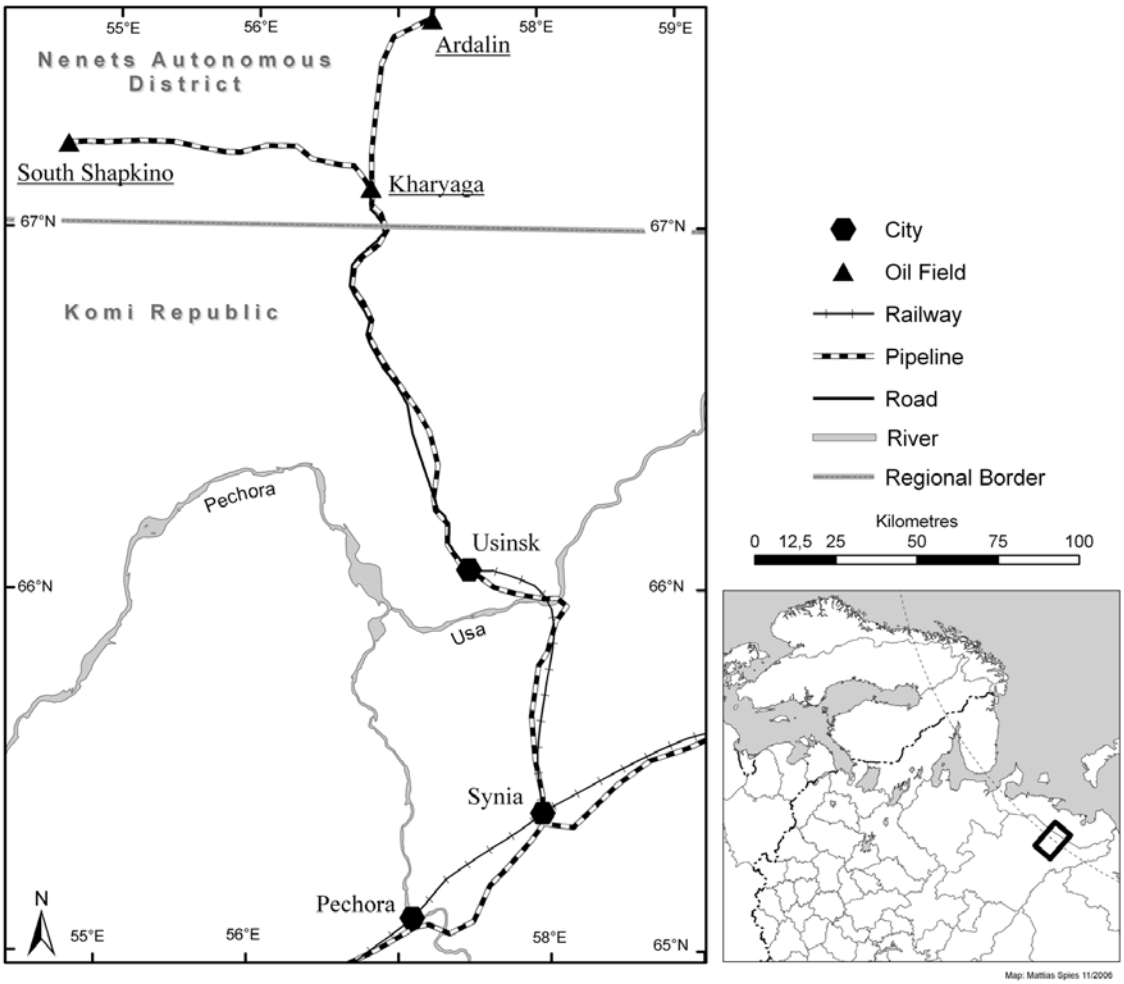

Fig. 1. Map of research area.

Table 1. Personal information on employees.

Average age	38 years
Sex	
▪ Male	94%
▪ Female	6%
Family status	
▪ Are married /cohabitating	83%
▪ Have children	77%
Former work experience	
▪ In another oil company	61%
▪ With long-distance commuting	65%

period followed by 15 days resting at home) but can be extended to 30/30 if the employees of two subsequent shifts agree on it. At the oil field, the work is organised into two daily shifts of 12 hours, each between seven o'clock in the morning and the evening. The average income of 867 USD per month (an average of the first nine months of 2004) is comparably high in Russian standards (SeverTEK 2004). The main difference in the management of ordinary workers and highly skilled employees is the way in which travel expenses are refunded. While the workers have to cover the travel expenses from home to the head office in Usinsk by themselves, the costs of highly skilled employees are covered by the company. This is explained by the shortage of educated specialists in the Russian oil and gas industry (Naskova 2004).

The accommodation complex at South Shapkino is new and modern. All facilities have been constructed since 2001 and are designed to offer a

large variety of amenities. It can be reached by helicopter from Usinsk in about 75 minutes the year round, or by vehicles along winter roads over frozen rivers and tundra. However, harsh climate and location in the far north are inevitably limiting the comfort. Construction and maintenance of the infrastructure is demanding and expensive, and space in the complex is therefore rather limited. The complex is designed to host a maximum of 250 people. Some dormitory rooms are designed for two occupants but most employees have to share rooms of approximately 10 m^2 with three other individuals (at any given time, two of the four employees will be working their shift).

The employees are provided with free food, primary health care and laundry services. Leisure time possibilities are mostly limited to indoor activities (TV, fitness room, table tennis etc.) due to climatic constrains in winter, and few opportunities in the tundra during summer. Strict intern security regulations (for alcohol use, contact with reindeer herders etc.) are further limiting personal freedom and decision-making. Therefore, workers' life is strongly characterised by 12 hours of work and subsequent sleeping time.

The survey among SeverTEK's employees reported in this paper aimed at reaching all staff working at the oil field in South Shapkino. A self-administered questionnaire in Russian language was disseminated to all present employees of two subsequent rotational shifts, of about 220 members each. Of these 440 subjects, 357 responded and returned the filled-in questionnaire.

Limitations

The main limitation of the study is that the data was collected from one company only. Therefore, it is justified to come to conclusions on the meaning of distance in long-distance commuting for the employees of SeverTEK only. Any attempt for conclusions on a wider scope has to keep this precondition in mind. Nevertheless, it seems reasonable to allow some degree of generalisation from this case study due to the similar working arrangements and conditions in other oil and gas companies in the Russian North.

It is difficult to estimate to what extent the findings suit to other regions of the world with long-distance commuting. Although the common trend in long-distance commuting research is to transfer findings from one context to another, this is criticised by Storey (2001b). The mere size of Russia constitutes a unique environment for long-distance commuters.

Both distribution and collection of the questionnaires was done with the help of SeverTEK. There is hence a possibility of bias in the data, as some employees may have felt uncomfortable to express their genuine feelings and opinions. However, no direct indication of biased answers was found in the data analyses.

Theoretical background

Long-distance commuting

Long-distance commuting (LDC) is a concept of workforce organisation and recruitment that is widely applied in the oil, gas and mining industries, as well as in all other industrial activities that take place in remote areas without sufficient local supply of labour and that lack the potential to attract labour to move in permanently. LDC is defined by Hobart (1979: 2) as "…all employment in which the work place is so isolated from the worker's homes that food and lodging accommodation are provided for them at the work site and schedules are established whereby employees spend a fixed number of days working at the site, followed by a fixed number of rest days at home. The expectation is that the employees will work an indefinite number of work and home rotation cycles." Most commonly, the travelling between home and work place is organised by air, often referred to as fly-in/fly-out. Commuting distance, transportation systems, work schedule details, on-site accommodation and other factors can vary significantly between different long-distance commuting operations and it is hence difficult to find one accurate generic descriptive definition (Shrimpton 1994). For example, shift lengths can vary from a few days to several weeks or even months. What defines the concept and distinguishes it from traditional forms of labour organisation is the unambiguous spatial and temporal separation between the employees' home and workplace. Based on this intermittent principle, the spatial range of available employment opportunities is extended widely for both employees and employers (Houghton 1993). Therefore, this form of commuting is used by various employers and industries located in regions with insufficient labour pools, thus giving access to distant labour markets.

On a grand scale, long-distance commuting was first developed and applied in the offshore oil in-

dustry in the Gulf of Mexico after the World War II (Storey 2001a; The Chamber of Minerals and Energy Western Australia 2005). LDC has since developed further and spread around the world. A frequent use of onshore long-distance commuting operation started in Canada and Australia in the 1970s, in many cases replacing the traditional establishment of mining towns at newly opened mining sites. Ever since, LDC has become more and more common, a process that is very likely to continue (Storey 2001b).

There are several reasons for the growth of long-distance commuting around the world. One reason is the unbalanced spatial distribution of population and natural resources (Storey & Shrimpton 1989). Building mining towns at remote places is not sufficient anymore. The decline in the number of remote resource towns in favour of long-distance commuting is based on three principal reasons. First, long-distance commuting is often more cost-effective than the construction of resource towns, allowing capital savings (Costa 2004). Especially front-end costs are drastically reduced and replaced by more evenly-distributed investments in transportation (Houghton 1993). Additionally, as demonstrated by Tykkyläinen (1996), longer working hours and leaner organisation structures are common in long-distance commuting operations reducing over-all costs in spite of higher transportation expenditures. Second, the progress has been strongly influenced by rapid technology development. Reliable and cheap transportation and communication technology are essential for establishing long-distance commuting operations (Tykkyläinen 1996). In addition, technological development in the mining industry works in favour of long-distance commuting. Increased automation and replacement of human labour by machinery reduce the need of labour force, which in turn leads to lower transportation costs. Third, workers' preferences have changed. The majority of mining workers are no longer willing to move to remote places in order to work in a mine (Storey & Shrimpton 1989; Tykkyläinen 1996). This is the case especially for employees with a partner and family. Due to the higher standard of living in urban regions, including better infrastructure, health and education facilities and a wide spectrum of recreational possibilities, the workers and their families are unwilling to accommodate to the Spartan life style of the resource towns. Unstable commodity prices, a trend towards smaller-scale operations and stricter regulations for environmental and social planning in the mining sector also support long-distance commuting. Consequently, there is no reason to believe that this trend in remote areas would change in the near future.

What are the political, social and economic impacts of this development? Conflicting messages have been given by the different stakeholders involved and it is difficult to judge the overall sustainability of long-distance commuting (Heiler & Pickersgill 2001; Costa 2004). The implications can be divided into three groups: First, the organisation of work differs from a normal work situation including special arrangements on working schedules, transportation issues, accommodation and other practical aspects in order to ensure a smooth production process. Consequently, facets of working life normally not in the scope of management have to be handled regularly (Storey & Shrimpton 1989). The maintenance of a harmonious working and living atmosphere among people living together in remote places, often with rather limited space and privacy, belongs to this category. Second, long-distance commuting has implications for the employees' well-being and family life. It is often assumed that the compact working schedule affects negatively the health and safety conditions. Nevertheless, these relationships are not fully proven and understood (Costa 2004). Alike, the impact on families remains unclear. On one hand it is reasonable to argue that the regular partings and reunions cause stress on families and that the extensive absence of parents is problematic. On the other hand, employees do not juggle the competing interests of work and domestic responsibilities and do not have to commute several hours each day, which reduces some stress (Heiler & Pickersgill 2001). Third, community life and regional development face new challenges in long-distance commuting settings, especially in areas with traditional village-type settlements. The long periods of absence, for example, make it difficult for residents to participate and contribute to community life. Many communities also experience out-migration of inhabitants due to their improved financial position and complain that the local share of the benefits from mining activities is too narrow (Storey 2001b). These implications are often related to the 'fly-over' problem, which leads to the exclusion of rural communities from the benefits from mining activities in their vicinity. The supply to and positive spill-over from the industry are arranged and shared between the mining site and a few, mostly metropolitan, areas from where

the mining process is organised and where most employees live. However, long-distance commuting contributes to the wealth of rural areas by enabling mining projects that would otherwise be unprofitable and by increasing employment possibilities.

On a theoretical level, the implications of long-distance commuting are extensive and challenge the traditional concepts of spatial structures and behaviour. Physical distance is perceived differently as it loses much of its limiting impacts on commuting activities. Mobility decisions are based on distance perceptions and scales that are altered by modern communication and transportation technology (Tykkyläinen 1996). More concretely, long-distance commuting changes the clear distinction between short-term mobility and permanent migration and obscures the meaning of traditional travel-to-work areas (Houghton 1993; McQuaid et al. 2001). These factors indicate a changing connotation of distance. Obviously, commuting under these new preconditions enables employees to cover much longer distances in travelling to and from work. It seems like spatial interaction is almost a random function of distance (Tykkyläinen 1996). In addition to an absolute notion of space expressed in kilometres, also alternative concepts are relevant for the analysis of long-distance commuting. Concepts like time distance and economic distance express a clearly individual or relative view on distance and help explain its changing meaning (Gatrell 1983). Janelle (1968) developed the concept of time-space convergence based on a relative understanding of space and shows how the effort needed to cope with distance is changing over time, for example by introducing more powerful means of transport. He concludes "…that physical points (places on the earth) are in relative motion with respect to one another…[and that] the structure of the resulting space, the frame of reference for human activities, is constantly in flux…" (Janelle 2001: 15474). Long-distance commuters obviously utilise the opportunities of this relativity, based on improved transport and communications technology, to overcome the friction of distance. They are extending their spatial leverage into areas that would be otherwise inaccessible. This results in growing personal extensibility (Janelle 1973; Adams 1995).

In Russia, long-distance commuting is known as the *'vakhtovyi'*, or 'shift work' method. Its principles are similar to those in other regions and described above. The sparsely populated north with its rich natural resources represents a substantial part of the country. Due to this precondition, long-distance commuting was and is an important aspect of the mining and hydrocarbon industry. Ever since the planned and industrialised exploitation of riches of the north started, labour supply was a crucial question. Several policies have been applied in order to ensure a sufficient potential of labour in the oft-extreme locations of natural resources extraction (Bond 1985). Long-distance commuting is one of the potential approaches and one that has recently attracted more attention, even though it is by no means a new concept in Russia. Sveshnikov (1988: 280) defines early examples of long-distance commuting as "expedition-related commuting-type settlements" that are supplied with food and other goods from supporting towns in more favourable natural conditions. Armstrong (1976) refers to cases of mineral resource extraction in remote northern locations in the 1960s, which applied the 'shift method'.

Today, long-distance commuting is indispensable for the industry in Russia's northern and eastern peripheries. These parts of Russia have experienced significant out-migration since the dissolution of the Soviet Union and the subsequent mitigation or disappearance of many benefits for its inhabitants (Heleniak 1999; Göler 2005). An increasing awareness of the real costs of maintaining a large and permanent population at remote locations in the north, often with extreme natural conditions, and the new geo-political realities of the post-Soviet period, have led to a different assessment of the value of these northern settlements (Hill & Gaddy 2003). Today, Russian officials promote long-distance commuting as a promising alternative development strategy for the north and claim that it should gradually replace permanent settlements (Drobizheva 1999; Walsh 2003). Nevertheless, ongoing attempts to resettle voluntarily the population from Russia's peripheries to central parts of the country are facing more difficulties than expected and are often related to place attachment, as Thompson (2002, 2004) and Round (2005) have demonstrated. Furthermore, any effort to replace permanent settlements in Russia's peripheries by long-distance commuting operations is likely to increase the fragmentation of the country between a few prospering urban areas and locations of natural resource extraction on one side and vast, 'empty', underdeveloped hinterlands (Dienes 2002).

Long-distance commuting is currently, in spite of its potential problems, an important way of attracting people to northern workplaces due to the reasons explained above, employees' preferences for living in the south and a lack of high skilled employees (Naskova 2004; Juurikkala & Lazareva 2006). Borisov (2004), for example, estimates that over ten percent of the workers in the oil and gas industry of the Khanty-Mansi Autonomous District have their homes in a different region of Russia and that the share of Gazprom's employees working with the *vakhtovyi* method will grow up to 16 percent in 2006. To conclude, present developments in Russia's peripheries and a simultaneous thrust of many natural resource extracting companies further north and east into even more remote places support the presumption that the number of long-distance commuting operations over increasing distances will continue to grow.

Job satisfaction and commuting

Research on job satisfaction is an important part of organisational behaviour and work psychology. The importance for psychological research can be evaluated from two different perspectives (Spector 1997). First, from a humanitarian perspective, a fair and respectful treatment of people is worth an endeavour. Job satisfaction appears here as evidence of good treatment of employees. Second, from a utilitarian perspective, it is crucial that satisfaction leads to employees' behaviour that supports the organisational functioning.

A look at the theories of job satisfaction gives an impression of the problems and complexities related to the issue. According to Dipboye et al. (1994), there are three different sets of important job satisfaction theories. The first is the two-factor theory. It tries to explain job satisfaction with extrinsic job factors (e.g. working conditions, salary) and intrinsic factors (e.g. responsibility and achievement). Job satisfaction occurs only when the intrinsic needs are fulfilled. The second set of theories compares the level of access to an aspect with the level of actual need to access this aspect (Dipboye et al. 1994). It deals with the degree of discrepancy between these two categories and defines it as the reason for satisfaction or dissatisfaction. This comparison can focus on a global level, measuring a value of overall job satisfaction. Furthermore, as recently stressed, it can look only at certain aspects of the job reality and give emphasis to these facets. The third set of theories is most recently developed and applied, and focuses on the individual characters of employees and on cognitive processes that constitute job (dis)satisfaction. Aspects like individual values and needs, personality traits, and the comparison of their own achievements at work with those of members of relevant social groups come to the forefront now (Thierry 1998).

Job satisfaction is influenced by a variety of factors and is far from being the result of any straightforward causal connection between any such factors. It is always difficult to deal with, for example, feelings and attitudes. Individuals tend to have their own personal point(s) of reference in the perception of their environment (Iverson & Maguire 2000). For Freeman (1978), this is the reason why job satisfaction has not received as much attention from economists as it should have due to its importance for economic processes in organisations.

The theoretical positioning is challenging. Furthermore, the specification of concrete determinates and potential effects of job satisfaction are multifaceted. When dealing with an interrelationship between personality traits and situational variables (Thierry 1998), it is not surprising that many factors influence job satisfaction. They can be divided into three groups: *Personal characteristics* (e.g. age, gender, personality and traits), *job-related factors* (e.g., salary, job design, labour conditions and participation in decision-making), and, finally, *non-work factors* (e.g. life satisfaction and family situation) that are important determinants for job satisfaction. Spector (1997) provides detailed information about, as he calls them, antecedents of job satisfaction. Among the personal factors he stresses particularly the concept of locus of control, which is a cognitive variable representing the belief/disbelief in self-determination (Spector 1997).

For this study, it is necessary to connect these insights on job satisfaction to the discussion on commuting in general and long-distance commuting in particular. It is valuable to look at specific aspects of and influential factors for job satisfaction. This emphasis on partial job satisfaction (Johansson 2004) justifies the in-depth look at long-distance commuting as one particular determinate of job satisfaction. Due to two reasons, it is not easy to establish the link between commuting and satisfaction. First, little attention has been paid so far on commuting as a determinant of job satisfaction. In addition, when it has been done, it has usually been understood as short distance or daily commuting.

Commuting studies often approach the question of job satisfaction indirectly by emphasising stress as the main factor (e.g. Cassidy 1992; Koslowsky et al. 1996; McLennan & Bennetts 2003). Nevertheless, the effects of stress are very similar to those of job satisfaction. McLennan and Bennetts (2003) name job performance, health and psychological adjustment as being affected by stress and hence, also job satisfaction is certainly influenced by commuting. Commuting is often referred to as a plague of modern man and generally associated with negative outcomes (Koslowsky et al. 1996). Distance, measured in kilometres or in time, is in this assessment of (daily) commuting one of the main determinants for stress and job satisfaction. Whether this applies also to long-distance commuting or not will be considered later. Some results (Cassidy 1992) point to the fact that longer commutes lead to a more negative experience of commuting. The relationship between distance and stress of commuting is, again, not straightforward. Johansson et al. (2003) have found that time distance has a non-linear influence on commuters' behaviour. They show that the time sensibility is much lower for very short and very long commuting distances. However, it has to be mentioned here that long time distance is defined by the authors as beyond one hour of travelling time (Johansson et al. 2003), which is, in terms of long-distance commuting as it is understood in this study, still a short distance. Concurrent results are provided concerning the means of influencing and levelling the stress caused by commuting. The fact that people seek control over their journey to work can be identified as the common bottom-line for all of these measures (McLennan & Bennetts 2003). Impedance, a concept of perceived speed and control of travelling, is very important and every attempt to increase the level of perceived speed and control helps to abate stress (Cassidy 1992).

The question, whether the findings concerning daily commuting, stress and job satisfaction can be applied to long-distance commuting, cannot be answered conclusively on a theoretical level. There are few literature references concerning this issue. Jenkins (1997) studied job satisfaction and long-distance commuting but he does not specifically deal with this question. Neither do Chen et al. (2003), who studied the determinates of perceived occupational stress among Chinese offshore oil workers. The issue is taken into account only indirectly by giving a decisive importance to the journey to and from work and the isolation from communities and family. I argue that job satisfaction in long-distance commuting is most likely influenced by some of the basic factors mentioned above relating to daily commuting. The perceived level of control is believed to be one of these central aspects. Employees seek a level of flexibility and control that meet their specific needs, and this matter may be compromised by long-distance commuting (Heiler & Pickersgill 2001). In a second assumption I hypothesise that the meaning of distance for job satisfaction and stress in long-distance commuting differs from that in daily commuting, but that it still impacts the perceived level of control. This appears to be especially valid if the subjective perceptions of individuals are considered. It seems likely that a several thousand-kilometre distance between home and workplace could lead to a strong feeling of helplessness, i.e. lack of control.

Does distance matter?

Approach to the analysis

In the analysis, physical distance is given in kilometres, as other forms of distance, such as travelling time or economic cost were not readily available. The use of physical distance has the advantage of being consistent and containing implicit information on relative concepts of distance considered in the analysis and interpretation. The distance values are based on the estimations given by the employees. It is assumed that they have sufficient knowledge of the distance they cover during their journeys to and from work. Some employees, however, referred to SeverTEK's headquarter in Usinsk when specifying the distance between home and workplace (see, for example, the minimum value of two kilometres in Table 2), while others referred to the accommodation complex at South Shapkino. Estimation errors and different associations with the term 'workplace' lead to slightly distorted data. Nevertheless, the setting of this research does not require absolutely precise distance values and their impact can be considered secondary if compared with the total range of values. Of the total 357 returned questionnaires, 306 had valid distance values, the descriptive statistics of which are shown in Table 2. The values differ significantly and they are not normally distributed.

Job satisfaction is measured as summated scales (cf. Bryman & Cramer 2004) of the employees' sat-

Table 2. Descriptive statistics distance and job satisfaction.

	Valid N	Mean	Median	Standard deviation	Minimum	Maximum
What is the distance between your home town/region and SeverTEK-workplace? (km)	306	1071.26	360	1180.89	2	10000
Job satisfaction (summated scale)	222	87.98	89	9.56	59	112

isfaction with 26 aspects of their work situation under long-distance commuting conditions (see Fig. 2). This approach is based on the idea of partial job satisfaction (Johansson 2004). Therefore, from all of the aspects covered by the questionnaire I have chosen those that allow conclusions on overall job satisfaction. A wide range of intrinsic and extrinsic job aspects is covered. The respondents were asked to rate their opinion on these 26 aspects on a five point Likert scale. The satisfaction values are derived from these agreement figures with the assumption that a strong agreement equals high satisfaction whereas a strong disagreement expresses compelling dissatisfaction. Some answers had to be scored reversely before summing up the answers to an overall satisfaction indicator. The highest possible score of 130 (26*5) expresses very high satisfaction and 26, the lowest possible score (26*1), dissatisfaction. The use of mean values of data acquired with Likert scales is controversial. Nonetheless, Bryman and Cramer (2004) argue that most writers are prepared to treat such data as interval/ratio variables if used in summated scales. The number of cases is reduced to 222 due to missing values. The summarised outcome for the overall job satisfaction is illustrated in Table 2.

Two approaches are chosen for testing the relationship between job satisfaction and distance between home and workplace. First, the immediate correlation between both factors is tested by calculating Spearman's correlation coefficient based on 222 valid cases. The missing normal distribution of the distance values inhibits the use of other testing methods (e.g., Martens 2003).

The second approach classifies the cases in three groups according to the distance between home and workplace. The distance groups (Table 3 and Fig. 2) are formed for cases with commuting distances up to 300 kilometres, between 300 and one thousand kilometres and for more than one thousand kilometres. The rationale behind these threshold values is based on the home place of the workers and the character of travel arrangements. The majority of employees travelling up to 300 kilometres live in the wider Usinsk region. Accordingly, their journey is comparatively unproblematic. The second group includes employees coming mostly from other parts of the Komi Republic or North-West Russia. Within this region, traffic connections and infrastructure are rather developed and supportive for commuters, e.g. direct flights from Syktyvkar to Usinsk. The last group includes employees travelling more than one thousand kilometres. Due to distance and/or traffic connections the commuting arrangements of these employees are time consuming and comparatively difficult to organise.

The Kruskal-Wallis test is performed in order to analyse the average job satisfaction of these three groups. This nonparametric variance analysis assumes homogeneity among the means of different groups and is based on the ranking of the scores (Eckstein 2004). Significant differences between the mean values of job satisfaction exist if it is possible to reject the homogeneity hypothesis. The Kruskal-Wallis test measures the influence of a categorical factor on a metric variable (Martens 2003). The average job satisfaction is in a strict sense not such a metric variable. Therefore, a second test is applied in which the categorical factor is formed by four groups of job satisfaction and subsequently, their influence on the distance variable is analysed. The four groups are formed by following the quartiles of the distribution and indicate increasing job satisfaction.

Another matter of complication is the fact that the working conditions in SeverTEK are not equal for all employees, as stated earlier. The most striking differences are the unequal repayment of travel expenses and variations in the shift's length, which potentially influence job satisfaction and commuting distance. While dealing with the interrelationship between job satisfaction and distance, this

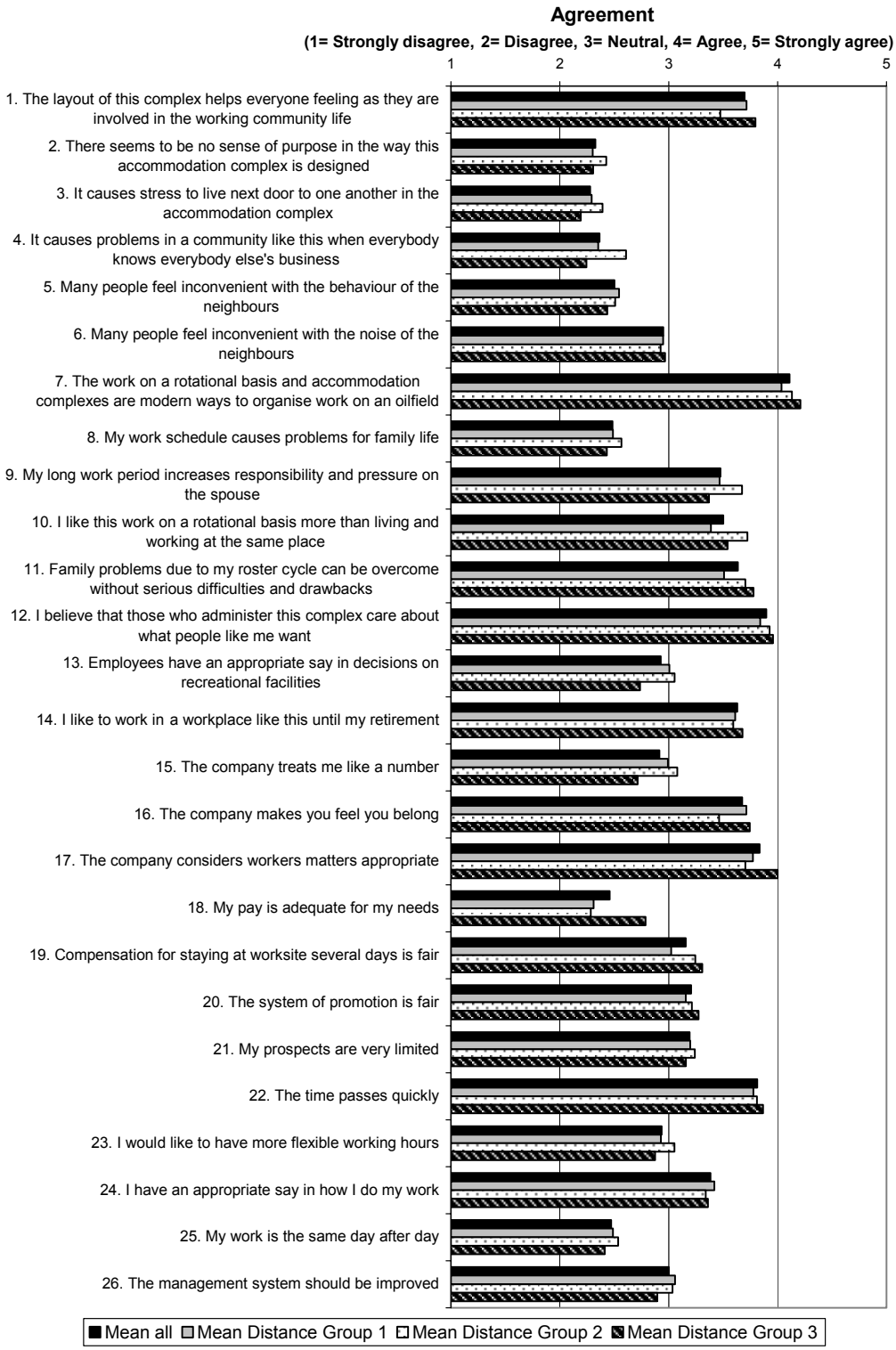

Fig. 2. Agreement with underlying factors (clustered by distance groups).

unequal treatment possibly has an influence on the employees' perceptions. Travel costs, especially airfares, are not trivial in Russia when compared to the average income. It seems reasonable to assume that employees who incur no commuting costs are happier with their jobs, especially under the conditions of long-distance commuting. The same applies to the different shift lengths. The 30/30-day rotation reduces by half the necessary monthly travel efforts because it limits the commuting to one journey into each direction instead of two in the 15/15 shifts. This saves time and money. Longer shifts could function, therefore, as a tool for altering time and economic distances. Based on these reasons, it is necessary to test if both aspects have an influence on the immediate connotation of distance for job satisfaction. This can be done by dividing the employees into different groups based on travel refunds and shift lengths before analysing their average job satisfaction and commuting distances. Furthermore, it is informative to show if these parties are represented equally in the distance and job satisfaction groups.

In the case of different travel refunds, the first group includes the white-collar management and supervisory staff. This group (N = 42) represents employees receiving refunds for their travel expenses. The second group (N = 208) includes those in SeverTEK who are not paid for their travel efforts, that is, the blue-collar staff. In order to compare the average job satisfaction of the two groups of employees, the Mann-Whitney test is performed. This is the equivalent of the Kruskal-Wallis test for two-independent-samples and proceeds in a similar way by ranking the scores and assuming homogeneity among mean values (Eckstein 2004). Cross-tabulation and the calculation of the Pearson Chi-Square reveal if the division of employees, belonging either to white or blue collar staff, across the job satisfaction and distance groups is evenly distributed or not. The same tests and procedures are applied in order to analyse the influence of different shift lengths on job satisfaction and the distance covered during journeys to and from work. At the time of employee surveying, 124 were working 15/15 rotations, while 172 employees were working 30/30 periods.

Research findings

An analysis of the 26 underlying factors of the overall job satisfaction leads to an ambivalent outcome (Fig. 2). The average agreement value of all cases for the 26 factors expresses neutral attitudes of the employees. However, some particular factors differ from the average, either negatively (for example factor 18: "My pay is adequate for my needs") or positively (for example factor 7: "Work on a rotational basis and accommodation complexes are modern ways to organise work on an oilfield").

One general trend found among the 26 factors when divided into the three distance groups is a higher satisfaction for the third group, the longest distances. In 21 of the 26 factors, this group shows the highest average satisfaction suggesting a higher job satisfaction among the employees with the longest commuting distance. This does not support the assumption that job satisfaction would decrease with growing commuting distance. Further statistical testing is needed to demonstrate if this trend can indeed be confirmed, and to unravel its possible reasons.

The outcome of Spearman's correlation is slightly positive (Kühnel & Krebs 2004) and statistically significant (0.144; $p = 0.032^*$), indicating a higher job satisfaction rate with increasing commuting distance, and pointing to the same direction as the results from the analysis of the 26 factors above. Despite the significant positive correlation between these factors, it is risky to make strict conclusions, as the positive value of the correlation coefficient is rather close to zero to indisputably indicate any major trend.

The second approach of analysing the relationship between job satisfaction and commuting distance is based on the comparison of the average values of groups. At first, the mean job satisfaction is specified for the three distance groups. Table 3 contains the average ranks of those groups and shows increasing figures indicating increasing commuting distance. The Kruskal-Wallis test indicates that the differences between the distance groups are significant by comparing the mean ranks. The homogeneity hypothesis has to be rejected and it is possible to conclude that the average job satisfaction increases significantly with the distance summarized in three groups.

In order to control the results from the first comparison of mean values and Kruskal-Wallis test, a further reversely designed statistical approach can be applied to give additional support to these findings. Table 3 shows a tendency of increasing average commuting distance within the four groups of growing job satisfaction. The significance of the differences between the four groups is even strong-

Table 3. Mean rank comparison distance and job satisfaction groups.

Distance groups [a]	N	Mean rank of satisfaction values
< 301 km (Usinsk region)	102	101.75
301–1000 km (Komi Rep. and NW Russia)	41	107.62
> 1000 km (rest of Russia)	79	126.10
Total	222	
Job satisfaction groups [b]	**N**	**Mean rank of distance values**
First quartile	60	111.13
Second quartile	54	94.14
Third quartile	56	105.47
Fourth quartile	52	136.44
Total	222	

[a] Differences in mean ranks are significant ($\chi^2 = 6.59$, df = 2, p = 0.037*).
[b] Differences in mean ranks are significant ($\chi^2 = 12.39$, df = 3, p = 0.006**).

Table 4. Mean rank comparison employee groups.

	Employee groups	N	Mean rank
Job satisfaction [a]	White-collar	28	88.95
	Blue-collar	157	93.72
	Total	185	
What is the distance between your home town/region and SeverTEK-workplace? [b]	White-collar	42	121.68
	Blue-collar	208	126.27
	Total	250	

[a] Differences in mean ranks are not significant (U = 2084.50, Z = –0.44, p = 0.663).
[b] Differences in mean ranks are not significant (U = 4207.50, Z = –0.38, p = 0.706).

er than in the previous analysis (also in the case where the extreme values are excluded), supporting the earlier conclusions. Remarkable is the outcome of group number four representing the employees with the highest job satisfaction rates: the average commuting distance of this group is clearly higher than in other groups, stressing the positive correlation between these variables.

An analysis was designed in an attempt to answer the questions of how SeverTEK's employees react to the unequal refunding of travel expenses and how this different treatment influences job satisfaction and commuting distance. Despite the differences in benefits between white-collar and blue-collar workers, there are no significant differences in job satisfaction nor in the distances covered during the journeys to and from work (Table 4). The calculation of the Mann-Whitney test confirms this outcome by leading to results that do not allow one to reject the homogeneity assumption.

The interpretation of the results from cross-tabulating both employee groups with the four groups of job satisfaction as well as three distance groups leads to similar outcomes. The observed counts and expected counts in Table 5 and the calculation of the Pearson Chi-Square result in probability values that do not prove any significant dependency between the variables.

Both approaches for analysing the importance of the unequal payment of travel refunds indicate that this policy does not significantly influence job satisfaction nor the commuting distance. Those who receive extra compensation for their journeys to Usinsk are not automatically more satisfied with their long-distance commuting job. The financial advantage, which certainly helps to cover long distances, does not automatically lead to longer commuting distances either. Differences in job satisfaction seem not to be caused by unequal travel refunds but rather by other factors not considered

Table 5. Cross-tabulation employee groups * job satisfaction and distance groups.

			Job satisfaction groups [a]				Distance groups [b]		
			1st quartile	2nd quartile	3rd quartile	4th quartile	< 301 km	301–1000 km	> 1000 km
Employee groups	White collar	Count	7	9	9	3	19	7	16
		Expected count	7.9	7.1	6.7	6.4	19.3	8.7	13.9
	Blue collar	Count	45	38	35	39	96	45	67
		Expected count	44.1	39.9	37.3	35.6	95.7	43.3	69.1

[a] Differences between counts and expected counts are not significant ($\chi^2 = 3.76$, df = 3, p = 0.288).
[b] Differences between counts and expected counts are not significant ($\chi^2 = 0.79$, df = 2, p = 0.675).

Table 6. Mean rank comparison rotation groups.

	Rotation groups	N	Mean rank
Job satisfaction [a]	15/15	82	89.89
	30/30	132	118.44
	Total	214	
What is the distance between your home town/region and SeverTEK-workplace? [b]	15/15	124	103.92
	30/30	172	180.64
	Total	296	

[a] Differences in mean ranks are significant (U = 3968.00, Z = –3.28, p = 0.001***).
[b] Differences in mean ranks are significant (U = 5136.00, Z = –7.64, p = 0.000***).

Table 7. Cross-tabulation rotation groups * job satisfaction and distance groups.

			Job satisfaction groups [a]				Distance groups [b]		
			1st quartile	2nd quartile	3rd quartile	4th quartile	< 301 km	301–1000 km	> 1000 km
Rotation groups	15/15	Count	30	23	19	10	89	27	8
		Expected count	23.0	18.8	20.7	19.5	59.5	23.9	40.6
	30/30	Count	30	26	35	41	53	30	89
		Expected count	37.0	30.2	33.3	31.5	82.5	33.1	56.4

[a] Differences between counts and expected counts are significant ($\chi^2 = 12.78$, df = 3, p = 0.005**).
[b] Differences between counts and expected counts are significant ($\chi^2 = 71.01$, df = 2, p = 0.000***).

here. The connection between refunds for travel expenses and commuting distance is, on the other hand, too intuitive to be used to deny that it influences the results found here. It is reasonable to conclude that there are no explicit signs showing that the refunding of travel expenses, and thus economic distance, is crucial in the analysis of the relationship between job satisfaction and distance.

Finally, as a last approach to empirical analysis, an assessment of the connotation of different shift lengths (15/15 or 30/30 day rotations) for job satisfaction and commuting distance was performed using the same tests as above. The comparison of mean ranks for job satisfaction and commuting distance for the two groups show (Table 6) considerable differences. Those in SeverTEK who are working on longer rotational shifts are more satisfied and they clearly commute over longer distances. The Mann-Whitney test values for these differences are highly significant.

Not surprisingly, the cross-tabulation (Table 7) of the two rotation groups with the job satisfaction and distance groups displays a significant pattern.

As the distribution of counts and expected counts shows, employees working on the longer 30/30 day shift are clearly over-represented in the fourth job satisfaction group and the third distance group. The 15/15 group reveals a contrary outcome and accordingly, is represented more strongly in the first job satisfaction and distance group. The Pearson Chi-Square's outcome confirms that this pattern is statistically significant and that the variables are dependent on each other.

The comparison of the mean ranks and the cross-tabulation suggest that shift length is important for the job satisfaction and average commuting distance for the personnel of SeverTEK. Those in the company who work on the 30/30 days shift are more satisfied with their situation and their average commuting distance is clearly longer. This result could indicate a negative linear correlation between job satisfaction and commuting distance, and the cost and efforts related to it. By working shifts twice as long it is possible to reduce commuting distance and expenses by half. For that reason, working on longer shifts could be perceived as a mechanism for reducing economic and time distances. Reducing these distances and simplifying the commuting process seemingly leads to higher job satisfaction. Variations in shift lengths alter the perception of physical distance and the satisfaction with the work situation and long-distance commuting.

Conclusions and discussion

The majority of the results presented here indicate a positive linear correlation between job satisfaction and commuting distance. The observed increase of job satisfaction with growing commuting distance is noticeable especially for the group containing the longest distances. The general positive correlation between theses variables is not strongly pronounced but is confirmed by comparing different groups of job satisfaction and distance levels. Most of the applied tests plus the analysis of the 26 underlying factors of overall job satisfaction lead to a similar result. However, the higher job satisfaction and commuting distance of those employees who work on longer rotational shifts can be interpreted indirectly as a sign for a negative influence of increasing distance on job satisfaction, as longer shifts are one option for reducing commuting efforts. Further discussion of these counter-intuitive results within the theoretical settings introduced in this paper is required to better understand the underlying factors.

Increasing distance between home and workplace does not lower job satisfaction inevitably. Concepts like locus of control and impedance, which are used in order to explain the relations between commuting, distance and job satisfaction, point to a presumable lower job satisfaction with increasing distances but fall short of explaining the observed situation. They cannot fully explain the relationship between the variables used in this research. On the other hand, these concepts make it difficult to explain the higher job satisfaction as a causal result of increasing commuting distance. Only if the control over travel arrangements, speed and costs and hence, time and economic distances, is fully independent of travel distance, it will be possible to decrease the importance of these concepts. In a real life situation, this kind of constellation seems unlikely. Again, the influence of longer rotational shifts on job satisfaction as found in the analyses above supports this argumentation. Therefore, it appears very reasonable that other factors influence the employees' job satisfaction more strongly than the plain commuting distance.

The differences between the 26 underlying factors for job satisfaction show which aspects could cause the higher satisfaction among the commuters with the longest commuting distance. Especially factors that deal with the income and the company's treatment of the employees show a higher satisfaction among these commuters. This suggests that the refunding of commuting expenses to the highly skilled and educated employees only is influential. These are the employees with a higher income and more prestigious position in the company. In this context, it seems possible that financial aspects and the status of employees within the firm are overruling or levelling off the influence of distance on the jobs satisfaction. However, the analysis also revealed that the employees with supposedly better job are not necessarily the more satisfied ones. Furthermore, they are not the employees who commute over the longest distances. Therefore, this possible explanation also fails in its reasoning for the causes of higher job satisfaction among those who commute over the longest distances.

After rejecting the idea that growing commuting distance is resulting directly in higher job satisfaction and accepting that occupying higher positions does not necessarily result in higher job satisfac-

tion, the only concrete hint on how to interpret the meaning of distance under long-distance commuting conditions are the differences between rotational groups. Different shift length does not change the physical distance between the employees' homes and SeverTEK's oil field. However, it has an important influence on the distance covered by the employees during their journeys to and from work. When it comes to the arrangement of the commuting process and its associated costs, it appears that choosing an easy and uncomplicated way of organising long-distance commuting is important for employees. They strive for higher impedance and flexibility. By voluntarily choosing to work longer rotational shifts, they successfully apply coping strategies for overcoming time and economic distances and increase their personal extensibility. The evidently higher job satisfaction and commuting distance of those who work longer shifts is a clear indication of this. This important finding stresses the significance of an individual or relative concept of distance as opposed to an absolute understanding and provides evidence for time-space convergence. Therefore, rather than the absolute number of kilometres, the individual perception and experience of commuting distance are factors influencing job satisfaction.

In the analysis of the interdependence between job satisfaction and commuting distance in long-distance commuting, no general upper limit of the distance between home and workplace was found. Long-distance commuting is therefore an alternative strategy for economic activities in remote locations, likewise in big countries such as Russia. Large physical distances, as found between the locations of remote natural resource extraction operations and places where the staff of these operations can live comfortably, are not necessarily barriers for development. More important than plain distance is the organisation of long-distance commuting operations in such a way that it meets the needs and expectations of the involved employees. The arrangement of shift lengths so that they simplify commuting efforts and lower expenses are suggested as a satisfactory and relatively easy measure to improve job satisfaction.

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