THE EFFECT OF WORKING FROM HOME (WFH) ON COMMUTING BEHAVIOUR IN THE DUTCH ICT SECTOR

The impact of The Covid-19 Pandemic

Abstract

This research aimed at revealing the effect of working from home (WFH) because of the covid-19 pandemic on commuting behaviour in the Dutch ICT sector. Data on the experience with WFH and people's commuting behaviour has been used (N=315). T-tests, chi-square tests and multiple linear regression analysis were used to determine the effect. ICT professionals worked almost all their days from home during the pandemic. The experience with WFH has been positive for the entire sample with people wanting to WFH more after the pandemic. People are not intending to commute by different modes but want to commute less after the pandemic. A 1-day increase in WFH during the lockdown leads to a 0.271 increase in the difference in the number of commuting days before and after the lockdown. It is too early to claim structural changes in commuting behaviour. Yet, this thesis provides some results which can be used for future transport policy.

26-07-2021
Roald Schoenmaker
S3110966
Spatial Sciences
Economic Geography
Supervisor: Dr. V.A. Venhorst
Second reader: F.J. Pot, MSc

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1. Introduction

What was first seen as an outbreak of viral pneumonia in December of 2019, eventually has been declared as what is now known as the Covid-19 pandemic (WHO, 2020). Governments all over the world took measures to reduce contamination levels to a minimum so that the spread of the virus remained controllable. By now it is assumed that everyone is familiar with the Covid-19 outbreak including the measures taken by the governments. These measures involve different forms of lockdowns including school closures, working from home (WFH[1]), online teaching, closure of retail and restaurants, curfews and basic rules on social distancing and hygiene measures.

First steps have been made towards combatting the virus by vaccinating the population. In this way, the non-medical measures (e.g. social distancing, lockdowns) can be relaxed and societies can move back to normal. Only, what does moving back to normal look like? Is there still a normal? Academia, politicians and policymakers are talking about a 'new normal' (Abdullah et al., 2020). It is argued that the Covid-19 crisis that we are currently experiencing, has stressed some of the biggest problems of current societies such as environmental pollution (Quéré et al., 2020). Yet, it also creates opportunities for changing the way things are done and increases efficiency. The shutdown of societies through lockdowns and measurements to combat the virus have changed peoples' work and daily life extensively. Some changes in behaviour might have positive advantages for society.

Previous research on the spread of infectious diseases has shown that human mobility is a big contributor to the spreading of a contagious virus such as Covid-19 because when people move, the virus moves. (Pestre et al., 2011; Savini et al., 2020). Jones et al. (2020) found that policies aimed at decreasing consumption and WFH were effective in decreasing people's social contacts and mobility. Therefore, the lockdowns included strict measures to reduce people's mobility and urge them to WFH as much as possible. Consequently, enormous decreases in total mobility were observed. For example, a 66% decrease in car use in Australia compared to the same period a year earlier (Beck and Hensher, 2020a). A decrease in the average number of trips from 8 trips per 3 days to 3.6 trips per 3 days compared to the same month a year earlier in The Netherlands (De Haas et al., 2020). Worldwide, this caused a decrease in traffic congestion in cities that has never been observed before (Tomtom, 2020). The lockdowns including the reduction in mobility triggered a significant reduction in global CO2 emissions. Quéré et al. (2020) estimated that global daily CO2 emissions during the first wave of Covid-19 in April 2020 were reduced by approximately 17%. This reduction brought CO2 emissions back to the levels that were observed in 2006, such a drop in emission levels has never been observed before. Of this 17%, the transportation sector, excluding aviation, contributed the most to the decrease in CO2 emissions with 36%. This was mainly due to decreases in city congestion and mobility within countries. Although the size of these decreases did not remain, these findings have underlined that changing our transport system contributes a lot to the battle against environmental pollution and climate change. Therefore, the current crisis is an opportunity for policymakers and transport planners to make steps towards a sustainable transport system.

WFH has played a big role in reducing city congestion during the pandemic. The pandemic has generated a giant experiment with WFH that could potentially change the ways people work and travel structurally. Some explorative studies that focus on changing travel patterns triggered by WFH have already been done. The experience with WFH was in general pleasant and people would like to WFH more in the future (Beck and Hensher, 2020b; De Haas et al., 2020; Shamshiripour et al., 2020).

[1] *The abbreviation WFH stands for the concept of working from home and therefore also stands for work, worked or works from home, depending on how it is used in a sentence*

Previous research has already shown that WFH can be a helpful tool in alleviating pressure on the transport system and environment, yet, before the pandemic, it was rather uncommon (Aguiléra et al., 2016; Shabanpour et al., 2018). Now that people experienced how WFH can be beneficial for them, they might want to WFH more in the future. Employees mark "not having to commute" as the greatest benefit of WFH during the pandemic (Beck and Hensher, 2020a; Shamshiripour et al., 2020). Hence, they might reconsider the amount of time they spend commuting after the pandemic and reduce this by WFH more. It has been proven that people who have a shorter commute in terms of time are overall more satisfied with their life than people that have a longer commute (Drobnič et al., 2010; Stutzer and Frey, 2007). Thus, from an employee welfare perspective, it is useful to reveal possibilities to decrease commuting behaviour as well.

Other research has focused on exploring the general changes in travel behaviour caused by the pandemic including grocery store and leisure trips (Beck and Hensher, 2020b; De Haas et al., 2020; Shamshiripour et al., 2020). These researches have shown some first insights in changing travel behaviour, nevertheless, they are limited to aggregated analysis while understanding changing travel behaviour at a more individual level is crucial for adapting our ways of commuting. Therefore, this research will not use aggregated data but will focus more on the individual level. Besides, other studies have focused on travel and commuting behaviour in general, which lacks the notion that some jobs are less suitable to perform from home (e.g. production occupations, construction workers) (Dingel and Neimand, 2020). This causes inaccuracies in the findings on the effect of WFH on commuting behaviour. Dingel and Neimand (2020) found that of all jobs, jobs in the ICT sector or most suitable for performing from home. Therefore, this study will focus on the ICT sector.

Thus, the pandemic shows what positive effects WFH can have on societies. Yet research is needed to reveal to what extent these effects will unfold and how they can be exploited by policymakers. By using data at an individual level and focussing on the ICT sector this research can gain an accurate insight into the effect of WFH on commuting behaviour. Therefore, this research aims to reveal how the (new) experience with WFH during the Covid-19 pandemic has affected commuting behaviour of Dutch ICT professionals. It will do so by addressing the following main- and sub-questions:

To what extent does the experience of working from home (WFH) during the Covid-19 pandemic affect commuting behaviour of Dutch ICT professionals?

- To what extent do Dutch ICT professionals work from home?
- How did Dutch ICT professionals experience working from home during the pandemic?
- To what extent did commuting behaviour of ICT professionals change compared to their commuting behaviour before the pandemic?
- What determines the change in commuting behaviour of Dutch ICT professionals?

This thesis first assesses the previous and current literature on the relationship between WFH and commuting in section 2. Secondly, section 3 explains the methods that have been used to conduct this research. After that, the findings will be presented in section 4 in which first general comparisons are drawn, followed by the results of multiple linear regression. In section 5, the results, limitations and future research directions are discussed. Ending with the concluding remarks of the research in section 6.

2. Theory

2.1 Early working from home and (tele)commuting

As a response to increasing traffic congestion problems, sprawl and air pollution, Nilles (1991) was one of the first that introduced the concept of WFH as a substitute for commuting. It was called telecommuting because WFH became possible through advanced telecommunication systems. The idea was that, instead of commuting every day, workers now could commute digitally to their working place. The work that they would normally do at their working place could now be done from home. Since then, the topic has been researched intensively by transportation researchers (Andreev et al., 2010). The main focus was put upon societal effects such as decreasing traffic congestion (Mokhtarian, 1991) and pollution (Cairns et al., 2004; Nilles, 1991). Zhu (2012) argued that there have been 2 lines of research on the relationship between WFH and commuting. The ones that have argued for telecommuting as a complement and the ones that have argued for telecommuting as a substitute. Telecommunication technology has developed fast and it is generally agreed upon by scholars that telecommuting has become a substitute for commuting (Andreev et al., 2010; Zhu, 2012). Besides, it has been proven that policies stimulating WFH can indeed alleviate pressure on the traffic system and reduce air pollution (Shabanpour et al., 2018).

Although a substitution effect was found, the effect was rather small. It was found that commuting as well as non-commuting miles per day decrease as a result of WFH (Mokhtarian et al., 1995). Which was confirmed by more recent research by Lachapelle et al. (2018), who found that overall travel time decreased by 14 minutes on average on working days for people that WFH. They added that when people who WFH do take trips, they may be more likely to avoid peak hours. However, Gubins et al. (2019) argued that people are willing to take a job that is located further away if they are allowed to WFH one day a week or more. As a consequence, they commute less frequently, yet longer distances. This may harm the impact on the net effects of WFH since longer commutes lay higher pressure upon the environment (e.g. air pollution, congestion). Ory and Mokhtarian (2005) found somewhat similar results, though, they found that telecommuters not only travelled less frequently but also faster than non-telecommuters. Therefore, telecommuters on average commute less in terms of time and thus the net effect of WFH on commuting should be positive.

2.2 Definition

In the literature, various forms of telecommuting have been determined in terms of time schedule (overtime or outside working days, part/full-time), working in third spaces and WFH. Schweitzer and Duxbury (2006) have defined 3 types of home-based teleworkers: employees who WFH instead of at the office, employees that work extra hours at home (overtime) and self-employed that have their own business at home. The focus for this thesis lies upon the first type of telecommuters that has been defined by Schweitzer and Duxbury (2006), as this type of telecommuter affects commuting behaviour most significantly (Lachapelle et al., 2018). Therefore, in this thesis, someone who works remotely from home and thus does not need to commute, is considered a homeworker/telecommuter. Also, WFH part of the day only affects commuting outside peak hours but does not reduce the number, nor the time or distance of commuting trips. This makes interpreting the effect of WFH on commuting behaviour rather complex. Hence, the focus lies upon people that WFH at least one entire day a week from home.

2.3 Working from home: how it used to be

Even though the literature found that WFH reduces commute travel, before covid, it had not been adopted as widely as expected by scholars (Aguiléra et al., 2016). Therefore, the social expectations of reducing congestion problems and air pollution had not been realized. This was caused by a lack of support for WFH of both employees and employers. It was found that there were differences in people's preferences and actual behaviour when it comes to WFH. People want to WFH but few actually do (Haddad et al., 2009). A lack of experience with WFH of employees and their hesitant attitudes towards WFH has created slow progress in the adaptation process. For example, 88% of full-time employees in the UK believed that WFH was not a possibility in their occupation (Dft, 2005). In France, 93% of employees indicated that their work could not be done from home. While other obstacles such as employer opposition were barely mentioned (Aguiléra et al., 2016). Although employees do not mention it, Haddad et al. (2009) found that the employer's support to WFH is most predictive for an individual to actually WFH. For employers, WFH is expected to have positive externalities such as improving the optimal use of office spaces and improving employees' job satisfaction by offering a less stressful working environment and more balance between work and family life (Wheatley, 2012; Zhu, 2012).

Nevertheless, employers have been somewhat hesitant in providing WFH as a viable option for their employees. The main cause for this lies with employers not wanting to invest in a reorganisation of the work environment because of the employer's insecurity about the possible benefits (e.g. higher job satisfaction, increase in productivity). Also, employers do not want to lose supervision over their employees when they WFH (Aguiléra et al., 2016; Noonan and Glass, 2012). Hence, Aguiléra et al. (2016) have argued that an exogenous shock is needed to achieve a breakthrough and meet the social expectations posed by more optimistic scholars.

Attitudes towards WFH are not solely related to their occupation type or employer's support. Other determinants of attitudes towards WFH are socio-demographic characteristics, the presence of young children, number of people in the household, education, age and income (Haddad et al., 2009). These factors have an impact on the WFH environment which makes employees more or less positive about WFH. For example, someone might have an occupation suitable for performing from home and a supportive employer. Nevertheless, this person does not want to WFH as there are young children present in the household who disrupt the working environment at home. Therefore, it is important to control for these factors when determining who WFH and why.

2.4 Breaking the barriers of working from home

The exogenous shock that was needed according to Aguiléra et al. (2016) can be found in the Covid-19 pandemic. Both employees and employers are forced to adopt some form of WFH at least for a certain period. The biggest barriers that prevented the wide adoption of WFH were constraints created by employers and employees. These barriers now have been tested and proven to be less severe than initially foreseen. Therefore, people might look at WFH in a different, more positive way than before.

However, people's attitudes might not directly lead to behaviour (Kroesen et al., 2017). There is a two-folded relationship between behaviour and attitudes. In a travel behavioural context, the effect of behaviour on attitudes is larger than the effect of attitudes on behaviour (Kroesen et al., 2017). In the light of this research, people are now forced to behave in certain ways (WFH and commute less). Since the effect of behaviour on attitudes is stronger than the other way around, it is expected that people have different attitudes in the future.

The psychological theory of Cognitive Dissonance (Festinger, 1957) plays a role in changing someone's behaviour. This theory argues that if there is dissonance between cognitions (attitudes and behaviour) psychological stress will be developed. To release this psychological stress, people want to reduce their level of dissonance. Therefore, they either adapt their behaviour or their attitude. Kroesen et al. (2017) add, that as a result of this theory attitudes are as likely to change as behaviours. During the pandemic, people's commuting behaviour has changed, however, this behaviour was partly forced upon them. Following the findings of Kroesen et al. (2017), this new behaviour will affect people's attitudes. Because of these changes in both behaviour and attitudes, a lot of dissonant travellers might have been created, which can lead to structural changes in behaviour as well as attitudes. Thus, it is important to take into account both attitudes and behaviours to make sense of the effect on commuting.

The pandemic has triggered new experiences with WFH. Once this new behaviour is experienced, previously unknown advantages are revealed and therefore people might change their attitudes accordingly. For example, employees accepted their 2 hours long commute because they thought that WFH was not possible in their occupation. During the pandemic, they have experienced new behaviour (they WFH) and find out that WFH actually is a possibility in their occupation. Because of the experience with this new behaviour, they will reconsider the 2-hour everyday commute. The commute is still the same, however, the employee will not accept it anymore as their attitude has changed. This then leads to structural changes in behaviour (Verplanken and Wood, 2006). As the attitude now has been adapted to be in line with the new behaviour.

The literature agrees that life events can trigger these changes in attitudes and behaviour and the pandemic might just be such a life event (De Haas et al., 2020). Störmberg and Karlsson (2016) argued that new experiences can lead to the creation of new habits because the obstacles that were anticipated end up being inaccurate. Once the new behaviour is experienced, previously unknown advantages are revealed and therefore people change their attitudes or behaviour structurally (Verplanken and Wood, 2006). These advantages of WFH can be: not having to commute or a better work-life balance. Also, Verplanken and Roy (2016) found that people that have experienced certain life events are more susceptible to interventions that try to change behaviour than people that did not experience such a life event. Thus, it is important to not only reveal how certain behaviour has changed but also explain the attitude behind this change. In this way, policymakers are provided with knowledge about how to intervene properly to sustain the positive effects. If it is clear what interventions can help in establishing a positive WFH experience, commuting behaviour can be impacted positively through WFH.

Lastly, the pandemic has been going on for more than a year at the time of doing this research. New habits might have been created by the pandemic itself. According to Lally et al. (2010), an average of 66 days is needed for the creation of a habit. This average has been greatly surpassed. Thus, new habits might have been formed and established new behaviour. Considering this, structural changes might already be present and will be difficult to break once the pandemic is over.

2.5 The new working from home experience

The first findings on the WFH experience suggest that the barriers of both employers and employees that have been argued above were not as big as expected. Work-life has changed entirely and both employers and employees are forced to deal with the situation as it is. The barriers discussed before have been removed, at least temporarily. Resulting in a giant experiment in which

employees' doubts and employers' hesitation about WFH are tested and new experiences are encountered.

In general, the results suggest that people have experienced WFH as rather pleasant. In The Netherlands, people who WFH mentioned that this was easy for them (60%) and that they had a good place to WFH (65%) (De Haas et al., 2020). In Australia, most respondents were satisfied with their WFH experience, they indicated that they had the right space, were as productive and want to WFH more in the future (Beck et al., 2020). These findings suggest that doubts about whether their occupation can be performed from home are taken away. Barriers for employers that have been discussed in the literature before the pandemic are also shrinking. As employers were forced to adapt to teleworking and invest in ICT infrastructure to make this possible, they are now planning to increase the number of employees that WFH significantly after the pandemic (Fana et al., 2020).

Not all employees are as satisfied with the WFH situation as others. Outcomes differ across occupation, industry, individual characteristics and geography. First, an analysis done by Mongey et al. (2020) found that workers that cannot WFH often have a low income, lack a college degree, are renters and non-white workers. This contradicts some of the findings of Shakibaei et al. (2021), who found no relationship between income level and the number of days WFH but also gender, age, car ownership and household size were not associated with the number of days WFH. Occupation type was the only factor that had a significant impact on the number of days someone WFH (Shakibaei et al., 2021). When looking at the type of occupations, jobs within the ICT sector are most suitable to perform from home (De Haas et al., 2020; Dingel and Neimand, 2020). This is because of the nature of the work (it can easily be done from home) and ICT employees find WFH a pleasant experience. Whereas, for example, people that work in educational occupations, have started WFH as much as the ICT employees, but their experience has been much less positive (De Haas et al., 2020).

2.6 Working from home and commuting

Studies try to find out what effects the WFH experiment had on travel behaviour and more specifically commuting (e.g. Abdullah et al., 2020; Beck et al., 2020; Beck and Hensher, 2020a, 2020b; De Haas et al., 2020; Eisenmann et al., 2021; Shamshiripour et al., 2020; Shakibaei et al., 2021). However, it should be noted that due to differences in travel restrictions in countries outcomes of the effect of WFH on commuting behaviour can differ between countries (Abdullah et al., 2020).

In the paragraph on WFH and commuting before covid, it was determined that WFH reduces people's total commuting time and distance. Yet, WFH has not been adopted and therefore the social expectations of traffic alleviation and reduced air pollution still have not been realized. Because of the pandemic, the situation has changed. As the government urged people to WFH and reduce their mobility to decrease the spread of the virus, a different motive to WFH emerged. Instead of WFH because it is preferred by the employee, someone now WFH because the government urged them to do so. Therefore, it is too simplistic to argue that the decreases in travel behaviour during the pandemic are a direct consequence of WFH. However, the decreases in travel behaviour did reveal its potential to create a more sustainable transport system.

Previous findings have suggested that commuting less, results in higher job satisfaction and well-being levels (Ingenfeld et al., 2019; Stutzer and Frey, 2007). This is reflected by what has been mentioned as the biggest advantage of WFH: not having to commute (Beck and Hensher, 2020b). Therefore, 71% of the respondents indicate that they would like to WFH more often in the future (Beck et al., 2020).

People commuted a lot less, Shakibaei et al. (2021) found that in Istanbul commuting by all transport modes decreased significantly except for private car use. In Germany, the same results were found, individual modes of transport became more popular, especially private car use(Eisenmann et al., 2021). Nonetheless, in Australia, total car use dropped by 35% compared to pre-pandemic levels (Beck and Hensher, 2020a). In The Netherlands, the decrease was less significant with a 10% drop in car use (De Haas et al., 2020). Public transport has been hit the hardest in terms of reduction in usage. In The Netherlands, people made 90% fewer trips as compared to the same period in 2019 (De Haas et al., 2020). Also in Germany, public transport use decreased but less significant than in The Netherlands (Eisenmann et al., 2021). These differences can be explained because the government urged people to avoid crowds. Normally, public transport is a place where crowds are present and thus people avoid these places.

It was argued that the trends discussed (more private car use and less public transport) might work in an adverse way (Eisenmann et al., 2021). More private car use leads to more congestion and more air pollution as less use of public transport will amplify these effects (Beck and Hensher 2020a). This might actually be the case considering research on previous virus outbreaks. Travel behaviour in Seoul significantly decreased because of the MERS outbreak, even after the outbreak people carried on avoiding public transport (Kim et al., 2013). This highlights that not only actual travel behaviour changes during pandemic alike situations, but also people's attitudes towards travelling (Abdullah et al., 2020). Therefore, it is important to take attitudes into account and reveal how they affect commuting behaviour.

2.7 Conceptualization

Figure 1 displays the relationships discussed in the previous sections. The Covid-19 pandemic has triggered new WFH experiences, these new experiences lead to new behaviour (Störmberg and Karlsson, 2016; Verplanken and Wood, 2006). The occupation type (Aguiléra et al., 2016; Dft, 2005) socio-demographics (Haddad et al., 2009) and the employer (Aguiléra et al., 2016) mediate the effect that covid has on the new WFH experience. By experiencing new behaviour, attitudes will change which in turn will trigger new behaviour (Kroesen et al., 2017). The pre-pandemic WFH experience has effect on the WFH experience during the pandemic. The new experience with WFH because of the pandemic impacts the change in commuting behaviour (De Haas et al., 2020). In turn, people's commuting patterns have an impact on their WFH experience as people that commute more are more likely to WFH (De Vos et al., 2018; Kim et al, 2013).

Specifically focussing on the change in commuting behaviour as the outcome, makes interpretation of the effect on the transport system straightforward. It is too simplistic to assume that changes in WFH levels will automatically have a positive impact on commuting behaviour. For example, people can WFH half a day from home and half a day at the office. This changes their commuting behaviour, however, whether this impact is positive or negative remains vague. Therefore, simply focussing on changes in WFH levels does not capture the effect on commuting behaviour sufficiently. While the exact effect on commuting behaviour generates the benefits of decreasing congestion and pollution for society. Hence, in order to reveal what benefits WFH has for society, commuting behaviour has to be the outcome variable.

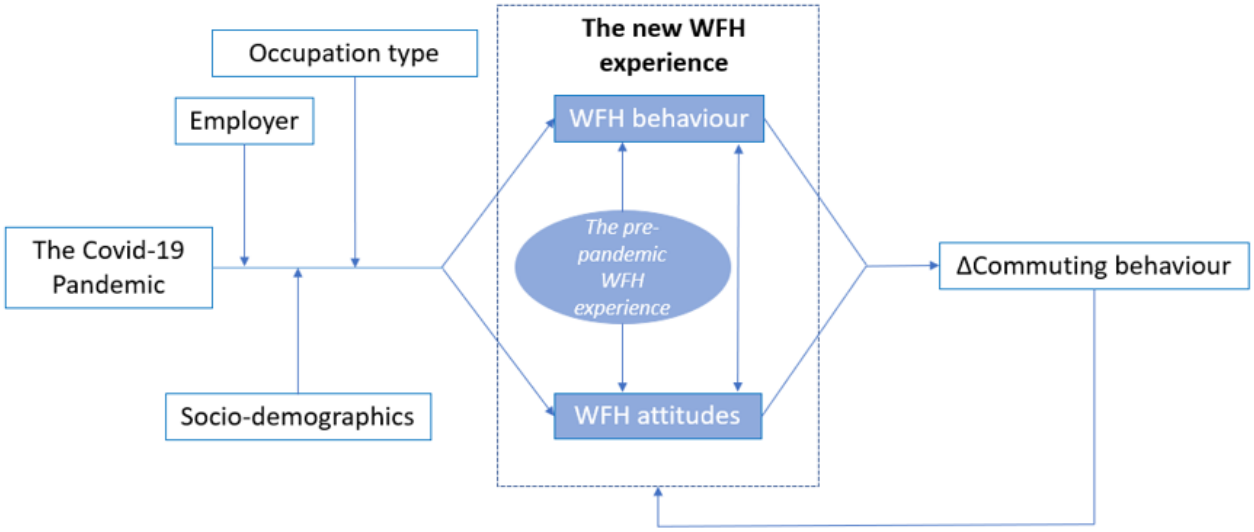

Figure 1. Conceptualization of the research framework. *Source: Author based on De Haas et al. (2020).*

This study adds to the literature in three ways. Firstly, instead of using aggregated data on people's travel behaviour in totality such as De Haas et al. (2020), Beck and Hensher (2020b) and Shamshiripour et al. (2020). This thesis will use individual data on Dutch ICT professionals so that changes in choices and preferences at an individual level become clear, which is essential to explain changes in behaviour. Secondly, by focussing on the ICT sector instead of the working population as a whole, policymakers will be provided with detailed insights into a sector where WFH is a suitable option. In this way, distortion of the effect on commuting behaviour because of sector specific reasons for not being able to WFH is minimized. By doing so, lessons learnt in this sector can be used to help other sectors where WFH is a viable option to accommodate changes in commuting behaviour. Lastly, it responds to the dynamic character of the pandemic. As the situation often changes and phases of the pandemic are being proceeded at a fast pace, ongoing and timely research is needed to reveal both long and short term impacts. Because changes in travel patterns happen during the event that is going on (Nguyen-Phuoc et al., 2018), research needs to be done during the event to reveal how to accommodate the changes that are happening. Different findings may be found, now that intensive vaccination is going on and people have become used to the presence of restrictions. This will provide policymakers with new understandings of how to influence current changes.

3. Methodology

3.1 Research approach

As there is no data available on how many ICT professionals WFH and their commuting behaviour, primary data has been collected through a questionnaire. Individuals can be sampled and perceptions, experiences, attitudes and behaviours can be revealed by using a standardized questionnaire (Mclafferty, 2016). Therefore, to identify and explain behaviours and attitudes survey research is a proper way to do so. Normally, a trip diary is used to obtain detailed data about changes in travel behaviour (Chlond and Eisenmann, 2018). Yet, this research aims to explain changes in behaviour from before and after the pandemic. Therefore, collecting data through a trip diary is not desirable for this research. As the respondents' ability to fill in travel diaries in a retrospective way will be unreliable. They tend to forget to declare trips (Prelipcean et al., 2018). Also, automated tracking of travel patterns is not possible as the period of interest (before the pandemic) is already finished. Besides, survey research is also widely used in travel behaviour research (Mclafferty, 2016).

Qualitative methods like in-depth interviews could have been used as well to gain thorough insights into people's attitudes about WFH. However, this research does not only investigate attitudes. It aims to measure the relationship between the experience of WFH and commuting to reveal how the transport system can benefit from this. Qualitative methods are not able to measure the impact on commuting behaviour. Therefore, quantitative, statistical analyses have been used to analyze the data and find answers to the research questions. By making use of quantitative models, a simplified version of reality about a social process can be obtained (Marshall, 2016). In this way, generalizations about a population can be made using inference through statistical techniques. This research reveals how WFH impacts commuting patterns. Consequently, the results found can be projected to the larger population of ICT professionals.

To obtain data on changes in individuals' travel behaviour, panel surveys are considered to be the best approach to do so (Chlond and Eisenmann, 2018). However, because of time constraints for this thesis, the high cost of data generation and the high respondent burden of a panel survey, this type of survey is not suitable for this research. Also, a panel survey would be an obstacle to the need for timely research on the consequences of the pandemic since they require a large time span. Therefore, a self-report survey has been used. They contribute to the need for timely research since self-report surveys do not require a large time span. Besides, this type of survey has low costs of data generation and has a low respondent burden. The self-report survey had to be filled in partly retrospectively as the respondents were asked to report on their behaviour before and during the pandemic as well as on their intended behaviour after the pandemic. A downside of a retrospective self-report survey is that it might be exposed to inaccuracies as not all respondents remember their behaviour from before the pandemic precisely. This has been tackled by asking the number of days commuted during an average workweek instead of asking the exact number of commuting trips. In this way, it is easier for the respondent to recall their previous behaviour as they can report an average and do not have to remember every specific commuting trip they made. Another downside of self-report surveys is that this type of survey can create biases. Respondents may try to answer in a socially desirable way or try to satisfy the researcher by giving answers that they think are needed for the research (Rosenman, 2011). By making the respondent aware that the questionnaire is anonymous and the data will be processed confidentially, respondents will be more likely to respond in an honest way (McLafferty, 2016). Besides, the questionnaire does not ask questions about subjects that are prone to social desirability bias (e.g. religion, addiction, illegal behaviour). Next to that, acquiescence bias (tendency to agree with response options in the questionnaire) might occur. To overcome this bias, different sorts of questions and answer possibilities like multiple-choice,

multiple answer, scale and open questions have been used to capture the respondents' attitudes about WFH. In this way, the effect of this bias is minimized.

It should be kept in mind that these surveys are measurements of travel quantities at a certain point in time. Especially the dynamic character of the pandemic can play a big role here because the effects that are being researched are dependent on the measurements that are in place to combat Covid-19. The researcher does not have influence when or where restrictions will be eased and as such different outcomes can be found at different points in time. Thus, when repeating the same research these differences in both restrictions in place and changes in behaviour must be taken into account.

3.2 Self-report survey

The self-report survey was designed using google forms. While designing the survey the guidelines of Mclafferty (2016) were followed by keeping the questions simple, defining terms clearly and keeping the survey short. Hence, the survey focused solely on the individual respondent's behaviour and attitudes. The survey was designed in Dutch as the respondents were all Dutch. An introduction was given first so that the survey would be self-explanatory. The introduction included an explanation of who the researcher is, why the research was done, what would happen with the obtained data and who could be contacted in case of a question or remark about the survey. The introduction was followed by 3 sections that entailed questions on the WFH experience, commuting behaviour and socio-demographic characteristics. The entire survey can be found in Appendix A.

The WFH section first asked how much the respondent WFH before and during the pandemic and how many days they would wish to WFH after the pandemic. The number of days WFH during the pandemic were measured using an average working week in March 2021. As this was a month with a strict lockdown in place including a WFH order, this was regarded as a good proxy for the number of days WFH during the pandemic. After that, it was asked what the biggest advantages or disadvantages of WFH were. Respondents could choose several advantages and disadvantages that were derived from the studies of Beck and Hensher (2020a), De Haas et al. (2020) and Shamshiripour et al. (2020). The respondents also had the option to choose "other" and write an advantage or disadvantage different than the answer possibilities. By doing this, the respondents are not constrained to certain answer possibilities and their true perspectives may be better represented (Mclafferty, 2016). For this question, this notion is important, as the advantages or disadvantages of WFH can differ for different countries, positions and phases in life. These questions were followed by a set of questions to capture the respondent's attitude towards WFH. Asking the respondent to provide a rating on an ordinal scale is an effective way to acquire insights into these attitudes (Mclafferty, 2016). A 5 point Likert scale was used with the 2 extremes being: entirely agree and entirely disagree. Finally, this section asked the number of days that a respondent worked in a week before and during the pandemic. In this way, a percentage of the days someone wants to WFH and total working days can be obtained.

The next section concerned questions on the respondent's commuting behaviour. As previous research found that people that commute longer times and distances are more likely to WFH (De Vos et al., 2018; Kim et al, 2013), it was asked how long the respondent's commute takes. Commuting distance has not been asked because it is easier for people to fill in the time they spend commuting. Besides, distance fails to capture time spent in traffic congestion. After that, it was asked what mode is used primarily for the commute before and during the pandemic and whether they are intending to change this after the pandemic. The last questions ask the number of days in a week a respondent commuted before and during the pandemic. Followed by a question on the number of

days in a week a respondent intends to commute once the pandemic is over. Accordingly, with these questions, it can be observed how the actual commuting behaviour has changed and what the respondent's intentions (attitudes) on commuting are.

In the last section, basic socio-demographic characteristics were being confiscated as these are important determinants of the attitude towards WFH (Haddad et al., 2009). These questions regarded age, gender, net income, education level, household composition, residential location (province) and how often their partner WFH.

3.3 Sampling frame and design

The survey has been distributed online through email and LinkedIn. This was the most practical way to target a lot of ICT professionals at once. First, the survey was distributed amongst the ICT departments of 7 different organizations that operate in different sectors at different locations. A gatekeeper was contacted to get access to the ICT employees of the organization. Getting access to an organization via a gatekeeper increases the willingness to cooperate in the research (Singh and Wassenaar, 2016). Given that the research does not serve a direct purpose for one of the organizations, informing the gatekeepers about the purpose and social value of the research was important in order to gain access. To ensure that no sensitive information about any organization would be obtained, the survey did not include any questions on the specific organizations. After that, two gatekeepers of the LinkedIn groups were contacted to get in contact with the members of the group. The same ethical considerations were taken into account here. Consequently, the sampling frame includes people that work in the ICT sector who either work at one of the companies that received the survey through mail or have a LinkedIn account and are a member of one of the groups.

The individuals from the sampling frame have been sampled through volunteer sampling. This way of sampling uses the self-selection of the individuals within the population to generate a sample. Burt et al. (2009) argue that these samples are prone to nonresponse bias because the individuals that select themselves are often more motivated and interested in the topic of the survey than the general population. This can cause the sample to differ significantly from the population. It could be that people that filled in the survey are more enthusiastic about WFH than people who did not want to fill in the survey. However, it could also be argued the other way around, people who are negative about WFH want to give their opinion because they are dissatisfied with their current situation. It is difficult to determine whether the sample is good or bad as data on the non-respondents does not exist (Burt et al., 2009). Nevertheless, it can be assumed that nonresponse bias does not occur to a great extent in the current sample. The population that is targeted is rather homogenous in itself as it focuses specifically on ICT professionals. Their occupations are all situated in the same sector, therefore it is expected that great disparities will be exceptions. Besides, the sample is representative of the population as a whole as argued in section 3.5

This sampling frame excludes individuals that do not have an internet connection, work at one of the selected companies or do not have a LinkedIn account. As the population does not include a group that might not have access to an internet connection (e.g. elderly, homeless people) it can be expected that this does not cause sample issues. Sampling through email and LinkedIn does exclude people from the sample, however, it is expected that this will not lead to any issues as the individuals included in the sample frame will not differ significantly from the individuals that are not.

The survey was set out from Monday the 19th of April until Monday the 10th of May 2021. The dynamic character of the pandemic and the following governmental measures made the timing of

the survey a point of interest. During the entire sampling period, a WFH order was in place, meaning that the government urged everyone to work as much from home as possible. Some other governmental measures did relax during the sampling period. At the start of the sampling period, a strict lockdown was in place. Shops and gyms were closed, restaurants only provided takeaway, a curfew was in place, only one visitor was allowed at home and all standard measures (e.g. social distancing, wearing masks and hygiene provision) were effective. However, relaxations were effective from the 28th of April onwards. The curfew was released, restaurants were allowed to welcome a maximum of 50 persons on their terraces and shops could open up again. This could affect the answers the respondents gave on the surveys, however, the outcomes of the survey did not change that much because no relaxation of restrictions were announced in the working environment for ICT professionals. Besides, nothing could be done about this because the data generation was planned these weeks. Postponing the data collection was not an option as the same problem would have appeared. The situation regarding Covid cases was bad during the sampling period. The peak of the third wave was going on during this period. The pressure upon the Dutch health care systems was high with hospitals scaling down regular health care to look after covid patients (RIVM, 2021).

3.4 Sample descriptives

The sample consists of 315 Dutch ICT professionals. Table 1 displays the socio-demographic characteristics of the sample. The sample is regarded as representative of the general population of ICT professionals. The literature agrees that the ICT sector is male-dominated (Richards and Bush, 2011; Kirlidog et al., 2009). This sample includes 86% males which is the same for the population of ICT professionals which consisted out of 85% male in 2019 (CBS, 2020). CBS (2020) found that 40% of ICT professionals was older than 45 in 2019. In the current sample, 50% of the respondents are older than 45 years. Considering the fact that this percentage was increasing every year and was expected to increase over the upcoming years (CBS, 2020), this sample is reasonably representative of the population concerning age as well. The ICT sector is regarded as a highly specialized sector that demands specialized professionals with high levels of education (European Commission, 2015). With this sample having 81% an educational level of HBO or higher, the overall education level of the sample is considered as high. It should be kept in mind that this is a sample of ICT professionals, therefore generalizations about the working population as a whole cannot be made. For example, the proportion of males and females is almost equal and only 42% of the working population has achieved an educational level of HBO or higher (CBS, 2021). This has implications for the effects on WFH and commuting behaviour and generalizations to the general workforce are therefore not valid.

N=315	Category	%[1] / descriptives
Gender	Male	86%
	Female	14%
Age		$\bar{x}$ = 45, σ= 11, min(18), max(68)
Education	MBO	20%
	HBO	57%
	WO	24%
Province	Drenthe	6%
	Flevoland	4%
	Friesland	2%
	Gelderland	9%
	Groningen	9%
	Limburg	2%
	Noord-Brabant	11%
	Noord-Holland	18%
	Overijssel	6%
	Utrecht	12%
	Zeeland	1%
	Zuid-Holland	19%
	Other[2]	2%
Household	Single	13%
	2 or more adults without children	28%
	Family, youngest child ≤ 11	31%
	Family, youngest child ≥ 11	28%
Net-income (N=207)[3]		$\tilde{x}$ = 3200, σ=1597, min(0), max(15000)

Table 1. Socio-demographics of the sample of ICT professionals. *Source: Author.*

[1] *Some categories do not add up to 100% due to rounding*

[2] *Respondents not living in The Netherlands: 1 respondent on Aruba, 5 respondents in Belgium.*

[3] *Because there are 108 missing values for the net-income variable N reduces to 207*

3.5 Statistical approach

The data used to answer the research questions has been analysed using STATA 16. Firstly, to find out to what extent ICT professionals WFH, a distinction was made between people that already WFH at least one day a week before the pandemic and people who did not. In this way, it could be revealed what effects WFH has for people for who the experience was entirely new. Besides, insights could be obtained on how people like to WFH their entire working week instead of just one or two days. Furthermore, it was tested whether there were differences in age, education level or commuting time between the people that already WFH and people who did not. Several t-tests and Chi-Squared tests have been used to do so. After this, descriptive statistics have been used to display the attitudes of the respondents on WFH and to find out how the respondents have experienced WFH. To analyse how the respondents' commuting behaviour changed, changes in mode use and the number of commuting days were assessed. Finally, a multiple linear regression has been performed to find out which variables can explain changes in the respondent's commuting behaviour.

3.6 Ethical considerations

Since the survey was conducted amongst different personnel of different organizations, ethical considerations were taken into account.

The survey included an explanation of who the researcher was, what the purpose of the research was, what time it would take to fill in the survey and a contact possibility if there were questions or remarks on the survey. If people are made aware of their rights and the purpose of the research, acquiring the trust of the respondents will be more likely. Accordingly, the chances for responses are being increased (Hay, 2016). Therefore, it was specifically stated that the data obtained will be processed completely anonymously and will not be shared with third parties. Next to that, the survey was designed in such a way that no questions could lead back to an individual respondent.

Despite the anonymous processing of the data, the explanation of the questionnaire beforehand specifically stated that the data that would be obtained would not be shared with third parties. It is not possible to ask the respondents for their consent to share the anonymous data as there are no contact details available of every single respondent. Therefore, the data obtained cannot be shared with others. The data will, however, be preserved confidentially by the researcher. In this way, a follow up of this research can compare the current data to data in the future to see whether the intended changes have become actual changes.

Other ethical considerations were not taken into account as no vulnerable group was being researched. The outcomes of the research will not harm any individuals or organizations. The results of the research can give employers in the ICT sector insight into the desires and behaviour of their employees which can be beneficial for the people that fill in the questionnaire.

4. Results

4.1 Changing the number of days working from home

Slightly more than half of the respondents were already considered homeworkers since 167 of the 315 respondents WFH at least one day a week before the pandemic. This underlines the findings of Dingel and Neimand (2020) that ICT jobs are suitable to do from home and that the adoption process of WFH in the ICT sector was already put in motion. Still, 148 respondents did not WFH at all before the pandemic and for them, this was a new experience. The respondents that WFH at least one day a week before covid are on average 3.1 years older than the respondents that did not WFH at all before the pandemic, $t(311) = -2.6411$, $p = .001$. No significant difference has been found in the average number of days WFH before the pandemic and the respondents' education level. The average commute is 46 minutes, respondents that WFH at least one day a week have on average an 11 minute longer commute than the respondents who did not WFH. These findings are in line with the findings of De Vos et al. (2018) that people with longer commuting times are more likely to WFH than people with shorter commuting times.

Findings show that the WFH order imposed by the government was rather effective, resulting in a big increase of days WFH. In March 2021, almost all the respondents (303) WFH at least 1 day a week. Figure 2 displays the percentage of respondents that WFH the number of days indicated at the x-axis during the pandemic. On average the respondents WFH 4 days a week during March 2021. More than 50% of the respondents WFH 5 days a week during covid and only 3.5% did not WFH at all. This is different from what has been found by other research. Beck et al. (2020) found that only 21% of workers WFH 5 days a week during the first and second waves of covid and an average of 1.7 days were WFH in this period. However, these findings are based on the working population as a whole and therefore are lower than the results from the current sample of ICT workers. There are also occupations in which WFH is not possible and therefore the average will be lower. Current findings are in line with the research of De Haas et al. (2020) who found that in the 'Automation and IT' sector the number of people WFH increased by the greatest amount.

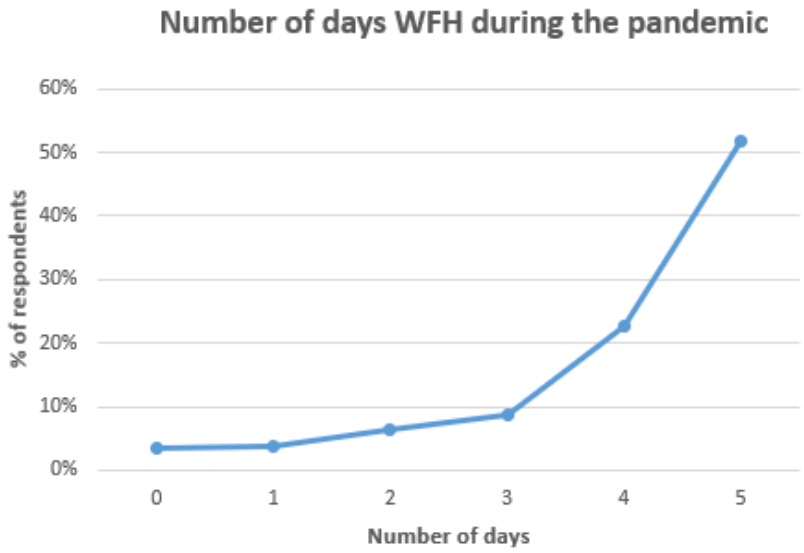

Figure 2. The number of days that a percentage of the respondents WFH during the pandemic. *Source: Author.*

There is a small but significant difference in days WFH during the pandemic between experienced homeworkers and unexperienced homeworkers. Experienced homeworkers started working 0.5 days from home more than unexperienced home-workers, t(251.27), -3.260, p = .001. There does not seem to be a cause for this. It is speculated that an explanation for this can be that also within the ICT sector there will be jobs that are less suitable to perform from home. The jobs of experienced home-workers have proven to be suitable to perform from home. Therefore, the transition towards WFH entirely will be more smooth.

Where other research found that overall employment has decreased because of covid (Beck et al. 2020; De Haas et al. 2020), current results did not find such a difference, t(313), -0.9912, p = .322. Only 3 percent of the respondents indicated that they worked more days during covid and only 5 percent indicated that they worked less. There were several sectors (e.g. restaurants, events, shops) that had to close down for a long time due to restrictions of the government. Therefore, firms in these sectors had to lay off personnel to maintain their business. NLdigital (2020) did research amongst directors and company owners within the ICT sector. They found that the amount of work in the ICT sector saw a decline as well because of covid. However, this decline did not lead to layoffs or cutting people's working hours.

The WFH levels during the pandemic become even bigger if displayed as a percentage of total days worked (number of days WFH divided by total days worked), as can be seen in table 2. Two-third (67%) worked 81 – 100% of their total working days from home. Only small percentages WFH 60% of their working days or less. Before the pandemic, almost 50% did not WFH at all, while during the pandemic 67% WFH more than 80% of their time from home. Table 2 shows that the situation has shifted from one extreme, where most people did not WFH to another extreme where most people WFH almost all of their time.

% of total working days WFH	Before[1]	During
0%	47%	3%
Up to 20%	23%	3%
21-40%	14%	7%
41-60%	5%	7%
61-80%	4%	13%
81-100%	8%	67%

Table 2. The days WFH as a percentage of the total working days of a respondent before and during the pandemic. *Source: Author.*

[1] *Category does not add up to 100% due to rounding*

4.2 The experience with working from home during the pandemic

To assess attitudes on the experience with WFH, respondents could indicate their attitude on a 5 point Likert scale. Overall, the experiences with (increased) WFH have been very positive. Figure 3 displays the attitudes towards WFH and shows that only 5% disagrees with the statement that WFH has been a pleasant experience and only 3% disagrees with the statement of having a proper place to WFH. Aguiléra et al. (2016) argued that one of the biggest barriers in adopting WFH is hesitance amongst employers about possible benefits such as increased productivity of employees. Although the employer is hesitant about this, 74% of the ICT professionals indicate that they are more productive than normal when WFH. Also, research has proofed that WFH actually leads to increased productivity (Kazekami, 2020). Therefore, although employers are hesitant about the benefits of

WFH, they do not seem to be justified. Hence, this barrier is not as big as anticipated. When looking at the working population as a whole, 35% indicates that they are more productive at home (Beck et al., 2020), therefore it might be that increased productivity is higher in the ICT sector than in other sectors. Explanations for the increased productivity and very positive experience with WFH might find its causes in the personality traits of ICT professionals. Research based on psychological preferences has found that ICT professionals usually have good technical skills but are often introverted and prefer to work alone (Kirlidog et al., 2009). Therefore, ICT professionals might enjoy WFH more than the general population as working alone, from home for them is psychologically more preferable.

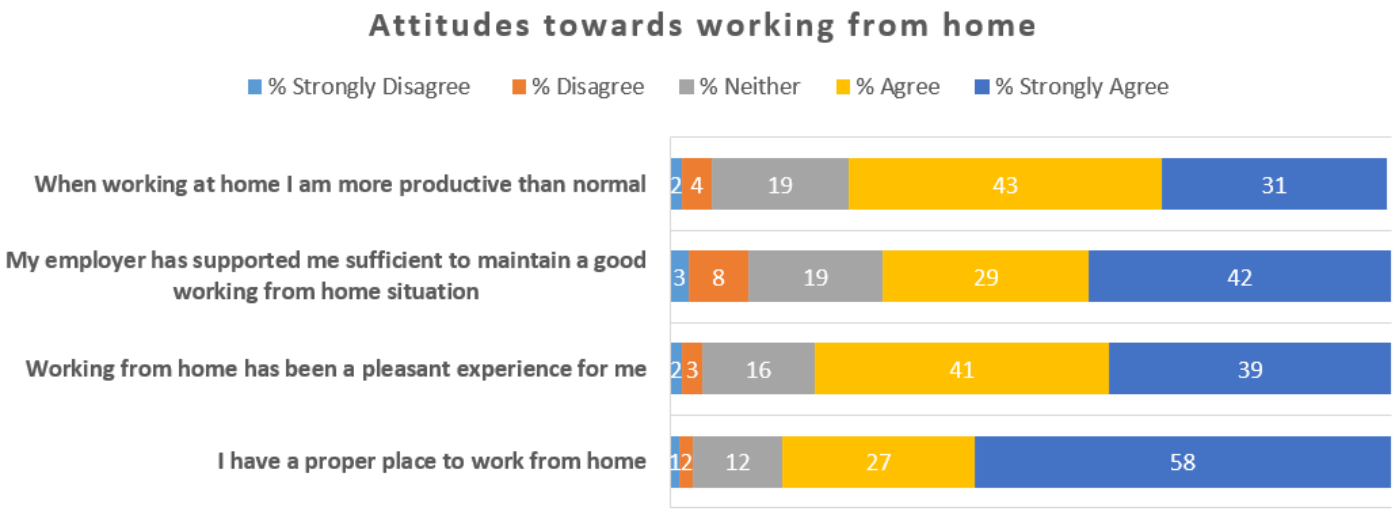

Figure 3. Respondents' attitudes towards the experience of working from home during the pandemic. *Source: Author.*

A comparison between the experiences with WFH of experienced homeworkers and unexperienced home-workers shows one significant difference. There is a statistically significant association between whether a respondent WFH before covid and their level of agreement with being more productive (χ^2 (2, N = 315) = 6.7556, p= .034). However, the association is rather weak as Cramérs V is 0.146. For the other attitudinal questions, no differences were found in the level of agreement of experienced homeworkers and unexperienced homeworkers. When comparing the experience with WFH of ICT professionals to the experiences of the working population in general as measured by Beck et al. (2020) it is observed that in general everyone is positive. The only clear difference is the difference in productivity when WFH as argued above.

4.3 Pros and cons of working from home

To gain insight into possible interventions to maintain higher levels of WFH than before covid, respondents were asked to indicate the biggest advantages and disadvantages of WFH during covid. Figure 4 displays the biggest advantages of WFH, similarly to the findings of Beck and Hensher (2020a) respondents who indicated not having to commute as the biggest advantage. Followed by having more flexible working hours and being more productive. When having a closer look at the 'Other' option a wide range of advantages regarding the respondents' individual life were mentioned. Nevertheless, one advantage that stood out, 6% of respondents mentioned an advantage regarding an improved work-life balance (e.g. picking up the children from school, doing

groceries, more time with family). Although this can be related to more flexible working hours, respondents still mentioned the advantage. Hence, this is regarded as an important advantage that can lead to an improved work-life balance which contributes to an increase in job satisfaction as mentioned by Wheatley (2012).

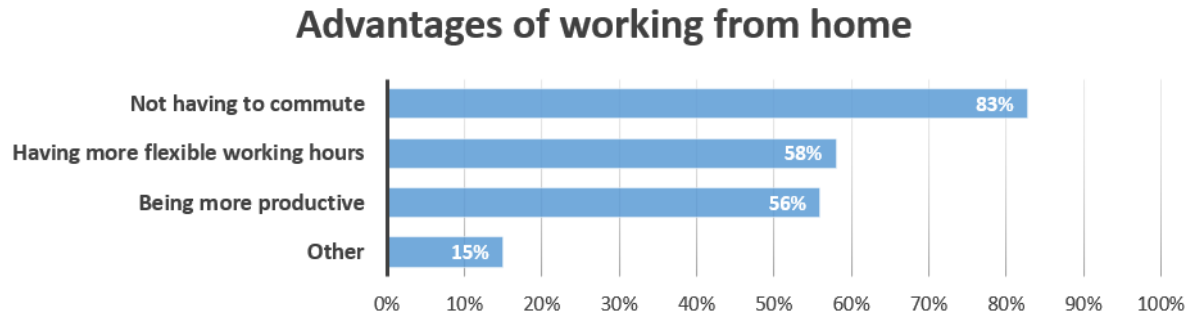

Figure 4. The percentage of respondents that indicated the biggest advantages of working from home for them. *Source: Author.*

Figure 5 displays the biggest disadvantages. Having less contact with colleagues is the biggest disadvantage. Therefore, it seems like ICT professionals like to work alone as found by Kirlidog et al. (2009), yet, up to a certain extent. Besides, most respondents WFH 5 days a week which is a situation that lies at the extreme experience with WFH and will most likely not maintain in its current form as discussed above. Most respondents would like to work in a hybrid form in the future of 2 or 3 days from home and the other days at the working place once covid is over. Therefore, this disadvantage is rather easy to overcome as people will most likely see their colleagues again in the hybrid working form in the future. The other possible disadvantages were not mentioned a lot, 35% of the respondents experienced a worsened work-life balance and 19% mentioned a disadvantage related to their individual life. Most people mentioned that they thought there were too many online meetings which are redundant. Being less productive was indicated by only 7% of the respondents which already became clear when people were asked whether they were more productive.

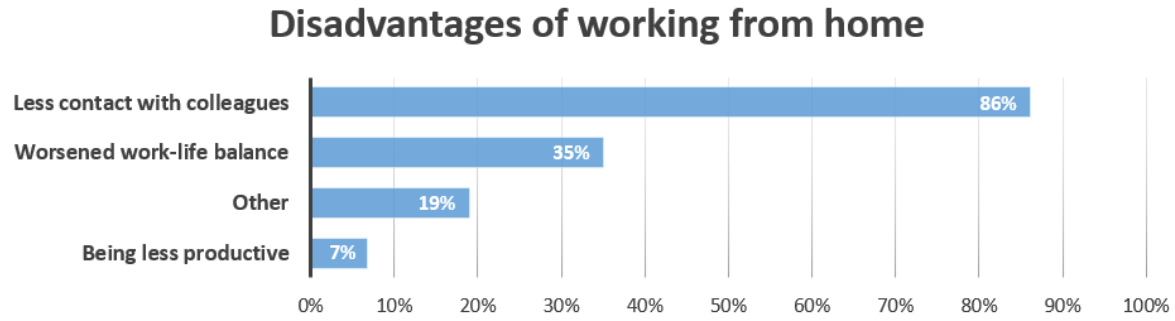

Figure 5. The percentage of respondents that indicated the biggest disadvantages of working from home for them. *Source: Author.*

4.4 Working from home after the pandemic

A Pearson's correlation coefficient was obtained to assess the relationship between the days WFH during the pandemic and the days intending to WFH after the pandemic. A strong positive correlation was found, r(df=312) = 0.529, p = .000, with days WFH during covid explaining 28% of the variance in the intended days WFH after the pandemic.

Table 3 displays the intended number of days respondents would like to WFH after the pandemic for the respondents for whom the experience was entirely new and for the respondents that already had some experience with WFH. Only 5% of the respondents do not want to WFH at all after the pandemic. Further examination of the data shows that these are all respondents that did not WFH before the pandemic either. Therefore, none of the respondents that did WFH before wants to WFH 0 days a week after the pandemic. People that did not WFH before the pandemic now want to WFH on average 2.3 days instead of 0 days before. An increase can be found for respondents that did WFH at least 1 day a week before as well. Respondents who did WFH before the pandemic want to work on average 0.8 days from home more after the pandemic, t(166), 7.286, p = .000. This comes down to an increase from 2.1 days before the pandemic to 2.9 days after the pandemic. In totality, ICT professionals want to work 2.6 days from home on average after the pandemic which comes down to an aggregated increase of 1.5 days.

Intended number of days WFH after pandemic	Did not WFH before pandemic	Did WFH before pandemic	Total
0 days	5%	0%	5%
1 day	4%	2%	6%
2 days	11%	14%	25%
3 days	16%	20%	36%
4 days	9%	11%	20%
5 days	2%	6%	8%
Total	47%	53%	100%
Average days WFH before pandemic	0 days	2.1 days	1.1 days
Average days WFH after pandemic	2.3 days	2.9 days	2.6 days

Table 3. The intended days working from home after the pandemic for respondents that did work from home before and that did not work from home before the pandemic and the averages for both groups. *Source: Author.*

Figure 6 displays the aggregated number of days that people have WFH before and during the pandemic and the intended days WFH after the pandemic. As can be seen, the respondents tend to move away from the 2 extremes experienced before and during the pandemic. WFH 5 days a week is not preferable and at the same time not WFH at all is not preferable either. A new equilibrium is found somewhere between these extremes with most respondents intending to work 2 or 3 days from home. Thus, the positive experience with WFH during the pandemic has led to an increase in the number of days respondents want to WFH after the pandemic.

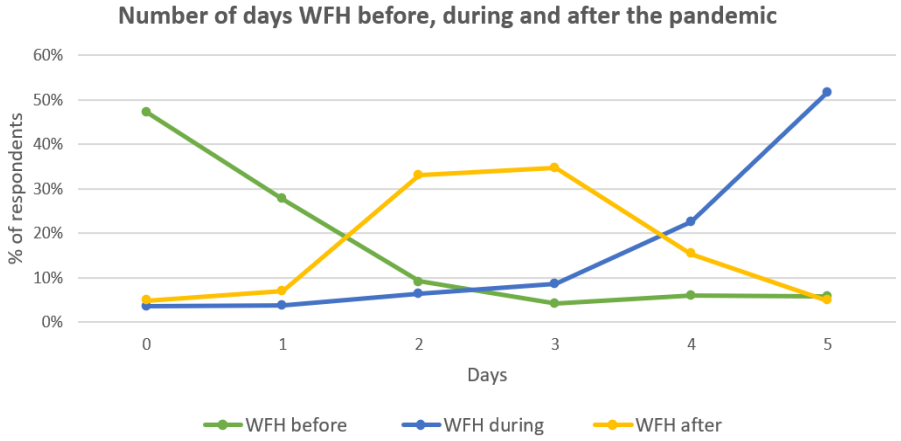

Figure 6. Number of days respondents WFH before and during the pandemic and the intended number of days WFH after the pandemic. *Source: Author*

4.5 Commuting patterns

Commuting behaviour is directly impacted by the number of days WFH. However, as previous research found the intended days that people would like to WFH is impacted by peoples' commuting patterns as well (De Vos et al., 2018). Therefore, insights have been gained into how and how long people commute. The average commute of the respondents was 46 minutes. People that already WFH before covid had a commute that was on average 11 minutes longer commute than people that did not WFH before the pandemic, t(310), 3.5626, p = .000. These findings are similar to the findings of De Vos et al. (2018) who found that the longer people commute the more likely they are to WFH. Not surprisingly, did the respondents' number of commuting days before and during the pandemic run in parallel with the number of days that people WFH. People commuted on average 4.2 days to their work before the pandemic. Nevertheless, when comparing the days that people WFH before the pandemic and the days that people did not commute before the pandemic (total number of workdays minus number of commuting days) some contradictions are found. The number of days WFH before the pandemic was on average 0.53 days higher than the number of days the respondents did not commute, t(313), 6.2699, p = .001. This implies that there are also respondents who WFH part of the day but still commute to work. Although this behaviour does not affect the total number of commuting trips or days, research has found that commuting at different times of the day can be beneficial in alleviating pressure on the transport system especially during rush hours (Shabanpour et al., 2018). During March 2021 the difference in commuting days and days working *not* at home remained present, yet, became smaller (0.33 day), t(313), 4.320, p < .001. Flexible time working schemes go beyond the scope of this thesis, however, it is important to note that these effects can have positive implications for commuting behaviour as well and therefore do not take away the positive effects of WFH.

4.6 Commuting modes

As can be seen in table 4 more than two-third of the respondents travelled to work by car. According to CBS (2019), 64% of the total Dutch working population commutes by car, 17% by public transport, 7% cycles and 12% uses other modes. Therefore, ICT professionals do not commute in different ways than the general working population in The Netherlands. When looking at mode use during the pandemic, few changes in commuting modes have been observed. Only 6.7 % indicated that they changed their commuting mode during covid. While research has found that individual modes of transport, especially the car, have become more important and the use of public transport decreased significantly (Eisenmann et al., 2020), current findings do not reveal such an effect. Even though attitudes towards public transport have become more negative during the pandemic (De Haas et al., 2020), 27% of public transport users remained using public transport, only 19% of public transport users chose to commute by car while more than half (54%) did not commute at all. Of the car users about a third (30%) did not travel to work at all during covid whilst about two third (68%) remained commuting by car. In this comparison, it is observed that no real changes in mode use are happening, but people mainly keep commuting using the same modes or do not commute at all. Other research focused on travel behaviour in its entirety, while current research solely focusses on commuting behaviour. Therefore, the different findings of Eisenmann et al. (2020) might be related to the fact that public transport could only be used for essential travelling which can be work-related but not related to, for example, leisure or shopping trips which were part of the research of Eisenmann et al. (2020) as well. Current findings are in line with the literature that states that

commuting behaviour is rather habitual and difficult to change especially when it comes to mode use (Clark et al., 2020).

Mode Use	Before	During	After[1]
Car	69%	52%	69%
Bicycle	16%	10%	18%
Public Transport	13%	4%	13%
Other	2%	1%	1%
No commute	x	33%	x

Table 4. Aggregated mode use for commute before, during and after the pandemic as indicated by the respondents. *Source: Authors.*

[1]*Category does not add up to 100% due to rounding*

Also, when looking at the modes that people are intending to use after the pandemic few changes are observed as can be seen in the last third column in table 4. The relative division between the modes remains almost the same. There are, however, some internal changes Only 7.3% of respondents is intending to use another mode after covid. Although the number of people that want to change modes is small, they do show a change towards individual modes of transport which was found by Eisenmann et al. (2020). An indication for a small change from public transport to car use. About one fifth (21%) of the public transport users intends to use the car after the pandemic, however, most public transport users (72%) want to keep using public transport after the pandemic.

4.7 The working from home experience and changing commuting behaviour

To find out how the experience of WFH has impacted changes in peoples' intended commuting behaviour a multiple linear regression analysis has been performed. The model estimates the intended change in commuting behaviour based on a set of independent variables capturing WFH experiences and controlling for independent variables that capture commuting behaviour and socio-demographics. Table 5 provides an overview of the variables that have been included in the final model. The change in commuting behaviour is defined as the difference between the number of days a respondent commuted before the pandemic and the number of days the respondent intends to commute after the pandemic (commuting days before pandemic minus intended commuting days after pandemic). In this way, a variable is generated that reflects how much the total number of commuting days of a respondent will change. By using the relative difference in commuting days as the dependent variable, the possibility of breaching the assumption of having uncorrelated errors is minimized. The number of days intended to commute after the pandemic can be dependent on the number of days commuted before the pandemic. Therefore, the intended commuting days after the pandemic do not tell anything about the change in commuting behaviour by itself while this study aims to capture changes in commuting behaviour. For example, the difference in commuting days for someone who only commuted 3 days a week before the pandemic and intends to commute 1 day after the pandemic will be the same for someone that commuted 6 days before the pandemic and intends to commute 4 days after the pandemic, namely 2 days. Thereby, actual behaviour (commuting days before covid) and attitudes (intended commuting days after covid) are integrated into one variable. As data about actual commuting behaviour after the pandemic is not possible to obtain, as the pandemic still is an ongoing process, the respondents' indication of their intended commuting days after covid comes closest to reality.

Variables	*Description*	Mean	SD
Dependent			
Relative Commuting Difference	Difference between commuting days before covid and intended commuting days after covid	1.7	1.2
Independent			
Socio-demographics		X	X
Gender (ref. = Female)	0: if respondent female 1: if respondent is male	X	X
Age	Age respondent in years	45.3	10.6
Ln Net Income[1]	Natural logarithm of net income in € per month respondent	8.1	0.4
Education (ref. = MBO)	Highest attained education level: 1: MBO 2: HBO 3: WO	X	X
Household (ref. = Family, youngest child ≤ 11 years)	Household composition: 1: Family, youngest child ≤ 11 years 2: Family, youngest child ≥ 12 years 3: Two or more adults without children 4: Single	X	X
WFH			
Days WFH during pandemic	Average number of days WFH per week in March 2021	4.1	1.4
Days WFH before pandemic	Average number of days WFH per week before the pandemic	1.1	1.5
Total working days	Total days working per week before the pandemic	4.8	0.7
Attitudes (ref. = disagree)[2]	1: Disagree, 2: Neither, 3: Agree	X	X
More productive	When WFH I am more productive than normal	X	X
Sufficient Support of Employer	My employer has supported me sufficient to maintain a good WFH situation	X	X
Commuting			
Commuting Time	One-way commuting duration in minutes	46.4	26.7
Commuting days during pandemic	Number of commuting days per week in March 2021	1.1	1.6
Mode use (ref. = car)[3]	Mode use before pandemic: 1: Car 2: Public Transport 3: Bicycle	 X X X	 X X X

Table 5. Variables included in the final model. *Source: Author.*

[1] *Net income has been transformed to the natural logarithm of net income to conform the data to normality*

[2] *The attitudinal variables included in the model has been recoded to 3 categories as this makes interpreting the results more intuitive because the difference between disagree and entirely disagree is rather vague*

[3] *The category 'Other' has been excluded here as this category only included 2 observations and therefore is redundant*

The sample size for the multiple linear regression analysis has been reduced from 315 cases to 196 cases mainly due to 108 missing values for the income variable. To deal with this, a comparison between the group of respondents that did fill out their income and the group of respondents that did not has been drawn to find out if there are any differences. Overall, there are not any differences present between the 2 groups when running several tests. No significant differences were found for the socio-demographic variables age, $t(243.327), 1.884, p = 0.0608$, education level, ($\chi^2$ (2, N = 311) = 0.9733, p= 0.615), gender, (χ^2 (1, N = 311) = 0.0606, p= 0.806),

household composition, (χ^2 (3, N = 310) = 3.8006, p= 0.284) as well as the respondents' commuting time, t(303), -0.9123), p = 0.3623, number of days WFH before the pandemic, t(313), -0.2369, p = 0.8129 and number of days WFH during the pandemic, t(313), 0.0950, p = 0.9244. Therefore, the missing values in the income variable does not depend on other variables. These variables will be treated as random missing values. The other missing values are missing values across the sample for different variables: gender (1), household (1), mode use (2), education (2), commuting difference (1), commuting time (4) there are no signs of relations between the missing values and are therefore treated as random. All cases with missing values are excluded from the analysis which brings the sample for the analysis to 196.

The results of the final model are provided in table 6, models excluding the variables on commuting and the socio-demographics are provided in Appendix B. A significant relationship between the difference in the number of commuting days before and after the pandemic and the independent variables that have been included in the models has been found, $F(19, 176) = 4.61$, $p < 0.001$, $R^2 = .3321$, $_{Adjusted}R^2 = 0.2600$). Additionally, there are no assumptions of multiple linear regression breached when estimating the model. Testing for heteroskedasticity using a Breusch-Pagan test shows that there is no problem with heteroskedasticity in the model as the chi-squared test of the null hypothesis that there is homoskedasticity cannot be rejected, (χ^2 (1, N = 196) = 0.68, p= .411). The model does not have a problem with multicollinearity. The independent variables are correlated only moderately since no variable has a Variance Inflation Factor (VIF) that has a value above 5 which is the value that is considered as a rule of thumb to generate a problem with multicollinearity (Mehmetoglu and Jakobsen, 2017). The residuals are normally distributed since the Shapiro-Wilk normality test fails to reject the null hypothesis that the residuals are normally distributed, W(196) = 0.989, p = .156. A link test showed that there are no misspecified variables included in the model, t(194) = 2.37, p = .019. Finally, there are no influential observations included in the model since Cook's distance is not above the cut-off point of 1.00 which should be used according to Mehmetoglu and Jakobsen (2017).

The R^2 value associated with the model suggests that 33.2% of the variance in the relative commuting difference can be explained by the independent variables. When controlling for the number of variables included in the model, 26% of the variance in commuting difference can be explained by the independent variables. Further examination of the individual predictors shows that the number of days WFH during the pandemic, the number of days WFH before the pandemic, being more productive, household composition and education level are all significant predictors in the model.

Model	Coefficient (Standard Error)
Constant	**2.865 (2.239)**
Days WFH during Pandemic	**0.271*** (0.082)**
Days WFH before Pandemic	**-0.125** (0.058)**
Total working days	**-0.089 (0.113)**
More productive	
Neither	**0.848** (0.424)**
Agree	**0.930** (0.391)**
Sufficient Support of Employer	
Neither	**-0.043 (0.303)**
Agree	**-0.210 (0.266)**
Commuting days during Pandemic	**-0.104 (0.074)**
Commuting Time	**-0.001 (0.004)**
Mode Use	
Public Transport	**0.112 (0.232)**
Bicycle	**0.102 (0.246)**
Age	**0.004 (0.008)**
Gender	
Male	**0.310 (0.247)**
Household	
Family, youngest child ≥ 12 years	**0.091 (0.284)**
2 or more adults without children	**0.455** (0.221)**
Single	**0.510* (0.262)**
Education	
HBO	**0.383 (0.228)**
WO	**0.602** (0.280)**
Ln Net Income	**-0.396 (0.258)**
R-squared	**0.332**
Adjusted R-Squared	**0.260**
N	**196**

Table 6. Model results and model fitting information for the difference in commuting days before and after the pandemic. *Source: Authors.*

*Significant at the 0.10 level, **Significant at the 0.05 level, *** Significant at the 0.01 level

The coefficient associated with the number of days WFH during the pandemic is the most significant in the model. Controlling for the other independent variables in the model, the coefficient indicates that for every one day increase in the days WFH during the pandemic, the difference in commuting days before and after the pandemic increases by 0.271 days, therefore, becomes larger. Hence, the more people have WFH during the pandemic, the bigger the change in their commuting behaviour. The coefficient related to the number of days WFH before the pandemic is significant as

well. Controlling for the other independent variables in the model, for every additional day WFH before the pandemic the relative commuting difference decreases by 0.125 day, therefore becomes smaller. The more people WFH before the pandemic, the fewer commuting days they had, hence, the smaller the change in commuting behaviour. Even though the coefficient for days WFH before is negative, it is smaller than the coefficient for days WFH during the pandemic. Therefore, the relative commuting difference still increases for people who have WFH both before and during the pandemic, yet, to a smaller degree than for people that did not WFH before and did WFH during the pandemic. The reason for this is because people that WFH before the pandemic commuted less than people who did not WFH before the pandemic.

There is no association between total days worked and the commuting difference as the coefficient is not statistically significant. The last variables that capture the WFH experience are the attitudinal variables capturing productivity and employer support. The coefficients for both 'Neither' and 'Agree' are statistically significant. Suggesting that being as productive when WFH relative to being less productive when WFH increases the difference in commuting days before and after the pandemic by 0.848 days. Being more productive when WFH relative to being less productive when WFH increases the difference in commuting days before and after the pandemic with 0.930 days. As argued before, because of the positive experience, people want to WFH more in the future. The current results also show that this is reflected in the relative difference in commuting days. As figure 4 showed that most people are more productive when WFH these people also want to commute less. Support of the employer was not statistically significant and therefore is not associated with a change in the difference in commuting days.

Although 'not having to commute' was the most often indicated advantage by the respondents, none of the variables related to commuting behaviour is statistically significant. Therefore, the number of commuting days during the pandemic, commuting time and mode are not associated with the relative commuting difference. Therefore, the cause for decreases in commuting days after the pandemic does not lie with the commuting variables themselves. Commuting time being not significant is in contradiction to previous research. It was found that people with longer commutes want to WFH more and therefore commute less (De Vos et al., 2018; Kim et al., 2013). Following these findings, it was expected that respondents with longer commute would have wanted to decrease their number of commuting days more than people with shorter commutes. People who WFH already before the pandemic had an 11 minute longer commute than people who did not WFH before the pandemic. Because of this, people with longer commutes WFH already and having fewer commutes because of that. Hence, the effect found by De Vos et al. (2018) and Kim et al. (2013) was already present before the pandemic and therefore commuting time is not significant in the model.

The coefficients for age and gender are not statistically significant and are not associated with the relative difference in commuting days. The coefficient for living with 2 adults or more and living in a single household are both statistically significant. Therefore, the difference in commuting days before and after the pandemic is 0.455 days larger for people that live in a household with 2 adults or more relative to living in a family where the youngest child is 11 years old or younger. The difference in commuting days before and after the pandemic is 0.510 days larger for people that live in a single household relative to people that live in a family where the youngest child is 11 years old or younger. These findings are in line with the findings of Beck and Hensher (2020) who found that the biggest challenge when WFH is the disruption of children and therefore people with children want to commute to work more. However, they speculate that this effect will diminish over time as

when restrictions are eased, children will go back to school again leaving a more calm WFH environment at home behind.

Also, the coefficient for having a WO education was found to be statistically significant. Therefore, the difference in commuting days before and after the pandemic is 0.602 days larger for someone with a WO education than for someone with an MBO education. Such an effect was not found for someone with an HBO education relative to someone with an MBO education. Lastly, the net income of a respondent was not found to be statistically significant and therefore does not affect the difference in commuting days in this model.

5. Discussion

WFH has changed peoples' travel behaviour substantially, but how exactly the behaviour changed and whether these changes will endure remained unclear. Therefore, these changes in behaviour must be monitored and acted upon by policymakers and transport planners to benefit from them. Policymakers and transport planners can play a big role in navigating these changes, yet, in order to intervene, they need to know what has changed and why. By discovering how the experience with WFH has led to changes in commuting behaviour, policymakers can be enabled to use WFH as a tool to generate structural changes in commuting behaviour.

The findings showed that the experience with WFH because of the pandemic has led to positive changes in behaviour and attitudes towards WFH and commuting. ICT professionals want to remain WFH at higher levels than before the pandemic, yet, to a lesser degree than during the pandemic. A new equilibrium has to be found for the number of days WFH that lies somewhere between the level of WFH before and during the pandemic. For the employees, this equilibrium looks like a form of hybrid working where most people work 2 or 3 days from home. If the intended changes will be realized in actual behaviour, this can generate a structural drop in the number of commuting movements. Which would be a great step towards a more sustainable transport system.

As the pandemic has been going on for more than a year now, new habits might have been formed which increases the odds for structural changes in behaviour (Lally et al. 2010). The line of argumentation of Störmberg and Karlsson (2016) and Verplanken and Wood (2006) on changing behaviour suggest the current situation has been a great possibility to establish structural changes. New experiences (WFH during the pandemic) can lead to changes in future behaviour (WFH after the pandemic and commuting less) because the expected obstacles turn out to be less severe (Störmberg and Karlsson, 2016). For employees, these obstacles mainly consisted of doubts about whether their job could be performed from home (Dft, 2005). For the ICT sector, this does not hold, as Dingel and Neimand (2020) found that jobs in the ICT sector are suitable for doing from home. Also, the positive experience of the ICT professionals adds to this notion being untrue for the ICT sector.

However, Kroesen et al. (2017) argued that attitudes do not always directly lead to behaviour. Attitudes towards WFH have become increasingly positive and people want to WFH more after the pandemic, yet, wanting to WFH more is not the same as doing it. Therefore, policymakers should intervene in order to turn the new positive attitudes into real behaviour. The social expectations (reducing emissions and congestion) of WFH have already been known for a long time. Yet, up until the pandemic, the concept of WFH has been a promise that was never met (Aguiléra et al., 2016). Even though WFH now has been adopted across the entire society for at least a considerable amount of time, the rationale behind this was out of necessity. Once the pandemic is over, motives for WFH will shift from necessity back to a consideration of costs and benefits. The past showed that this consideration of costs and benefits did not include the social costs of congestion

and pollution as the social expectations of WFH were never met. The situation has changed with barriers of WFH now being breached which has led to more positive attitudes. However, the changes in behaviour are surrounded by uncertainty as they are intended, not real changes. Therefore, the problem of cognitive dissonance remains. The social costs of congestion and pollution should be added to the consideration of employers and employees to WFH by creating incentives to WFH in the future.

On top of that, Verplanken and Roy (2016) and Mergelsberg et al. (2020) argue that people who have experienced significant changes in their life are more susceptible to interventions than people who did not experience these changes. The pandemic can be considered as such a life event and therefore people will now be more susceptible to interventions than once the pandemic will be over. Besides, big events in people's life generate significant changes in their commuting behaviour. Yet, these changes mainly happen during the event and diminish afterwards (Parkes et al., 2016). The Covid-19 pandemic has triggered changes that are going on now. People are now likely to be more susceptible to interventions. Therefore, interventions should be targeted at the changes that are going on now. Policymakers should act now as losing time means losing impact.

There lies an important task for the employer here to make these changes possible. The ICT professionals were in general positive about the support of their employer when WFH during the pandemic and employer's support is not associated with changes in relative difference in commuting behaviour. These findings are in line with Haddad et al. (2009) who found that employees do not mention the support of their employer as a barrier to WFH. Nevertheless, even though employees do not mention it, the employer's support for WFH is most predictive for employees to actually WFH. There are benefits to be gained from WFH for the employer as well as research has shown that WFH leads to increased productivity (Bloom et al. 2015; Kazekami et al., 2020). However, managers and supervisors were hesitant about these benefits before the pandemic and therefore did not want to invest in creating a proper WFH environment (Aguiléra et al., 2016). Because of the pandemic, employers were forced to let their employees WFH and thus were confronted with the benefits and disadvantages. Therefore, it might be that managers and supervisors might be more positive about the benefits of WFH than they were before the pandemic. In the media, some big firms indicate that they want to maintain some form of WFH after the pandemic[2]. Yet, profound research on the experience with WFH during the pandemic of employers seems to be scarce. Therefore, now that it is clear that employees want to WFH more after the pandemic, research using the employer as the unit of analysis is needed. In order to find out how they have experienced WFH during the pandemic and how this experience could be improved.

In order to stimulate the employer's support for WFH, policymakers should create incentives to lay out formal, flexible working arrangements. Aguiléra et al. (2016) argued that the people that did WFH before the pandemic mainly had informal flexible working arrangements. This caused WFH to be an abstract concept for employees. More flexible working arrangements would benefit the employees because flexible working arrangements including WFH result in higher job satisfaction (Mas and Pallais, 2020). Hence, ways have to be found to include such arrangements in the new situation with WFH.

This research added to the literature by responding to the call of Beck and Hensher (2020) for ongoing and timely research on changes in travel behaviour during the pandemic. Furthermore,

[2] For example: https://www.theguardian.com/business/2021/jan/13/unilever-workers-will-never-return-to-desks-full-time-says-boss or https://www.cnbc.com/2020/05/01/major-companies-talking-about-permanent-work-from-home-positions.html

by researching a sector where WFH is a great possibility the effects of WFH on commuting behaviour do not suffer from ambiguity caused by occupations that are not suitable for WFH. Lastly, policymakers and transport planners are provided with insights into how WFH can change commuting behaviour in the future, which can be used to improve our transport system.

6. Limitations and future research

Regarding the limitations of this research, the focus solely lied upon the ICT sector. Because of this choice, the effects might differ in other sectors as the experience with WFH during the pandemic has not been as positive as the ICT sector. For example, teachers have WFH almost as much as ICT professionals during the pandemic, yet, they were less positive about WFH (De Haas et al., 2020). With jobs suitable for WFH (Dingel and Neimand, 2020), workers that prefer to work alone (Kirlidog et al., 2009) and the overall positive experience with WFH, It might be that the ICT sector is one of the sectors where WFH is most likely to remain. Whereas in sectors where jobs are less suitable for WFH and the experience has been less positive do not want to remain with a form of WFH. If so, the impact on commuting behaviour will also be nihil. Thus, further research on the relationship between WFH and commuting behaviour in other sectors is needed. Also, the gender division in the ICT sector might enhance the effects currently found. This research did not find a difference in gender and the experience with WFH, however, the sample consisted of 86% out of men. For men, WFH is a way to increase their employment time while for women WFH is a way to combine work and family life which affects the experience with WFH (Powell and Craig, 2015). Hence, the experience with WFH may be different in other sectors where the gender division is more equal. Yielding different effects on commuting behaviour. For example, focussing on call centre employees, for whom WFH is a suitable option as well (Bloom et al. 2015) and where the workforce is predominantly female (Scholarios and Taylor, 2010).

Secondly, as argued before, the problem of cognitive dissonance remains. Although the situation now is substantially different from the situation before the pandemic, the intended changes are not realized yet. Therefore, it is essential to keep doing research and monitor the changes in people's WFH and commuting behaviour to reveal whether the intended changes become reality. By using panel data it can be revealed whether people actually changed their behaviour and what motives they have.

Moreover, the geographical scope of this research is limited to The Netherlands. The effects found can play out differently in other countries. Research found that the potential for WFH is higher in advanced economies than in emerging economies (Lund et al., 2020). Besides, 97% of Dutch households have an internet connection, which is the second-highest share in Europe (Eurostat, 2020). Therefore, WFH is possible for almost everyone in The Netherlands while this might not be the case for other countries. Future research should also focus on the effect of WFH on commuting behaviour in emerging economies.

7. Conclusion

This thesis has analysed to what extent the experience with WFH because of the Covid-19 Pandemic has affected commuting behaviour of Dutch ICT professionals. By first analysing to what extent they WFH and how their experience was, it could be examined how their commuting behaviour changed because of this and what the determinants of these changes were.

Firstly, ICT professionals WFH extensively during the pandemic. Most of the ICT professionals WFH all of their working days during the pandemic. They had a very positive experience with WFH

during the pandemic. With them having experienced WFH as pleasant, being more productive when WFH and having a proper place to WFH. This has led to a substantial increase in the number of days ICT professionals would like to WFH after the pandemic. Secondly, the number of days people have commuted during the pandemic decreased significantly. Also, after the pandemic people want to commute significantly less than they did before the pandemic, yet, more than they did during the pandemic. The size of the decrease in the number of commuting days is most significantly associated with the number of days people WFH during the pandemic. The more people have WFH during the pandemic, the more they are intending to decrease the number of days they commute. Other determinants that significantly enlarge the decrease in commuting days after the pandemic were: being more productive when WFH, having a WO education and the absence of children in the household. The decrease gets significantly smaller for people that already WFH before the pandemic. Thus, the new experience with WFH because of the pandemic affects the commuting behaviour of Dutch ICT professionals in a way that it reduces the number of intended commuting days after the pandemic. If the intended changes are realized into actual changes in commuting behaviour, WFH more will contribute to a more sustainable transport system after the pandemic.

The results found are promising for establishing a more sustainable transport system in the future. However, there are still obstacles that should be overcome. Findings might be different in other sectors because not all sectors are suitable for WFH. Besides, the problem of cognitive dissonance might remain present as the pandemic still is an ongoing process. Employers will play an essential role in maintaining structural benefits. By establishing a proper WFH environment for their employees in the future.

To maintain structural benefits, policymakers should use WFH as a tool to decrease commuting behaviour. Policymakers should create incentives for employers to provide employees with flexible working agreements. To have the most impact they should intervene now as changes are going on now.

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Appendix A

Enquête thuiswerken en reisgedrag in de IT/ICT sector

Mijn naam is Roald Schoenmaker, student Economische Geografie aan de Rijksuniversiteit Groningen. Momenteel ben ik bezig met het schrijven van mijn scriptie waarin ik begeleid word door Dr. Viktor Venhorst. Met het onderzoek willen wij graag inzicht krijgen in welk effect thuiswerken heeft op het woon-werk verkeer binnen de IT/ICT sector. Daarom zouden wij u erg dankbaar zijn als u deze korte enquête voor ons zou willen invullen. De enquête zal ongeveer 5 minuten van uw tijd in beslag nemen. De resultaten worden volledig anoniem verwerkt en zullen niet met derden gedeeld worden.
Als u vragen en/of opmerkingen heeft over de enquête of over het onderzoek dan ontvang ik die graag en kunt u contact opnemen met mij of mijn begeleider:
Roald Schoenmaker

r.p.schoenmaker.1@student.rug.nl

Dr. Viktor Venhorst

v.a.venhorst@rug.nl

Alvast heel erg bedankt voor het invullen van de enquête.

Thuiswerk ervaring

Hoeveel dagen werkte u in een gemiddelde werkweek voor corona vanuit huis? (als dit niet van toepassing was, vul dan 0 in)

…

Hoeveel dagen heeft u in een gemiddelde werkweek in maart 2021 thuis gewerkt? (als dit niet van toepassing is, vul dan 0 in)

…

Hoeveel dagen van een gemiddelde werkweek zou u vanuit huis willen werken na corona? (als dit niet van toepassing is, vul dan 0 in)

…

Wat is voor u het grootste voordeel van thuiswerken? (meerdere opties mogelijk)

- Niet hoeven te reizen
- Flexibelere werkuren
- Productiever dan op werk
- Anders: …

Wat is voor u het grootste nadeel van thuiswerken? (meerdere opties mogelijk)

- Minder contact met collega’s
- Minder productief
- Verslechterde werk-privé balans
- Anders: …

Hoeveel dagen in de week werkte u voor corona?

…

Hoeveel dagen in de week werkt u nu (tijdens corona)?

…

Geef aan op een schaal van 1 tot 5 in hoeverre u het eens bent met de volgende stellingen

1. Helemaal oneens – 2. Oneens – 3. Neutraal – 4. Eens – 5. Helemaal Eens

Ik heb thuis een goede plek om te werken

Ik heb het thuiswerken als prettig ervaren

Ik ben thuis even productief als dat ik op werk ben

Mijn werkgever heeft mij voldoende ondersteund om het werken vanuit huis goed te laten verlopen

Voor corona had ik al ervaring met werken vanuit huis

Woon-werk verkeer

Hoe lang duurt de reis van uw huis naar uw werk van deur tot deur in minuten?

…

Hoe reisde u voor corona naar uw werk? (als er meerdere opties van toepassing zijn, kiest u voor de optie die het meeste tijd kostte)

- Auto
- Trein
- Bus
- Lopend
- Fiets
- Anders: …

Hoe reist u tijdens corona naar uw werk? (als er meerdere opties van toepassing zijn, kiest u voor de optie die het meeste tijd kostte)

- Auto
- Trein
- Bus
- Lopend
- Fiets
- Niet
- Anders: …

Bent u van plan, als corona voorbij is, op een andere manier naar uw werk te reizen? (als er meerdere opties van toepassing zijn, kiest u voor de optie die het meeste tijd kostte)

- Nee
- Ja, met de auto
- Ja, met de trein
- Ja, met de bus
- Ja, lopend
- Ja, met de fiets
- Anders: …

Hoeveel dagen in de week reisde u voor corona naar uw werk?

…

Hoeveel dagen heeft u in een gemiddelde werkweek in maart 2021 naar uw werk gereisd? (als dit er geen zijn, vul dan 0 in)

…

Hoeveel dagen in de week bent u van plan om naar uw werk te reizen als corona voorbij is?

…

Wat is uw leeftijd?

…

Wat is uw geslacht?

- Man
- Vrouw
- Overig

Wat is uw netto inkomen per maand?

…

Wat is uw hoogst genoten opleiding?

- MBO
- HBO
- WO

Hoe is uw huishouden samengesteld?

- Single
- 2 of meer volwassenen zonder kinderen
- Gezin, jongste kind 12 jaar of ouder
- Gezin, jongste kind 11 jaar of jonger

Gaat u in de komende 6 maand van baan wisselen?

- Nee
- Ja, een andere baan binnen de ICT sector
- Ja, een andere baan buiten de ICT sector

In welke provincie woont u?

…

Indien u een partner heeft die werkt, hoeveel procent van hun totale werkweek werkt deze thuis? (indien u geen partner heeft kunt u deze vraag leeg laten)

Appendix B

Multiple regressions that have been run in Stata excluding the commuting variables and socio-demographic variables

	A	*B*	C (final model)
Constant	0.235 (0.0.695)	0.836 (0.850)	2.865 (2.239)
WFH during Covid	0.363*** (0.060)	0.289** (0.082)	0.271*** (0.082)
WFH before Covid	-0.131** (0.056)	-0.123** (0.057)	-0.125** (0.058)
Total working days	-0.121 (0.110)	-0.130 (0.111)	-0.089 (0.113)
More productive			
Neither	0.925* (0.411)	0.820* (0.424)	0.848** (0.424)
Agree	1.04** (0.381)	0.911** (0.395)	0.930** (0.391)
Sufficient support employer			
Neither	0.063 (0.299)	0.005 (0.302)	-0.043 (0.303)
Agree	-0.228 (0.267)	-0.276 (0.268)	-0.210 (0.266)
Commuting days		-0.106 (0.076)	-0.104 (0.074)
Commuting Time		-0.001 (0.004)	-0.001 (0.004)
Mode Use			
Public Transport		0.277 (0.216)	0.112 (0.232)
Cycling		0.078 (0.236)	0.102 (0.246)
Age			0.004 (0.008)
Gender			
Male			0.310 (0.247)
Household			
Family, youngest child ≥ 12 years			0.091 (0.284)
2 or more adults without children			0.455** (0.221)
single			0.510* (0.262)
Education			
HBO			0.383 (0.228)
WO			0.602** (0.280)
Ln Net Income			-0.396 (0.258)
R-squared	0.264	0.278	0.332
Adjusted R-Squared	0.237	0.235	0.260
N	196	196	196