How remote work affect employee productivity

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Abstract

Due to the covid-19 pandemic, the world of remote work exploded. This study investigates how remote work affect employee productivity. The data is collected through a web-based questionnaire where Swedish employees and managers respond to questions related to remote work productivity. There are some previous studies of the topic, based on data from other countries. However, studies covering the Swedish market are limited, whereas this thesis contributes to that knowledge gap. The study includes the independent variables desire to work remotely, age, family situation, gender, educational background, collaboration, and support from management, to recognize what factors have an impact on employee productivity as dependent variable. The results indicate that both employees and managers recognize an average increase in employee productivity, where the factors desire to work remote, age and family situation are found to have a significant impact on productivity. Furthermore, the study also found that the vast majority of workers prefer a hybrid work solution where 40-60% is conducted remotely to utilize the benefits of both options.

Keywords: *Remote work, Productivity, Sweden, Employee perspective, Manager perspective, Desire to work remotely, Age, Family situation, Gender, Collaboration, Education, Support from management.*

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Content

List of abbreviations

OECD	The Organization for Economic Cooperation and Development
OLS	Ordinary Least Squares
VIF	Variance Inflation Factor
ANOVA	Analysis of variance

1. Introduction

1.1 Background

The 30th of January the World health organization (WHO) declared the covid-19 outbreak to be a considerable public health emergency of the international community (World Health Organization, 2020). During the worst phase of the covid-19 pandemic a common strategy to decrease the spread of the virus, applied by governments worldwide, was to either force or strongly encourage the citizens to self-isolate. The pandemic thereby caused a rapid and extensive shift toward remote work, also known as telework, telecommuting or working from home, for both employees and companies, without much time for preparation. The restrictions during and after the covid-19 pandemic, made remote work the new way of working for millions of employees around the world (Caligiuri et al., 2020; OECD, 2021). According to Eurofound (2020), the proportion of Europeans working remotely increased from 12% to 50% during the pandemic. Similarly, in the US, measures were put in place by the Government to accommodate the dramatic change. The outcome led to a significant increase where 71% had the opportunity to work remotely, a difference from 43% prior to the pandemic (Zhang, Yu & Marin, 2021).

Remote working was already a phenomenon even pre covid-19 and has according to Dimitrova (2003) been utilized since 1970. Due to globalization and advancements in digitalization over the last few decades, there has however been a profound impact on the way we choose to live and work (Rañeses et al., 2022). New technological advances in communication and subsequently the spread of the internet, have further enabled the development of remote work. The shift has been accompanied by a decline in the traditional manufacturing industry and a significant increase and importance of the service industry (Sewell & Taskin, 2015).

Skype, Zoom, Slack and Microsoft Teams, to mention a few, are popular communication software used worldwide to communicate. These tools allow people and employees to collaborate and connect with each other remotely. Microsoft, the creator and owner of Microsoft Teams, describe their product as “a collaboration app built for hybrid work so you and your team stay informed, organized, and connected — all in one place.” (Microsoft, 2023). Companies all over the world are utilizing the benefits of these digital tools to conduct work meetings, workshops and seminars regardless of the users’ locations since the only thing

needed to connect remotely is internet connection. As technology has gradually developed, remote work has increased in popularity among the companies and employees (Waters, 2022). From the companies' perspectives, this has enabled benefits in terms of reduced costs, increased productivity and improved the overall quality of life for the employees (Dimitrova, 2003).

However, the increasing prevalence of remote work since the covid-19 pandemic has brought both its benefits and drawbacks to the forefront. The shift to remote work has been accelerated and so has the attention from researchers, studying its impact on productivity (Felstead, 2022). A recent study made in Japan showed that the employees subjectively estimated that their productivity decreased to approximately 60-70% compared to their business as usual in the office facilities (Morikawa, 2021). Another study conducted by Nemțeanu, Dabija & Stanca (2021) found no evidence of negative impact on employees' productivity from remote work, but indications that remote work can cause counterproductive work behaviors. Furthermore, the study by Rañeses et al. (2022) suggests that remote work can boost productivity and motivation, as employees work longer hours undisturbed. In addition, there are also other benefits for the workers such as saved time and reduced costs for commuting (Galanti et al., 2021).

To summarize, remote work has been utilized since the 1970s and has from then only continued to gain momentum (Dimitrova, 2003). The covid-19 pandemic has increased its popularity and accelerated its inevitable trend, making it crucial for the modern workplace (Van der Lippe & Lippényi, 2019). Furthermore, the new way of working is expected to persist and there is no indication that the trend will slow down (Galanti et al., 2021). Despite remote works relevancy nowadays, the phenomenon of remote work is still limited in research and comprehensive understanding around the world. The limitation within the subject leaves room for further studies (Waters, 2022).

1.2 Problem statement

Remote work has become a controversial topic since it challenges the fundamental basis of how companies were previously structured and doing its businesses (Allen, Golden & Shockley, 2015). Prior to the pandemic, remote work existed to some extent but was mainly associated with specific industries and mostly with high-income jobs. During the covid-19 pandemic, remote work was a forced adoption for the companies to maintain its operations and remote work was made widely available (OECD, 2021; Dingel & Neiman, 2020). Since the outbreak subsided, remote work has remained to a great extent and the companies take different paths forward. Employers and companies now face the new reality whether to continue to let employees that prefer to work from home to do so, allow a flexible hybrid solution or demand everyone to work full time from the offices again. However, the ongoing debate concerns how favorable the development has been and the question is whether it is a win-win for all parties involved (Gutiérrez-Crocco, Martin-Caballero & Godoy 2023; Fan & Moen, 2023).

The covid-19 pandemic has been a valuable lesson for both employees and employers, since the work can allegedly be done just as efficiently without being physically present in the office (Strack et al., 2021). The employees report substantial increases in productivity and even considerable satisfaction with remote work. According to Barrero, Bloom & Davis (2021) and Bloom et al. (2023), employees are even prepared to accept significant decrease in salary to maintain the benefits of remote work. Furthermore, nine out of ten employees prefer to maintain the option to work remotely part or full time (Felstead & Reuschke, 2021). Although the benefits of remote work have recently emerged there is resistance, mainly from the employers (Bloom et al., 2023). Managers and employees now disagree to some extent about the beneficial aspects of remote work and how to move forward. Employees emphasize an increase in productivity and various other benefits with remote work, but managers are nonetheless skeptical about the beneficial aspects and believe productivity is reduced (ibid.).

Studies by various researchers support the employees' beliefs that remote work has a positive impact on productivity. However, the concerns and the negative impact from the employers are also supported and explained by various researchers. Prior to covid-19, companies around the world were reluctant to implement remote work due to various fears that the teamwork would be affected. Subsequently, that effort levels and productivity would decrease as employees cannot be supervised as easily (Felstead & Reuschke, 2021). The pitfalls associated

with remote work can also be underestimated as the companies' operational and financial benefits are not always enough to justify remote work. To have successful operations when the work is conducted remotely it is essential for companies to provide the workers with the right conditions to maintain or even increase their productivity (Baruch, 2000; Galanti et al., 2021). The shift to remote work was a fast adaptation for the companies and the necessary investments needed were not always made. Increased pressure on IT and communication capabilities, increased data security risks as well as possible legal issues concerning injuries and health care for employees working from home instead of the office emerged (Sharit et al., 2009). Some industries and practices are not always suited for remote work. Performance is not always valued over attendance, and trust barriers exist between managers and employees (Baruch, 2000; Parker, Knight & Keller, 2020; Phillips, 2020).

The companies' expectations that remote working was just a temporary solution during the covid-19, do not seem to be completely in line with the new expectations of remote work from the employees. For example, several major tech companies and banks in the US are restricting the possibility to work remotely either completely like Goldman Sachs and Twitter, or to a majority of the time like Disney, Google, IBM and JPMorgan (Canal et al., 2023). In Sweden, Dagens Industri (DI) published an article in December 2022 based on a study conducted by Boston Consulting Group (BSG) related to flexibility within distance work. The study revealed that the flexibility related to remote work resulted in reduced development for the companies as well as delayed projects with higher cost as a result. BSG found that particularly affected are the Swedish companies, which have been the worst performing companies since remote work was introduced. They state that on average projects have become 30% more expensive and take 50% longer to complete.

As employee productivity is considered to affect the organizational performance (Chatterjee, Chaudhuri & Vrontis, 2022), the way companies choose to continue working moving forward might have a great impact on the development of organizations, employment and thereby in the long run, the welfare of individuals, companies and even societies. With this in mind, and the fact that there is a lack of comprehensive understanding and relevant studies of the subject, it is therefore in our great interest to contribute to this knowledge gap.

1.3 Purpose and Research questions

Working remotely has become a controversial subject with proclaimed pros and cons from the aspect of the employees as well as the employers. There are several studies that cover parts of our research area such as a study in Lithuania by Raišienė et al. (2022), one in Japan by Morikawa (2021) and one in Russia by Toscano et al. (2022), but to our knowledge, there is no study that examines how remote work affect the productivity of Swedish employees. The aim and purpose of this study is to investigate if there is a relation between employee productivity and remote work and if so, what factors are affecting employee productivity. Furthermore, investigate the benefits and drawbacks of remote work. For this purpose, the research questions we would like to further explore are:

1. *To what extent does remote work affect the perceived productivity of Swedish employees?*

2. *What factors are affecting the perceived productivity of Swedish employees while working remotely?*

3. *What are the benefits and drawbacks with remote work impacting the perceived productivity of Swedish employees?*

2. Theory

2.1 Remote work

As explained by Allen, Golden & Shockley (2015) there are extensive implications while reviewing scientific findings related to remote working. This, because of the various definitions in existing literature. A lacking common definition is therefore seen as a main reason why the understanding of remote work is limited and results in studies are hard to compare. One definition of remote work by Konradt, Schmook & Malecke (2000), which will be used in this study, is: "A form of work organization in which the work is partially or completely done outside the conventional company workplace with the aid of information and telecommunication services".

Remote work does not automatically equate to the workers to be fully remote, even though this was common during the covid-19 lockdown to reduce the spread of the virus. Working remotely can also mean that the worker spends some of the working hours in the office and occasionally, once or twice a month or a few days a week remotely, normally referred to as "hybrid" work (Verma et al., 2023). According to a survey conducted by Bloom (2020), more than half of the responding employees prefer a hybrid solution rather than fully remote or fully on-site. This is also mentioned by for example Golden & Veiga (2005) and Virick et al. (2010), namely that there is a higher job satisfaction for those working remotely a "moderate" amount of time, compared to both a smaller and higher number of hours remotely.

There are several studies made during the last couple of years studying the phenomenon of remote working as a consequence of the covid-19 pandemic. These have different angles and focus on various aspects of remote working. Remote work includes several fields, for example psychology, management, communication and information systems, which is a challenge when conducting research, especially as the different research fields are often conflicting (Allen, Golden & Shockley, 2015). The main topic of this study is to study the perceived productivity of employees, but findings from previous studies in other areas are relevant since they can have an impact on the former and it is therefore interesting to include them in this study.

2.2 Employee productivity

As previously stated, remote work has not been a widespread practice prior to the covid-19 pandemic, and it is therefore not widely researched. However, the shift to remote work has accelerated the attention from several researchers to studying its impact on productivity and performance (Felstead, 2022). Remote working is according to Allen, Golden and Shockley (2015) connected to several factors that will affect the financial result of the organizations, namely, worker performance and productivity, wages, absenteeism, turnover, and overall firm performance.

Felstead (2021) states that the empirical evidence from previous research regarding remote work and productivity is ambiguous, some pointing in the direction of positive impact on productivity, while others direct to the opposite and some states that no significant impact was found. Bloom et al. (2015) examined the notable result from an experiment conducted by NASDAQ-listed company Ctrip in China, where 16,000 employees were given the opportunity to work from home instead of in the office. The result from the experiment showed a significant increase of 13% in performance. The employees worked more efficiently per shift, had fewer breaks and less absence due to sickness. Furthermore, the employees reported higher job satisfaction and this positive impact resulted in 50% less job attrition.

Further, Zhang, Gerlowski & Acs (2021) conducted a study in the US on how small businesses have been affected by remote work during the covid-19 pandemic. The shift to remote work has shown to improve smaller companies' productivity and performance, due to less absenteeism, improved work-life balance, reduced stress and less commuting to work. A similar study conducted by Felstead & Reuschke (2021) however, found no connection between increased productivity and remote work.

Nemțeanu, Dabija & Stanca (2021) conducted a study in Romania, collecting data from 641 respondents. The study showed no evidence of negative impact on employees' productivity while working remotely, but that remote work can cause counterproductive work behaviors. Another study by Galanti et al. (2021) found that productivity increases when workers work remotely. However, they further state that productivity can vary depending on numerous factors which need to be taken into consideration. Potential barriers for increased productivity can arise from the employee's family situation, social isolation and other distracting work

environments (ibid.). These barriers are also mentioned by Mehdi & Morisette (2021) during a study of Canadian workers. The employees that reported productivity loss mentioned social isolation and difficulties in the family situation as main reasons. However, the vast majority of the remote workers, approximately 90%, reported being at least as productive as in the office prior to covid-19.

Meta-analytical research conducted by Gajendran & Harrison (2007), indicates that there is a connection between remote working and supervisor-rated or objectively measured job performance. Several other studies mentioned by Allen, Golden and Shockley (2015) support the theory by Gajendran & Harrison (2007) that self-reports are generally exaggerated and therefore not as accurate compared to other reports of performance. However, perceived productivity through self-reports is a common practice when studying this type of subject where measurement is complex. As stated in a study by Morikawa (2021) where Japanese workers were evaluated, it can be extremely difficult to measure the productivity of individual workers accurately, especially white-collar workers, meaning the most accurate measurement is to compare the productivity of the individual against the same individual remotely versus on-site with a self-assessment. From that study the average respondent experienced that their productivity while working remotely was approximately 60-70% of their regular productivity while working from the office. Another study in which self-assessment of perceived productivity was used as measurement for productivity is the study of Italian workers by Galanti et al. (2021).

A stated the previous research regarding perceived productivity is ambiguous, but nonetheless the majority of studies seem to point in the direction of a positive impact whereas we formulate a hypothesis accordingly:

Hypothesis 1: On average employees perceive their productivity as increased while working remotely compared to in the office.

2.2.1 Desire to work remotely

The desire to work remotely has become more common recently and refers to the individual preference of the employees to work outside the traditional workplace. The driving factors are the beneficial aspects it offers like flexibility, less time and money spent due to reduced

commute, improved work-life balance and an increase in productivity (Pokojski, Kister & Lipowski, 2022; Onque, 2022; Pattnaik & Jena 2020; Chatterjee, Chaudhuri & Vrontis, 2022).

The option to work remotely is preferred by workers at least once or more every week, and workers in the US are even willing to accept a decreased salary (Barrero, Bloom & Davis, 2021). More than half of the respondents in an American and Canadian survey prefer to keep the option to work part or fully remote (Barrero, Bloom & Davis, 2021; Bloom, 2020; Mehdi & Morisette, 2021). Studies also suggest that the employee's own willingness to work remotely has a positive impact on performance and productivity (Bloom et al., 2015). The flexibility and work-life balance with families also increase the desire to work remotely. Women do however have a higher aspiration than men to have the option to work remotely (Laß & Wooden, 2023; Raišienė et al., 2022).

Remote work and higher job satisfaction are closely linked, irrespective of the job (Golden & Veige, 2005). Employees with high job satisfaction and morale are more likely to perform, and thereby a key for an employee to be productive (Mihalca, Irimias & Brendea, 2021; Pattnaik & Jena, 2020). Employees who desire to work from home are usually workers with established social lives, families, or are in the end of the income spectrum. However, remote work is not suited for everyone and not always desired either, this could also be seen by the Chinese company Ctrip. Employees who volunteered to work from home increased the overall productivity with 13%. Some employees changed their mind and returned to the office, since remote work was not suitable enough for their personal preferences (Bloom, 2014; Bloom et al., 2015).

The covid-19 pandemic was a forced adaptation for companies to stay in operation and workers, willing or not, were forced to work remotely. The positive outcome in the Chinese company Ctrip differ from enforced remote work, since the experiment was voluntary. Enforcing remote work can have negative consequences on both companies and the employees (Anderson & Kelliher, 2020; Bloom et al., 2015; Palumbo, 2020). These consequences can, according to Palumbo (2020), result in confounding boundaries in the overall life between work and family commitments.

Previous research has shown that employees' own willingness to work remotely can have an impact on productivity. However, the desire to remote work can vary depending on individual

preferences and enforced remote work can cause a negative impact on productivity. This leads us to test the following hypothesis:

Hypothesis 2: Employees that have a desire to work remotely are more likely to perceive a higher productivity while working remotely.

2.2.2 Age

One factor related to remote work and productivity that has been studied in various previous research is age. Employees tend to experience remote work different by age, since all groups are at different stages in life and have different preferences (Wilson, 2021). Toscano et al. (2022) found during their study of Russian employees that as age increased the participants had fewer positive opinions regarding remote work. They further indicated less engagement and less exchange with their supervisors than younger employees. A possible reason for this, as observed by Drucker and Khattak (2000) can be correlated with the lower confidence in information and communication technologies (ICTs) elderly employees might experience.

A study conducted of Lithuanian remote workers by Raišienė et al. (2022) states that there are significant relationships between age and the quality of life affected by remote working. The authors found that respondents of older age experienced less work-life balance and difficulties to separate working time from time off than younger employees. On the other hand, younger employees were found to be more likely to develop harmful habits due to the stress experienced related to remote working. A similar study was also conducted by Raišienė et al. (2020) in Lithuania where younger up to middle-aged workers are more satisfied with remote work than older employees.

Sharit, Hernandez & Nair (2009) conducted a study where 314 managers from different managerial levels in organizations in the United States participated. Their study found that the older workers were significantly preferred over the younger workers among the four attributes that were stated to be most important for the managers: trustworthiness, reliability, ability to work independently and time management ability. However, regarding the ability to be flexible, have a higher level of cooperation between teams and technical abilities, the younger workers were favored.

As stated in a recent article by Ray (2022) of American workers, remote work flexibility must be an option since all employees are at different stages in life and many request the option of remote work. In order to recruit the best talents, offering remote work to a certain degree is a must. For Gen Z (born 1997-2012) as many as 27% of the participants in a survey see remote working as “an absolute necessity”. Even in other generations there are many with the same opinion, on average 24% of all respondents.

Considering that the research indicates that younger employees are more likely to feel engaged while working remotely, that they to a higher extent have technical confidence and that they prefer to work remotely to a higher extent, it is likely that they perceive their own productivity as higher compared to employees of higher age. We have therefor formulated the hypothesis accordingly:

Hypothesis 3: Younger employees are more likely to perceive higher productivity while working remotely compared to older employees.

2.2.3 Family situation

Remote work is a new tool with the potential to improve life balance for families with equitable distribution between work and free time, and in turn increase equality between men and women (Ramos & Garcia-De-Diego, 2022).

Remote work can have both positive and negative effects on workers with families. According to Laß & Wooden (2023) greater flexibility and reduced time commuting do have a positive impact on family-life but it can also have a negative impact on family conflicts. A similar study conducted by Raišienė et al. (2022) found that the variable having the most impact on satisfaction of remote working was if the respondent had home-living children or not. Furthermore, one difference was that workers with children to a larger extent experienced lack of sleep to get the life puzzle to fall in place. The respondents with children felt more guilt of not spending time with their families, also causing stress to the respondent. A slight majority of the respondents experienced difficulties to focus on work during work hours while working from home and just under 40% felt that the family commitments affect concentration negatively.

Dunatchik et al. (2021) conducted a study in the US on how the closing of schools during the covid-19 pandemic altered responsibilities in families. Families with dual-earner couples showed no evidence that the gender-gap declined as fathers began working from home. Fathers did increase their involvement in housework, but the gender-gap was indifferent with a continuously higher workload on the mothers, since both parents increased their contributions to the housework. In relationships where only the mothers worked remotely, the study also indicated of an increased responsibility on mothers to care for the children and take care of the households as they spent more time at home, which further increased inequality. A similar study regarding how the shift to remote work affected the housework for middle class women in Turkey was conducted by Çoban (2021). The study showed that in a country where traditional gender roles already existed, the burden on women to take care of the household increased. The arguments favorable with remote work like its flexibility, decreased time commuting and improved work life balance, were instead transferred to an increased burden for the women. These findings were also found in a study of Australian remote workers by Powell & Craig (2015).

Another study by Kurowska (2020) compared Sweden and Poland, two countries with different models of division of labor. The findings in Poland shows a similar pattern as mentioned by Çoban (2021) and Powell & Craig (2015), that the time saved from commuting and leisure were transferred to household and caregiving. Women in Poland tend to be the primary carer, despite being a bigger part of the workforce. Sweden on the contrary is known to have one of the highest equalities between men and women in Europe, and housework duties are expected to be divided between the two genders to a higher extent than in other countries and with other cultures. The result of this study in Sweden showed a lower negative impact overall of remote work for both genders since the housework was distributed between both men and women (Kurowska, 2020; World Economic Forum, 2022).

These findings can further be explained by Sullivan & Lewis (2001) and Sullivan & Smithson (2007) where households characterized by high gender equality experienced higher satisfaction with remote work. Work-family balance and responsibilities in the household were reported as an improvement by both men and women. However, these findings also indicate that the effectiveness with remote work depends on cultural and social factors as households with traditional gender roles made no significant differences in gender equality and improvements in family situations.

Previous research in family situations have shown both positive and negative impacts on productivity but as the culture in Sweden is characterized by high gender equality it indicates a possible positive effect on perceived productivity for employees with home-living children. This leads us to test the following hypothesis:

Hypothesis 4: Workers with home-living children perceive their productivity increased to a higher extent while working remotely compared to workers with no home-living children.

2.2.4 Gender

The participation of men and women in the workforce are to a large extent similar in industrialized countries. Despite this similarity, studies have found that men and women conduct and experience remote work differently. Studies have found that 63% of the women prefer remote work compared to 49% men (Alon et al., 2020). A survey made by Pelta (2021) highlighted that 68% of women want to work exclusively remotely and consider remote work to be an important factor when applying for a new job. This could also be seen by Katie (2021) that conducted a LinkedIn survey where women to a larger extent apply for jobs that offer remote work.

Women with families face challenges with remote work, separating work with the overall life balance, with families and unpaid work in the household as mentioned earlier (Kurowska, 2020; Çoban, 2021; Dunatchik et al., 2021; Powell & Craig, 2015). The challenges for women can also according to Ramos & Garcia-De-Diego (2022) be that women had more difficulties concentrating on work tasks compared to men while working remotely. One explanation for this was the increased workload for taking care of the children, and the limited involvement from men in the overall work-life balance. Women with children do however despite this, have a more positive attitude towards remote work than fathers despite increased family demands for mothers (Raišienė et al., 2022; Laß & Wooden, 2023).

Remote work with its flexible work arrangement has been seen as a solution to accelerate gender equality and increase productivity in the long term. Studies have also found that women prefer remote work and report higher satisfaction compared to men. Women do, however, also face challenges with remote work and these are less common in Sweden since we have the

highest equalities between men and women in Europe (Alon et al., 2020; Kurowska, 2020; World Economic Forum, 2022). This leads us to test the following hypothesis:

Hypothesis 5: Women are more likely to perceive a higher productivity while working remotely than men.

2.2.5 Collaboration

Some type of work is naturally more suitable for remote working. Some industries and practicalities with remote work are not suitable enough to be efficient, and the quality of collaboration cannot be so easily replaced virtually with remote work (Gibbs et al., 2021; Phillips, 2020). Golden and Gajendran (2019) suggests that jobs that have a high level of complexity and require more concentration would benefit from remote work due to the decrease in distraction compared to what an office could have. In their study of employees from several white-collar positions such as sales, marketing, engineering and accounting, work tasks that were highly complex or did not to a high extent require collaboration were better performed remotely.

Battiston et al. (2021) conducted a study in United Kingdom from an organization responsible for emergency calls. The study revealed that teamwork is crucial and productivity higher between colleagues' face to face interactions. Complex and urgent tasks are according to Battiston et al. (2021) more efficiency when collaboration is physical presence in the office since emergency calls requires direct and immediate responses. Employees with more creative tasks can according to Dutcher (2012) enhance employees with an increased productivity. However, for repetitive and dull tasks requiring structure and supervision with collaboration in the physical office, resulted in reduced productivity. The employees became distracted and unproductive according to the study. Another study by Yang et al. (2022) studied how the shift to remote work affected the collaboration among employees in Microsoft. The findings demonstrated an increase among the employees to be more stagnant and isolated. A similar study was conducted by Gibbs et al. (2021) at an Indian technology company where the result showed a slight decrease in productivity, since time spent on meetings and coordination activities increased.

Furthermore, a study by Van der Lippe and Lippenyi (2019), including data from nine European countries, 11,011 employees, 259 establishments and 869 teams, found that there is a relationship between how many employees work remotely and their productivity. Collaboration in teams showed to significantly deteriorate the more people in the team working remotely. Productivity losses was also reported by employees in a Canadian study conducted by Mehdi & Morisette (2021) where they reported lack of interactions with colleagues as the main barrier for productivity.

The previous studies are aligned when it comes to collaboration and point in the direction of decreased productivity for work where a high level of collaboration is needed, and the hypothesis is therefore formulated as:

Hypothesis 6: Employees with jobs that require a high level of collaboration perceive lower productivity while working remotely than employees with jobs that require a low level of collaboration.

2.2.6 Educational background

In the United States, remote work is associated with the highest paid employees. Occupations allowing employees to work remotely are usually found in education, finance, law, tech or managing positions (Dingel & Neiman, 2020). Similar findings are also mentioned by Barrero, Bloom & Davis (2021) and Bloom et al. (2023), an increasing incidence for employees with higher education and income.

Findings by both Golden and Gajendran (2019) and Morikawa (2021) states that workers with higher educational background working with more complex tasks are more likely to adopt and succeed with remote work than workers with lower educational background and less complex tasks. Etheridge et al. (2020) found a similar pattern in the UK, that productivity substantially varies depending on industries and socioeconomic backgrounds. Findings in the study showed no decline in productivity on average, however there was a decline in productivity for low earners and industries that are less suited for remote work. This can also be supported by Bartik et al. (2020) in the US, after a survey of small and larger companies in the US on remote work and its productivity during the covid-19 pandemic. The results of the study show that industries that are more suitable and adapted to remote work, experience less loss in productivity. The

findings by Morikawa (2021) could also see a similar pattern, the productivity of the employees in the study on average was decreasing, however, the workers with higher education were decreasing less. Furthermore, the study by Bartik et al. (2020) indicates that for companies and industries with highly educated workers where remote work is a common phenomenon, no noticeable loss in productivity was prevalent.

For the Swedish population the educational level is high compared to other countries, even when comparing to other OECD (The Organization for Economic Cooperation and Development)-countries (Education GPS OECD, 2023). Looking at statistics, the educational level in Sweden is measured for adults aged 25-64 and spans from primary and lower secondary education to post-graduate education (SCB, 2023).

Table 1. The educational level of the Swedish population 2022.

Field of education (SUN 2020)	Population	Primary and lower secondary education	Upper secondary education less than 3 years	Upper secondary education 3 years	Post-secondary education, less than 3 years	Post-secondary education, 3 years or more	Post-graduate education	No information about level of education
All fields								
Total								
25-34 years	1 447 457	124 585	97 223	461 368	248 921	445 612	6 689	63 059
35-44 years	1 342 361	131 822	120 016	342 131	206 813	471 071	23 893	46 615
45-54 years	1 313 360	122 039	287 646	271 347	195 643	386 453	25 352	24 880
55-64 years	1 253 811	159 457	433 658	181 435	203 873	243 154	19 319	12 915
Total 25-64 years	5 356 989	537 903	938 543	1 256 281	855 250	1 546 290	75 253	147 469

As previous studies found that employees with a higher educational background are more likely to succeed with remote work, the hypothesis forms as:

Hypothesis 7: Workers with higher educational background perceive higher productivity while working remotely than workers with lower educational background.

2.2.7 Implementation and support from management

Performance Management System (PMS) can according to Epstein (2016) be defined as "the process of quantifying and improving the efficiency and effectiveness of an organization". If designed and implemented successfully, PMS can be of great support for organizations to implement strategies as well as increasing performance. Identifying performance

measurements (PMs) or key performance indicators (KPIs) is crucial to measure an organization's success in achieving their set goals.

The shift from office work to remote work comes with several challenges. Management need to find ways to adapt when it comes to moving away from direct supervision and face-to-face meetings to managing their subordinates digitally from a distance (Kurkland & Bailey, 1999; Mishra and Jena, 2020; Chatterjee, Chaudhuri & Vrontis, 2022; Mihalca, Irimias & Brendea, 2021).

The degree of adapting to the new reality of remote work and ensuring an effective implementation of remote working models which emphasize continuous communication, support, collaboration and knowledge transfer, might have a great impact on the success of changing to a remote working environment (Fritz & Manheim, 1998; Kurkland & Bailey, 1999; Lautsch & Kossek, 2011, cited by Epstein, 2016). This is also in line with the findings by Galanti et al. (2021) and Phillips (2020) that there is a relationship between performance and productivity with how well the conditions around remote work are structured and that challenges and productivity losses can be reverted with the right support from the managers.

This leads us to the following hypothesis:

Hypothesis 8: Employees that feel that management has put in effort to facilitate remote working perceive a higher productivity while working remotely.

2.3 Employer/Manager perspective

From the employer and manager perspective, some do see the benefits of allowing employees to have the option of working remotely either partly or full-time. However, some do see the workplace in a traditional sense as before the pandemic (Felstead, 2022). The beneficial perspective with remote work has been due to various factors such as reduced cost, improved employee satisfaction, improved work-life balance and increased productivity (Waters, 2022). Reducing costs has been one strong motivation earlier to increase remote work. For example, the Chinese company Ctrip as discussed previously choose to offer employees the opportunity to work from home partly due to high property prices in China. The company expected that the possible reduced productivity would be offset by saved office costs. To their surprise,

productivity instead increased by 12%, resulting in Ctrip getting almost an extra workday a week out of the employees. The company also gained more satisfied employees since its increased flexibility (Bloom, 2014; Bloom et al., 2015).

The increase in productivity is also stated by Sharit, Hernandez & Nair (2009) and some other benefits highlighted is the increased potential related to recruitment, since the employees can be located in other places than within commuting distance to the office. This is also mentioned by Pokojski, Kister & Lipowski (2022) where employees can save between 28 to 50 days by eliminating commuting. This time could instead be spent on work, family commitments or according to their preferences. In addition, the company also experienced less sick leave and absenteeism since it was possible for the workers to work from home to some extent if the level of sickness is low like a cold or something minor. Remote work could also contribute to higher productivity considering less distractions in the office (Sharit, Hernandez & Nair, 2009).

The main drawbacks with remote work have its foundation with the construction of offices and factories where all employees are physically present in the same workplace under supervision and under allotted hours. The foremost fear from the employers and managers is rooted in these traditional beliefs that employees out of sight will result in decrease in productivity. This can be controversial for the employer since it might result in increased difficulty to monitor and measure the performance of the employees (Felstead, p 9, 55-56, 2022). Another explanation relates to the company culture. An increased level of remote work could lead to negative impacts on the organizational culture and team spirit, a reduced possibility to cooperate and share knowledge, as well as onboarding new team members (Sfard, 1998). These arguments are also mentioned by Baruch (2000), despite the overall advantages, several barriers can be associated with remote work which are often underestimated. The companies' operational and financial benefits are not always justified for remote work and other aspects need to be taken into consideration. The company's culture must develop conditions for remote work, where trust and acceptance exist between employees and managers. In addition to the cultural aspect, results in performance must be valued over attendance (Baruch, 2000).

Since the covid-19 outbreak the attention toward remote work and its benefits have become increasingly significant. However, studying the impact on productivity from the employer's perspective is not widely researched. The current debate from the employer/manager

perspective is how favorable the development has affected the productivity of the employees (Canal et al., 2023; Bloom et al., 2023). We have therefore formulated a hypothesis:

Hypothesis 9: Managers perceive their employees' productivity as decreased while working remotely compared to their productivity in the ordinary workplace.

2.4 Summary of hypotheses

Table 2. Summary of hypotheses.

Hypothesis	**Variable**	**Hypothesis**
1	Perceived productivity employees	On average employees perceive their productivity as increased while working remotely compared to in the office.
2	Desire to work remotely	Employees that have a desire to work remotely are more likely to perceive a higher productivity while working remotely.
3	Age	Younger employees are more likely to perceive higher productivity while working remotely compared to older employees.
4	Family situation	Workers with home-living children perceive their productivity increased to a higher extent while working remotely compared to workers with no home-living children.
5	Gender	Women are more likely to perceive a higher productivity while working remotely than men.
6	Collaboration	Employees with jobs that require a high level of collaboration perceive lower productivity while working remotely than employees with jobs that require a low level of collaboration.
7	Educational background	Workers with higher educational background are more productive working remotely than workers with lower educational background.
8	Support from management	Employees that feel that management has put in effort to facilitate remote working perceive a higher productivity while working remotely.

9	Perceived productivity managers	Managers perceive their employees' productivity as decreased while working remotely compared to their productivity in the ordinary workplace.

3. Method

3.1 Choice of method

Methodological choices are crucial for any research since the impact of the method can have significant implications on the result. The methodological choices should reflect the aim of the research so that the data collection method and analysis is aligned with the purpose (Bryman & Bell, 2015).

The purpose of this study was to investigate to what extent the perceived productivity for Swedish employees is affected while working remotely as well as to find the impact from the identified factors: desire to work remotely, age, family situation, gender, collaboration, educational background, and support from management. The study is mainly quantitative with a deductive approach but also qualitative in terms of understanding the phenomenon of remote work preferences further. The data will be collected through a questionnaire, with the aim to gain knowledge about the perceived productivity of employees and managers, identifying what variables have an impact on perceived productivity, as well as the perceived positive and negative aspects of remote work.

The survey research method is a common choice for quantitative studies (Bryman & Bell, 2015). Since the purpose with this study was to draw conclusions regarding Swedish employees in general rather than a small group in depth, a high number of observations is preferred and therefor the questionnaire a suitable option for data collection. It allowed us to collect data in a standardized way from a large sample of respondents and identify patterns related to their demographics, attitudes, behaviors and experiences. In addition, we were able to gather a wide range of information on topics such as the benefits and challenges of remote work, the impact of remote work and the factors that influence remote workers' perceived productivity.

As found in studies mentioned by Allen, Golden and Shockley (2015) as well as Gajendran & Harrison (2007), self-reports are generally exaggerated and therefore not as accurate compared to other reports of performance. The way to measure employee productivity of individual workers accurately, especially while-collar workers for whom remote work is possible to a higher extent, is however extremely difficult (Morikawa, 2021). With this in mind and knowing that the measurement of productivity is a central matter when researching how its affected by

remote work, we came to the conclusion that the evaluation can not only be based the results on self-assessments from the employees but that an assessment from managers needs to be included as well for a nuanced view from both perspectives. For that reason, the survey was divided into two sections, one in which the employees contributed with their perceived productivity and one in which managers provided their perception of their employees' productivity. This provided the possibility to examine and compare if the assessments from employees were aligned with the managers and provide more credibility to the results.

With the collected data from the employees, we performed a multiple linear regression analysis with the dependent variable employee productivity and the independent variables: desire to work remotely, age, family situation, gender, collaboration, educational background and support from management. This will then be compared with the data collected from the managers.

3.2 Collection of data

The survey was conducted through a web-based questionnaire. The method is simple and cost-effective with minimal maintenance of administration, as the respondents only need a computer and access to the internet to participate (Cooper & Schindler, p 231, 2014). The advantages of web surveys make it a popular method to conduct and work by inviting potential respondents through a website where the questionnaire is located. The method has an advantage over traditional surveys like email and paper, since the collection of data can reach a larger variety of participants (Bryman & Bell, 2015).

To distribute and administrate the results from the survey in an easy and structured way we chose to use Microsoft Forms, a software by Microsoft to make questionnaires. As Microsoft Forms registered all responses digitally automatically it decreased the risk of human errors. Another good feature of Microsoft Forms is that we, depending on the answers from the survey, could direct the respondent to the next relevant question based upon the previous answers, limiting the number of questions the respondent needs to see and answer. To get as many responses as possible we distributed the survey through several channels such as reaching out to persons in our personal and professional network as well as social media, which included LinkedIn as well as relevant Facebook forums.

As the research is studying Swedish employees, a demographic section was included in the survey to ensure that the respondents were employed in Sweden or worked for a Swedish company. As the appropriate sample size to conduct a regression analysis depends on the number of independent variables and a rule of thumb is at least ten observations per independent variable, the minimum for the employee analysis was a minimum of 70 observations (Newbold, Carlson & Thorne, 2023).

3.3 Analysis of empirically collected material

The answers from Microsoft Forms were downloaded to Excel, where it could be adjusted to fit into SPSS where most of the analysis was run. The data collected from the employee responses in the survey was analyzed in multiple ways. The perceived productivity, which is the dependent variable, was collected through an estimation of the employees as well as the managers. This data was used in a multiple linear regression analysis based on Ordinary Least Squares (OLS) together with the independent variables specified below. When running the regression analysis several assumptions of the data are to be considered, which are presented in the following sections.

3.3.1 Multiple linear regression analysis (OLS)

The data from the survey was included in the regression model. This was used to test the chosen hypotheses, in our case about the factors desire to work remotely, age, family situation, gender, collaboration, educational background and support from management, which according to the literature review conducted, can influence the productivity based on the self-assessment of Swedish employees included in the study. The regression analysis of the gathered data gave us opportunities to test the hypotheses as well as indicating how much they are each contributing to the perceived productivity.

The formula for our multiple regression analysis is the following:

$$Productivity = \beta 0 + \beta 1(DesiredRemote) + \beta 2(Age) + \beta 3(FamilySituation) + \beta 4(Gender) + \beta 5(Collaboration) + \beta 6(Education) + \beta 7(SupportManagement) + ei$$

Where:

$\beta 0$ = Expected productivity when all variables are zero, also known as the constant or intercept

$\beta 1$- $\beta 7$ = The regression coefficient of each independent variable

ei = Random error term

3.3.1.1 Dependent variable

The dependent variable for this study is perceived productivity. To measure the employee productivity, we asked the respondents to estimate their average productivity while working remotely compared to working on-site. Since this can differ over time, we set the time frame for the estimate to be based on the past twelve months.

If the respondents answered they have the same productivity while working remotely compared to working in the office, that was translated to 100, e.g., full productivity. A decrease in productivity resulted in a value below 100 where 10% decrease equals 90, 20% decrease equals 80 etc. Same logic was also applied for the increase in productivity, 10% increase equals 110, 20% increase 120 etc.

3.3.1.2 Independent variables

The independent variables that will be used in this study has its foundation in the literature review and the questions included in the surveys to capture the answers are presented below:

Desire to work remotely

The respondents were asked to specify how much they would like to work remotely, from not at all (0) to full time (100), based on several options like “once a week”, “three days a week” etc., which was translated into the corresponding number in percentage of full time.

Age

For the independent variable age, we used the exact age specified by the respondent to be able to have a more precise number contributing to more accurate statistics, for example for the mean value, than using age groups.

Family situation

To analyze the family situation of the respondents, we asked them to specify their current family situation to recognize if they are living with or without children.

Gender

For the independent variable gender there were indications of both increase and decrease in productivity related to the gender, which made us include this as variable to recognize any significant difference between the genders. The options were woman, man, other or prefer not to say.

Collaboration

Another factor that is stated to affect productivity is how much collaboration is needed. A job that requires a low level of collaboration is stated to be easier to conduct independently and better suited for remote job, compared to a job that requires high level collaboration, where remote work might have a negative impact of the collaboration and thereby the productivity. In our survey we therefore included a question regarding what level of collaboration was needed in the current working role of the respondent from a scale 0 (no collaboration needed) to 100 (collaboration needed on all work tasks).

Education

A high educational background is stated to have a positive impact on productivity while working remotely. Therefore, we asked the respondents to specify their educational level based on seven different options on a scale ranging from Compulsory schooling (school year 0-10) to a PhD.

Support from management

Lastly, it was stated that the level of support employees receives from management in terms of effective implementation of remote working models which emphasize continuous communication, support, collaboration and knowledge transfer is key for successful remote working. Hence, a question on the topic was included where the respondent could answer on a five-option scale reaching from 1 (No support) to 5 (Great support).

3.3.1.3 Normality

Having normally distributed observations makes the variance at a minimum. Two commonly used procedures to measure the normality of the observations collected is the Shapiro-Wilk test and Kolmogorov-Smirnov test, where the latter is more frequently used with a larger sample size. In both tests the p-value should be above the cut-off value of 0.05 to be considered

normally distributed. Beside this, it also possible to analyze the skewness and kurtosis of the collected data. As the sample size in this study is relatively big (over 100 samples) the normality is not as important (Pallant, 2016), but the tests will be run to see if the data is normally distributed as a part of the analysis.

3.3.1.4 Multicollinearity

Multicollinearity, when some or all of the independent values in the regression model have a linear relationship, can make statistically significant variables insignificant and difficulties estimating the coefficients accurately (Sheresta, 2020). To check for multicollinearity, we used two indicators, the Variance Inflation Factor, VIF, as well as correlation. The VIF value gives an indication of multicollinearity where a value between 1-5 is considered a low to moderate correlation between the independent variables and a value between 5 and 10 indicates high correlation (ibid.). The matrix indicates the correlation between variables and can span from -1 to 1 where a negative number close to -1 means high negative correlation, 0 means no correlation and 1 means strong positive correlation. The suggested threshold for a correlation to be considered okay is positive or negative 0,7 (Pallant, 2016), but it is preferred to look at multiple indicators with such relatively high correlation.

3.3.1.5 Heteroscedasticity

Another assumption is that the variance of the residuals from the model, error term, is constant and not related to the independent variables. When the variance is not constant it means we have heteroscedasticity. The estimated values are not affected but it does have a risk of making the estimated standard error too large or, most commonly, too small (Sage Research Methods, 2015). To test for heteroscedasticity, we ran the Breusch–Pagan test.

As the risk of heteroscedasticity could not be rejected with the Breusch-Pagan test, we ran the Robust Standard Error to adjust for that.

3.3.2 Positive and negative aspects of remote work

In this study we have not measured or asked the respondents to grade what factors have the largest positive impact on their productivity. However, we included questions regarding the subject to get some more input about the benefits the employees highlighted as contributors to their increased productivity. We both gave them some options from literature; less disturbance,

less time spent on commuting and flexibility of work hours and location, but also allowed the option to write on the subject freely. Similar to the positive impact we asked questions about the negative factors related to remote work productivity. Also here, the respondents were given options supported by literature; hard to focus due to distractions while working remotely, hard to collaborate with colleagues and less directive/support from management, but the respondents could also contribute with their own negative aspects if needed.

3.3.3 Independent sample T-test/Welch T-test

To compare the findings from the employees with the managers we conducted an independent sample T-test looking at the unequal variances not assumed section, also known as the Welch T-test. This test is suitable for sample sizes that are not equally big, like in our case with employees versus managers, or when the data is not normally distributed (Kent State University Libraries, 2023).

3.4 Ethics

All participants have been informed in advance about the purpose of the study and our collection of the data. The survey has been voluntary and completely anonymous, and all collected data has been handled confidentially in a responsible manner. All collected data has only been used for the thesis study and has not been used for any other purpose. We have also considered and evaluated potential conflicts of interests throughout the study. No conflicts of interest have been identified and under the entire study, we have been objective.

The design of the web survey was carefully designed to avoid misleading questions and to contain clear, user-friendly and inclusive questions. One example of an active choice of being inclusive is for the question of gender to include the options “Other” and “Prefer not to say” if the respondent is not comfortable about sharing their gender or don’t define as man or woman.

3.5 Limitations

For all methods there are benefits and drawbacks and a study conducted with the survey research method is no exception. For our particular study we used an undetermined selection of respondents and distributed the survey in various forums. By that we have decreased control regarding which respondents were answering compared to for example interviews where the

respondents are selected based upon certain criteria such as age, gender, educational background etc. To have a representative study we want to ensure a good sample as we otherwise may encounter response bias or other issues that affect the validity of our findings.

Another limitation to have in mind is that some of the questions are up to the respondent to estimate, such as how much they are collaborating, how much they are working remotely and how their perceived productivity is impacted. With subjective estimates there is a greater risk of errors and possibly incorrect outcome than if the measurement would be objective. As stated by Morikawa (2021), it is very hard to measure individual productivity, especially for white-collar workers, but when looking at similar studies like the one by Morikawa (2021) and Galanti et al. (2021) self-assessments of productivity is the chosen type of measurement. We have that as our main source of data, but also chose to not only ask employees about their productivity but also get the perspective of employers and managers to gain a more nuanced perception.

Something to be careful about to ensure high validity in the results is if the respondents might have incitement to respond in a certain way. For example, benefits from being allowed to work remotely can be based on improved quality of life due to remote work flexibility. These findings are mentioned by CNBC, that the employees' work-life balance can be significantly improved when remote work is utilized (Onque, 2022). Furthermore, as mentioned, in the study conducted by Pokojski, Kister & Lipowski (2022), the authors found that employees can save an average between 28 to 50 days of work time in a year by eliminating their daily commute. According to (Haskel, 2021) there is a correlation between increased productivity and the expectations for increased opportunities to work remotely. Another example from Bloom et al. (2015) showed that there was an incentive from the employer to shift to remote work, since the property prices had increased and there were interests in reducing costs. Furthermore, there are incentives by companies and managers to be in favor of remote work such as decreased costs for office spaces and a lower employee turnover, but there can also be resistance. The foundation of the resistance may, according to Felstead (2022), be based on the traditional view that managers want the employees to be visible at all times. The lacking comprehensive understanding of remote work and its limitations in the research field can also point to a fear where managers believe undesirable effects may occur (Waters, 2022; Bartik et al., 2020).

All the potential benefits and drawbacks mentioned above can have a significant impact on the research since employees and managers may respond to favor their own interests. Since a large portion of the questions required an estimation from the respondent, it is a risk that the participants could have chosen to exaggerate their responses in their favor and state that they are working more productively from home, since they think that that might increase the chances that they will be allowed to work remotely. We considered this aspect and believe that the risk would have been higher if the survey was conducted with employees from a particular company where the outcome is to be presented to management. We still have this in mind in our analysis but assess that the risk is lower than compared to one specific company since the respondents are from various companies where their own management is not directly connected to the study.

In summary, we concluded that the questionnaire survey was the most suited data collection method for this research even with potential drawbacks and limitations in mind as this serves the purpose of the study the best. The broad access of respondents through our network and various forums easily accessible on the internet, allowed us to collect a wide and diverse data, which is a prerequisite to be able to identify general patterns related to the Swedish employees.

4. Result

4.1 Survey

The empirical data consists of the responses in the conducted web survey. The survey was open between 2023-04-17 19:50 and 2023-05-04 20:00. In total there were 404 responses. Since the survey should only be answered by respondents that have the possibility to work remotely and be employed in Sweden or by a Swedish company, the total number of replies within the target group was 338. The survey was divided into two parts, one for managers and one for employees. The answers received consist of contributions from 54 managers and 284 employees.

4.2 Employee perspective

4.2.1 Descriptive statistics

Table 3. Descriptive statistics employee perspective.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Productivity	284	20	200	117,78	32,813	,234	,145	,367	,288
DesireRemotely	284	0	100	58,52	28,864	-,236	,145	-1,023	,288
Age	281	18	68	41,02	11,847	,384	,145	-1,053	,290
FamilySituation	284	0	1	,43	,495	,301	,145	-1,923	,288
Gender	284	0	2	,62	,500	-,340	,145	-1,463	,288
Collaboration	283	0	100	50,36	23,731	-,089	,145	-,844	,289
Education	284	1	7	4,21	1,418	-,049	,145	-,929	,288
SupportManagement	284	1	5	3,52	1,041	-,491	,145	-,024	,288
Valid N (listwise)	280								

The table displays the descriptive statistics of the data in the study, including number of observations, minimum value, maximum value, mean, standard deviation, skewness and kurtosis.

4.2.1.1 Productivity

Hypothesis 1: On average employees perceive their productivity as increased while working remotely compared to in the office.

The results indicate that most respondents experience an increase in productivity while working remotely compared to on-site in their regular office. A significant number of respondents experience no difference between remote work and on-site, and a minority experience a decrease in productivity while working remotely compared to on-site.

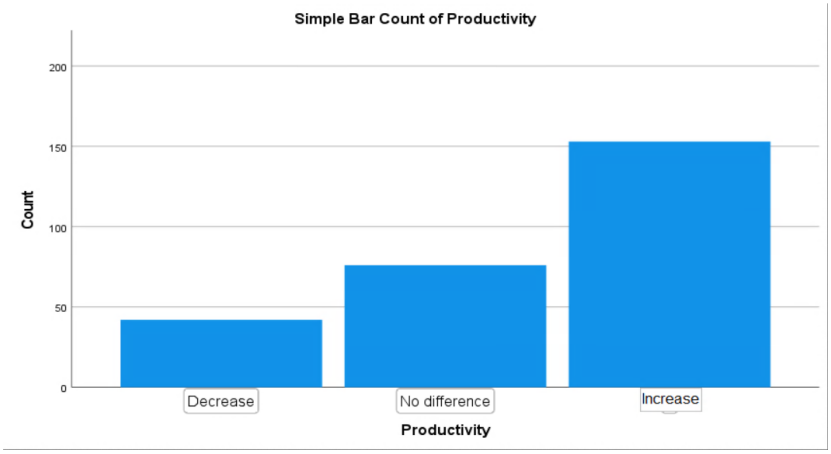

Figure 1. Frequency count of productivity per group.

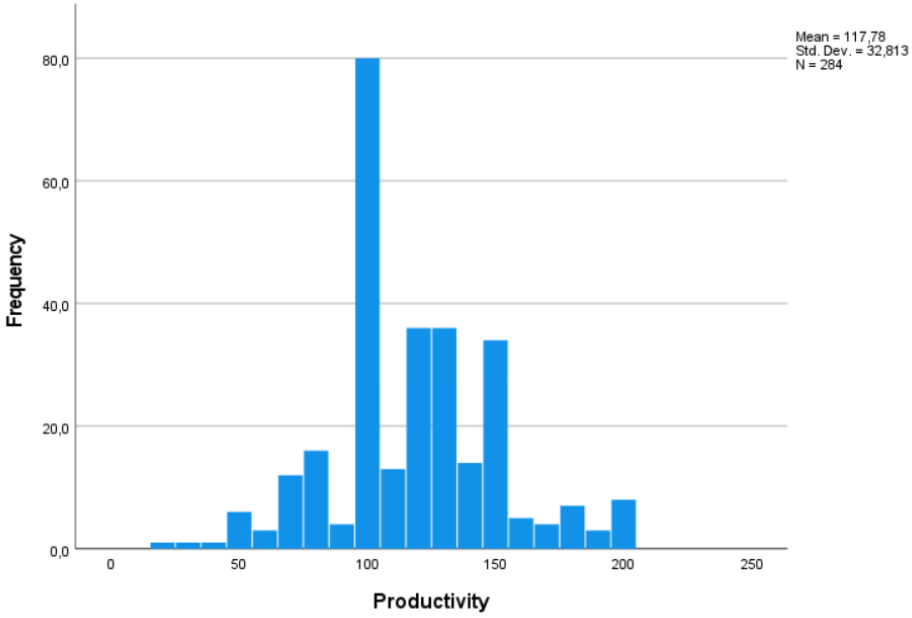

Figure 2. Frequency count of productivity detailed.

A high number of respondents perceive themselves as more productive while working remotely compared to office work, with a mean of close to 118 (as found in the descriptive statistics), it is indicating an average increase of productivity by 18% while working remotely.

By this, we accepted the hypothesis that on average employees perceive their productivity as increased while working remotely compared to in the office.

4.2.2 Multiple linear regression analysis (OLS)

Following in the outcome from the regression analysis conducted in SPSS, which is further assessed and analyzed in the following chapter.

Table 4. Model summary from Multiple linear regression analysis.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,551[a]	,303	,285	27,470

a. Predictors: (Constant), SupportManagement, Education, FamilySituation, DesireRemote, Gender, Collaboration, Age

Table 5. Table showing the coefficients from the multiple linear regression analysis.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	89,104	10,927		8,154	<,001
	DesireRemote	,558	,058	,497	9,659	<,001
	Age	-,288	,144	-,105	-1,995	,047
	FamilySituation	9,774	3,388	,149	2,884	,004
	Gender	5,786	3,324	,089	1,741	,083
	Collaboration	-,047	,071	-,034	-,659	,511
	Education	-1,563	1,171	-,069	-1,335	,183
	SupportManagement	2,415	1,609	,077	1,501	,134

a. Dependent Variable: Productivity

Table 6. Table showing the coefficients adjusted with Robust Standard Errors.

Parameter Estimates with Robust Standard Errors

Dependent Variable: Productivity

Parameter	B	Robust Std. Error[a]	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	89,104	10,708	8,321	<,001	68,023	110,184
DesireRemotely	,558	,059	9,443	<,001	,441	,674
Age	-,288	,143	-2,006	,046	-,570	-,005
FamilySituation	9,774	3,569	2,739	,007	2,747	16,800
Gender	5,786	3,239	1,786	,075	-,592	12,163
Collaboration	-,047	,074	-,630	,529	-,192	,099
Education	-1,563	1,215	-1,286	,199	-3,954	,829
SupportManagement	2,415	1,773	1,362	,174	-1,075	5,906

a. HC3 method

4.2.2.1 Desire to work remotely

Hypothesis 2: Employees that have a desire to work remotely are more likely to perceive a higher productivity while working remotely.

The result indicates that a desire to work remotely corresponds to an unstandardized B-value of ,558 at 1% significance level. By that, we accepted the hypothesis that employees that want to work remotely are more likely to perceive a higher productivity.

4.2.2.2 Age

Hypothesis 3: Younger employees are more likely to perceive higher productivity while working remotely compared to older employees.

The results from the regression analysis suggests that productivity tends to decrease with the coefficient of -,288 with a significance level of 5%. By that we accepted the hypothesis that age influences perceived productivity where younger employees perceive a higher productivity than older employees.

4.2.2.3 Family situation

Hypothesis 4: Workers with home-living children perceive their productivity increased to a higher extent while working remotely compared to workers with no home-living children.

The results indicate a positive increase in productivity for the workers with home-living children on a 5% significance level. By that we accepted the hypothesis that workers with home-living children experience a higher increase in perceived productivity while working remotely compared to workers with no home-living children.

4.2.2.4 Gender

Hypothesis 5: Women are more likely to perceive a higher productivity while working remotely than men.

The results indicate a positive increase in productivity, but the result is not within the 5% significance level. By that we rejected the hypothesis on 5% but accepted it on 10%.

4.2.2.5 Collaboration

Hypothesis 6: Employees with jobs that require a high level of collaboration perceive lower productivity while working remotely than employees with jobs that require a low level of collaboration.

The results indicate a small negative affect on productivity where collaboration is high, but the p-value is 0,511, far over the 0,05 threshold which indicates the result is not significant at 5%, and the hypothesis was therefore rejected.

4.2.2.6 Educational background

Hypothesis 7: Workers with higher educational background perceive higher productivity while working remotely than workers with lower educational background.

The results indicate a loss in productivity for respondents with higher educational background, but it is not significant with a p-value of 0,183, meaning that the hypothesis was rejected.

4.2.2.7 Implementation and support from management

Hypothesis 8: Employees that feel that management has put in effort to facilitate remote working perceive a higher productivity while working remotely.

The result indicates a positive effect on productivity with high support from management, but it is not significant with a p-value of 0,134 and the hypothesis was therefore rejected.

4.2.2.8 Summary of hypotheses and their outcome

Table 7. Table summarizing the hypotheses related to employees tested with outcome.

Hypothesis	**Variable**	**Hypothesis**	**Result**
1	Perceived productivity employees	On average employees perceive their productivity as increased while working remotely compared to in the office.	Accepted
2	Desire to work remotely	Employees that have a desire to work remotely are more likely to perceive a higher productivity while working remotely.	Accepted
3	Age	Younger employees are more likely to perceive higher productivity while working remotely compared to older employees.	Accepted
4	Family situation	Workers with home-living children perceive their productivity increased to a higher extent while working remotely compared to workers with no home-living children.	Accepted
5	Gender	Women are more likely to perceive a higher productivity while working remotely than men.	Rejected on 5%, accepted on 10%
6	Collaboration	Employees with jobs that require a high level of collaboration perceive lower productivity while	Rejected

		working remotely than employees with jobs that require a low level of collaboration.	
7	Educational background	Workers with higher educational background perceive higher productivity while working remotely than workers with lower educational background.	Rejected
8	Support from management	Employees that feel that management has put in effort to facilitate remote working perceive a higher productivity while working remotely.	Rejected

4.2.3 Normality

Table 8. Table covering the Tests of Normality.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized Residual	,032	280	,200*	,994	280	,298
Standardized Residual	,032	280	,200*	,994	280	,298

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Both tests, Kolmogorov-Smirnov as well as Shapiro-Wilk, indicates that the data is normally distributed as the p-value is above 0,05.

4.2.4 Multicollinearity

Table 9. Table showing VIF statistics.

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	DesireRemote	,969	1,032
	Age	,931	1,074
	FamilySituation	,958	1,043
	Gender	,981	1,019
	Collaboration	,958	1,044
	Education	,970	1,031
	SupportManagement	,966	1,035

a. Dependent Variable: Productivity

The VIF is just above 1 for all independent variables, indicating multicollinearity is not an issue for the sample.

Table 10. Table showing the correlation between the variables.

Correlations

		Productivity	DesireRemote	Age	FamilySituation	Gender	Collaboration	Education	SupportManagement
Productivity	Pearson Correlation	1	,507**	-,052	,117*	,123*	-,061	-,065	,105
	Sig. (2-tailed)		<,001	,389	,049	,038	,303	,275	,076
	N	284	284	281	284	284	283	284	284
DesireRemote	Pearson Correlation	,507**	1	,031	-,020	,057	-,123*	-,023	,085
	Sig. (2-tailed)	<,001		,609	,737	,340	,039	,705	,155
	N	284	284	281	284	284	283	284	284
Age	Pearson Correlation	-,052	,031	1	,187**	,004	-,043	-,171**	,055
	Sig. (2-tailed)	,389	,609		,002	,945	,472	,004	,359
	N	281	281	281	281	281	280	281	281
FamilySituation	Pearson Correlation	,117*	-,020	,187**	1	,051	,048	-,013	,027
	Sig. (2-tailed)	,049	,737	,002		,390	,425	,829	,650
	N	284	284	281	284	284	283	284	284
Gender	Pearson Correlation	,123*	,057	,004	,051	1	,074	-,002	,087
	Sig. (2-tailed)	,038	,340	,945	,390		,212	,974	,145
	N	284	284	281	284	284	283	284	284
Collaboration	Pearson Correlation	-,061	-,123*	-,043	,048	,074	1	,007	,124*
	Sig. (2-tailed)	,303	,039	,472	,425	,212		,910	,037
	N	283	283	280	283	283	283	283	283
Education	Pearson Correlation	-,065	-,023	-,171**	-,013	-,002	,007	1	-,003
	Sig. (2-tailed)	,275	,705	,004	,829	,974	,910		,959
	N	284	284	281	284	284	283	284	284
SupportManagement	Pearson Correlation	,105	,085	,055	,027	,087	,124*	-,003	1
	Sig. (2-tailed)	,076	,155	,359	,650	,145	,037	,959	
	N	284	284	281	284	284	283	284	284

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The correlation matrix shows that all correlations between independent variables are low or insignificant and far below the suggested threshold of 0,7 (Pallant, 2016), which also indicates that there are no issues with multicollinearity.

4.2.5 Heteroscedasticity

Table 11. Table showing Breusch-Pagan test for heteroscedasticity.

Breusch-Pagan Test for Heteroskedasticity[a,b,c]

Chi-Square	df	Sig.
16,359	1	<,001

a. Dependent variable: Productivity

b. Tests the null hypothesis that the variance of the errors does not depend on the values of the independent variables.

c. Predicted values from design: Intercept + DesireRemotely + Age + FamilySituation + Gender + Collaboration + Education + SupportManagement

The Breusch-Pagen test conducted in SPSS provided a p-value of less than the cut off value of 0,05. This suggests we could not reject the null hypothesis, which indicates there is a risk for heteroscedasticity issues in the data sample. To adjust for this the Robust Standard Errors was utilized adjusting for the heteroscedasticity (see table 6).

4.2.6 Positive impact from remote work

Table 12. *Table of the positive aspects of remote work from the employee perspective.*

Reason	Replies	Number of responses	Percentage
Less disturbance while working remotely	216	284	76%
Flexibility regarding working hours and place of working	188	284	66%
Less time spent on commuting to the office	214	284	75%
Other	35	284	12%

Other: The most mentioned positive aspects in the other section were no time, cost, or environmental affect due to less commuting, easier to take short breaks and better work life balance. Beside that the respondents also mentioned: Improved health, better stress management, better sleep, no pressure to dress in a certain way, more time with the kids, more time for recharging, own working space at home, more commitment to show results due to the lack of supervision, easier to work out during lunch or when suitable.

In appendix 1 the independent variables that were found to have an impact on productivity are accounted for under each positive impact.

4.2.7 Negative impact from remote work

Table 13. *Table of the positive aspects of remote work from the employee perspective.*

Reason	Replies	Number of responses	Percentage
Hard to collaborate with colleagues remotely	109	284	38%
Hard to focus due to distractions while working remotely	67	284	24%
Less directions/support and supervision from management	52	284	18%
Other	78	284	27%

Other: The most mentioned negative aspects in the other-section were no negative impact, less information sharing due to less spontaneous meetings with colleagues, less socializing and that some meetings require physical presence. Beside that the respondents also mentioned: longer working hours, harder to integrate new colleagues, harder to get technical help if needed, not as good work station at home, lack of access to documents that only exist in physical form, hard to keep the discipline to work the set hours and not mixture the time due to my schedule, harder to feel connected to the company when not meeting people face to face, need to remember to move enough, harder to separate work and private life.

In appendix 1 the independent variables that were found to have an impact on productivity are accounted for under each negative impact.

4.3 Manager perspective

4.3.1 Descriptive statistics

Table 14. Descriptive statistics manager perspective.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Productivity	54	50	200	108,89	26,038	1,039	,325	2,700	,639
Age	54	26	67	45,35	10,651	,132	,325	-,788	,639
Gender	54	0	1	,61	,492	-,469	,325	-1,850	,639
Education	54	2	7	4,37	1,418	,006	,325	-,733	,639
Valid N (listwise)	54								

The table displays the descriptive statistics of the data in the study, including number of observations, minimum value, maximum value, mean, standard deviation, skewness and kurtosis.

4.3.2 Productivity

As stated in the literature review, employee self-assessments can sometimes be exaggerated, whereas we choose to include the perspective of managers as well to see if their perception of productivity varies to a great extent compared to the perception of employees.

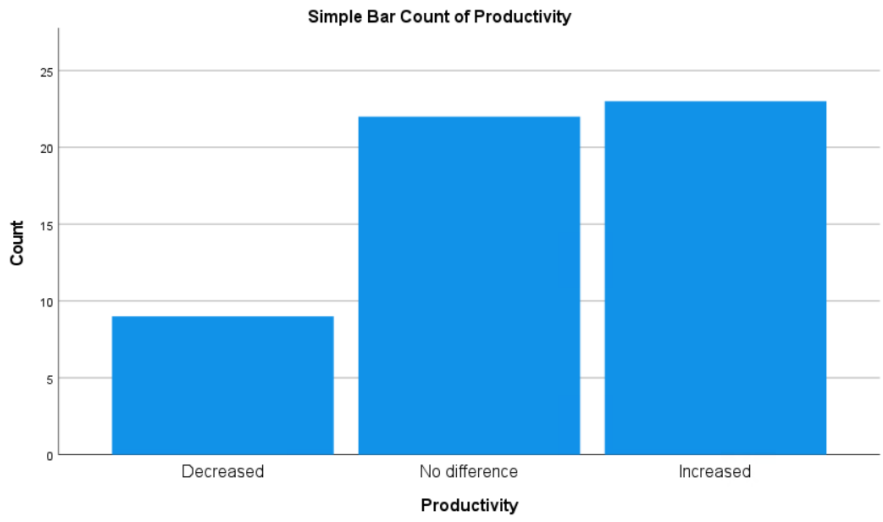

Figure 3. Frequency count of productivity per group.

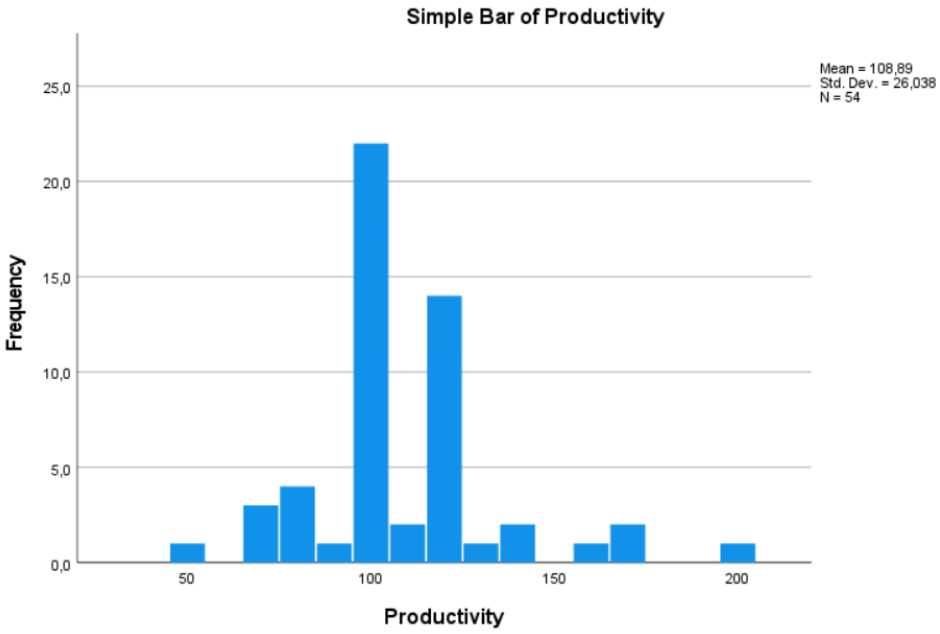

Figure 4. Frequency count of productivity detailed.

A high number of respondents perceive their employees as more productive while working remotely compared to office work, with a mean of close to 109 (as found in the descriptive statistics), it is indicating an average increase of productivity by 9% while working remotely.

4.3.3 Independent sample T-test/Welch T-test

Table 15. Independent sample T-test/Welch T-test.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p			Lower	Upper
Productivity	Equal variances assumed	5,635	,018	1,881	336	,030	,061	8,893	4,727	-,405	18,191
	Equal variances not assumed			2,200	88,331	,015	,030	8,893	4,043	,858	16,927

Since the large difference in sample size while comparing the employee data with the manager data, we look at the values under “Equal variances not assumed”, also known as the Welch T-test. We can see that the p-value is below 0.05 indicating there is a statistically significant difference between the groups.

4.3.4 Summary manager perspective

Hypothesis 9: Managers perceive their employees' productivity as decreased compared to their productivity in the ordinary workplace.

Both the Welch T-test, the statistics and the histograms indicate that the sample collected from the employees versus the managers are different. The result is however in both cases indicating an increase in productivity, but the one found among managers has a lower mean than the one found among employees. We therefore reject the hypothesis that managers perceive their employees' productivity as decreasing compared to their productivity in the ordinary workplace.

4.3.5 Positive impact from remote work

Table 16. *Table of the positive aspects of remote work from the manager perspective.*

Reason	**Replies**	**Number of responses**	**Percentage**
Less disturbance while working remotely	30	54	56%
Flexibility regarding working hours and place of working	35	54	65%
Less time spent on commuting to the office	31	54	57%
Other	7	54	13%

Other: Positive aspects beside the ones above are that it is possibility to hire from a global talent pool, better work-life balance and reduced stress.

As the sample size for managers is only 54 observations, we have chosen not to look at differences in age/gender/educational background etc. as calculating means is not accurate if the sample size per variable is insufficient.

4.3.6 Negative impact from remote work

Table 17. Table of the positive aspects of remote work from the employee perspective.

Reason	Replies	Number of responses	Percentage
Hard to collaborate with colleagues remotely	30	54	56%
Hard to focus due to distractions while working remotely	13	54	24%
Less directions/support and supervision from management	16	54	30%
Other	6	54	11%

Other: The most mentioned negative aspect is that it is harder to form effective relationships remotely as well as lack of social interaction and contribution.

5. Analysis

5.1 Regression analysis

The model summary provides valuable information when assessing how well the regression model is measuring the intended. The R Square, which is a value from 0-1 is an indicator of how much of the dependent value is explained by the independent variables. With this regression model we have a R Square of 0,303 which means that 30,3% of perceived productivity from employees is explained by their desire to work remotely, their age, their family situation, their gender, the amount of collaboration their work requires, their educational level and how well they are supported by management. Having a high R Square value is something to strive for as it means that the used independent variables are explaining a large portion of the dependent variable, but how high this number is and can be is depending on the study and how much is known about the subject as that helps identifying independent variables to include in the study, which can naturally contribute to a higher R Square value. As a comparison, other similar studies where productivity of employees was measured through self-assessments, like the study of Italian workers by Galanti et al. (2021) the R Square value was 0,36 and of Japanese workers by Morikawa (2021) the R Square value was 0,204. This suggests that the R Square value of 0,304 in this study is on a reasonable level.

The coefficients provide the numbers to put into the regression model to predict the productivity, with the independent variables. As the variables that are insignificant is not stated to contribute to the productivity within the required significance level, these are removed from the final formula:

$$Productivity = 89{,}104 + 0{,}558(DesiredRemote) + -0{,}288(Age) + 9{,}774(FamilySituation) + ei$$

5.2 Desire to work remotely

The result from the regression analysis indicates that a desire to work remotely corresponds to a value of ,558 at 1% significance level. By that, we did accept the hypothesis that employees that want to work remotely are more likely to perceive a higher productivity. This is in line with what Bloom et al., (2015) found in their study of the Chinese company Crip. Our findings can further be explained by Zhang, Yu & Marin, (2021), the employees who desire to work remotely are those who benefit from remote work. These employees are driven by their

personal preferences and can benefit from the advantages that remote work has to offer. For those who didn't desire to work remotely according to Bloom et al., (2015) was voluntarily returning to the office. Enforcing remote work on employees can, however, result in confounding boundaries between leisure and work and have the opposite effect on productivity (Palumbo, 2020). Our findings are according to previous studies not surprising that Swedish employees who desire to work remotely perceive themselves as more productive.

What is interesting, and what can be seen with descriptive statistics below is that almost half of all the respondents would like to work remotely an average of two to three days a week and only 2,8% of all the respondents would like to work full time in the office, i.e., 97,2% want to work at least some part of their working time remotely. Also, only 9,9% want to work fully remote, i.e., 88,3% want a hybrid solution. This is in line with the findings by Bloom (2020) and Mehdi & Morisette (2021) that more than half of the responding employees prefer a hybrid solution rather than fully remote or fully on-site. Golden & Veiga (2005) and Virick et al. (2010) also found that there is a higher level of job satisfaction for those working remotely a "moderate" amount of time, compared to both a smaller and higher number of hours remotely.

Table 18. Frequency table showing the employees' desire to work remotely.

DesireRemotely

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	8	2,8	2,8	2,8
	10	17	6,0	6,0	8,8
	20	25	8,8	8,8	17,6
	40	63	22,2	22,2	39,8
	60	64	22,5	22,5	62,3
	80	32	11,3	11,3	73,6
	90	47	16,5	16,5	90,1
	100	28	9,9	9,9	100,0
	Total	284	100,0	100,0	

If we compare this with the preference of the managers we see some similarities, for example that the employees are working remotely two to three days a week is the most desired time also from the managers' perspectives. Further, that a very small percentage of 1,9 % want their employees to work in the office full time and 22% does not have a preference of where the employees are working. As stated previously, one of the major fears from management is that employees that are out of sight will have decreased productivity (Felstead, 2021). However,

our result indicates that this does not seem to be the case for our Swedish sample as managers are indifferent of their employees' location and even encourage them to work some of their time remotely.

Table 19. Frequency table showing the managers' desire for their employees to work remotely.

DesireRemotely

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	1,9	1,9	1,9
	20	5	9,3	9,3	11,1
	40	12	22,2	22,2	33,3
	60	13	24,1	24,1	57,4
	80	2	3,7	3,7	61,1
	90	2	3,7	3,7	64,8
	100	7	13,0	13,0	77,8
	No preference	12	22,2	22,2	100,0
	Total	54	100,0	100,0	

5.3 Age

The results from the regression analysis suggest that productivity tends to decrease with the coefficient of -,288 with a significance level of 5%. By that we can accept the hypothesis that younger employees are more likely to perceive higher productivity compared to older employees.

One thing that stands out when looking at the positive and negative aspects related to age is that younger people seem to appreciate the flexibility regarding working hours and place of working more, compared to older workers. 75-76% of the workers between 18-39 highlighted this as a positive aspect and 51-60% for the workers 40+ years of age. This is in line with the article by Ray (2022) that especially younger workers more or less demand the possibilities to work remotely due to its many benefits. Raišienė et al. (2020) also mention that younger and middle-aged employees prefer remote work and could also see that the older generation was less satisfied with remote work. This finding could further also be explained by Drucker and Khattak (2000), since older employees have lower confidence and find it harder to adapt to new communications technologies.

Another positive aspect that was more appreciated by the younger workers was less time spent on commuting to the office. 75-85% of the 18-49 years old highlighted this as a benefit, compared to 60-63% of the older workers. These findings could be explained that younger employees have established social environments and tend to include the commuting time in their calculation to fit the overall quality of life and individual preferences (Bloom, 2014; Bloom et al., 2023; Raišienė et al., 2020; Ray, 2022).

There are no significant differences related to collaboration, but 38% of the youngest workers, 18-29 years old, experience that it is hard to focus while working remotely because of distractions. A bit less at 26-29% of the 30-49 years old and 8-15% of the oldest workers. According to Raišienė et al. (2022) younger people in Lithuania are more likely to develop counterproductive habits resulting in distractions and stressful habits, and difficulties in separating leisure and work. This could explain why our findings in the category 18-29 years old mention hard to focus due to distractions.

Further, there is also a significant difference regarding the negative aspect of less supervision. More than 20% of the two youngest age groups 18-39 brought this up as a negative aspect, compared to the elderly where the number decreased with age to just 5% for the workers 60+. This could be explained as younger employees also value face-to-face interaction since remote work could result in barriers in the carrier development (Wilson, 2021). Less supervision for elderly workers was also found in the study of Russian employees by Toscano et al. (2022). This is intuitively a natural phenomenon, since with age come both experience and seniority and the need for supervision would be expected to decrease.

5.4 Family situation

The results indicate a positive increase in productivity for the workers with home-living children on a 5% significance level. By that we did accept the hypothesis that workers with home-living children experience an increase in productivity compared to workers with no home-living children. The area of family situation is an interesting topic as this might have a big impact from cultural differences, but for our sample of Swedish workers, we could accept the hypothesis.

Studies made in Turkey as well as Poland, Australia and the US indicated the opposite. The beneficial aspects with remote work in flexibility, saved time in commuting and better balance between work and leisure were instead transferred to an increased burden for the women on children and housework (Powell & Craig, 2015; Çoban, 2021; Dunatchik et al., 2021; Kurowska, 2020).

Sweden is however characterized by high gender equality, one of the highest in Europe and also in the world according to World Economic Forum (2022). Our findings are in line with the study by Kurowska (2020) that the increased burden for children and housework arising with remote work was found to be distributed between the two parents in Sweden compared to the more traditional and unequal burden in the other mentioned countries, such as Poland, where the main part was added on to the mothers. Also, the findings by Sullivan & Lewis (2001) and Sullivan & Smithson (2007), points in the same direction, that the effectiveness with remote work depends on cultural and social factors and a household with traditional gender roles have according to previous studies suggested that no significant differences and improvements were made.

5.5 Gender

For the independent variable gender there were indications of both increase and decrease in productivity related to the gender, but a majority in the direction of productivity increase for women compared to men. The results indicate a positive increase in productivity, but the result is not within the 5% significance level. However, it’s significant on the 10% level indicating an that women perceive their productivity as higher while working remotely compared to men.

Our findings that women perceive themselves as slightly more productive than men can be in line with previous studies and surveys. Women tend to value remote work more than men, 63% of the women compared to 49% of the men of the respondents according to Alon et al. (2020). Similar pattern was found by Pelta (2021) and Katie (2021), 68% of the women prefer remote work and also pointed out this as one of the crucial factors when applying for new jobs.

On the questions regarding what positive and negative aspects there are with remote work there are some questions that differences between men and women and some where the responses are similar. For example, on the positive note that women to a higher extent experience less

disturbance while working remotely compared to men, 80% versus 69%. This finding was surprising since all previous studies on gender and remote work are pointing to the opposite direction, since arising challenges for women are resulting in higher disturbance (Kurowska, 2020; Çoban, 2021; Dunatchik et al., 2021; Powell & Craig, 2015; Ramos & Garcia-De-Diego, 2022; Raišienė et al., 2022; Laß & Wooden, 2023)

However, on the questions regarding flexibility, regarding working hours and place of working and less time spent on commuting to the office the answers are rather similar, 65% for men and 66% for women and 74% and 76%. For the negative aspects men and women answered similar regarding the question about collaboration as well as support from manager and slightly different related to disturbance while working remotely. 28% of men experience that it is hard to focus due to distractions while working remotely compared to 20% of women.

5.6 Collaboration

A job which requires a low level of collaboration should be easier to conduct independently, compared to high level collaboration, where remote work might have a disadvantage. The results indicate a small negative affect on productivity where collaboration is high, in line with the previous literature (Gibbs, et al., 2021; Battiston et al., 2021; Van der Lippe and Lippenyi, 2019; Yang et al., 2022; Dutcher, 2012). A high level of collaboration can have a negative impact on productivity, but the result is not significant at 5% level, and the hypothesis was rejected.

In our study 38% of all respondents believe that there is a negative impact on the collaboration with colleagues while working remotely. Similar findings are mentioned by Mehdi & Morisette (2021) where 22% reported a negative impact on collaboration and less interaction with colleagues. These 38% are evenly spread between the genders and age groups. A possible explanation for this could be that the respondents in our study to a large extent have experience of remote working even before the covid-19 pandemic. 33,5% of the 284 respondents that work at least once a day remotely today stated that they worked remote at least once a day before the covid-19 pandemic, which indicates that the workers are experienced with remote work and might have a well-established way to work and collaborate in a good way. This is the line with

the findings from Galanti et al. (2021), that workers with experience of working remotely are more productive compared to workers with no experience of remote work.

5.7 Educational background

The results indicate a loss in productivity for respondents with higher educational background, but not significant on 5% level, meaning the hypothesis was rejected. Our findings are in line with (Dingel & Neiman, 2020; Barrero, Bloom & Davis, 2021; Bloom et al., 2023), where we could see a connection between higher education and remote work. In our sample only 15.2% of the respondents have not attended universities, which makes the sample a bit unrepresentative compared to the whole Swedish population as it is 52,4% for adults aged 25-64 (SCB, 2023). However, since the result indicates a loss in productivity, our findings are in opposite to previous studies by Etheridge et al. (2020), where highly educated workers are more productive than workers with lower education.

One main reason why the sample looks this way is that most white-collar jobs are often done by highly educated staff. The study focuses on the population that would be able to work remotely, whereas the respondents that stated they could not work remotely were excluded. So, if the sample would have been more evenly distributed including more people with lower educational background it might have been possible to see a difference in productivity but in this sample where the most have a high educational background the result is insignificant.

Table 20. Table showing the educational background of the employee responses.

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Compulsory schooling	3	1,1	1,1	1,1
	Gymnasium	37	13,0	13,0	14,1
	University up to two years	44	15,5	15,5	29,6
	Bachelors degree	96	33,8	33,8	63,4
	One year Masters degree	26	9,2	9,2	72,5
	Masters degree	73	25,7	25,7	98,2
	PhD	5	1,8	1,8	100,0
	Total	284	100,0	100,0	

5.8 Implementation and support from management

Lastly, it was stated that the level of support employees receives from management in terms of effective implementation of remote working models which emphasize continuous communication, support, collaboration and knowledge transfer is key for successful remote working.

The result indicates a positive effect on productivity with high support from management, but it is not significant on 5% level and the hypothesis was therefore rejected. Reasons why it cannot be accepted on 5% level could be explained that the respondents in this study are highly educated and therefore do not need the same level of support from management compared to a more versatile group of respondents. Further, as discussed related to collaboration, approximately one third of respondents have prior experience of remote work, which could be another reason why support from management is not needed as much as it would for unexperienced remote workers.

5.9 Managerial view of employee productivity

The result from the managers' view of productivity is indicating an increase in productivity and we therefore rejected the hypothesis that managers perceive their employees' productivity as decreased compared to their productivity in the ordinary workplace. Our finding was surprising and interesting since the debate in the US point to the opposite direction (Canal et al., 2023; Bloom et al., 2023), and the study conducted by Boston Consulting Group (BSG) published by Dagens Industri, where Swedish companies has been the worst performing companies since remote work was widely implemented.

One of the main risks seen by management from previous studies is that employees that are out of sight will be harder to monitor and might therefore decrease their productivity (Felstead, 2022). Our results indicate that 30% of our Swedish managers thinks that less directions/support and supervision is a negative aspect of remote work, but more than two thirds do not see this as an issue and overall, the results indicate a positive impact on productivity.

In the other section where the managers could express any thoughts that was not covered by the questionnaire, some of the managers confirmed previous theory. Both that there is a risk that the organizational culture and team spirit is negatively impacted (Sfard, 1998; Baruch, 2000) but also that remote work opens possibilities to find talents in other places than only locally, as stated by Ray (2022).

The main negative aspect mentioned by the managers is that it might be harder to collaborate well within the team. 56% of the managers highlight this as a negative impact, compared to 38% of the employees. This can be an issue that has to be addressed and worked on by management. However, as found by Galanti et al. (2021) and already stated, workers with experience from working remotely are more productive and learn how to collaborate even remotely with time.

6. Conclusion

In this study, we have looked at perceived employee productivity in relation to remote work. We can conclude that the majority of both employees and managers perceive that productivity has remained indifferent or increased with remote work, on average 18% increased according to the employees and 9% according to the managers.

Further, we concluded that the factors desire to work remotely, age and family situation have an impact on productivity. However, we were not able confirm on a 5% significance level that gender, collaboration, educational background and support from management, have an impact on productivity.

The main highlighted positive aspects by the employees were less disturbance while working remotely and less time spent commuting to the office. The main highlighted negative aspect by the employees was that it is hard to collaborate with colleagues remotely.

In addition, most of the respondents, both employees and managers seem to desire a hybrid working situation to get the best from both worlds. The social exchange that happens in the office and the possibility to collaborate face to face on tasks that require such, combined with the flexibility, better work-life balance, less stress and time savings related to remote working.

One interesting aspect that had an impact on our findings is the cultural differences and how the outcome of the studies can differ depending on the cultural aspects of the respondents. For example, that previous studies indicated that women with children would experience an increase in housework and taking care of children when working remotely, but our study indicates the opposite due to the gender equality in the Swedish culture.

With this study we have contributed with knowledge about how perceived productivity is affected while working remotely in the Swedish market. We have further found what factors are impacting productivity and highlighted the benefits and drawbacks of remote work.

The main limitation of this study is that the measurement of productivity is built on self-assessment from employees and managers. It is a common practice while conducting this type of research, but a subjective type of measurement is a limitation compared to an objective.

Future research that would be of interest would be to assess managers to a greater extent as this part of the study was rather limited. Furthermore, it would be interesting to look at an even larger sample with more observations that reflects the Swedish population, since this study mostly captured the perspectives of experienced and well-educated remote workers. In addition to that, observations of the various industries would also be of interest as the perceived productivity may differ between industries and that was not covered in this study.

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Appendix

Appendix 1. Positive and negative aspects with calculated percentage

Less disturbance while working remotely
Total number of replies: 216 out of 286 = 76%

Desire to work remotely:
Low desire (Not at all to once a week): 23 out of 50 = 46%
Moderate desire (Two to three days a week): 103 out of 127 = 81,1%
High desire (Four days a week to always remotely): 90 out of 107 = 84,1%

Age:
18-29: 35 out of 53 = 66%
30-39: 78 out of 94 = 83%
40-49: 37 out of 51 = 73%
50-59: 49 out of 63 = 78%
60-68: 14 out of 20 = 70%

Family situation:
No home-living children: 123 out of 163 = 75%
Home-living children: 93 out of 121 = 77%

Gender:
Men: 75 out of 109 = 69%
Women: 139 out of 173 = 80%
Other: 2 out of 2 = 100%

Flexibility regarding working hours and place of working
Total number of replies: 188 out of 284 = 66%

Desire to work remotely:
Low desire (Not at all to once a week): 26 out of 50 = 52%
Moderate desire (Two to three days a week): 78 out of 127 = 61%
High desire (Four days a week to always remotely): 84 out of 107 = 79%

Age:
18-29: 40 out of 53 = 75%
30-39: 71 out of 94 = 76%
40-49: 26 out of 51 = 51%
50-59: 38 out of 63 = 60%
60-68: 12 out of 20 = 60%

Family situation:
No home-living children: 112 out of 163 = 69%
Home-living children: 76 out of 121 = 63%

Gender:
Men: 71 out of 109 = 65%
Women: 115 out of 173 = 66%
Other: 2 out of 2 = 100%

Less time spent on commuting to the office
Total number of replies: 214 out of 284 = 75%

Desire to work remotely:
Low desire (Not at all to once a week): 32 out of 50 = 64%
Moderate desire (Two to three days a week): 95 out of 127 = 75%
High desire (Four days a week to always remotely): 87 out of 107 = 81%

Age:
18-29: 40 out of 53 = 75%
30-39: 80 out of 94 = 85%
40-49: 42 out of 51 = 82%
50-59: 40 out of 63 = 63%
60-68: 12 out of 20 = 60%

Family situation:
No home-living children: 121 out of 163 = 74%
Home-living children: 93 out of 121 = 77%

Gender:
Men: 81 out of 109 = 74%
Women: 131 out of 173 = 76%
Other: 2 out of 2 = 100%

Hard to collaborate with colleagues remotely
Total number of replies: 109 out of 284 = 38%

Desire to work remotely:
Low desire (Not at all to once a week): 32 out of 50 = 64%
Moderate desire (Two to three days a week): 49 out of 127 = 39%
High desire (Four days a week to always remotely): 28 out of 107 = 26%

Age:
18-29: 20 out of 53 = 38%
30-39: 37 out of 94 = 39%
40-49: 19 out of 51 = 37%

50-59: 26 out of 63 = 41%
60-68: 7 out of 20 = 35%

Family situation:
No home-living children: 65 out of 163 = 40%
Home-living children: 44 out of 121 = 36%

Gender:
Men: 44 out of 109 = 40%
Women: 65 out of 173 = 38%
Other: 0 out of 2 = 0%

Hard to focus due to distractions while working remotely
Total number of replies: 67 out of 284 = 24%

Desire to work remotely:
Low desire (Not at all to once a week): 26 out of 50 = 52%
Moderate desire (Two to three days a week): 27 out of 127 = 21%
High desire (Four days a week to always remotely): 14 out of 107 = 13%

Age:
18-29: 20 out of 53 = 38%
30-39: 24 out of 94 = 26%
40-49: 15 out of 51 = 29%
50-59: 5 out of 63 = 8%
60-68: 3 out of 20 = 15%

Family situation:
No home-living children: 43 out of 163 = 26%
Home-living children: 24 out of 121 = 20%

Gender:
Men: 31 out of 109 = 28%
Women: 35 out of 173 = 20%
Other: 0 out of 2 = 0%
Less directions/support and supervision from management
Total number of replies: 52 out of 284 = 18%

Desire to work remotely:
Low desire (Not at all to once a week): 26 out of 50 = 52%
Moderate desire (Two to three days a week): 27 out of 127 = 21%
High desire (Four days a week to always remotely): 14 out of 107 = 13%

Age:
18-29: 11 out of 53 = 21%

30-39: 24 out of 94 = 26%
40-49: 6 out of 51 = 12%
50-59: 7 out of 63 = 11%
60-68: 1 out of 20 = 5%

Family situation:
No home-living children: 32 out of 163 = 20%
Home-living children: 20 out of 121 = 17%

Gender:
Men: 21 out of 109 = 19%
Women: 31 out of 173 = 18%
Other: 1 out of 2 = 50%

Appendix 2. Questionnaire

To what extent is remote work affecting productivity?

This questionnaire is a part of a master thesis in which the authors are studying the topic *remote work productivity*.

The aim of the study is to examine how a remote working environment affect the employee productivity. Remote work does not have one definition only. In this study it is defined as "A form of work organization in which the work is partially or completely done outside the conventional company workplace with the aid of information and telecommunication services".

The survey is voluntary and completely anonymous. All collected data will be handled in a responsible manner and only for this study.

Thank you for your participation!

* Required

Remote working possibilities

For this question, disregard if you are working remotely or not and only consider if it would be physically possible for you to work remotely.

1. Is it physically possible for you to work remotely?

- ◯ Yes
- ◯ No

Company location

For this research the aim is to study the Swedish labor market meaning the respondents needs to be either working for a Swedish company or be based in Sweden.

2. Are you employed in Sweden or by a Swedish employer?

- ◯ Yes
- ◯ No

About you

In this section we want to get to know you a bit better.

3. Age *

The value must be a number

4. Gender *

- ◯ Woman
- ◯ Man
- ◯ Other
- ◯ Prefer not to say

5. What is your highest level of accomplished education? *

- ◯ Compulsory schooling (Grundskola) (study year 0-9)
- ◯ Upper secondary school (Gymnasium) (study year 10-12)
- ◯ Studies in College/University (Högskola/Universitet) up to two years
- ◯ Bachelor's degree (Kandidat)
- ◯ One year Master's degree (Magister)
- ◯ Master's degree (Master)
- ◯ PhD (Doktor)

6. How many years of working experience (relevant to your current role) do you have? *

The value must be a number

7. In which industry/branch does the company where you are employed operate in?

- ◯ Finance/Business/Banking
- ◯ Law
- ◯ Government
- ◯ Military
- ◯ Sales
- ◯ Retail
- ◯ Purchasing
- ◯ Restaurant/Hospitality/Tourism
- ◯ Manufacturing/Industry
- ◯ IT/Technology
- ◯ Office work/Administration/HR/Customer service
- ◯ Warehouse/Logistics
- ◯ Marketing/Information/Media
- ◯ Pedagogy/Education
- ◯ Health care
- ◯ Other

8. In which department do you work?

- 1. Finance/Business/Banking
- 2. Law
- 3. Government
- 4. Military
- 5. Sales
- 6. Retail
- 7. Purchasing
- 8. Restaurant/Hospitality/Tourism
- 9. Manufacturing/Industry
- 10. IT/Technology
- 11. Office work/Administration/HR/Customer service
- 12. Warehouse/Logistics
- 13. Marketing/Information/Media
- 14. Pedagogy/Education
- 15. Health care
- 16. Other

9. If you answered other in the previous question, please specify the department.

10. Are your currently employed as a manager with responsibility over other employees?

- ◯ Yes, I am a manager with responsibility over employees
- ◯ No, I am not a manager with responsibility over employees

About you as a manager

When answering these questions, please consider the average situation based on the past 12 months.

11. How many employees are reporting to you as manager?

The value must be a number

12. How many years of work experience do you have in your current role?

The value must be a number

13. To what extent are your employees working remotely an average month? Please choose the option closest to the average time.

- ◯ Always remotely (100%)
- ◯ Most days (90%)
- ◯ Four days a week (80%)
- ◯ Three days a week (60%)
- ◯ Two days a week (40%)
- ◯ One day a week (20%)
- ◯ Once every two weeks (10%)
- ◯ Always in the office (0%)

14. To what extent would you like your employees to work remotely an average month? Please choose the option closest to the average time.

- ◯ Always remotely (100%)
- ◯ Most days (90%)
- ◯ Four days a week (80%)
- ◯ Three days a week (60%)
- ◯ Two days a week (40%)
- ◯ One day a week (20%)
- ◯ Once every two weeks (10%)
- ◯ Always in the office (0%)
- ◯ No preference, the employees can decide

15. To what extent were you or management forcing or strongly encouraging your employees to work remotely during the covid-19 pandemic? Please choose the option closest to the average time.

- ◯ Always remotely (100%)
- ◯ Most days (90%)
- ◯ Four days a week (80%)
- ◯ Three days a week (60%)
- ◯ Two days a week (40%)
- ◯ One day a week (20%)
- ◯ Once every two weeks (10%)
- ◯ Always in the office (0%)

16. To what extent were you or management forcing or strongly encouraging your employees to work remotely before the covid-19 pandemic? Please choose the option closest to the average time.

- ◯ Always remotely (100%)
- ◯ Most days (90%)
- ◯ Four days a week (80%)
- ◯ Three days a week (60%)
- ◯ Two days a week (40%)
- ◯ One day a week (20%)
- ◯ Once every two weeks (10%)
- ◯ Always in the office (0%)

Flexibility

When answering these questions, please consider the average situation based on the past 12 months.

17. How much impact do your employees have to choose their own working hours? Please rate the answer 1-5 where 1 means no influence and 5 means great influence.

- ◯ 1 (The working hours are decided set by management, no influence from the employees)
- ◯ 2 (The employees have limited influence over their working hours)
- ◯ 3 (The employees have moderate influence over the working hours)
- ◯ 4 (The employees can to a great extent decide the working hours)
- ◯ 5 (The employees can decide the working hours more or less independently)

18. How much impact do your employees have to choose their place of working (physically)? Please rate the answer 1-5 where 1 means no influence and 5 means great influence.

- ◯ 1 (The place of working is decided set by management, no influence from the employees)
- ◯ 2 (The employees have limited influence over their place of working)
- ◯ 3 (The employees have moderate influence over the place of working)
- ◯ 4 (The employees can to a great extent decide the place of working)
- ◯ 5 (The employees can decide the place of working more or less independently)

Productivity

When answering these questions, please consider the average situation based on the past 12 months.

19. Overall, would you say that remote working is increasing or decreasing the productivity of your employees compared to working on-site?

- ◯ Increasing
- ◯ No difference
- ◯ Decreasing

20. To what extent is the productivity of your employees decreased while working remotely?

- ◯ Decreased productivity with 10%
- ◯ Decreased productivity with 20%
- ◯ Decreased productivity with 30%
- ◯ Decreased productivity with 40%
- ◯ Decreased productivity with 50%
- ◯ Decreased productivity with 60%
- ◯ Decreased productivity with 70%
- ◯ Decreased productivity with 80 %
- ◯ Decreased productivity with 90%
- ◯ Decreased productivity with 100%

21. To what extent is the productivity of your employees increased while working remotely?

- ◯ Increased productivity with 10%
- ◯ Increased productivity with 20%
- ◯ Increased productivity with 30%
- ◯ Increased productivity with 40%
- ◯ Increased productivity with 50%
- ◯ Increased productivity with 60%
- ◯ Increased productivity with 70%
- ◯ Increased productivity with 80%
- ◯ Increased productivity with 90%
- ◯ Increased productivity with 100%

22. What are the main factors leading to an increased productivity on the performance/productivity of your employees?

- ☐ Less disturbance while working remotely
- ☐ Flexibility regarding working hours and place of working
- ☐ Less time spent on commuting to the office
- ☐ Other

23. If you answered other in the previous question, please specify your answer.

24. What are the main factors leading to an decreased productivity on the performance/productivity of your employees?

- [ ] Hard to focus due to distractions while working remotely
- [ ] Hard to collaborate with colleagues remotely
- [ ] Less directions/support and supervision from management
- [ ] Other

25. If you answered other in the previous question, please specify your answer.

Collaboration

When answering these questions, please consider your average situation based on the past 12 months.

26. To what extend does the work of your employees require that they collaborate with others? 0% means no collaboration needed, 100% collaboration on all tasks.

Number must be between 0 ~ 100

Implementation and support from management

27. To what extent do you think you as manager support to your employees in their remote working in terms of continuous communication, support, collaboration and knowledge transfer? Rate the support 1-5 where 1 is the lowest and 5 is the highest.

- ◯ 1 (No support)
- ◯ 2 (Bad support)
- ◯ 3 (Moderate support)
- ◯ 4 (Good support)
- ◯ 5 (Great support)

Other

28. Is there anything else you would like to add related your opinion about employee productivity and remote working?

Remote working as an employee

When answering these questions, please consider your average situation based on the past 12 months.

29. To what extent are you working remotely an average month? Please choose the option closest to the average time.

- ◯ Always remotely (100%)
- ◯ Most days (90%)
- ◯ Four days a week (80%)
- ◯ Three days a week (60%)
- ◯ Two days a week (40%)
- ◯ One day a week (20%)
- ◯ Once every two weeks (10%)
- ◯ Always in the office (0%)

30. To what extent would you like to work remotely an average month? Please choose the option closest to the average time.

- ◯ Always remotely (100%)
- ◯ Most days (90%)
- ◯ Four days a week (80%)
- ◯ Three days a week (60%)
- ◯ Two days a week (40%)
- ◯ One day a week (20%)
- ◯ Once every two weeks (10%)
- ◯ Always in the office (0%)

31. To what extent were you on average forced or strongly encouraged by your employer to work remotely during the covid-19 pandemic? Please choose the option closest to the average time.

- ◯ Always remotely (100%)
- ◯ Most days (90%)
- ◯ Four days a week (80%)
- ◯ Three days a week (60%)
- ◯ Two days a week (40%)
- ◯ One day a week (20%)
- ◯ Once every two weeks (10%)
- ◯ Always in the office (0%)

32. To what extent were you on average working from home before the covid-19 pandemic? Please choose the option closest to the average time.

- ◯ Always remotely (100%)
- ◯ Most days (90%)
- ◯ Four days a week (80%)
- ◯ Three days a week (60%)
- ◯ Two days a week (40%)
- ◯ One day a week (20%)
- ◯ Once every two weeks (10%)
- ◯ Always in the office (0%)

33. While working remotely, where are you working?

- ◯ From home
- ◯ From a co-working space
- ◯ Other

34. What does your current living situation look like? If your situation varies or is not an exact match against any of the options, please choose the one that reflects your living situation the best.

- ◯ Living alone
- ◯ Living with friends
- ◯ Living with partner, no children
- ◯ Living with partner and young children (0-10 years)
- ◯ Living with partner and children (10+ years)
- ◯ Living with young children (0-10 years), no partner
- ◯ Living with children (10+ years), no partner
- ◯ Living with parents

Flexibility

When answering these questions, please consider your average situation based on the past 12 months.

35. How much impact do you have to choose your own working hours? Please rate the answer 1-5 where 1 means no influence and 5 means great influence.

- ◯ 1 (The working hours are decided set by management, no influence from me as employee)
- ◯ 2 (I have limited influence over my working hours)
- ◯ 3 (I have moderate influence over the working hours)
- ◯ 4 (I can to a great extent decide the working hours)
- ◯ 5 (I can decide the working hours more or less independently)

36. How much impact do you have to choose your place of working (physically)? Please rate the answer 1-5 where 1 means no influence and 5 means great influence.

- ◯ 1 (The place of working is decided set by management, no influence from me as employee)
- ◯ 2 (I have limited influence over my place of working)
- ◯ 3 (I have moderate influence over my place of working)
- ◯ 4 (I can to a great extent decide my place of working)
- ◯ 5 (I can decide my place of working more or less independently)

Productivity

When answering these questions, please consider your average situation based on the past 12 months.

37. Overall, would you say that remote working is increasing or decreasing your productivity compared to working on-site?

- ◯ Increasing
- ◯ No difference
- ◯ Decreasing

38. To what extent is your productivity decreased while working remotely?

- ◯ Decreased productivity with 10%
- ◯ Decreased productivity with 20%
- ◯ Decreased productivity with 30%
- ◯ Decreased productivity with 40%
- ◯ Decreased productivity with 50%
- ◯ Decreased productivity with 60%
- ◯ Decreased productivity with 70%
- ◯ Decreased productivity with 80 %
- ◯ Decreased productivity with 90%
- ◯ Decreased productivity with 100%

39. To what extent is your productivity increased while working remotely?

- ◯ Increased productivity with 10%
- ◯ Increased productivity with 20%
- ◯ Increased productivity with 30%
- ◯ Increased productivity with 40%
- ◯ Increased productivity with 50%
- ◯ Increased productivity with 60%
- ◯ Increased productivity with 70%
- ◯ Increased productivity with 80%
- ◯ Increased productivity with 90%
- ◯ Increased productivity with 100%

40. What type of positive impact are you experiencing on your performance/productivity?

- ☐ Less disturbance while working remotely
- ☐ Flexibility regarding working hours and place of working
- ☐ Less time spent on commuting to the office
- ☐ Other

41. If you answered other in the previous question, please specify your answer.

42. What type of negative impact are you experiencing on your performance/productivity?

- [ ] Hard to focus due to distractions while working remotely
- [ ] Hard to collaborate with colleagues remotely
- [ ] Less directions/support and supervision from management
- [ ] Other

43. If you answered other in the previous question, please specify your answer.

Collaboration

When answering these questions, please consider your average situation based on the past 12 months.

44. To what extend does your work require that you collaborate with others? 0% means no collaboration needed, 100% collaboration on all tasks.

Number must be between 0 ~ 100

Implementation and support of management

45. To what extent do you think management support you in your remote working in terms of continuous communication, support, collaboration and knowledge transfer? Rate the support 1-5 where 1 is the lowest and 5 is the highest.

- ◯ 1 (No support)
- ◯ 2 (Bad support)
- ◯ 3 (Moderate support)
- ◯ 4 (Good support)
- ◯ 5 (Great support)

Other

46. Is there anything else you would like to add related your opinion about your productivity and remote working?