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TELEWORK IN JAPAN
Status, Trend, and Development

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Summary

This study aims to improve the adoption of telework in Japan by assessing its current status and examining the factors that may influence its progress. While there have been numerous international studies on telework, there is a relative scarcity of research on the telework status in Japan. This study aims to address this gap and contribute to understanding telework in Japan while providing insights on improving its adoption.

The data used for this study was obtained from the Communication Usage Trend Survey (通信利用動向調査), an annual survey conducted by the Japanese Ministry of Internal Affairs and Communications. Two sets of data were utilized: one about telework-related information and profiles of surveyed firms and another concerning individual telework information and household profiles.

Before the COVID-19 pandemic, telework was available in Japan and gradually increased its effectiveness. However, since the pandemic's start, telework has experienced significant growth. This study found that even as the situation improves, the telework adoption rate remains high in Japan, with more than 50% of firms and nearly 20% of individuals committing to it. This indicates the substantial potential for further growth of telework in the future.

The study has also uncovered additional characteristics of telework in Japan. Work-from-home has emerged as the most popular teleworking style, primarily driven by the COVID-19 pandemic

and the need to mitigate infection risks. Firms that have adopted telework express a high preference for it, with 80% confirming its effectiveness. However, individuals without prior telework experience still harbor some apprehension. The primary reasons for not adopting telework among firms and individuals are job content unsuitability and the lack of teleworking systems. It is worth noting that the number of firms with a high proportion of teleworking employees has grown significantly since the pandemic's start.

The study also examined the factors that may have a statistical relationship with telework adoption. Through chi-squared test analyses, industry, capital amount, number of employees, and region were found to have a statistically significant relationship with the telework adoption rate from the firm's perspective. Similarly, age, gender, family structure, income, and region correlated with the telework adoption rate from the individual's perspective. Further analysis revealed that firms in more densely populated areas, particularly in the IT, finance, and real estate industries, with more significant capital amounts and employee numbers, were more likely to have higher telework adoption rates. Similarly, individuals in their 30s to 50s, male workers, those with smaller family sizes, higher incomes, and residing in central areas exhibited higher telework adoption rates.

To promote telework in Japan, the government should leverage the knowledge and practices of firms and individuals with high telework adoption rates. This includes reorganizing and providing support to address concerns related to job content suitability and teleworking systems. By doing so, the government can encourage wider adoption of telework among firms and individuals, facilitating the development of a flexible work culture throughout Japan.

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CHAPTER 1. INTRODUCTION AND OVERVIEW OF TELEWORK

Section 1. INTRODUCTION OF TELEWORK

Telework enables employees to work remotely ('tele' is a prefix meaning 'over a long distance') outside the traditional office setting. With the advancements in information and communication technology and remote work tools, telework has become increasingly prevalent across numerous industries and occupations. Telework, also known as telecommuting, remote work, outwork, distance work, or homeworking, encompasses a wide range of practices.

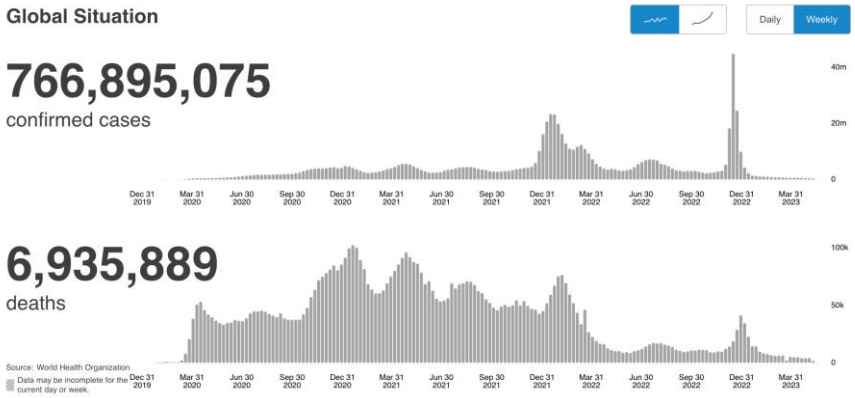
According to the Japan Telework Association, telework can be categorized into several types based on the location of work (e.g., work-from-home, mobile work, satellite/coworking space, and workcation). Satellite working was one of the earliest forms of telework, where employees could work in corporate-designed satellite offices. More recently, satellite working includes coworking spaces. Work-from-home offers benefits such as reduced commuting time, decreased physical and relocation stress, and effective time management. Mobile work, also known as work-from-anywhere, is a newer form of telework that allows employees to work from trains, airplanes, coffee shops, or any other location while traveling. This flexibility leads to increased efficiency. Workcation, a blend of 'work' and 'vacation,' is another emerging form of telework. It enables employees to work from resorts or distant vacation spots. Workcation often includes leisure time before and after business trips.

The term 'telecommuting' was initially coined by Jack Nilles, a NASA engineer, in 1972 while working on a complex NASA communication system. In his book 'The Telecommunications - Transportation Tradeoff,' published in 1973, Nilles described telecommuting as the need for job redesign to enable self-contained work at individual locations or the development of sophisticated telecommunications and information storage systems to facilitate effective information transfer as if employees were centrally collocated. Nilles accurately predicted the future as advancements in telecommunications and information storage systems have significantly evolved, enabling

instantaneous information transfer, and forming the foundation for the development of telework. Another critical factor in the development of telecommuting was the oil shocks of 1973 and 1979, which prompted its adoption as a solution to the circumstances at that time. However, it was not until the 1980s, with the proliferation of computers and subsequent promotion through U.S. legislation in the 1990s, that telecommuting became common. From a government perspective, telework is a robust tool for managing the risks associated with disasters and terrorism. At the same time, businesses view it as a management strategy to achieve work-life balance and reduce costs. Over time, telework has steadily gained popularity since the beginning of the 21st century.

The telework trend peaked in March 2020 when the COVID-19 pandemic officially spread and posed a global threat. The first cases of COVID-19 were reported in Wuhan, China, in December 2019, and by March 2020, the disease had been detected on all continents (WHO). There have been 766,895,075 confirmed cases and 6,935,889 deaths (Figure 1). From March 2020, the term 'telework' gained widespread attention worldwide (Figure 2). The risk of infection was one of the primary reasons for the surge in telework. COVID-19 has undergone several variants, including alpha, beta, gamma, delta, and, most recently, the omicron variant. However, the initial variants, like alpha and delta, had a higher mortality risk than the subsequent ones (Figure 3). Additionally, government-mandated lockdowns in some countries and areas promoted telework as the only viable means to continue working. Throughout the pandemic, telework played a crucial role in various types of work and businesses, presenting a valuable opportunity for telework to become widespread and entrenched as a natural mode of working even after the pandemic. However, questions regarding the essentiality of telework in the world, its significance post-pandemic, the pros and cons of telework, and its future trajectory remain unclear and are actively studied by scientists and organizations worldwide.

Figure 1: Number of confirmed cases and deaths of COVID-19 over time (Source: WHO, 2023)



(Source: WHO, 2023)

Figure 2: Interest over time of the word "telework" (Source: Google trend, 2023)

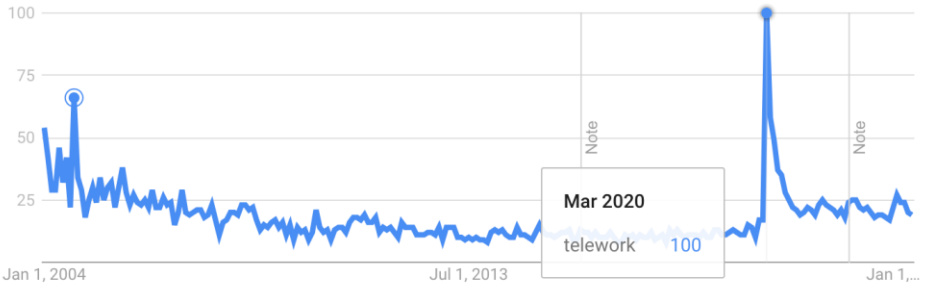
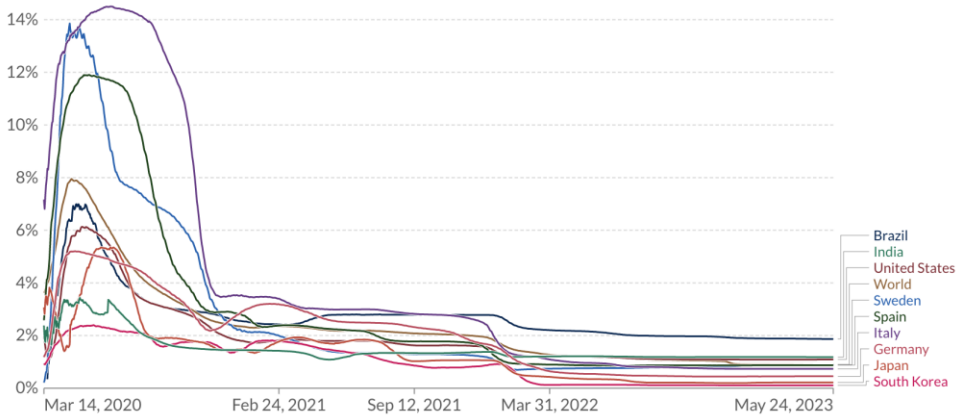


Figure 3: Case fatality rate of COVID-19 (Source: Our World in Data,2023)



Section 2. FACTORS THAT AFFECT THE CHOICE OF TELEWORK

From the onset of the COVID-19 pandemic 2020, telework rapidly became an indispensable aspect of people's lives. With the escalating risk of infection and mounting death tolls, individuals started recognizing the importance of understanding telework. Extensive research studies conducted between 2020 and 2023 have generated much-updated information and new data on the subject. In this section, let us comprehensively overview the factors identified as crucial considerations in adopting telework, supported by official data and research findings. Broadly, these factors can be categorized into three main groups: business environment factors, firm characteristics, and employees' profiles.

1.2.1. Business environmental factors

Firstly, concerning the business environment, studies have shown that government policies and geographic conditions play significant roles in the decision-making process for employers and employees when considering the implementation of telework.

Adrjan et al. (2022) discovered that differences in the persistent adoption of telework across countries could be partly explained by variations in government-mandated lockdown measures during the pandemic and the level of "digital preparedness" before the outbreak. Similarly, Aksoy et al. (2022) found that the experience of stringent and prolonged government restrictions on commercial and social activities, summarized as the Cumulative Lockdown Stringency (CLS) index, not only influences the decision to transition to telework but also impacts employers' plans for telework in the post-pandemic period. Specifically, higher CLS values are associated with a greater likelihood of employers planning to continue telework post-pandemic.

Additionally, geographic factors also play a crucial role. Dalton, Dey, and Loewenstein (2022) indicated that jobs that are well-suited for telework tend to be concentrated in dense, central cities. Furthermore, Kwan and Matthies (2022) demonstrated that firms with establishments in urban and densely populated areas, as well as larger firms, are more likely to shift towards remote work.

1.2.2. Factors of firms’ characteristics

When it comes to the characteristics of firms that influence the choice of telework, several factors come into play. These factors include industry, occupations, organizational human resources, IT infrastructure, human resources, and firms' experience with telework.

Dingel and Neiman (2020) conducted calculations and found that approximately 37% of jobs in the US can entirely perform from home, based on a specific list of telework-compatible occupations. Dalton, Dey, and Loewenstein (2022) discovered a significant difference in telework adoption rates between jobs suitable for telework and those not (31.5% vs. 4.7% of employees implemented telework, respectively, in 2021). Brynjolfsson et al. (2023) highlighted the variations in telework rates across industries and argued that industry characteristics play a crucial role in determining telework rates.

In addition to industry and occupation characteristics, Kwan and Matthies (2022) emphasized the importance of organizational resources and IT infrastructure as firm-specific factors contributing to successful telework implementation. Their study revealed that a one-standard-deviation increase in the IT index leads to a 5.5% shift towards remote work. Moreover, firms with more managerial engagement tend to have a higher prevalence of remote work. These factors are understandable, as telework heavily relies on online platforms, advanced IT systems facilitate productive work, and managerial resources are essential for monitoring and ensuring smooth operations.

Furthermore, firms' prior experience with telework is crucial in determining their commitment to telework. Lewandowski, Lipowska, and Smoter (2022) demonstrated that firms with more experience in remote work are more willing to accept telework candidates. Bai et al. (2021) concluded that firms with high pre-pandemic work-from-home (WFH) feasibility exhibited significantly better performance than those with lower pre-pandemic WFH indices. Conversely, firms with lower pre-COVID-19 WFH feasibility made a significantly higher percentage of IT infrastructure investments to facilitate remote work and sustain operations during the pandemic.

1.2.3. Factors about employees’ profile

The profile of employees also plays a significant role in the choice of telework, with factors

such as gender, age, educational level, and family structure being influential.

Gender is an essential factor to consider. Kwan and Matthies (2022) found that firms with more men tend to engage in remote work less, as women often benefit more from the flexibility of telework due to parental responsibilities. Another study by Brynjolfsson (2022) revealed that female workers were more likely to maintain the same level of telework during the pandemic. Additionally, Lewandowski, Lipowska, and Smoter (2022) showed that female workers were more willing to pay for the option to telework compared to male workers.

Age is another crucial factor in the adoption of telework. A study conducted in Japan found that those who worked from home were generally younger than those who did not, with a statistically significant difference at the 99% level. Conversely, a study conducted in the US demonstrated that workers with longer tenure at a firm and older workers tended to engage in remote work more frequently. While the reasons for these differences may vary, age still plays a vital role in the decision to adopt telework.

The educational level also influences the choice of telework. Aksoy et al. (2022) observed that individuals with higher levels of education tend to place a higher value on telework than those with lower education levels. Furthermore, Brynjolfsson et al. (2022) found that workers with a college education were statistically more inclined to continue teleworking even after the COVID-19 pandemic, adopting hybrid telework.

Family structure is another factor to consider. Aksoy (2022) found that both men and women placed a higher value on the option to telework when they had children aged 14 or younger. Having children in the household increases the importance of telework as a flexible work arrangement.

Various factors for firms and employees influence the decision to adopt telework. External environment factors such as government policy and geographic conditions, as well as firm characteristics including industry, occupations, managerial and IT infrastructure, and prior telework experience, all play a significant role. Additionally, employees' profiles, including gender, age, educational level, and family structure, also influence the choice of telework.

Understanding these factors is crucial for governments to develop targeted policies and

incentives to promote telework among specific groups or industries. It also helps firms tailor their telework strategies based on their unique characteristics and the profiles of their employees. By considering these factors, both governments and firms can make informed decisions regarding the adoption and implementation of telework as a work arrangement.

Section 3. THE IMPACTS OF TELEWORK

Section 2 examined the factors influencing the decision to adopt telework. We now explore the consequences of telework after its implementation. This section will focus on the impact of telework in three main areas: society, firms, and employees.

1.3.1. Impact of telework on the society

The development of telework has resulted in a decline in commuting and has weakened the agglomeration economies of cities. Sitian and Yichen (2022) conducted a study showing that telework has caused significant employment and urban exodus from large to small cities. Delventhal and Parkhomenko (2022) also found that while workers who cannot work remotely move closer to their workplaces, workers who can work from home decentralize, ending up much farther from their jobs. This phenomenon has brought about significant changes in society.

One significant change caused by this urban exodus is its effect on the housing and office markets. Dalton, Dey, and Loewenstein (2022) found that telework has led to firm downsizing and reduced foot traffic in densely populated central city areas. They quantified the effects, such as a 1% increase in downsizing resulting in a 0.7% decline in rental prices and a 10% reduction in foot traffic associated with a 2.4% fall in local rental prices. Conversely, migration facilitated by telework has contributed to an increase in house prices in local areas. Mondragon and Wieland (2022) calculated that remote work accounts for at least half of the 24% increase in house prices between December 2019 and November 2021. In terms of office prices, Gupta, Mittal, and Nieuwerburgh (2022) observed a 35% decline in office values in 2020 and a 28% decline in the long run, with higher-quality office buildings being relatively more resilient due to a flight to quality, while lower quality office buildings experienced more substantial swings.

The increasing rate of telework has also led to changes in local employment. Since commuting becomes unnecessary with telework, there are direct effects on local services and customer spending, affecting employment in specific industries. Dalton, Dey, and Loewenstein (2022) found that a 10% decrease in foot traffic in a given area resulted in a decline of 2.8% in employment for accommodation and food services, 2% in retail trade, 1.9% in transportation and warehousing, 1.7% in art and entertainment, and minor adverse effects on manufacturing, wholesale, and construction in that area.

Another impact of telework on society is the reduction of inequality between areas. Sitian and Yichen (2022) demonstrated that the urban wage premium decreased during the COVID-19 pandemic, with the decrease being smaller for jobs with a low level of telework adoption and more pronounced for jobs with a high level of telework adoption. This phenomenon indicates a narrowing of wage disparities between urban and non-urban areas. Similarly, Delventhal and Parkhomenko (2022) found that telework contributes to decreased income inequality across locations. Workers residing in a broader range of locations now have increased access to high-paying job opportunities in "superstar" cities, leveling the playing field to some extent. Additionally, in the venture capital (VC) industry, which previously relied on geographical clustering for acquiring information about early-stage companies, Alekseeva et al. (2022) found that VCs invested in more distant startups during the pandemic. They observed a 43% increase in the distance between VC firms and their portfolio companies, indicating a higher likelihood of VCs investing outside their state borders.

The findings on the impact of telework provide valuable insights for policymakers when considering the promotion of telework as a solution to various societal challenges. By harnessing the benefits of telework, governments can effectively tackle issues related to high density, inequality, and regional disparities to create a more balanced and inclusive society.

1.3.2. Impact of telework on firms

The impact of telework on firms is primarily seen in the changes it brings to their operations. Many firms faced significant challenges in transitioning to telework during the sudden onset of the COVID-19 pandemic and government-mandated lockdowns. As a result, various aspects of their

operations, including productivity, internal interaction, performance, and innovation, were affected. Among these, productivity is a widely studied topic among researchers worldwide. Aksoy et al. (2022) conducted a survey of employees in 27 countries and found that 56.4% of respondents felt optimistic about their productivity while teleworking, 31% reported no significant change in productivity, and only 12.6% reported a decline. Similarly, Harrington and Emanuel (2021) found that remote work increased worker productivity by 6-10% based on data from call centers of a US Fortune 500 retailer. In contrast, a study by Atkin, Schoar, and Shinde (2022) examining telework productivity in India showed an 18% lower productivity for workers randomly assigned to work from home than those in the office. Morikawa (2021)'s study of Japanese employees revealed that the mean productivity of working from home relative to the usual workplace was about 60-70%, with lower levels observed for employees and firms that began teleworking only after the COVID-19 pandemic spread.

Regarding internal interaction, Sitian and Yichen (2022) provide evidence that telework weakens in-person interaction facilitated by physical proximity, ultimately leading to decreased productivity. Kwan and Matthies (2022) also found that employees share less information during telework and engage in fewer discussions on new topics, aligning with theories suggesting that remote work reduces coordination within a firm. Morikawa (2021) highlighted the inherent constraint of telework due to the loss of face-to-face interactions when analyzing the factors contributing to decreased telework productivity in Japan, where inter-worker coordination is culturally significant. However, there are also positive aspects of telework about internal interaction. Bloom, Han, and Liang (2022) found that telework employees increased their usage of individual messaging and group video calls, even when physically in the office. This reflects the impact of remote work on modes of communication. Additionally, Chen, Frey, and Presidente (2022) studied the disruptive effect of telework on research collaboration and surprisingly discovered that the initial negative effect reversed and even became significantly positive from 2015 onwards. This suggests that even though telecommunication tools are imperfect substitutes for face-to-face interactions, they still have a positive effect in specific contexts.

In addition to its impact on firms' operations, telework has significant financial implications, including changes in office costs, monitoring costs, and transition costs. Bloom, Han, and Liang (2022) have highlighted that telework in a hybrid form can help firms reduce office space, which is one of the benefits of telework. However, the study also emphasizes the importance of considering the transition costs involved in moving between entirely in-person, fully telework, and hybrid forms of work. One financial cost that arises when adopting telework is the monitoring cost. Monitoring is essential for smooth operations, but transitioning to telework requires adjustments and significant investments in infrastructure and monitoring systems. Kwan and Matthies (2022) explain that telework creates distance between managers and workers, potentially increasing monitoring costs. The study proves that telework leads firms to invest more in monitoring by upgrading their IT infrastructure and hiring additional managers. Lewandowski, Lipowska, and Smoter (2022) also mention that while telework may reduce office costs, it increases the managerial effort required to supervise and monitor workers. Additionally, Bai et al. (2021) note that firms without prior experience of telework before the COVID-19 pandemic retained a significantly higher percentage of software investment. This investment was made to catch up in terms of IT infrastructure, enabling remote work and ensuring the continuity of operations during the pandemic.

Another critical impact of telework on firms is its effect on human resources. A study by Ranganathan and Das (2022) found that remote workers were significantly less likely to voice concerns and mobilize around their pay and workload issues than their in-person counterparts. The study highlights the potential role of telework in driving what is known as the "great resignation," where employees may choose to silently leave their organization instead of expressing their concerns to address grievances. Furthermore, Emanuel, Harrington, and Pallais (2022) have demonstrated another impact of telework on human resources. The study shows that the loss of proximity resulting from telework during the pandemic has a particularly significant effect on young engineers and female engineers, making them more likely to leave the firm when they are physically distant from their coworkers.

The findings underscore the importance of carefully considering the potential impacts of

telework on firms. Companies must capitalize on the positive effects while addressing the challenges and implementing strategies to ensure a smooth operation, foster a sense of connection, and support their remote workforce. By doing so, firms can maximize the positive impacts and effectively mitigate the negative impacts on their performance.

1.3.3. Impacts of telework on employees

Like firms, telework also strongly impacts employees in their working environment and personal life. Delventhal and Parkhomenko (2022) have highlighted several impacts of telework on employees. Firstly, the study showed that workers' income rises by 1.6%, suggesting that telework is more productive for most workers, leading to increased incomes. Additionally, as remote work becomes more common, job opportunities become more accessible to individuals who do not reside in major cities, reducing income disparities across different locations. The study found that although the average distance between an employee's home and office increases by 52%, the time spent commuting decreases by 20.5%. This change indicates significant time savings in commuting despite the longer distance to the workplace. Furthermore, the study also found that teleworkers experience a significant impact on residential floorspace prices, with the average price paid for residential floorspace also felt down.

Studies on hybrid work, an advanced form of telework, have revealed several impacts on employees. Choudhury, Khanna, Makridis, and Schirmann (2022) found that workers in hybrid telework with office work experience higher work quality and wage increases compared to other forms of telework. This finding suggests that the hybrid model combines the flexibility of telework with the benefits of in-person collaboration. Similarly, Bloom, Han, and Liang (2022) discovered that hybrid work improves productivity and enhances work satisfaction, life satisfaction, and work-life balance. The study also highlights the potential of hybrid work to address employee stress and excessive working hours. Furthermore, the research reveals a significant reduction in non-working days among hybrid employees, including sick leave, holidays, and absences. These findings emphasize the advantages of hybrid work in terms of employment outcomes and well-being.

In contrast, studies have also highlighted some negative impacts of telework. Lewandowski, Lipowska, and Smoter (2022) conducted a study on the mismatch in telework preferences between employees and employers, revealing that employers generally have a low preference for telework due to concerns about potential productivity loss and increased management costs. As a result, employers expected a wage reduction of 40.7% when selecting a telework employee. On the other hand, workers preferred telework more and were willing to sacrifice 5.1% of their earnings for the option to telework, despite knowing that most employers do not favor it. Another study by Ranganathan and Das (2022) pointed out that teleworkers are less likely to voice concerns and mobilize around their pay and workload than in-person workers, suggesting that telework can lead to isolation and reduced communication among workers.

Telework has significant impacts on employees' personal lives as well. Ueno (2022) found that teleworking allowed a portion of respondents to have an additional 30 minutes or more of sleep, potentially improving their overall sleep health due to the elimination of commuting time. Additionally, households experienced an increase in monthly electricity consumption, likely due to the higher usage of lighting and air conditioning systems. Another study by Amano et al. (2021) showed that obtaining adequate sleep is associated with higher work engagement among Japanese telework employees. For working parents, Pabilonia and Vernon (2022) found that parents working from home alone spent more time on childcare compared to those working on-site. Moreover, when both parents teleworked, they could maintain their paid hours while dedicating more time to childcare responsibilities. This finding suggests that telework can significantly benefit workers with children. These findings shed light on the impact of telework on various aspects of employees' personal lives.

CHAPTER 2. PURPOSE OF THE STUDY

The previous chapter highlighted the development and various forms of telework, such as work-from-home, mobile work, satellite or co-working spaces, and the emerging concept of workcation. Telework interests many organizations with expectations of increased productivity, the ability to overcome geographical limitations and improved work-life balance for employees. The recent global spread of COVID-19 has further emphasized the significance of telework as it became the primary solution for firms to continue operations during government-imposed lockdowns. Governments worldwide have been working on developing and facilitating telework, while researchers have shown increased interest in studying it and its effects.

This study focuses specifically on Japan, a highly developed country with traditional and unique characteristics. Despite the prominence of telework globally, studies and updated information on Japan's telework landscape are limited. This shortage indicates a need to delve into and understand telework in the Japanese context. The following chapter will explore previous studies conducted on Japan's telework status.

Although there are ongoing discussions regarding the effects and impacts of telework, its benefits for employees, organizations, and society have been demonstrated. Therefore, this study proposes teleworking as an advanced work arrangement for Japan by analyzing relevant datasets the Japanese government provides. The primary objective is to promote telework effectively, beginning with an understanding of the current state of telework in Japan and subsequently identifying significant factors that may influence its adoption in the country.

CHAPTER 3. DATASETS

The datasets used in this study are derived from the Communication Usage Trend Survey (通信利用動向調査), an annual survey conducted by the Japanese Ministry of Internal Affairs and Communications (MIC). The primary objective of the survey is to track the usage trends of communication and broadcasting services, including the internet, mobile phones, and smartphones, from the perspective of users, encompassing both households and firms. The survey has been conducted since 2000, with the most recent available data being from 2022. It should be noted that the inclusion of telework-related data in the survey began in 2011 for the firm's survey and in 2016 for the individual survey.

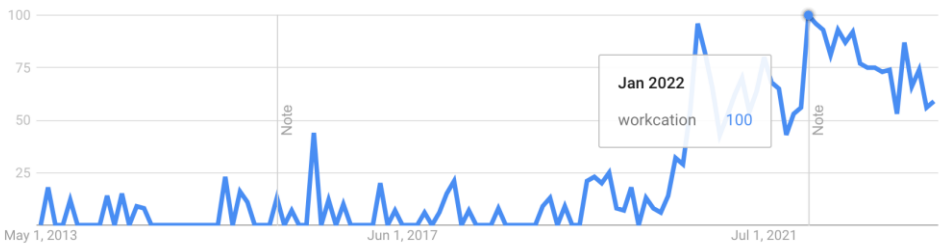
The survey covers all regions of Japan and includes all households with a householder aged 20 or over as of April 1st of the survey year. However, it excludes individuals under the age of 6 who reside with the householder and those who do not live with the householder. The survey encompasses companies with 100 or more regular employees in industries listed in the Japan Standard Industrial Classification, excluding those classified under the significant S-public affairs category. The specific characteristics of these two datasets will be further discussed in the subsequent sections.

The survey is conducted using both mail and online methods. The survey forms are distributed to individual respondents by third-party companies commissioned by the MIC. Respondents can complete the survey form and mail it back or download it from the official website and submit it via email. Similarly, the firm's survey is distributed by mail through third-party companies commissioned by the MIC, and respondents can either mail the completed questionnaire or respond online through the Joint Statistical System.

The survey data provided information on different forms of telework, which evolved in Japan. Until 2012, the survey categorized telework into two primary forms: work-from-home and non-work-from-home. However, starting in 2013, the survey began to distinguish between three types of telework: work-from-home, satellite/co-working space, and mobile work. In 2022, a new

form of telework called workcation was introduced to the survey. These four forms of telework emerged in Japan at different points in time. Satellite offices were the earliest form and became available in the 1980s. Work-from-home was likely to be introduced in the 1990s and 2000s with the advancement of internet technology and personal computers. Co-working spaces became a trend, particularly during the COVID-19 pandemic, when workers faced limitations in going to the office or staying at home. Workcation is the most recent form of telework, first promoted in Japan by Japan Airlines in 2017 (Worker's Resort, 2021). While the exact reasons for changing or adding telework forms were not explicitly announced, they can be attributed to shifts in the working market trends. For instance, workcation was initially adopted before the COVID-19 pandemic, but its popularity waned as concerns about health risks grew. After prolonged lockdown periods and the fatigue associated with staying home, people began venturing out for telework. This change led to a resurgence of interest in workcation as a telework option. Figure 4 shows the rise in interest in terms of "workcation".

Figure 4: Google trend in worldwide of the word “workcation” (Source: Google Trend, 2023)



Section 1. DATASET OF FIRM

The dataset for firms includes telework-related data from 2011 to 2022, spanning 12 straight years. However, the content of the survey varied each year and covered topics such as the internet, cloud services, security, and more. Within the survey were five unchanged questions related to telework and added one question in 2019. The questions and their respective options are as follows:

1. Introduction status of telework (introduced under the work-from-home form, or

non-work-from-home form, or not introduced but planned to, or not interesting)

2. Percentage of employees using telework for firms where telework is introduced (less than 5%, 5%-10%, 10%-30%, 30%-50%, 50%-80%, more than 80%)
3. Purpose of introducing telework for firms where telework is introduced (to improve operation, to add value to the operation, to reduce office cost, ...)
4. Efficiency of telework for firms where telework is introduced (very efficient, somewhat efficient, not efficient)
5. Reasons for not applying telework for those firms that have not applied telework but are willing to (not applicable to the job, operation that cannot perform through telework, lack of understanding about the merits of telework, difficulty in evaluating employees...)

Additionally, starting from the 2019 data, a sixth question was added regarding the elements necessary for the spread of telework.

6. For all firms that responded to question 1: The elements mentioned could relate to either firm-internal factors (firm-internal factors such as optimization of labor management, maintenance of work environment… or external factors such as activities for telework promotion, supporting for telework adoption…)

The data represents the number of firms that chose the respective answer options for each question. The dataset is further categorized by industry, capital amount, number of employees, annual sales, operating profit margin, fixed assets, and region. However, there are some important considerations regarding these categories:

(i) Prior to 2019, the IT industry was included in the Service and Others category. However, from 2019 onwards, the IT industry was treated as a separate category.

(ii) The region category is divided into 11 regions: Hokkaido, Tohoku, Northern Kanto, Southern Kanto, Hokuriku, Koshinetsu, Tokai, Kinki, Chugoku, Shikoku, and Kyushu Okinawa.

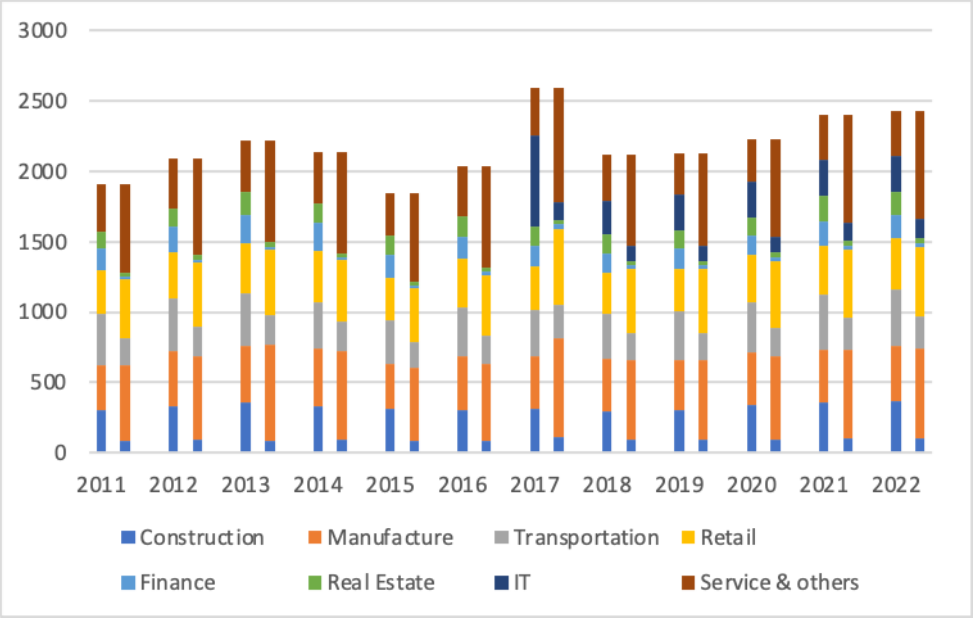
(iii) Since it is challenging to control the number of firms participating in the survey within each category, the Ministry of Internal Affairs and Communications (MIC)

has adjusted the number of firms in each category using the weight of the industry size composition of the population.

Although the core questions related to telework remained unchanged, there were occasional revisions to the answer options. As a result, minor edit is necessary to prepare the data for further analysis.

Next, let us examine the characteristics of the firm dataset in each category. Firstly, as mentioned in (iii), the weighted adjustment can be explicitly observed in the industry and region categories, which consist of seven categories. Figure 5 represents the number of firms in the dataset categorized by industry. The left bars represent the original data, while the suitable bars represent the adjusted data.

Figure 5: Number of firms by industry before and after being adjusted



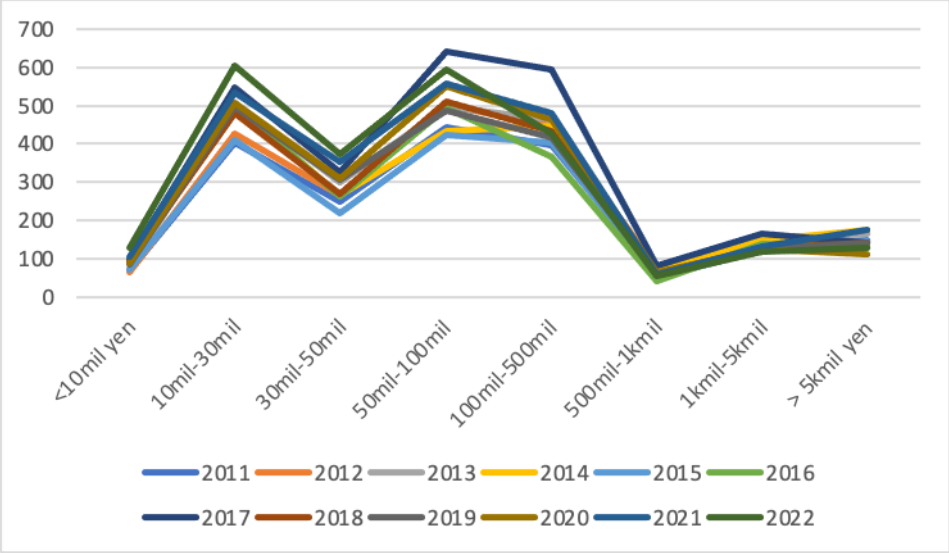
Source: author's elaboration

The original data displayed a more balanced distribution among industries, whereas the adjusted data skewed towards the manufacturing and service sectors, resulting in a lower representation of the construction and transportation industries. However, this level of heavy adjustment was not observed in the other categories.

Regarding the capital categories, many firms in our sample fell within the capital range of

10 million to 30 million yen and 50 million to 500 million yen. This distribution pattern resembles the shape of an elephant curve, as shown in Figure 6. Most responded firms have capital amounts falling within the 10-30 million yen and 50-500 million yen ranges. The next significant group consists of firms with capital amounts exceeding 1000 million yen, while those with less than 10 million yen and those with capital amounts between 500-1000 million yen represent the most minor proportions.

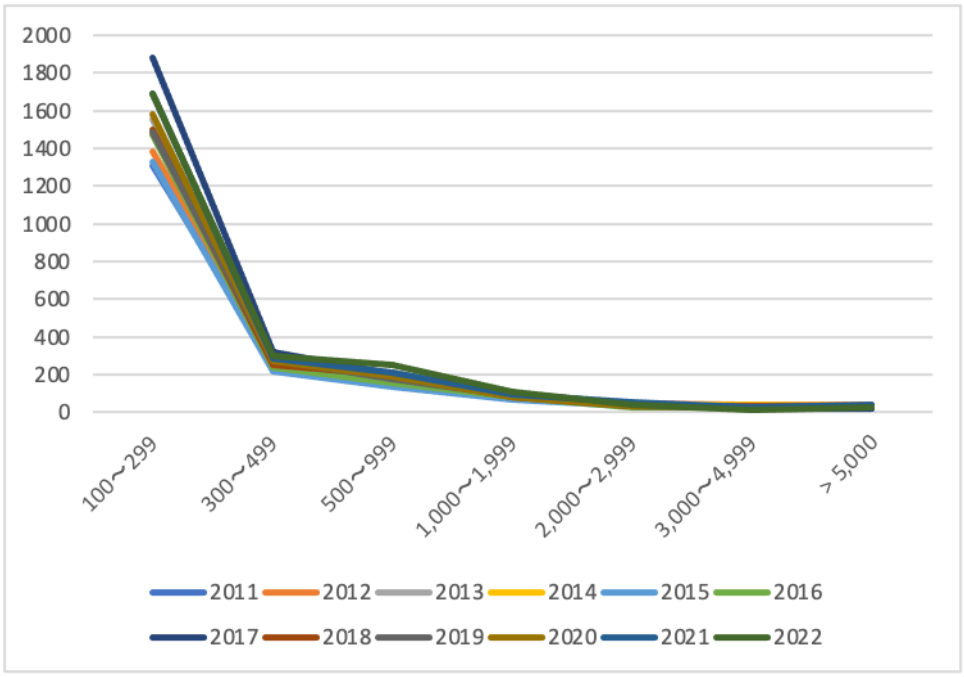
Figure 6: Number of Firms by Capital Amount



Source: author's elaboration

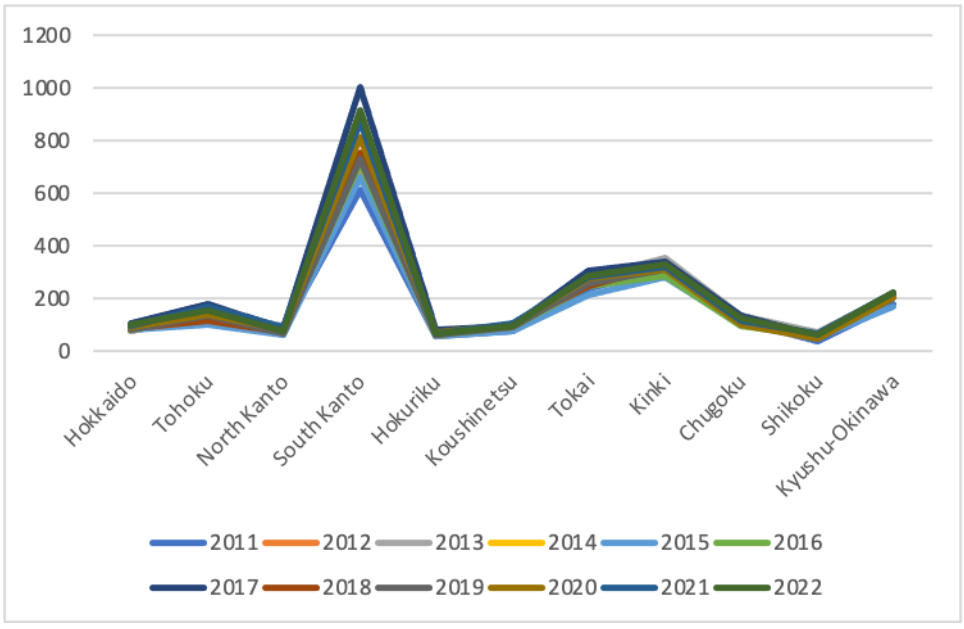
Within this dataset, firms with a workforce of 100 to 499 employees represented more than 80% of the total (Figure 7). Regarding regional distribution, the South Kanto area accounted for approximately one-third of the dataset (Figure 8). The result showed a symmetrical distribution when examining the number of firms based on annual sales and operating profit margin. Around half of the firms had annual sales in the range of 1,000 to 10,000 million yen (Figure 9), and approximately half of the firms had an operating profit margin of 0-5% (Figure 10).

Figure 7: Firms Distribution by No. of Employee



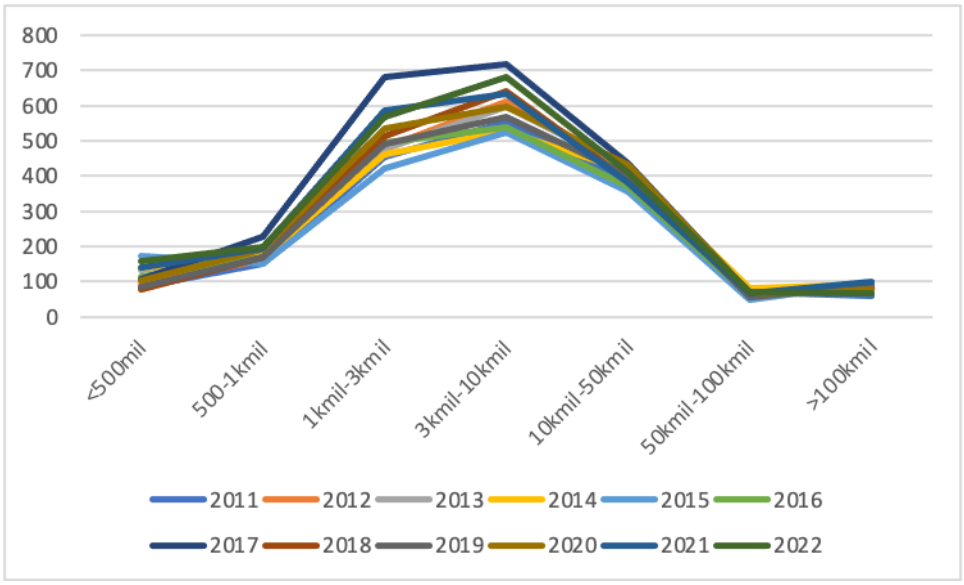
Source: author's elaboration

Figure 8: Firms Distribution by Region



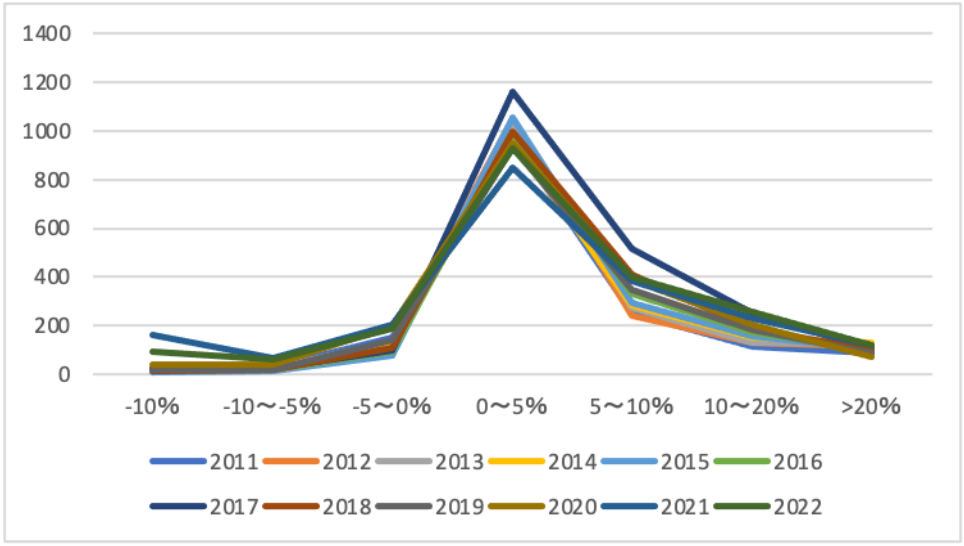
Source: author's elaboration

Figure 9: Firms Distribution by Sales Amount



Source: author's elaboration

Figure 10: Firms Distribution by Profit Margin



Source: author's elaboration

Section 2. DATASET OF HOUSEHOLD

The dataset used in this thesis consists of continuous data from 2016 to 2022, covering seven years. Unlike the survey conducted for firms, the household survey is shorter, comprising

approximately 35 questions, and does not undergo significant changes over time. Within the 2016-2022 period, the survey includes three telework-related questions:

1. Whether applying telework or not for individuals currently working (options include work-from-home, satellite office, during transportation-mobile work, or no telework).
2. Whether individuals prefer applying telework or not, for those who have not applied telework (options include "yes, I want to try" or "no, I have no preference")
3. Reasons for not applying telework for those who have not applied but prefer telework (options include unapplicable environment, job, atmosphere among colleagues, or uncertainty about telework applicability).

The data represents the number of individuals who choose the same answer for each question. Typically, the data displayed across various categories such as age, gender, family members, family structure, income, and resident region.

Similar to the dataset for firms, there are some additional notes regarding the dataset:

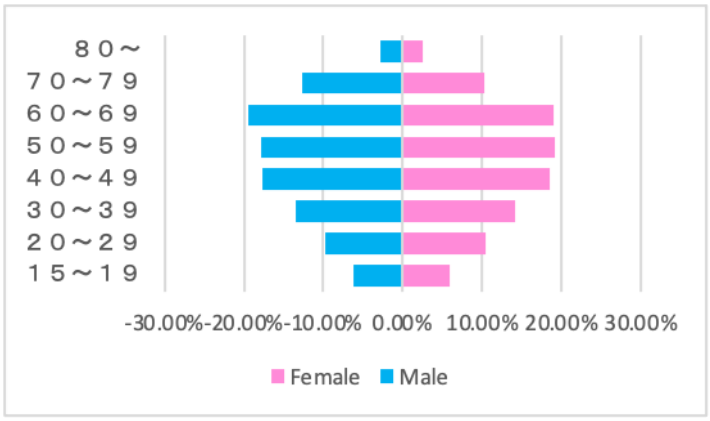
(i) Since the number of respondents in each category is random, an adjustment based on the population proportion is necessary to ensure balance among the datasets. This adjustment considers the population proportions of age and gender, divided into prefectural proportions.

(ii) In the family structure categories, divisions are made based on the number of children, adults, and elderly. Here, children indicated individuals under 19 years old; the elderly category includes individuals above 65.

(iii) Similar to the dataset for firms, the region category is divided into 11 main areas: Hokkaido, Tohoku, Northern Kanto, Southern Kanto, Hokuriku, Koshinetsu, Tokai, Kinki, Chugoku, Shikoku, and Kyushu Okinawa.

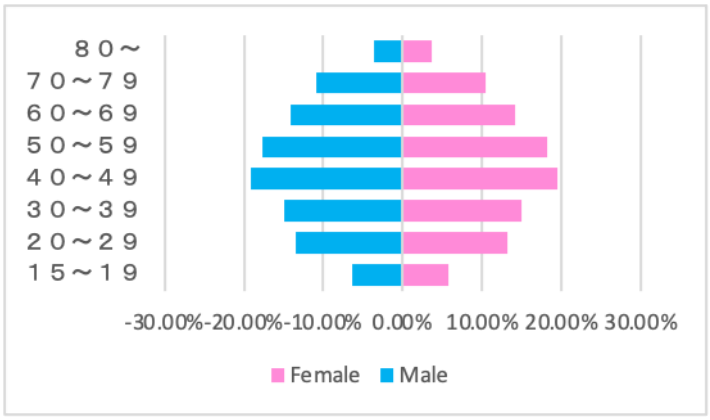
Firstly, let us analyze how the adjustment based on population proportion affected the dataset. Specifically, we will examine the proportion of gender divided by age in the original data, adjusted data, and the overall Japanese population.

Figure 11: Original Survey Population by Gender



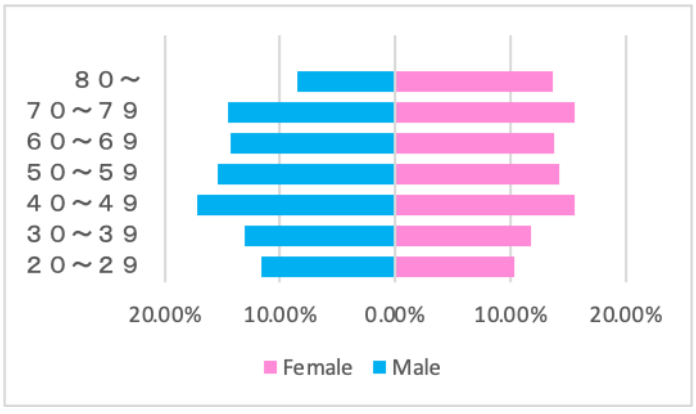
Source: author's elaboration

Figure 12: Adjusted Survey Population by Gender



Source: author's elaboration

Figure 13: Japanese Population over 15 by Gender

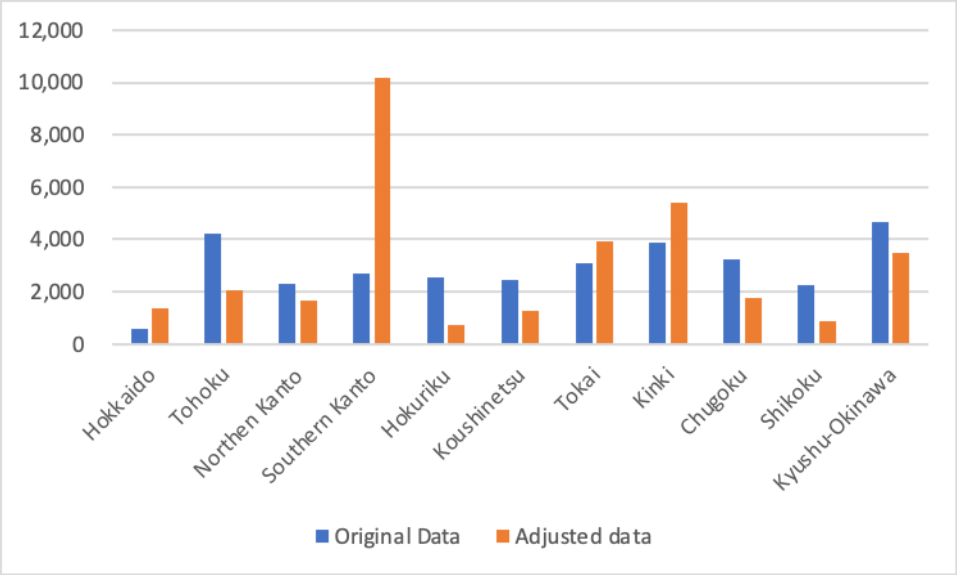


Source : author's elaboration from data of Statistic Bureau of Japan (2022)

As observed in Figures 11,12, and 13, the adjusted data shows a better balance between genders, with the proportion of different age groups resembling that of the Japanese population, except for individuals over 70. This deviation is due to the retirement age in Japan, which is typically around 65 years old. Consequently, the number of individuals actively working beyond 70 significantly decreases and remains below the actual population count.

Another category that undergoes significant adjustment is the regional category. Due to the high population density in central regions such as Southern Kanto and Kinki, the adjusted data reflects a more accurate population distribution across different areas than the original data. Figure 14 illustrates the differences between the original data and the adjusted data in terms of regional distribution.

Figure 14: Comparison of respondent's population by region before and after data adjustment

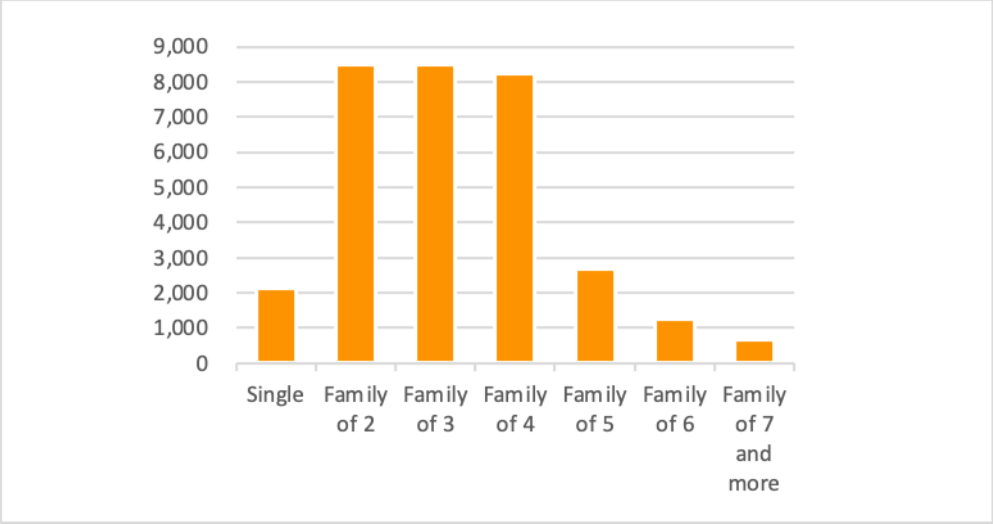


Source : author's elaboration

In other categories, the differences between the original and adjusted data are less significant. In the category of the number of family members, families with 2, 3, and 4 members each account for approximately one-fourth of the dataset. In contrast, the remaining category represents one-fourth (Figure 15). It is worth noting that the dataset used in this study is more concentrated on family households, considering that 38% of households in Japan are single-person

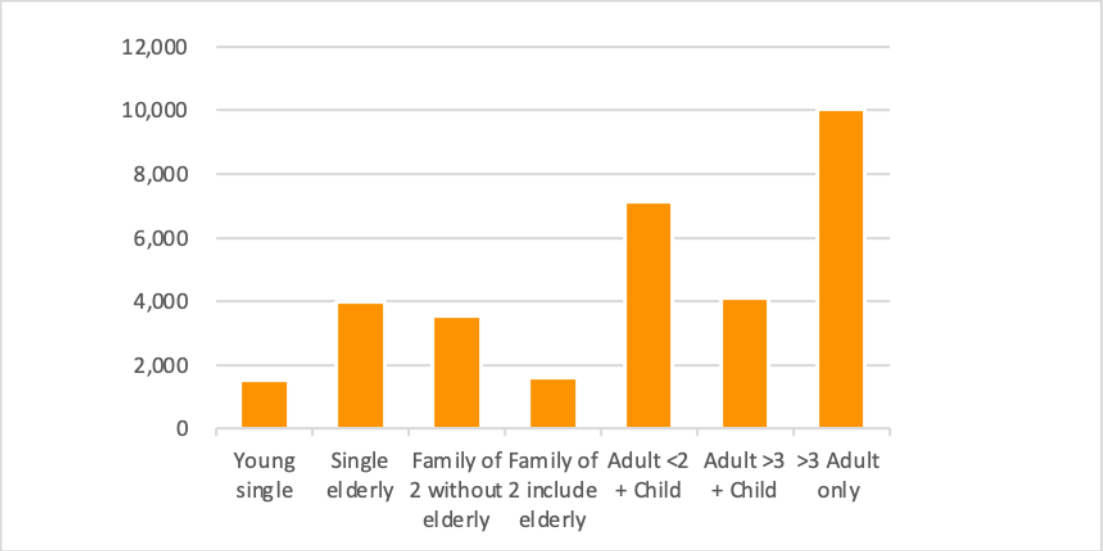
households (Statista, 2023). When examining family types (Figure 16), families with three adults and no children comprise approximately one-third of the dataset. Families with two or fewer adults and children comprise around one-fourth of the dataset, while families with young singles constitute a minor proportion. Regarding income distribution (Figure 17), individuals with annual incomes ranging from 2 million yen to 6 million yen represent approximately 50% of the dataset. Conversely, individuals with annual incomes exceeding 20 million yen account for only 1% of the dataset. Comparing this with the data from the Family Income and Expenditure Survey conducted by the Ministry of Health, Labor and Welfare (MHLW) in 2020, it is evident that the dataset used for this study contains a slightly higher proportion of middle-income households.

Figure 15: Number of respondents by number of family member



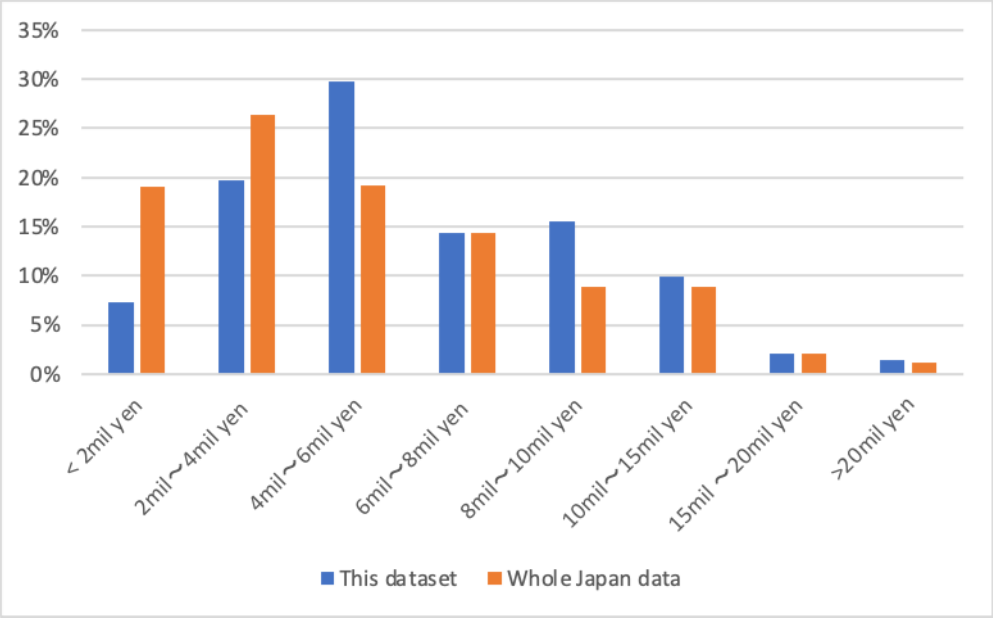
Source: author's elaboration

Figure 16: Number of respondents by Family Structure



Source: author's elaboration

Figure 17: Comparing Survey Population by Income Level with whole Japan data



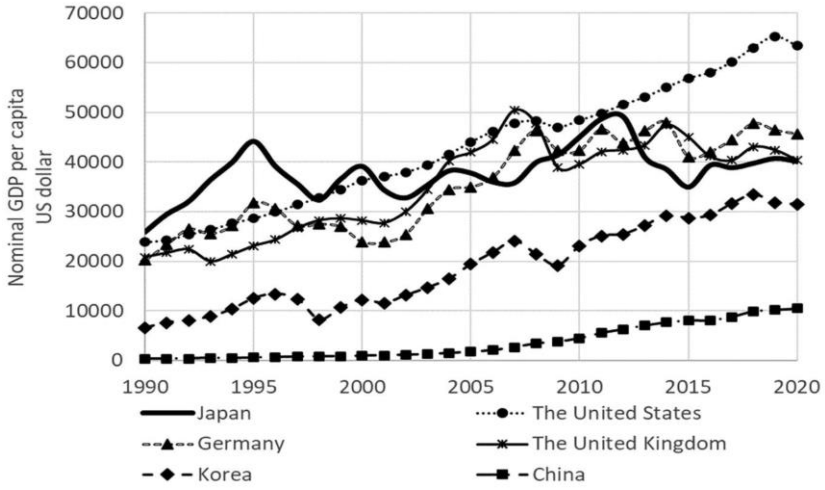
Source: author's elaboration from MIC dataset and from MHLW data set

CHAPTER 4. TELEWORK IN JAPAN

Section 1. HISTORY OF TELEWORK IN JAPAN

As the world's fourth-largest economy, Japan has undergone rapid economic development and has a distinctive culture. It holds fourth in terms of GDP size and fifth in the Nation Brand 2023 Ranking. However, since the bubble economy burst in the 1990s, Japan has faced stagnant development, with declining nominal GDP per capita compared to other countries since 1995. The traditional Japanese working culture has made it challenging to embrace change. The Japanese government has implemented various measures to improve productivity to revive development and address the issue of a dwindling workforce. Telework has emerged as an advanced tool to help reverse the situation.

Figure 18: Nominal GDP per capita. (Source: Ishikura and Khare, 2022)



4.1.1. Historical development of telework in Japan

During the 1980s, Japan was influenced by the United States and ventured into telework. NEC Corporation played a significant role by establishing its first satellite office in 1984. The primary objective of these satellite offices was to support married female workers with children, reducing their commuting time and improving employee retention. As the bubble economy took hold in the late 1980s, land and office prices skyrocketed, prompting more companies to adopt satellite

offices as a cost-effective solution to the expensive office fees in city centers. Telework also became an attractive benefit for companies to attract and retain talented employees. Telework mainly involved satellite offices at this stage since personal computers were not widely prevalent, and working from home or mobile work was yet to be feasible.

Following the burst of the bubble economy, many companies shifted their focus away from telework, leading to the closure of several satellite offices during the economic downturn. However, the Japanese Government remained committed to promoting satellite offices as a means of job creation in rural areas and employing individuals with physical disabilities. In the late 1990s, telework regained attention as the internet and personal computers became more widespread. It was promoted as a component of business process re-engineering to improve productivity, which is essential for the economy's recovery. This period also witnessed the emergence of other forms of telework, including work-from-home and mobile work.

Additionally, since the early 21st century, there has been a growing focus on social issues such as job creation for local employees and environmental concerns like global warming. These factors propelled telework into an advanced working style and garnered promotion from various associations and the Government.

Indeed, the widespread adoption of telework in Japan has faced challenges due to the insufficiency of digital transformation (DX) and IT infrastructure. While the Japanese Government recognizes the importance of DX and IT, it has struggled to implement them fully. For instance, efforts to enhance the effectiveness of telework have been hindered by the complexity of the Japanese Government's computer systems, making it challenging to implement necessary improvements. Another example is the My-Number system, a significant investment aimed at assigning a unique identification number to all registered individuals in Japan. However, Japanese citizens have not received this system because it is not effectively linked to other government systems in many municipalities. Such limitations and inefficiencies hinder the overall progress of DX and IT in Japan. To catch up with the rapid development seen in other countries, Japan needs to exert more outstanding efforts and address these challenges to enhance its DX and IT infrastructure.

This effort will be crucial for promoting the widespread adoption of telework and keeping pace with global advancements.

4.1.2. Telework under the COVID-19 pandemic

The outbreak of COVID-19 in Japan catalyzed change, forcing the country to recognize the importance of telework. Initially, when the first COVID-19 case was detected in Japan in January 2020, the government swiftly responded by designating it as an infectious disease under the Infectious Diseases Control Law and a quarantinable infectious disease under the Quarantine Act (Government of Japan, 2020a). In April, the Prime Minister declared the first emergency in seven prefectures, including Tokyo. However, it did not involve a complete lockdown but urged people to stay home. Declarations of the state of emergency were periodically reinstated and lifted throughout 2020 and early 2021 in response to fluctuations in infection rates. Japan began its vaccination campaign in April 2021.

Traditionally, the Japanese working culture heavily emphasized in-office work, with employees dedicating long hours to their companies. However, in the face of the pandemic, telework became necessary, requiring significant IT infrastructure investment. A survey conducted in Tokyo revealed a significant shift in telework adoption, with the proportion of employees working from home increasing from less than one in five in December 2019 to over half in April 2020 (Tokyo Metropolitan Government, 2020, p. 2). However, as the situation evolved, another survey indicated a decline in telework, with the proportion of individuals working from home decreasing to one in five by April 2021 (Japan Productivity Center, 2021a, p. 17).

The adoption of telework presents various challenges for all stakeholders involved. Workers face adjustments in their working environment, including working from home, communication with managers and colleagues, and potential impacts on their mental health (Gane & Saito, 2022). Establishments encounter challenges related to productivity, monitoring of remote work, and the need to adapt office spaces to accommodate telework.

Telework also has broader implications for the economy. It can adversely affect employee health, particularly among younger workers, and may slow down recruitment, retention, and

business travel for establishments. However, there are also positive perspectives on telework. For instance, it enhances flexibility and work-life balance, leading to a sustained high preference for telework among those who have experienced it before and among working women even after the pandemic (Kaonavi, 2020e). Additionally, a survey revealed that teleworkers expressed a stronger sense of attachment and gratitude toward their companies than those working in traditional office settings (Persol, 2020b).

The impact on employee well-being and the recognition of its potential by major Japanese companies cannot overlook. Fujitsu and Hitachi are notable examples of companies that have embraced telework as a permanent and beneficial working style. Fujitsu, in its July 2020 press release, emphasized the importance of employee well-being and introduced three core principles: Smart Working, Borderless Office, and Culture Change, aiming to redefine working styles and create an optimal work environment for its employees in Japan (Fujitsu, 2020). Similarly, Hitachi has been proactive in implementing telework and remote work initiatives even before the pandemic. Through its subsidiary, Hitachi Vantara, the company has been driving digital transformation and influencing remote work practices within the organization. President Hiroaki Nakanishi and Hitachi Vantara's CEO, Jack Domme, have supported and promoted a hybrid management approach that combines Japanese and global business practices. It is important to note that telework is unsuitable for all types of jobs and tasks, and its effectiveness varies depending on the nature of the work and the employees involved. However, the positive impact of telework on employee well-being and the proactive stance of these significant companies highlight the potential benefits that can be derived from adopting telework as a permanent working style.

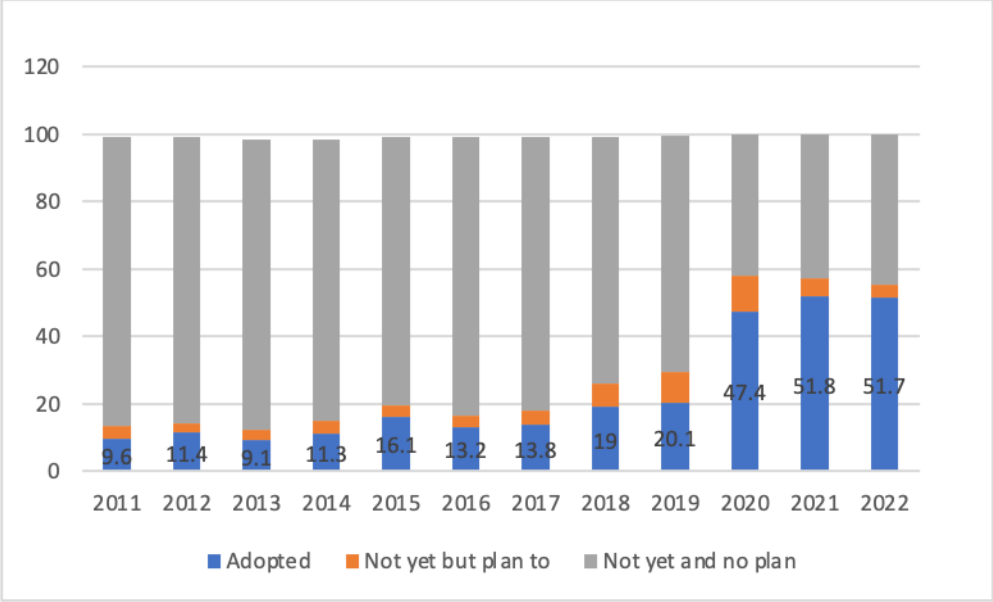
Section 2. TELEWORK TREND OVERTIME IN JAPAN

As discussed in the previous section and based on the previous studies, the take-up rate of telework was likely to increase at the start of the COVID-19 pandemic in 2020 but started to decrease in 2021. So, based on the data set from MIC, let us see the telework trend over time in Japan.

4.2.1. Telework trend from firms' perspective

Firstly, let us examine the adoption status of telework among firms over time. As shown in Figure 19, the percentage of firms adopting telework has steadily increased. In particular, the telework adoption rate witnessed a significant surge in 2020, jumping from 20.1% in 2019 to 47.4% in 2020. This substantial increase can be attributed to the onset of the COVID-19 pandemic. Interestingly, while the telework take-up rate in many other countries experienced a sharp decline after the pandemic became calmer, Japan has maintained a high adoption rate, reaching 51% in 2022. This phenomenon happened due to certain aspects of Japanese culture, such as a high score in "uncertainty avoidance" and "long-term orientation," according to Hofstede Insights (2023). Japanese society tends to be cautious in adopting new practices, but once they become familiar with them, they embrace them for the long term. Additionally, it is noteworthy that the percentage of firms willing to adopt telework without implementing it has decreased since 2020. This change suggests that firms now have a better understanding of whether telework is suitable for their operations, and those who desired to shift to telework have already done so during the pandemic.

Figure 19: Firms telework adoption status

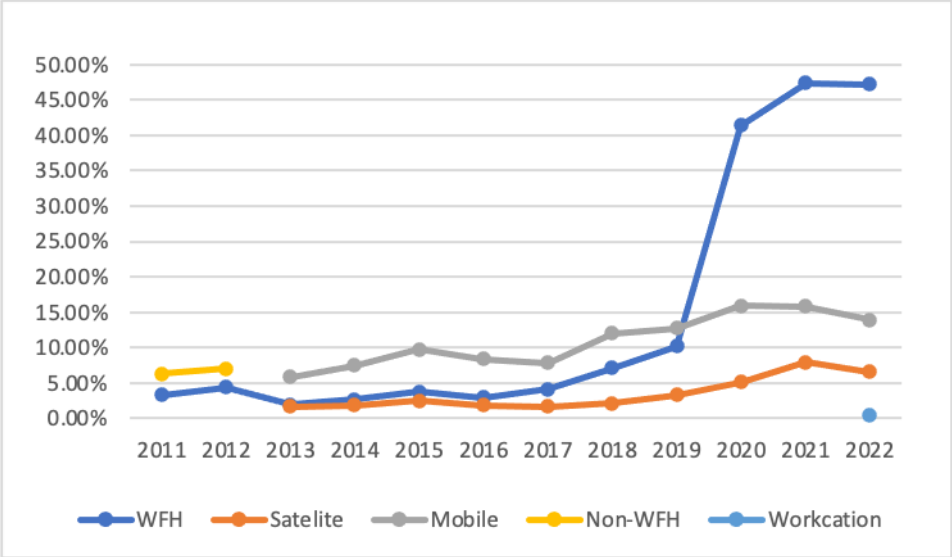


Source: author's elaboration

Delving deeper into the types of telework within this high adoption percentage, the three

prevalent types in Japan—work-from-home, satellite office, and mobile work—have grown until 2021 and have remained stable or slightly declined in 2022. Before 2019, mobile work accounted for the highest percentage of adoption, given its ease of setup and lower risk than other types. However, since the beginning of the COVID-19 pandemic, the rate of work-from-home skyrocketed and became widely adopted, with 50% of firms confirming its implementation. Additionally, since 2022, a new type of telework has emerged: workcation. Alongside work-from-home, satellite office, and mobile work, the development of teleworking with more diverse types and increased applicability to various jobs can be anticipated.

Figure 20: Firms' adoption rate of telework by type

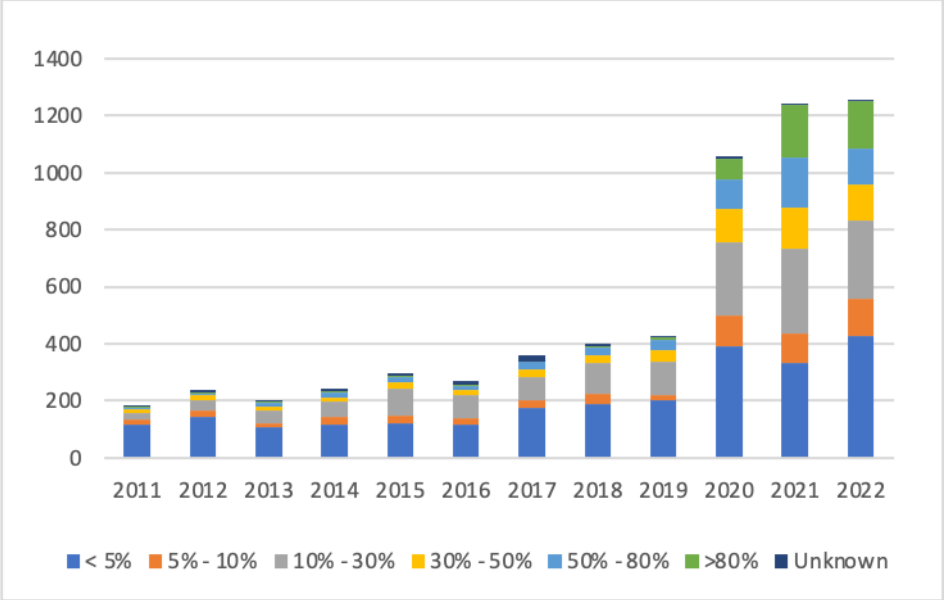


Source: author’s elaboration

Moving on to the percentage of employees engaging in telework within each firm, the highest number of firms implementing telework have less than 5% of their employees engaged in telework, followed by firms with 10%-30% of employee participation. As the number of companies implementing telework has increased, the number of firms falling into these two categories has also increased. However, since 2020, all categories have shown strong growth, particularly the presence of companies with more than 80% of employees engaged in telework, which has increased remarkably. This surge can be attributed to the government's urging people to stay at home, with most individuals opting for work-from-home if feasible. In 2022, the rate of employees engaging in

telework at an 80% level has slightly declined, and the number of firms with 5% employee participation has increased again, indicating that some companies have begun reducing the percentage of telework as they transition back to normal operations.

Figure 21: Percentage of employees applying telework



Source: author's elaboration

Furthermore, their responses varied when asking firms about the reasons for adopting telework. The survey provided around 10 to 13 possible answers to this question, categorized into five main groups:

1. Firm operation improvement: includes 'improve productivity,' 'enhance creativity,' 'increase customers' satisfaction,' 'reduce office cost,' and 'secure excellent human resource.'

2. Employee benefits: include 'providing a comfortable and healthy life for workers', 'reducing commuting time,' 'supporting vulnerable commuters,' and 'reducing long working hours.'

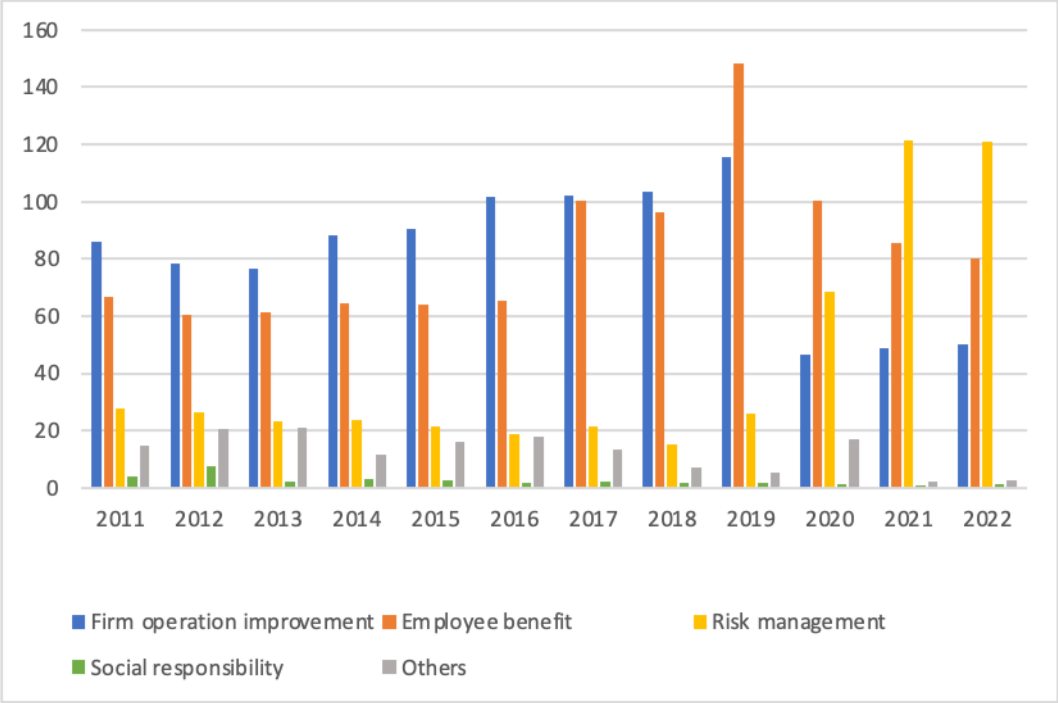
3. Risk management: including 'preparing for emergency cases' and 'responding to COVID-19.'

4. Social responsibility: including 'addressing global warming and 'implementing energy-saving measures

5. Other: including those who answered 'others' and 'unknown.'

As depicted in Figure 22, during the 2011-2016 period, the primary reason for adopting telework was to improve firm operations. However, as telework continued to develop from 2017 to 2019, the primary reason gradually shifted to "employee benefits." This change indicates that as more firms and employees adopted telework, it gained the trust and recognized as a beneficial arrangement for employees. Since the pandemic's onset, telework adoption's primary purpose has been "risk management." The data remains relatively stable between 2021 and 2022, indicating that Japanese firms prioritize emergency preparedness when implementing telework. Overall, telework has increasingly become recognized as a beneficial arrangement for employees. Therefore, in the future, once the concerns related to COVID-19 diminish, there is a high possibility that telework will continue to be developed and considered a valuable practice from both the firms' perspective and in supporting employee well-being.

Figure 22: Purpose of Telework Adoption

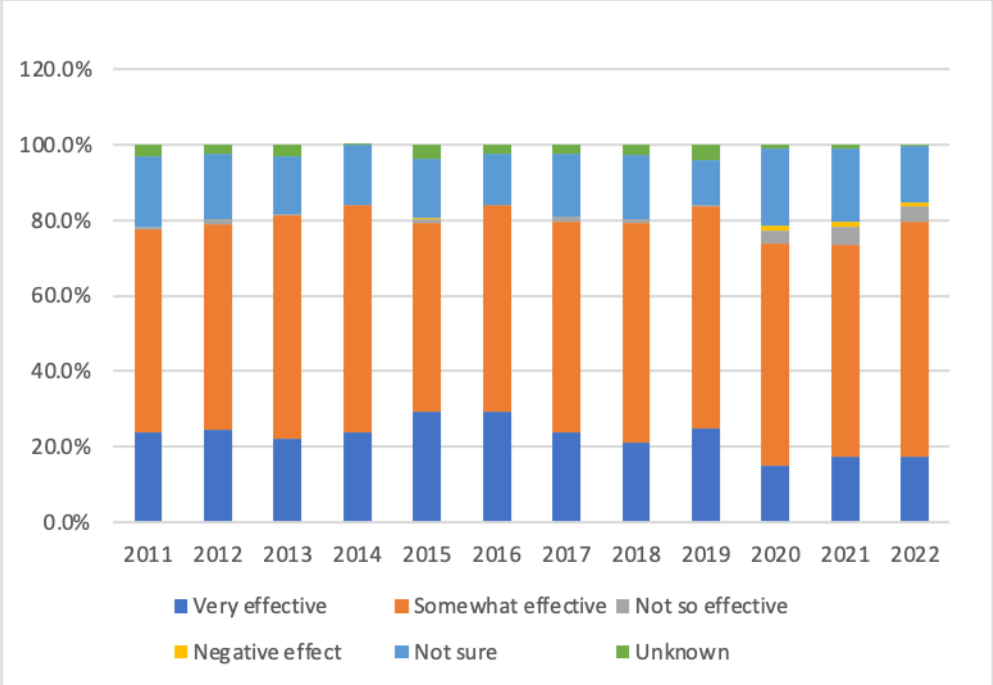


Source: author’s elaboration

*Note: Since this question allowed respondents to select multiple choices, the total percentage in some categories may exceed 100% due to the summation of several answers.

Regarding the effectiveness of telework, as reported by firms implementing it, around 80% of firms consistently confirmed its efficiency as "very effective" or "somewhat effective" over the past decade. This result is promising, considering that almost all firms implementing telework have found it to have a positive impact. However, we should note that a portion (10%-20%) of firms always need clarification on the effects of telework. Once again, it highlights that telework is not a one-size-fits-all solution for every business.

Figure 23: Firms' evaluation of telework effect



Source: author's elaboration

Lastly, firms that have not yet adopted telework were asked about their reasons for this decision, and their responses have remained relatively consistent over time. These reasons can be categorized into six main groups:

1. Job content: These firms state that no suitable job positions or tasks can perform through telework.

2. Operating problems: Reasons in this group include difficulties in operating the business, challenges in evaluating employee performance, payroll issues, slow progress in document digitization, and concerns about information leakage.

3. Communication problems: This category includes challenges related to internal communication within the company, burdens on non-telework employees, and difficulties maintaining external relationships.

4. Acknowledgement problem: Some firms need more understanding of the benefits of telework and a lack of employee demand for it.

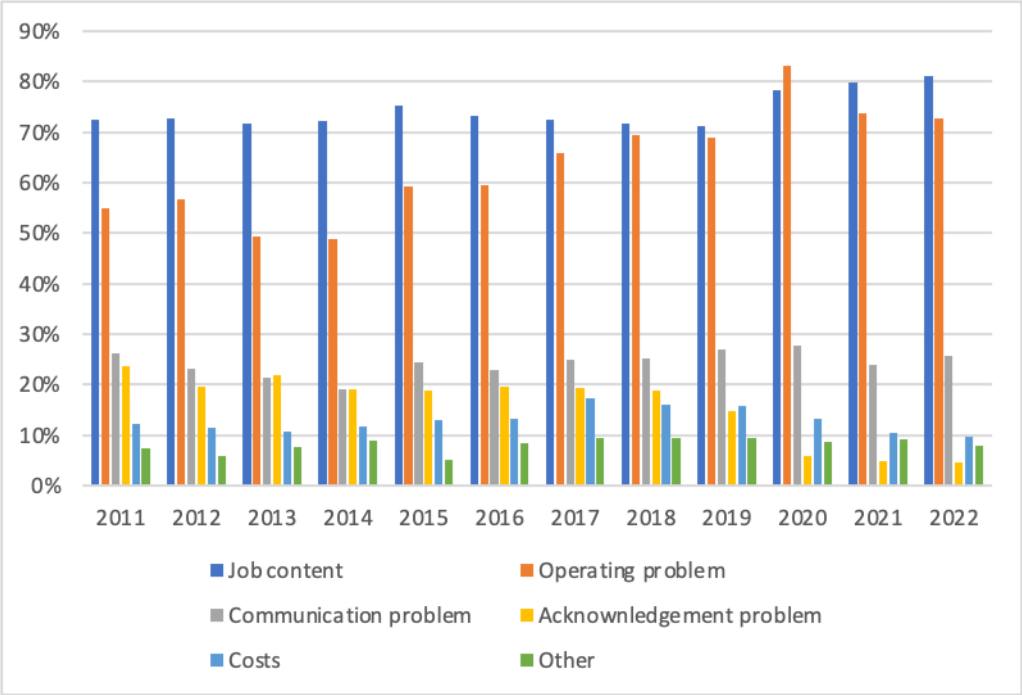
5. Cost-related problems: This group includes concerns about the costs associated with transitioning to telework and the perceived time required for implementing the necessary changes.

6. Others: This category comprises responses that fall into "other reasons" or are unknown.

Figure 24 illustrates the changes in reasons for not adopting telework over time. It reveals essential insights into the factors hindering firms from choosing telework as an option. From 2011 through 2022, the primary reason cited by firms for not adopting telework has consistently been the lack of job positions suitable for remote work. Approximately 70% to 80% of firms indicated this was their primary obstacle. This consistency indicates that many firms need help identifying roles that can effectively perform through telework. The following popular reason mentioned is operating problems. The number of firms selecting this reason increased until 2019, indicating that while there was interest in teleworking, firms faced challenges adapting their operating systems to accommodate remote work arrangements. However, since the onset of the COVID-19 pandemic, the number of firms citing operational problems as a hindrance to telework has decreased. This suggests that the pandemic has played a significant role in helping firms become more accustomed to operating with telework. On the other hand, the number of firms citing acknowledgment problems related to telework has decreased over time and sharply since the COVID-19 pandemic. This change indicates that the pandemic has helped spread awareness and acceptance of teleworking practices among firms. The reasons for cost-related problems and "others" have also experienced slight decreases over time, although not as pronounced as the previously mentioned reasons. To promote telework for the development of local areas in Japan, the government should consider focusing on jobs more suitable for telework or explore opportunities to reorganize certain positions to make them more compatible

with remote work setups. Providing detailed instructions and guidelines for operating systems with telework can also address any concerns or uncertainties that firms may have and facilitate the adoption of telework practices. By addressing these specific challenges, the government can encourage greater telework adoption and support the growth of remote work in Japan.

Figure 24: Reasons for not adopting telework



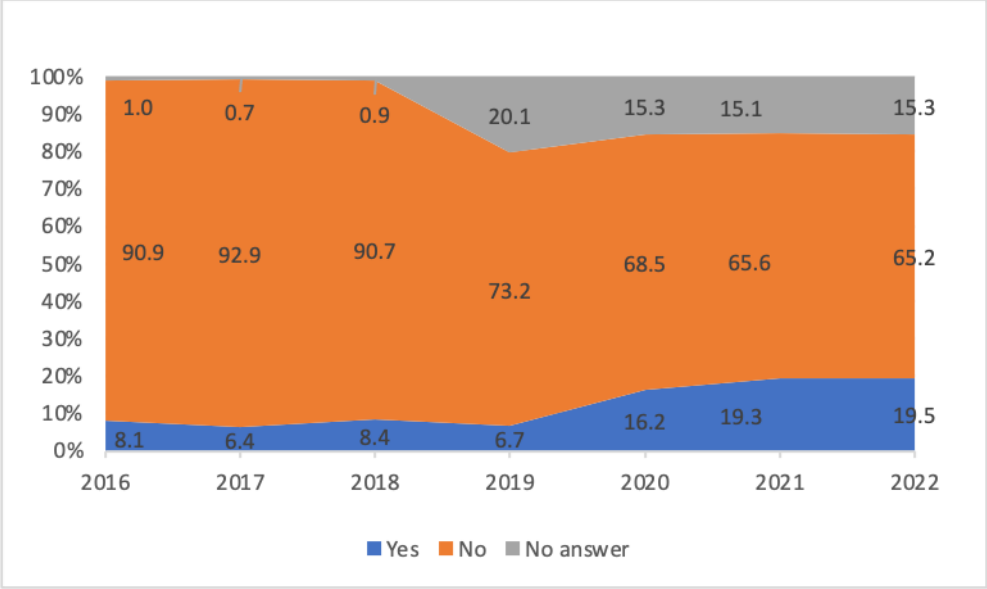
Source: author's elaboration

4.2.2. Telework trend from household's perspective

Firstly, let us examine the telework adoption rate among households, as shown in Figure 25. The survey collected responses on whether respondents have applied to telework, whether they are interested in trying it, and the reasons for not applying to it. Notably, the number of respondents has seen a significant increase since 2019, from approximately 2,000-3,000 to over 30,000 people. This indicates a substantial growth in the number of individuals engaging in telework. When considering the timing, the number of telework participants started to rise in 2020, coinciding with the widespread impact of the COVID-19 pandemic. This trend continued to increase in 2021 and even in 2022, despite the stabilization of the pandemic. This trend aligns with the cautious nature of

Japanese society in adopting new practices. Once they become familiar with them, they tend to embrace them for the long term. These findings suggest the potential for further development of telework in the future. However, it is essential to note that since 2019, along with the increase in respondents, there has also been a significant rise in the number of "unknown" responses, which remains high at 15%. This poses a challenge in drawing firm conclusions from the data, as it introduces uncertainty regarding the respondents' knowledge or understanding of telework. To gain a more comprehensive understanding of telework adoption among households, further research and analysis are needed to address the "unknown" responses and delve deeper into the factors influencing telework adoption and attitudes toward it.

Figure 25: Change of Telework Take up Rate

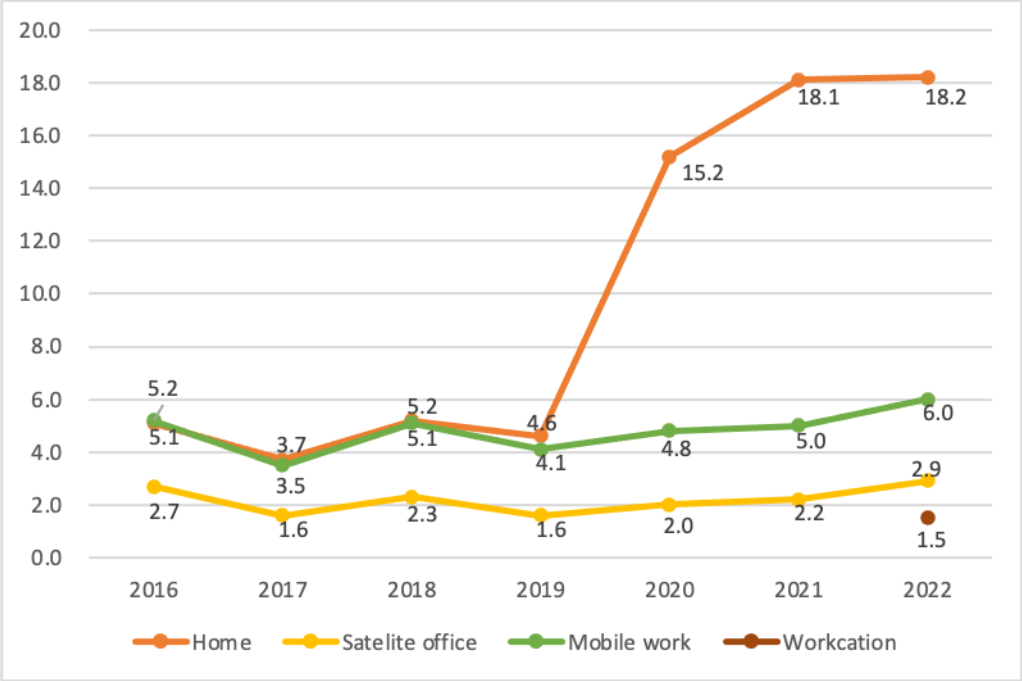


Source: author’s elaboration

Regarding telework types among households, similar to the survey conducted among firms, the proportion of satellite office and mobile work did not change significantly over time. However, there was a notable increase in work-from-home use starting in 2020, which remained at a high rate (18%) until 2022 (Figure 26). This increase is to the onset of the COVID-19 pandemic when government recommendations to stay home and health concerns prompted individuals to adopt work-from-home arrangements to minimize work disruptions and reduce the risk of virus

transmission. Additionally, starting in 2022, a new type of telework called workcation emerged. As mentioned earlier, workcation had initially gained popularity in Japan in 2017 but declined during the pandemic when people could not go out. However, as the situation improved and people sought to break free from the monotony of staying home, workcation regained popularity. This trend suggests that individuals seek more flexible and diverse telework options that accommodate different job types and cater to their preferences. The development and availability of various telework options are promising, as they allow individuals to choose the most suitable arrangement based on their specific needs and job requirements. This variety of telework options contributes to a more adaptable and flexible work environment, supporting the potential growth and adoption of telework practices.

Figure 26: Proportion of Telework by Types

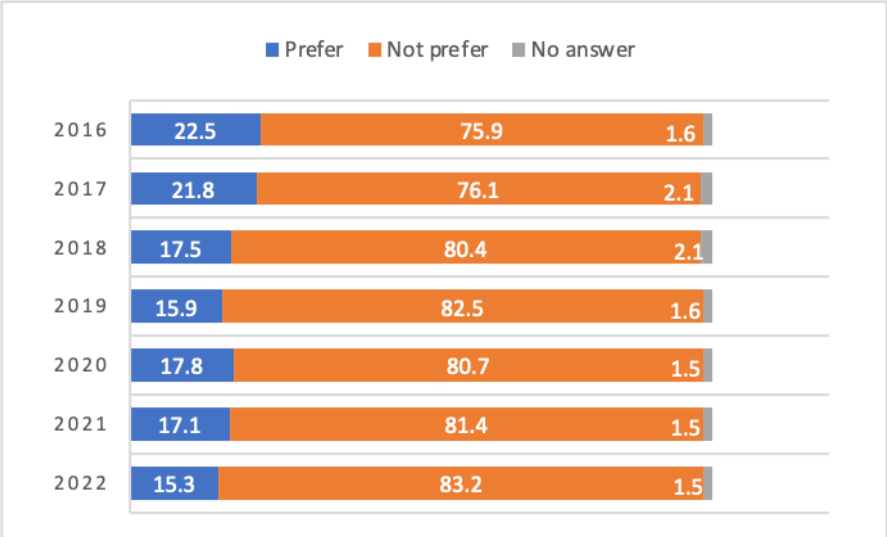


Source: author's elaboration

It is interesting to observe that the percentage of people who prefer telework has decreased over time, as shown in Figure 27. Since 2016, there has been a steady decline in the preference percentage, with a slight increase at the beginning of the COVID-19 pandemic. However, in 2022, the percentage was even lower than the pre-pandemic level, at 15%. It is crucial to consider the

context of this data. The question regarding telework preference was explicitly asked to individuals with no previous teleworking experience. Given the deeply ingrained cultural norms in Japanese society that emphasize going to the workplace and dedicating oneself to work, it is understandable that individuals who have yet to try telework may not strongly prefer it. The preference for traditional work practices and the need for more familiarity with telework could contribute to the lower percentage of individuals expressing a preference for telework. Furthermore, it is worth noting that since the onset of the pandemic, many employees have already started teleworking. As a result, the number of individuals who have not experienced telework and responded to this question may be small. This could also influence the overall percentage and contribute to a lower preference for telework among the surveyed population. Overall, these findings suggest that there may be a need for further education, exposure, and experience with telework to increase the preference for it among individuals who have yet to try it. As telework becomes more prevalent and accepted in the workplace, attitudes, and preferences may gradually shift.

Figure 27: Telework preference



Source: author's elaboration

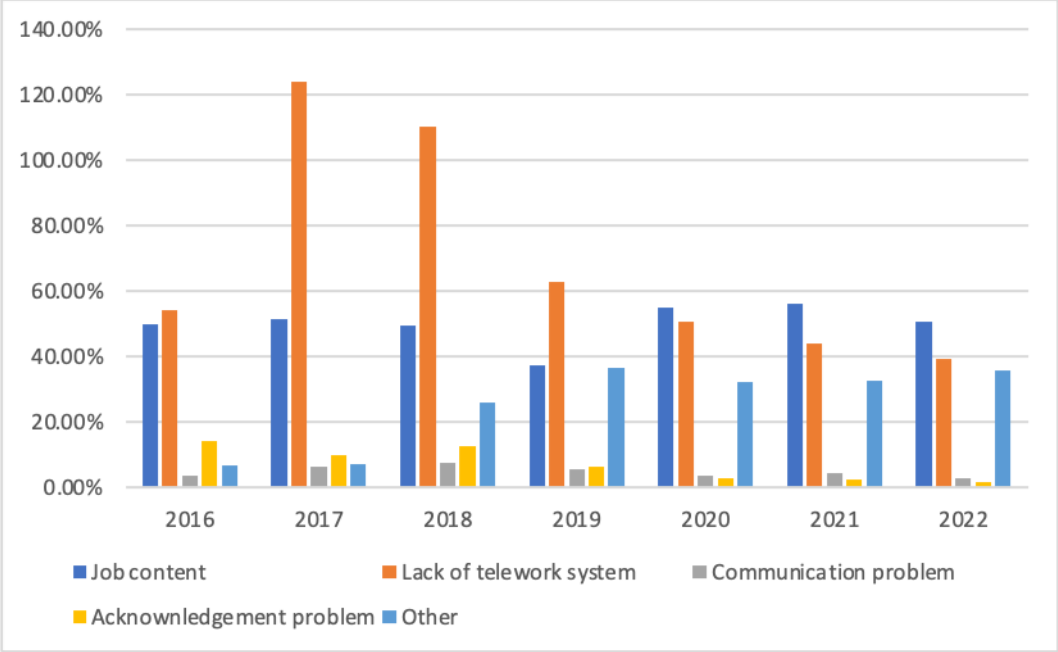
When examining the reasons for not teleworking among individuals who have not yet experienced telework but are willing to try it, the responses can be categorized into five main categories:

1. Job content: This category includes individuals whose roles are unsuitable for telework. Certain types of work may require physical presence or specific equipment that cannot be easily replicated in a remote setting.
2. Lack of telework system: Some respondents mention that their firms need a proper system. This category could include difficulties in managing telework, challenges with document digitization, or a need for appropriate telework environments or ICT systems within their organizations.
3. Communication problem: If they telework, individuals in this category express concerns about potential communication issues. They may worry about the effectiveness of internal communication or feel that the working atmosphere could be more conducive to telework.
4. Lack of telework acknowledgment: Some respondents need clarification on whether telework is possible within their organizations. This problem suggests more awareness and clarity regarding telework policies and opportunities.
5. Others: This category encompasses individuals who provided specific reasons that do not fit into the categories mentioned above or those who responded with "other reasons" or "unknown."'

As observed in Figure 28, the primary reason for not applying telework in the early years was the "lack of telework systems," which gradually decreased over time. In contrast, the proportion of respondents citing "job content" increased over time and became the most common reason for not adopting telework since 2020, coinciding with the start of the COVID-19 pandemic. This suggests that many firms have been able to incorporate telework into their systems, except for jobs that are not suitable for remote work. Furthermore, with the spread of COVID-19, the proportion of individuals indicating a lack of telework acknowledgment and experiencing communication problems while teleworking decreased. This indicates a positive effect of the pandemic on telework adoption, as individuals have become more aware of telework possibilities and have improved communication practices even in the teleworking environment. However, it is noteworthy that the

proportion of individuals selecting "others" as their reason for not teleworking has increased. This suggests that additional reasons may hinder the adoption of telework that needs to be captured by the provided categories. Conducting more detailed surveys could help identify these reasons and clarify the barriers to telework adoption from employees' perspectives. In summary, similar to the findings from the firm survey, to improve the telework adoption rate among individuals, the Japanese government should focus on jobs more suitable for telework or consider reorganizing certain positions to make them compatible with remote work setups. Additionally, providing detailed instructions and guidelines for firms to establish appropriate telework systems for their employees would be beneficial.

Figure 28: Reasons for not doing telework



Source: author's elaboration

*Note: Since this question allowed respondents to select multiple choices, the total percentage in some categories may exceed 100% due to the summation of several answers.

4.2.3. Summary of telework trend in Japan

The telework trend in Japan has seen significant growth and adoption among firms and individuals. Approximately 51% of firms and nearly 20% of individuals in Japan are implementing

telework. The telework take-up rate has steadily increased over time, with a sharp rise since the onset of the COVID-19 pandemic. Unlike in other countries where telework rates dropped after the pandemic, in Japan, the adoption of telework has remained stable even after the situation improved. This stability is due to the cautious nature of Japanese culture, where once they become familiar with the practice, they tend to continue using it.

In terms of telework types, prior to the pandemic, mobile work was the most popular choice among firms and individuals due to its ease of implementation. However, since the start of the COVID-19 pandemic, work-from-home has become the predominant type of telework, providing a necessary solution to continue work while minimizing the risk of infection. The preference for work-from-home aligns with the circumstances surrounding the pandemic and the government's recommendations to prevent the spread of the disease.

Among firms that have implemented telework, approximately 80% have found it practical or somewhat effective. However, the preference for telework among individuals who have yet to experience it has declined. This declining can be attributed to the cautious nature of Japanese culture when adopting new practices. However, once individuals successfully engage in telework, they tend to commit to it for the long term.

Regarding the reasons for not adopting telework, firms and individuals consistently state that the primary reason is the unsuitability of job content for telework, followed by a lack of telework operating systems. Interestingly, the order of these two reasons was reversed before the pandemic, indicating that the pandemic was a catalyst for pushing firms and individuals to adapt to telework, except for jobs that are incompatible with remote work setups. To promote telework, the Japanese government should focus on more suitable jobs and consider reorganizing certain positions to enable remote work. Providing detailed instructions and guidelines for firms to establish appropriate telework systems would also be beneficial.

Additionally, from the perspective of firms, there were further insights into the reasons for adopting telework. Initially, the main reason for adopting telework was to improve firm operations. However, starting in 2019, the primary reason shifted to employee benefits. Since the onset of the

pandemic, risk management has become the top reason for adopting telework. This change highlights the evolving reasons behind telework adoption based on prevailing circumstances, with a shift towards emphasizing employee benefits.

Regarding the percentage of employees engaging in telework, prior to the pandemic, more than half of the firms had less than 5% of their employees teleworking. However, since the start of the pandemic, there has been a significant increase in the proportion of employees teleworking. The percentage of firms with less than 5% of employees teleworking decreased to 30%, while 20% reported having 10%-30%. Notably, 15% of firms stated that more than 80% of their employees were teleworking.

In summary, telework in Japan has experienced a significant opportunity for growth unexpectedly brought about by the COVID-19 pandemic. Given its positive effects on both firm operations and employee benefits, it would be beneficial if the Japanese government could leverage this development momentum to enhance telework further and cultivate it as a prevalent working culture in Japan.

CHAPTER 5. TELEWORK AND THE RELATIONSHIPS WITH OTHER FACTORS

This study aims to promote the development of telework in Japan by examining its current status and identifying factors that may influence its adoption rate. In the previous chapter, we explored and gained an understanding of the state of telework in Japan. This section will investigate the relationship between the telework adoption rate and various factors, delving as deeply as possible into the available data. Our ultimate goal is determining which factors are significant and should be considered when promoting telework.

This chapter will be divided into two sections: the relationship between a firm's telework adoption rate and its related factors and the relationship between an individual's telework adoption rate and their household's profile factors. We can analyze the relationships independently since we have separate datasets for firm-level and individual-level data.

However, it is vital to acknowledge the limitations of this analysis. The available datasets consist of aggregated data, which restricts the depth of analysis we can perform. For example, for each aggregated unit (e.g. country-year, industry-year), we only have one observation on the proportion engaging in work-from-home, instead of having disaggregated observations at the individual level. Consequently, we can only utilize the chi-squared test to test for statistically significant differences in aggregate proportions, to determine if a statistical relationship exists without being able to provide detailed insights into the nature of the relationship. We will consider a relationship as significant at the 95% level when the p-value is below 0.05, and significant at the 99% level when the p-value is below 0.01. Based on the available data, we will summarize the characteristics of how each factor may affect the telework adoption rate and provide suggestions on how to improve telework in the future further.

Section 1. RELATIONSHIP OF FIRM'S TELEWORK ADOPTION RATE AND OTHER FACTORS

As mentioned in the previous sections, several factors are believed to influence a firm's

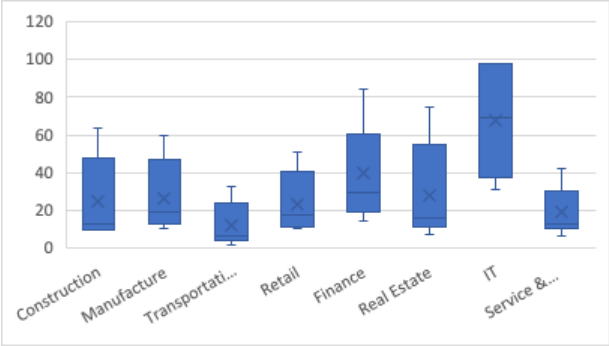
decision to adopt telework. In our dataset, we have variables related to the firm's profile that align with previous findings and could potentially have a specific effect on the telework adoption rate. These factors include industry, company scale, operations, and geographic location. This section will use the chi-squared test to examine the relationship between the telework adoption rate and industry, the firm's capital amount, the number of employees, profit margin, and region. We hypothesize that all these factors have a statistical relationship with the telework adoption rate.

Table 1: p-value from Chi-squared Test of Firms Telework Take up Rate and other factors

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Industry	0.02311	0.01373	0.00551	3E-05	6.9E-07	0.00022	6E-08	1.5E-09	6.2E-12	1.3E-37	2.7E-46	6.2E-40
Capital	1.2E-15	9.5E-21	1.9E-37	7E-42	1.5E-31	6.2E-28	2.5E-25	3.8E-35	1.9E-40	2.7E-68	1.3E-95	2.3E-60
No. of employee	3.8E-05	2.7E-14	1.6E-18	4.4E-26	3.5E-17	6.8E-28	2.7E-23	1.6E-25	4.8E-31	1.7E-19	3.1E-33	9.3E-19
Profit margin	0.212	0.033	0.004	0.028	0.379	0.036	0.017	0.0005	0.418	3.6E-05	1.6E-09	6.1E-11
Region	2.8E-06	0.01556	7.8E-05	8.5E-07	2.1E-06	2.1E-05	1.5E-12	1E-09	9.8E-08	1.2E-28	1.4E-30	2.2E-18

Table 1 presents the p-values of the chi-squared test calculated using 12 years of continuous data on the telework adoption rate from 2011 to 2022, considering factors such as industry, capital amount, number of employees, profit margin, and region. Generally, except for the profit margin, most of these factors showed a significant relationship with the telework adoption rate for the whole period. Therefore, the difference in profit margin may not be related to the telework adoption rate. However, a statistical relationship exists between industry, capital amount, number of employees, region, and the firm's telework adoption rate. Changes in these factors could impact the adoption of telework. Let us examine the telework take-up rate in more detail based on the available dataset, focusing on industry, capital amount, number of employees, and region.

Figure 29: Firms Telework Take up Rate by Industry

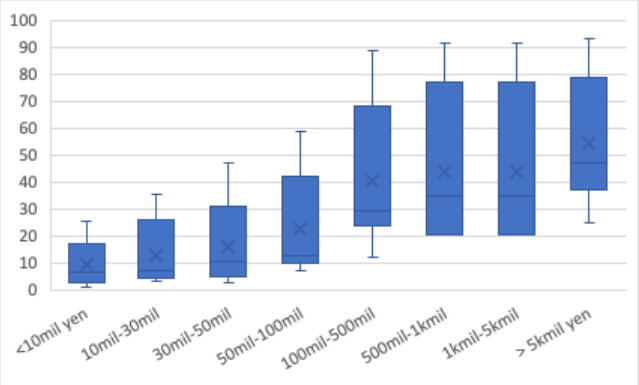


Source: author's elaboration

Firstly, regarding the telework take-up rate by industry, Figure 29 shows the box plot of the telework take-up rate during the period 2011-2022 for the seven industries mentioned in the survey: Construction, Manufacturing, Transportation, Retail, Finance, Real Estate, IT, Services, and others. In general, all industries show dispersed data since the onset of the pandemic affected and changed the telework take-up rate of all industries. The IT telework proportion shows a higher median among the industries than any other. While others have a positive skew, the IT telework proportion has a negative skew, indicating a remarkable difference in the telework rate of the IT industry compared to others. This difference makes sense since IT jobs are mostly done via personal computers and the Internet and are less dependent on physical office spaces than other jobs. The remaining telework proportion are all positively skewed, but the finance industry showed a relatively high proportion, followed by real estate, manufacturing, and construction. The proportion of the transportation and service industries are positioned lower. They are less dispersed, indicating a lower telework take-up rate and a potentially lower growth potential even during the pandemic than other industries. These findings suggest that the nature of the industry plays a significant role in adopting telework. Industries more conducive to remote work, such as IT, show higher telework take-up rates. In contrast, industries that rely heavily on physical presence, such as transportation and service sectors, have lower rates of telework adoption. Policymakers and organizations must consider the industry-specific challenges and opportunities when promoting telework adoption. Industries with

lower telework rates may require additional support and guidance to explore ways to implement telework effectively. In comparison, industries with higher telework rates can serve as examples and share best practices. Targeted strategies can be developed to encourage telework adoption across different sectors by understanding the relationship between industry and telework adoption.

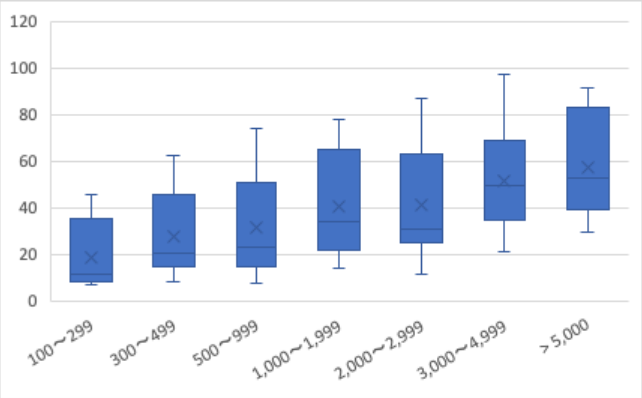
Figure 30: Firms Telework Take up Rate by Capital Amount



Source: author's elaboration

Next, we examine Figure 30, illustrating the telework take-up rate by capital amount. There is a trend of increasing telework take-up rates with higher capital amounts. This trend suggests that larger firms have greater flexibility in choosing their work arrangements based on changing circumstances. On the other hand, firms with capital amounts of less than 10 million yen have lower telework rates, and even during the pandemic, a significant proportion of them did not transition to telework.

Figure 31 Firms Telework Take up Rate by Number of Employee

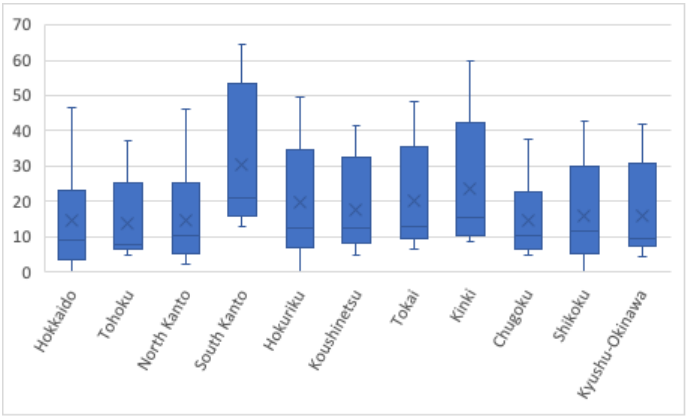


Source: author's elaboration

Moving on to Figure 31, which depicts the telework take-up rate by the number of employees, we can observe that, in general, the larger the number of employees, the slightly higher the telework take-up rate. The data show relatively consistent dispersion among the categories. However, firms with fewer than 300 employees have the lowest telework rates, and their distribution appears to be less dispersed and positively skewed compared to other categories. This low rate suggests that smaller firms, especially those with fewer than 300 employees, face more challenges adopting telework, even during the pandemic.

Figure 32 provides insights into the telework take-up rate by region. It is evident that the South Kanto area, which includes major cities like Tokyo, has the highest telework take-up rate and the most dispersed data among the regions. This trend makes sense, considering this area's high population density and concentration of jobs and firms. The Kinki region, including cities like Osaka, shows the second-highest telework rate and is relatively dispersed. In contrast, less densely populated areas such as Chugoku, Tohoku, and Hokkaido exhibit lower telework take-up rates, less dispersion, and positive skewness. This telework proportion shape suggests that firms in these regions consistently have lower telework adoption rates and are less flexible in transitioning to telework, even during the pandemic.

Figure 32: Firms Telework Take up Rate by Regions



Source: author's elaboration

Based on the above figures, IT, finance, and real estate firms tend to have higher telework rates. Additionally, firms with higher capital amounts, a more significant number of employees, and those in more densely populated areas are more likely to have higher telework take-up rates. Considering these findings, if the Japanese government aims to improve the telework take-up rate, they could start by supporting firms in the finance and real estate industries, firms with lower capital amounts, fewer employees, and those in less densely populated areas. Providing targeted assistance and resources to these categories of firms may help increase telework adoption and promote a more widespread telework culture in Japan.

Section 2. Relationship of Individual's Telework Adoption Rate and Other Factors

Based on previous findings, several factors can influence an individual's decision to adopt telework, such as age, gender, family structure, income, and region. This section will examine the relationship between these factors and the telework adoption rate using chi-squared tests. We hypothesize that all these factors have a statistical relationship with the telework adoption rate.

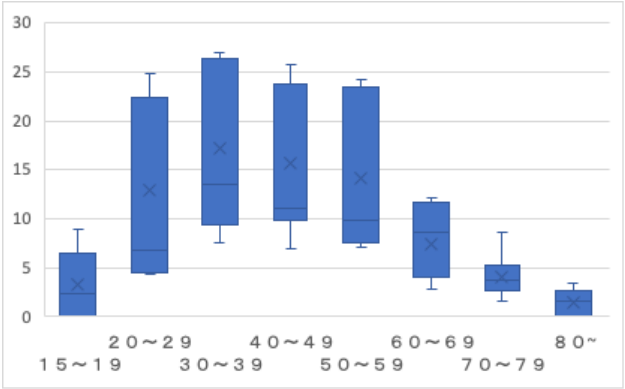
Table 2: p-value from Chi-squared Test of Individuals Telework Take up Rate and other Factors

	2016	2017	2018	2019	2020	2021	2022
Age	1.1E-06	0.14341	1.6E-09	3E-101	1E-228	1E-228	9E-261
Gender	4.2E-08	7.2E-05	5.2E-16	2.7E-72	2E-108	3E-137	2E-132
No. of family member	7.4E-07	0.06903	0.00087	8.7E-11	5.9E-73	2.3E-50	2.1E-23
Income	7.5E-30	1E-10	6.5E-26	2E-224	4E-305	0	0
Region	1.4E-21	0.00328	1.3E-22	2E-131	1E-244	2E-202	3E-186

Table 2 presents the chi-squared values and p-values calculated using seven years of continuous data from 2016 to 2022, considering the factors of "age," "gender," "number of family members," "income," and "region." All factors demonstrate a significant relationship with the telework adoption rate.

Moving on to Figure 33, which illustrates the telework adoption rate by age, we can observe that workers in their 30s are more likely to have a higher telework adoption rate than other age groups, followed by workers in their 40s, 50s, and 20s. Conversely, workers in their 10s, 70s, and 80s exhibit meager telework adoption rates. This trend aligns with the fact that individuals aged 20-59 make up the primary working force in Japan, with more employment options and flexibility in choosing their working styles. In contrast, individuals in their 10s, 70s, and 80s have fewer employment options and less elasticity in adopting new working styles.

Figure 33: Individuals Telework Take up Rate by Age

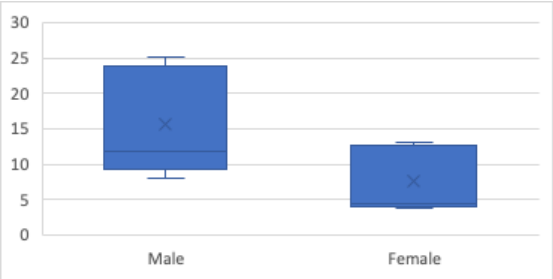


Source: author's elaboration

Figure 34 illustrates the telework adoption rate by gender. There is a clear difference in the

telework adoption rate between male and female workers. On average, male workers have a higher and more dispersed telework adoption rate than female workers. This difference aligns with previous global studies that indicate men have more opportunities to try, choose, and adopt telework. This disparity may be attributed to the challenges faced by Japanese women in pursuing careers after marriage, leading to limited job opportunities and reduced flexibility in choosing jobs or working styles. This longstanding issue in Japanese society is yet to be fully addressed. However, once this problem is effectively addressed, it may also increase the chances for Japanese women to choose telework as a more beneficial and suitable working style.

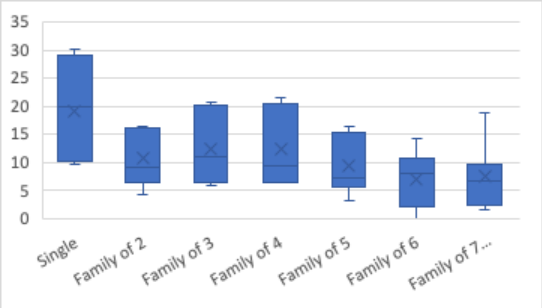
Figure 34: Individuals Telework Take up Rate by Gender



Source: author's elaboration

Figure 35 illustrates the telework adoption rate by the number of family members. Single workers have the highest telework adoption rate, with more excellent dispersion in the data. This dispersion suggests that single workers are more flexible in telework, with a higher median telework adoption rate than other family types. Families with 3 or 4 members exhibit similar interquartile ranges, but families with four have a lower median and a more positive skew. Families with two and five members have lower positions on the graph, showing lower telework adoption rates and less dispersion than families with 3 or 4 members. These two family types follow a similar pattern. Families with six or more members have the lowest telework adoption rates and a positive skew, indicating limited adoption of telework in most instances.

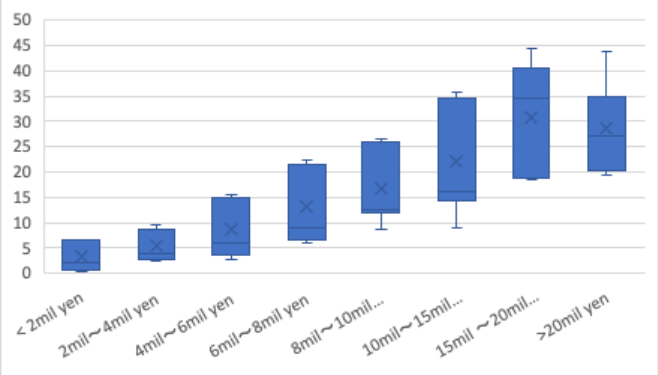
Figure 35: Individuals Telework Take up Rate by Number of Family Member



Source: author's elaboration

A clear trend can be observed in Figure 36, which depicts the telework adoption rate by income. Generally, the higher the income, the higher and more dispersed the telework adoption rate, except for the highest income bracket (more than 20 million yen). This trend suggests that higher-income individuals have more flexibility and options regarding job content and working styles. It is important to note that individuals with lower incomes may require more support in adopting telework compared to those with higher incomes.

Figure 36: Individuals Telework Take up Rate by Income

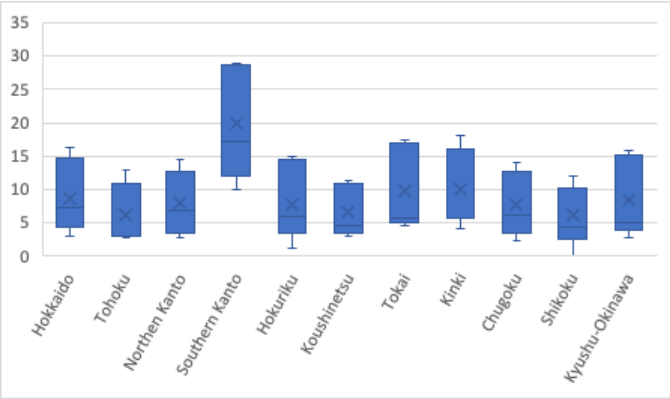


Source: author's elaboration

Figure 37 provides insights into the telework adoption rate by region. Southern Kanto, Japan's most central and densely populated area, exhibits the highest telework adoption rate and the

most dispersion among all regions. This result aligns with the findings in the analysis of firm-level data (Figure 32). The concentration of diverse job opportunities and well-developed infrastructure may contribute to this region's higher telework adoption rate. The following regions regarding telework adoption rate are Tokai and Kinki, followed by Hokkaido and Kyushu-Okinawa, which are surprising findings. In contrast, despite having a lower telework adoption rate among firms, Chugoku demonstrates a middle position in terms of individual-level telework adoption rate. On the other hand, Koushinetsu has the lowest telework adoption rate among regions, indicating ineffective telework development despite a significant number of firms adopting telework. This differences raises the need for further investigation into the underlying factors, whether it be job content or telework systems, through more specific surveys.

Figure 37: Individuals Telework Take up Rate by Regions



Source: author’s elaboration

In conclusion, individuals in their 10s, 60s, 70s, and 80s, female workers, individuals with more family members, individuals with lower incomes, and individuals residing in less central areas face more challenges in adopting telework. To improve the telework adoption rate in Japan, the government should focus on these target groups, conduct more detailed surveys to understand their specific challenges and provide adequate support tailored to their needs.

CHAPTER 6. CONCLUSION

This study aims to improve the adoption of telework in Japan by assessing its current status and examining the factors that may influence its progress. The data used for this study was obtained from the Communication Usage Trend Survey (通信利用動向調査), an annual survey conducted by the Japanese Ministry of Internal Affairs and Communications. Two sets of data were utilized: one about telework-related information and profiles of surveyed firms and another concerning individuals' telework information and household profiles.

Previous studies have highlighted several factors that have been shown to affect telework adoption and the impact of telework on society, firms, and employees globally. External factors such as government policies, geographical conditions, and professional networking influence the telework uptake rate. From the perspective of firms, industry type, occupation, digital infrastructure, managerial and IT human resources, and pre-pandemic telework experience are essential factors in the decision to adopt telework. On the other hand, from the perspective of employees, gender, education, age, family structure, and pre-pandemic telework experience are considered significant factors. Once telework is implemented, it can affect firms' operations, financial status, and human resources, as well as impact both the working environment and employees' personal lives.

While there have been numerous international studies on telework, there needs to be more research on the telework status in Japan. This study aims to address this gap and contribute to understanding telework in Japan while providing insights on improving its adoption. The history of telework in Japan dates back to the 1980s but faced challenges during the 1990s bubble economy and initially received less attention from firms. However, telework gradually gained traction in the 2000s and 2010s. The COVID-19 pandemic marked a significant turning point, leading to over 51% of Japanese firms adopting telework, with nearly 20% of employees implementing it. Unlike the global trend, where telework rates declined after 2022 as the pandemic stabilized, our data indicates that telework rates in Japan continued to improve. This trend can be attributed to the cautious nature of Japanese culture, where they approach new practices carefully, but once they become familiar,

they embrace them for the long term. These findings suggest the potential for further development of telework in Japan.

The study has uncovered additional characteristics of telework in Japan. Work-from-home has emerged as the most popular teleworking style, primarily driven by the COVID-19 pandemic and the need to mitigate infection risks. Firms that have adopted telework express a high preference for it, with 80% confirming its effectiveness. However, individuals without prior telework experience still harbor some apprehension. The primary reasons for not adopting telework among firms and individuals are job content unsuitability and the need for teleworking systems. It is worth noting that the number of firms with a high proportion of teleworking employees has grown significantly since the pandemic start.

The study also examined the factors that may have a statistical relationship with telework adoption. Through chi-squared test analyses, industry, capital amount, number of employees, and region were found to have a statistically significant relationship with the telework adoption rate from the firm's perspective. Similarly, age, gender, family structure, income, and region correlated with the telework adoption rate from the individual's perspective. Further analysis revealed that firms in more densely populated areas, particularly in the IT, finance, and real estate industries, with more significant capital amounts and employee numbers, were more likely to have higher telework adoption rates. Similarly, individuals in their 30s to 50s, male workers, those with smaller family sizes, higher incomes, and residing in central areas exhibited higher telework adoption rates. To promote telework in Japan, the government should leverage the knowledge and practices of firms and individuals with high telework adoption rates. This solution includes reorganizing and providing support to address concerns related to job content suitability and teleworking systems. By doing so, the government can encourage wider adoption of telework among firms and individuals, facilitating the development of a flexible work culture throughout Japan.

Using data from a nationwide survey, this study aims to contribute to understanding telework in Japan and provide recommendations to the government for further improvements. However, it is essential to note that this study has limitations. The data used in this study was obtained from official

government sources and analyzed in an aggregated form, restricting the ability to identify specific patterns and directions of the relationships. Therefore, further studies utilizing raw data should be conducted better to understand these factors and their impact on telework adoption, enabling more informed policymaking and promoting telework.

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