



# On the Work Autonomy Supported by Information and Communication Technology A Case Study of Work from Home in Japan before the COVID-19 Epidemic

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## Abstract

Telecommuting increased during the COVID-19 pandemic. To make telecommuting the “new normal,” it is essential to not only change the legal system and employment contracts but also reform organizational processes. Prior research has demonstrated a positive correlation between telecommuting and perceived autonomy using questionnaire surveys, but the lack of a widely accepted measurement scale to capture the reality of telecommuting has hindered the capacity to understand its current status. In this study, we conducted unstructured interview surveys to elucidate the mechanisms of the relationship of perceived autonomy and telecommuting, while focusing on perceived autonomy in organizational processes. The paper is organized as follows: it reviews previous studies on telecommuting and describes the related advantages and disadvantages; examines changes in the environment and attitudes based on interviews conducted with employed telecommuters; examines changes in telecommuters’ attitudes toward perceived autonomy.

**Keywords** Telework · Telecommuting · Autonomy

## 1 Introduction

The COVID-19 pandemic forced the world to engage hard in telecommuting, and it has been encouraged in Japan since April 2020. Nonetheless, many companies were not prepared for this sudden shift to telecommuting, and a major issue was how to manage working hours, especially in the absence of communication with

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supervisors or colleagues; this made job performance and time progress management an important matter. However, another problem of telecommuting is the inability to give instructions and consultation on the management of job performance, and because there are no time and location restrictions in telecommuting, workers must manage these matters properly and independently. However, this can lead to long working hours, sometimes unpaid overtime, and other problems [1]. Therefore, this study examined the relationship between information and communications technology (ICT) and autonomy. In this study, autonomy is, in general, defined as the ability to plan and manage own work time and progress, as well as perform own duties [1]. Thus, we would like to propose the following type of relationship between ICT and autonomy: (1) ICT-dependent, in which time management is delegated to ICT; (2) action-oriented (or performativity), in which autonomy is enhanced through ICT use. Through interviews, we attempted to clarify whether autonomy in telecommuting is of the action-oriented type.

Importantly, the study sample comprised telecommuters who did not work under the discretionary labor system and who engaged in telecommuting prior to COVID-19. In this system, workers would not be paid for overtime work that has not been agreed upon beforehand. In this point, this system is similar to exempt employee, but for different tasks. Thus, this system is applied for two categories: first, specific specialties in their work, including lawyers, accountants, second, workers related to corporate management-related planning, research and analysis.

Thus, this case study shows that telecommuting is possible even without a discretionary labor system, provides potentially useful evidence for the design of systems for new ways of working in the so-called “new normal era” post-COVID-19, and for defining the usability of ICT in work settings. Moreover, the implementation of telecommuting related to COVID-19, which occurred as a measure to prevent the spread of the infection, was an emergency measure out of necessity. Such measure led companies to engage in a great deal of trial-and-error and frustration. In the past, the introduction of a discretionary labor system was considered essential to the implementation of telework. However, as noted above, the scope of work covered by the discretionary labor system is quite restricted. For this reason, it has been considered difficult to shift all kinds of work to telework. Such points are similar to the case of telework implementation prior to COVID-19. In light of such delegation, it is significant to examine the results of a survey conducted with full-time telecommuters who had a non-discretionary work prior to the COVID-19 pandemic.

Regarding autonomy, this study aimed to examine how the attitudes of non-discretionary full-time telecommuters toward work hours and progress management were transformed through telecommuting practices and the management systems that support these practices. This paper is organized as follows: the first section presents a literature review of studies on telecommuting and describes the advantages and disadvantages of telecommuting that have been identified; the second section examines changes in the environment and attitudes toward work hours and progress management based on interviews conducted with employed telecommuters; the third section examines changes in telecommuters’ attitudes toward autonomy.

## 2 Prior Research on Telecommuting in Japan

In this section, first, we review the current state of telework research in Japan and then examine prior research on autonomy in telework.

### 2.1 Current Status of Telework Research in Japan

The history of telework research in Japan can be traced back to the late 1980s.<sup>1</sup> To the best of our knowledge, the first study was a demonstration of satellite offices, which was followed by the energetic development of demonstration experiments on resort offices, albeit these gradually declined with the end of the bubble economy [2]. In the late 1990s, policies like “e-Japan” were expected to drive the spread of telework<sup>21</sup>. Additionally, the Great East Japan Earthquake triggered the implementation of telework as a beneficial means of business continuity planning. By working from home (WFH), it has been noted that business activities can be continued even in emergency situations such as disasters. While the resilience ability of organizations against disasters has attracted attention, the importance of telework has been recognized in the formulation and implementation of a “business continuity plan” [3]. These research trends led various scholars to begin to report the results of surveys investigating the current status and effects of telecommuting or WFH [4]. The evidence showed that telework had great promise as a means of solving many social problems, such as easing traffic congestion, expanding employment opportunities for people who have never had their own place of employment, and other vulnerable transportation workers, as well as helping women advance in society [5].

Challenges to the realization of telework quickly became apparent, with research describing a lack of jobs suitable for telework, difficulties in evaluation, inadequate working environments, and security concerns [1–5]. Furthermore, expectations for telework increased with the enforcement of policies such as the Japanese government’s “Charge of Promoting Dynamic Engagement of All Citizens,” the clarification of the current status and issues of crowdsourcing of work [7], and proposals for telework environments [8–11].

Regarding the use of telework as a means of outsourcing, in addition to international development in the software industry, which uses outsourcing, outsourcing also developed through the creation of the so-called owned media (e.g., websites

<sup>1</sup> There is no shortage of studies on telework and telecommuting. In addition, there are some papers that review previous studies [43]. Since it would take too much space to cover all of them, the review of previous studies in this study are limited to representative literature, such as the studies by Spinks [5], Sato [2], and the Ministry of Internal Affairs and Communications [44].

<sup>2</sup> e-Japan refers to the concept, strategy, and policy that the Japanese government aims to realize a Japanese-style IT society. On September 21, 2000, then Prime Minister Yoshiro Mori made the first statement in his policy speech at the plenary session of both houses of the Diet (150th Diet session). High-speed network infrastructure development (at the time, 30–100 Mbps was a standard), realization of e-commerce, e-government, and enhancement of human resource development were the priority issues. See also the URL below (We last accessed on 2023.2.3.).

[https://www.soumu.go.jp/menu\\_seisaku/ict/u-japan/new\\_outline01.html](https://www.soumu.go.jp/menu_seisaku/ict/u-japan/new_outline01.html).

and public relations magazines) and take notes of proceedings (there is work to record the meeting and transcribe it later, and work to organize those notes.). These developments were expected to increase the employment opportunities for people with disabilities and telecommuters with disabilities [7].

Regarding studies proposing telework environments, many relate to the construction of supportive environments for the development of a sense of connectedness among telecommuters; specifically, by enabling them to feel the “workplace atmosphere” through providing them with constantly connected large-screen images, in addition to the use of web and video conferencing systems [8–11]. Although these highly functional systems are significant support tools, they are expensive. A study also describes the difficulties surrounding understanding their system concepts [12], and another attempted to bring a sense of connectedness using social media, albeit it was shown that the attempts were not highly functional [13].

Despite the plethora of research on telework, the implementation rate in Japan has remained at around 17% until the COVID-19 pandemic [14]. Thus, the real catalyst for a rapid increase in telecommuting implementation rates was the COVID-19 pandemic. The pandemic led the Japanese government to request people to refrain from leaving their homes when unnecessary, which made companies quickly adopt telework activities, making the implementation rate rise to 55.9% [15]. This led researches to investigate the prevalence of teleworking under COVID-19 using published survey data [16, 17], by applying surveys on the actual status of teleworking under COVID-19 [18], and to examine the demonstrations of diversity in employment patterns [19]. Thus, COVID-19 pandemic gave rise to numerous research on the current status of telecommuting.

Nonetheless, with the decline in the risk of infection, a trend of the discontinuation of telecommuting started. It may be that while telecommuting has been deemed as effective in preventing the spread of infection, it was not linked to improved corporate performance. Various researchers have shown that telecommuting is effective in improving corporate performance, but the economic contraction that occurred amid COVID-19 certainly did not lead to improved corporate performance for many companies [20]. Thus, teleworking research under COVID-19 may require a different research approach than that used in the past. In fact, in a survey study during COVID-19, many people described that teleworking has the benefits of the prevention of infection and elimination of commuting time, and there was a strong nuance that it was only an emergency response [21].

## 2.2 Telecommuting and Perceived Autonomy

Regarding international studies, the lack of a widely accepted measurement scale to capture the reality of telecommuting has been described to hinder our capacity to understand its current status [22]. Nevertheless, many researchers have explored the effects of telecommuting, demonstrating the relationship between telecommuting and organizational performance variables, including organizational citizenship behavior, work–life balance, and job satisfaction [23]. This study placed autonomy

(explicitly or implicitly) as a mediating factor, implying that telecommuting affects organizational performance through the mediation of perceived autonomy.

In this context, autonomy was defined as “a substantial freedom, independence, and discretion” [1], and as the ability to control the work method, schedule, pace, procedures, workplace, evaluation, hours, type, amount, goals, priorities, and criteria [24]. Still, autonomy has been broadly discussed in the context of human resource management, work sharing, flexible work arrangements, and is not a keyword specific to telecommuting. Therefore, we reviewed prior research on autonomy, job autonomy, and employee work control in the human resource management field. Its history can be traced back to the 1970s [24], wherein researchers discussed expanding the rights of shop floor personnel to choose their work tools and procedures at factory labor sites. Later, scholars demonstrated that autonomy positively impacts motivation [1], and in the 1980s, autonomy was shown to be important in the context of “empowerment” and “high-performing organizations” both for factories and white-collar companies [25]. The authors classified these previous studies as follows: studies on the concept of autonomy when used in international comparisons; that identify the promoting factors of autonomy; and explore the impact of autonomy. Researchers have measured autonomy as “the degree of initiative employees can exercise over the work tasks they directly perform,” “the degree of work schedule control,” and “the degree of work method control” [26].

In Japan, autonomy is a major keyword and is expected to be a driving force for a reform in the country’s unique job practices.<sup>3</sup> Specifically, there are no strict definitions as to the contents and practices of jobs. Meanwhile, working hours are strict and defined by rules, evoking a lack of time freedom [27]. Since these job practices have recently been shown to impede productivity improvement—and increasing white-collar productivity is considered an urgent topic—the need to improve autonomy has become a major and pressing issue, with concrete means for tackling this issue being systems that allow workers to determine their own working hours<sup>4</sup> Nevertheless, these systems can only be adapted to jobs with a high degree of autonomy, making them somewhat tautological.

Job autonomy has also been used as an explanatory variable for productivity and motivation in the context of human resource management, with a quick Google Scholar search for the keywords “job and autonomy” in Japanese yielding over 16,000 hits (Our last web search was on February 3, 2023). Still, most research on this topic are related to nursing, and few telecommuting research have explored

<sup>3</sup> In particular, Japan’s unique “discretionary labor system” is being discussed as autonomy over working hours is important. Under this system, workers are paid based on a pre-estimated number of hours rather than actual working hours. Therefore, overtime pay is not paid. This system is expected to encourage workers to voluntarily manage their time and perform their duties.

<sup>4</sup> See the following URL from the Ministry of Health, Labor and Welfare (We last accessed August 1, 2022). Ministry of Health, Labor and Welfare (2021.6.25) “Outline of Survey on Discretionary Labor System” (<https://www.mhlw.go.jp/content/11402000/000797825.pdf>).

Of course, the subject of autonomy should not be limited to time. However, in Japan, work content is not clearly defined, so time has attracted attention as an index for examining the autonomy of the process of performing duties.

the topic of autonomy. For example, two studies demonstrate that telecommuting increases autonomy [28, 29], while another depicts that enhanced learning opportunities for telecommuters increase autonomy and morale [30]. Meanwhile, a paucity of researchers had focused on the telecommuters' autonomy, meaning that despite the flourishing of telecommuting studies due to COVID-19, most are surveys of the actual conditions of telecommuting, and no researcher has examined autonomy improvement in this context—to the best of our knowledge.

### 2.3 Extending the Concept of Autonomy

The concept of autonomy explored by the research described above refers to workers' perceived autonomy for a given task, thus differing from the concept of autonomy as an individual attribute. The latter refers to a dimension of personal profiling, including conscientiousness, self-regulation, and extraversion [31]. Discussions of autonomy in the ICT field often propose that even those who lack individual attributes of autonomy can act autonomously by delegation of a task (e.g., time management) to a system, naming this approach to autonomy as ICT dependent.<sup>5</sup>

However, ICTs do not automatically extend autonomy and are not a means of solving problems all at once, like “a silver bullet that kills the immortal monster werewolf created by melting down a cross with a single blow” [31]. Instead, they should be regarded as a means to expand autonomy through the interaction of ICT and job performance, with this expansion in autonomy referring to an expansion of perceived autonomy—not a radical change in personality. Conventional telecommuting and human resource management research have generally focused their discussions on the augmentation of autonomy through institutional change, leaving the gradual change in job autonomy through ICT use an unexplored topic. A representation of studies exploring this gradual change is the series of studies by MIT's Orlikowski [32], wherein she discusses transformation through the interaction of ICT and organizational factors, initially relying on Giddens' structuration theory [33] and actor-network theory [34]. These studies led Wanda Orlikowski to propose her own perspective of sociomateriality [35]. Sociomateriality is expected as a perspective that bridges the micro and macro changes that the use of ICT systems gives to autonomy.

## 3 Management and Awareness of Telecommuters by an ICT System

### 3.1 Summary of Interviews with Telecommuters

As discussed in another paper [21], in Japan, it is said that working from home has become popular as a measure to prevent the spread of the COVID-19 pandemic.

<sup>5</sup> There are two research trends in information system research [45]: “development research” and “utilization research”. Development research focuses on “developer autonomy”, and usage research focuses on “end-user autonomy”. In this paper, we limit our discussion to end-user autonomy, including Zuboff [46].

However, as the threat of COVID-19 subsides, more and more companies are returning to the traditional work style [21]. This is probably because the telework process contradicted traditional business practices [21]. Then, what is the new business practice for the realization of telework?

To answer this question, in this paper, this study explored the attitudes of three telecommuters at a company that provided an appropriate telework environment even before the COVID-19 pandemic, and clarified the behavior and system mechanisms that influence the telecommuters' attitudes toward perceived autonomy through unstructured interview surveys.

Waki [36] examined the challenges of telecommuting from both the perspective of management and employees, finding that the following three issues were common to and recognized by both sides: difficulty in separating work time and time for other topics (boundary permeability issue), anxiety about long working hours (long working hours issue), and lack of communication (communication issue). These difficulties can be alleviated to some extent by education and training to increase autonomy [37]. Thus, this study explored the effect of in-house ICT systems on these three challenges. While some argue that management with monitoring through ICT systems is sub-optimal, this study examines how ICT management affects telecommuters' autonomy.<sup>6</sup>

The survey was conducted among telecommuters at Y's Staff Corporation (hereafter referred to as "Company Y"), headquartered in Kitami City, Hokkaido.<sup>7</sup> At the time of the survey, the company had four executives, 12 employees in its two offices, and 110 contract staff in Japan and overseas. Despite being primarily engaged in Internet content-related business since its establishment, the company was also engaged in regional revitalization projects and telework consulting. Contract staff were self-employed teleworkers without a designated office and who were not obliged to commute to work, and the company's office workers were allowed to telecommute, as the company considered that telecommuting had a well-developed environment.<sup>8</sup> At the time of this study, three of the 12 office workers were full-time telecommuters, and we interviewed each of these three employees by text. The survey used a semi-structured interview. In fact, we asked them to answer a questionnaire in advance, and then used a method of communication via e-mail.<sup>9</sup> The survey period was from March 15 to April 24, 2017.

<sup>6</sup> When one of the authors presented a draft of this paper at an academic conference in Japan, one person was pointed out by the floor as "excessive oversight". However, such comments are not based on empirical research. We would like to expect the development of future discussions, so we dare to note that there was such a comment.

<sup>7</sup> The registered head office is located in Nara, but the actual headquarters of the directors, including the of the president, is in Kitami. Furthermore, the actual head office operations are conducted in Kitami.

<sup>8</sup> This is based on the exchange including [blinded for review] on the mailing list for members of the Japan Telework Association between October 1 and 2, 2014.

<sup>9</sup> However, due to budget constraints (originally, the interview should have been conducted face-to-face at the site, but it was unavoidable) that the interview was conducted online instead of face-to-face (the interviewees live in South Korea and Hokkaido, and we moved at that time, there was no research funding to do so).



In particular, I would like to clarify that through the use of the telework information system developed by Company Y, the feeling of discomfort with telework has gradually eased. A feature of the company's system was the ability to take screenshots of the work screens of workers' personal computers at irregular intervals, which was rare at the time.

We would like to discuss how this system, which at first glance looks like a monitoring system, has gradually built a relationship of trust in telework and fostered a view of work that a worker is a worker only if s/he performs own duties.

### 3.2 Telecommuters' Working Conditions and Behaviors

An overview of the work environment and background of the three employees is shown in Table 1. Two employees, Ms. A and Ms. B, were transferred because their spouse had underwent a job transfer, and one employee, Mr. C, was unable to commute because of a disability. Ms. A and Ms. B had working experience before joining Company Y and had already been regular office workers at Company Y. Mr. C was a new graduate with no experience in regular office work. These three were the only full-time telecommuters in the company, and this is while various forms of telework existed across the whole organization; for example, executives and employees could telecommute partially as per the company's or their needs.

Since Company Y's executives frequently telecommute, the company had been improving its information system environment ever since its early stages, and this is an uncommon circumstance for a company of this size. Specifically, the company introduced a business communication tool using e-mail (Pro. Mail), a remote time and attendance management system (F-Chair+), a virtual office communication system (Sococo), and the ICT system environment for labor management and communication had been developed to a relevant extent (see Fig. 1).<sup>10</sup> In this paper, we focus on this system (F-Chair+ and Sococo) as suggesting the interdependence of systems and organizational behavior that is the focal point in sociomateriality. All work was done in a complete cloud environment. At that time, three full-time telecommuters did not face any security issues due to security measures in place.

### 3.3 Thoughts on Time and Work Status Management Systems

All three participants viewed their relationship with their surroundings positively, and they reported that telecommuting allowed them to maintain or renew their careers. Nonetheless, one of the problems with telecommuting that they described

<sup>10</sup> For more details on Y's Staff's understanding of telecommuting and its environmental arrangements, please refer to the websites of the company ([blinded for review]) and its affiliated company [blinded for review] ([blinded for review]). Moreover, its affiliate [blinded for review] is a product of Sococo Inc. of the U.S. and sold by [blinded for review] on behalf of Sococo. F-Chair+ was jointly developed and provided by [blinded for review], and Promail was developed in-house by Y's Staff.



**Table 1** Respondent's work environment and background

Respondents	Ms. A	Ms. B	Mr. C
Main tasks	General secretary	Legal security	Business SNS management
Reason for telecommuting	Spouse transfer	Spouse transfer	Hospitalization due to illness
Former Job	Translation education	Education	None
Type of work	Full time	Part time	Part time

was a sense of alienation and loneliness, especially so in the case of their full-time telecommuting, which entailed the complete absence of physical office dynamics.

Thus, teleworking by this system (F-Chair+) is expected to improve productivity. However, Ms. A said that it can also lead to feelings of loneliness and alienation in our web interview. Based on this, systems that use video and audio and provide as close a feeling as possible to that of face-to-face communication have been developed, as described above (Sococo). Still, the existence and implementation of systems that constantly convey the atmosphere and presence of a workplace can be perceived as being there also for monitoring purposes, so they have been criticized by those who hold the opinion that telework should emphasize autonomy and discretion. Ms. A felt that she had to maintain her trust as long as she was engaged in telework “on a trial basis.” For this purpose, for example, the following measures were taken; she could not take the telephone receiver (handset) with her when she went to the restroom or turn off her computer. She felt it was necessary to show that she was “connected” at all times. However, with the introduction of the system, it became possible to share “her work performance (when and what kind of work she is doing)” in the form of screen captures with her boss. Then, she does not have to work hard to maintain her credit (that she is doing a good job out of sight). As a result, she was able to focus on her work itself as her worries were resolved.

Such a series of her remarks is highly suggestive. Before the introduction of the function, the worker was required to be autonomous in order to work autonomously. Thus, if telecommuting is considered as an autonomous way of working and if it is allowed mainly for those who are subject to the discretionary labor system, employees will be required to autonomously plan and execute their work across the 24 h of the day, which also encompass their private life. Therefore, although the discretionary labor system tackles overtime work, the long working hours issue remains unresolved in practical terms because of the complex intertwining that telecommuting imposes on private life and work. That is, telecommuting may be related to workaholic-related issues.

However, not everyone can perform their duties autonomously. Originally, if a person can work autonomously, a certain amount of discretion is allowed,<sup>11</sup> and the discretionary labor system is applicable to this professional. Still, not all people who

<sup>11</sup> Discretion here refers to discretion in Japan's discretionary labor system (also see footnote 3), and more specifically, it is used in the sense of autonomy in the use of time.



Fig. 1 Company Y's virtual office (provided by Company Y)

wish to telecommute are engaged in attempts to work autonomously, so a strong demand for autonomy (e.g., in time management) may diverge from the original purpose of the introduction of telework.

This problem shares similarities with restrictions on mobile device use among children. One way to limit the amount of time children spend on their devices is to use usage restrictions. By doing so, the child will gradually think about when and how to use the device within a limited time. Similarly, in the case of Y's Staff, three people said that visualizing the time and content of their work on the system gave them the opportunity to think independently about what work should be done in a limited amount of time. teleworker pointed out. The teleworkers can set up this feature themselves and leave their time management to the system. Primarily, it may seem that the adult is making oneself tied to the system, but accepting and following the system's control may actually mean that oneself is autonomously thinking about how to allocate and plan the time one has. The state of having a personal computer connected to the network all the time in order to gain the trust and confidence of my boss, who is in an invisible place, and having a handset on my phone all the time, is not so much autonomy as a bond (a chain called work. It seems to be connected).

Conversely, information systems such as screen captures, at first glance, appear to be mechanisms for monitoring workers, but all three teleworkers surveyed used them to promote their work performance. I came to think that it is possible. In other words, monitoring is read as a "gaze" that the boss "cares about". Such transformation does not occur immediately after the introduction of the system. As suggested by the social materiality, it can be said that it gradually emerged as I accumulated actual work practices. In other words, it can be said that the interaction between the

information system and practice resulted in the transformation of observation from observation.

### 3.4 Awareness of Work Location and Management by the System

Because they were full-time telecommuters, the three study participants were not located in the offices to which they were affiliated when they worked. When the author asked them about how they decided about to which office they would be affiliated and how they saw the relationship between the office to which they were affiliated and their own office, Ms. A and Ms. B, who had already been regular office workers, answered that they were not very conscious of the difference between the offices, describing that “the location of the office to which we are affiliated is not important because there are virtual offices” and that “full-time telecommuting allows us to carry out our work in an atmosphere as if we were on a long business trip.”

In companies that own multiple offices, the office to which the worker is affiliated may be an important matter for forming own identity. From a management perspective, organizational identification is necessary for employees to develop as one with the surroundings and have a sense of belonging to the organization. Then, as the sense of belonging increases, one’s social identity and self-concept increase and are influenced by the workplace/company [38, 39]. In this context, employees’ behaviors are also determined by “the way of working that is typical of our department” or “the way of working that is typical of our company” [35]. Nevertheless, it may be difficult to satisfy this desire for identification in full-time telecommuting. The statements of Ms. A and Ms. B show how the identification process relates not to the workplace but to the company for full-time telecommuters. It seems that Ms. A and Ms. B formed their work identities when they worked in the office of Y company. However, it seems that it was an identity deeply connected with the practice of working in an office. As a result, they could not hide their confusion about working without going to the office. For example, Ms. A. said, “I do not get the sweets that are delivered to the office,” and “I feel helpless because I cannot help when the real office is busy.”

When working in an office, a worker has a colleague or supervisor in front of themselves. On the other hand, in telecommuting, the teleworker works alone at home. For this reason, teleworkers who do not live together (or are unmarried) often feel a sense of loneliness [21]. What measures can be taken to overcome this sense of loneliness? In recent years, many researchers and companies have been trying to compress space–time through technology, for example, by constructing systems that project the main office onto a screen under an always-connected environment [8–12]. However, it is difficult to say that Ms. A’s “loneliness” described above can be overcome by projecting the main office onto a screen in front of her. The fact that he can see the main office through the screen may in fact increase his sense of loneliness.

On this point, the idea of work identity is suggestive. For example, Ota [40] distinguishes between “company person,” whose identity is based on the

company or office, and “work person,” whose identity is based on the duties to be performed. As long as one is a company man, it will be difficult to reduce the distance from the office. We believe that telecommuting can be successfully executed only when the work identity is established through the duties that can be performed at home. This is an issue related to the work perspective of what it means to work.

On the other hand, in case of Mr. C, we would like to consider how the work identity is formed by telework. For people with physical disabilities, work itself tends to be a major hurdle, and overcoming it with technology is a joy for them and their supporters, regardless of how many hours they work [41, 42]. Specifically, Mr. C said that an environment with a time and attendance management system where people with disabilities are allowed to work for short periods of time and where assistance-related time (e.g., rehydration or running personal errands) is excluded from working hours (without treating the employee as a “special” worker) enables workers with disabilities to perform their duties with peace of mind and without hesitation [41]. From Mr. C’s remarks, it can be inferred that the existence of a system to record working conditions is an infrastructure for practicing work styles that take into consideration the individual circumstances of workers. As described above, we believe that the use of information systems leads to the formation of social identities, and that even full-time telecommuters fulfill identities to some extent.

Like Ms. A and Ms. B, Mr. C also described being concerned about not having much involvement with the workplace outside of work hours, such as joining coworkers to eat out after work, and then said, “Still, no disadvantages of working from home.” Meanwhile, Ms. A had a vague feeling of uneasiness about Mr. C joining the company because of the physical disabilities, albeit Ms. A reportedly was able to treat Mr. C as a colleague without being constantly made aware of the disability through the telecommuting work and the use of company Y’s virtual office system (in particular, F-Chair+ and Sococo).

As described above, when autonomy is viewed as voluntary management of time (work allocation, progress management, etc.), the method of randomly capturing computer screens on the system may at first glance appear to be “monitoring” or “monitoring.” Although it gives the impression of “strengthening management,” in the case of Company Y, through practice, it can be seen that it gradually came to be read as “a tool for workers to allow managers to see the work status.” In this way, it can be seen that through the use of information systems, the meaning (how they are used and how they are positioned in the performance of duties) differs from that at the design stage or when they were first introduced. Although it is only one example, it is thought that we can understand a part of the meaning formation of the information system through practice.

Ms. A and Ms. B could have become contract staff and worked unrestricted hours, and Mr. C could have worked as contract staff and adjusted his workload at his own pace. However, considering their own way of work, they seemingly perceived the control of the system positively, and apparently did not perceive the control of the system as a negative form of surveillance. Instead, they reportedly felt secure and grateful for the “gaze” of the system and the “gaze” of the people around them that derives from it. The term “gaze” here does not include the meaning of control in

the sense of monitoring or surveillance, but is used in a more neutral sense, with a nuance closer to “watch over”. It is the sense that workers recognize that their supervisors and coworkers are watching over them and that the organization will support them if they have problems. In the case of company Y, their original information systems (that is, F-Chair+ and Sococo) enable us to visualize and experience this kind of gaze.

#### 4 Autonomy of Telecommuters and its Relationship with the System

Telework has generally been positioned as an autonomous way of working that is free from time management and that allows for discretion. Furthermore, with the current ICT systems, telecommuting became possible even for employees who require the company’s management for own time management. Specifically, such telecommuting became possible for these employees through providing them with an environment characterized by the systemization of mutual aid and mutual monitoring [35], which is the “gaze” of the workplace. Then, a feature of the mutual aid system is that it is easy to induce organizational or individual support when a worker is in trouble. It can be said that it is a system of “gaze” in the sense that they are watching each other. On the other hand, in the mutual monitoring system, support such as mutual aid is not considered necessary.

By the way, it should be noted that whether the same information system functions as mutual assistance or mutual monitoring depends on the organizational context, and that the context can be strengthened or changed through practice. There is a need. It is important that such plasticity is manifested through practice.

Still, whether this “gaze” is perceived positively or negatively (e.g., a form of surveillance) may vary by person and job position. In the case of this study, the company established an attendance management system that took a screenshot of the worker’s screen at irregular intervals, and this differed from the normal gaze of a colleague because the screen is not always visible to others just by taking a picture. Rather, in this case, the irregular capture of which tasks are being performed and when (or how, as the case may be) serves as a mechanism for inspecting and ultimately proving that the worker is performing his/her duties with integrity. In order to describe such a watchful function for inspection and proof, this paper uses the expression “gaze,” which is different from surveillance. The “gaze” of the organization was more likely to be attributed to an ICT system in this case study depending on the worker’s position (i.e., telecommuter) and if the person wanted a sense of security and protection, and it was preferred over autonomy to choose work time and location.

Furthermore, management systems for telecommuting are placed only within the locations relevant for an organization and do not surveil an unspecified number of people in public places. People’s perceptions about surveillance cameras that constantly film an unspecified number of people in public places (e.g., brings some form of peace of mind or a sense that someone is constantly monitoring your behavior) vary by person, the person’s position, and context. Research describes that any

kind of surveillance or control, regardless of the entity that establishes it (e.g., the state or an organization), raises the issue of privacy or the “cost of privacy” [44]. In this case study, the advantage of accepting a monitoring system is that telecommuters got more private time by improvements in their general time management.

## 5 Conclusion

In the future, the role of information systems in business execution will become more and more important. This study examined how telecommuters’ behaviors and emotions are affected in an environment where they can directly sense the system’s management, while focusing on workers’ autonomy. In this paper, as IT-based autonomy, we clarified that the system’s function of always being watched in time management promotes the autonomy (voluntary time management) of teleworkers.

Our sample comprises telecommuters with active employment contracts with private companies. Thus, self-employed teleworkers, such as “gig workers” or small office home office (SOHO) workers in the past, who have recently been attracting attention, are excluded from the study’s scope. Unless otherwise specified, the term “telework” is considered in a broad sense, is not limited to telecommuting, and is used separately from telecommuting. Lastly, this study is only one case study, and it was conducted in Japan’s unique society. In the future, we would like to continue the case study and increase the validity of our assertion.

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**Data Availability** The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

## Declarations

**Conflict of interest** The authors have no conflicts of interest directly relevant to the content of this article.

**Ethical Approval** No problem.

**Informed Consent** No problem.

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