Remote work paradigm shift: A comprehensive analysis of post-pandemic workplace dynamics and prospective applications of technology

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Abstract
Purpose: The advent of the COVID-19 pandemic triggered a global paradigm shift, compelling employees to switch from traditional workplace settings to remote work from home. The accelerated adoption of digital channels has notably reshaped workplace dynamics, impacting both employees and overarching organizational structures. The primary aim of this research paper is to better understand the benefits and challenges that employees face, as well as to provide organizations with a comprehensive analysis of the nuances of work in the future, which is expected to be much different from today due to the rapid advancement of artificial intelligence, enabling them to create fair and effective post-pandemic policies.
Design/methodology/approach: A total of 276 participants voluntarily participated in this study by answering a Google Form survey. The research employed content analysis, a qualitative methodology that interprets and dissects textual content.

Findings: Obtained results highlight the benefits of working from home which allows individuals to have a healthier work-life environment, flexibility of work, enriching their mental health and productivity of work schedules. For seamless working organizations should invest in strong internet connection, pooling all resources at the server for easy access by all employees, training sessions to ensure better coordination so that productivity is maintained.

Research limitations/implications: The potential for remote work enabling the integration of Industry 5.0 is discussed, where fostering collaborative partnerships between humans and artificial intelligence is considered.

Practical implications: Originality/value: Humans would be able to focus on innovation and developing creative and authentic ideas while artificial intelligence systems would operate the machinery that engages in manual labor. This heralds an era of a new industry, characterized by a synergistic relationship between humans and robots.

Keywords: Future of Work, Human-Robot Interface, Post-Pandemic Workplace, Remote Working

Introduction

The onset of the COVID-19 pandemic marked an unprecedented juncture in the annals of global work dynamics, forcing practically all organizations to accelerate digital adoption to ensure business continuity amidst widespread lockdowns and public health concerns. This shift, which involves more than just the physical relocation of workspaces, signifies a deeper transformation in work culture as people are forced to work online, a situation they may have never done before, to form new digital work habits to stay connected, fueled by technological advancements. It represented a broader paradigm shift, emphasizing the role of technology as an enabler of sustained productivity and collaboration in a dispersed work environment.

The benefits of accelerating digital adoption in the workplace are manifold. Organizations could tap into a global talent pool unbounded by geographical constraints, while employees reveled in newfound flexibility, which frequently culminated in a more harmonious work-life balance. Specific benefits of this abrupt change include 61% of individuals reporting a pleasant remote work experience because it resulted in notable productivity (Toscano & Zappalà, 2021), a positive mindset (Ahmadi et al., 2022), and the allure of work flexibility (Ahmadi et al., 2022; Rahman & Arif, 2020), particularly reducing commute time to work. These were the primary reasons 56% of the US workforce shifted to full-time remote work by the end of 2020 (Global Workplace Analytics, n.d.).

However, accelerating digital adoption in the workplace faces numerous challenges. For instance, studies conducted during the pandemic revealed that many employees working from home felt isolated, faced communication barriers, and struggled to delineate professional and personal boundaries (BBC Worklife, 2020) as a result of altered family behaviors and routines (van der Lippe & Lippényi, 2020), resulting in fatigue and increased stress. Not to mention the instability of internet connection access, which worsened their difficulties in performing their tasks. This condition has resulted in the erosion of organizational commitment (Wax et al., 2022), as well as productivity pitfalls due to environmental distractions and diminished interpersonal interactions (Aczel et al., 2021; Bao et al., 2022), which are caused by hampered collaboration among employees and difficulty monitoring employee performance.

From these findings, it can be concluded that the accelerated adoption of digital channels to support remote work systems has benefited many people while posing a challenge for others. Nevertheless, what is certain is that the future of work is projected to look much different than it does today due to the rapid advancement in artificial intelligence (AI) (Bao et al., 2022). With the emergence of AI-powered software and 5G technology, professionals around the

world have benefited from enhanced connectivity, improved security, and greater flexibility when working from home, thereby enhancing productivity and driving cost efficiencies (ARK Investment Management LLC, 2023). One of the most significant advantages of AI in remote work is its ability to outperform humans in routine and repetitive tasks such as data entry, scheduling, and email responses, freeing up time for remote workers to focus on more complex and creative tasks.

However, there are still intense debates among top management regarding the future of work, including whether employees prefer to return to working in the office or are more interested in organizations with more flexible policies as remote technology advances (Bloom et al., 2023). This debate raises an important question: As workplaces increasingly integrate AI and other digital tools, how will this transition impact work productivity, particularly among diverse demographic segments? This condition must be explored because working from home during the COVID-19 pandemic was not just a transient phenomenon but represents a seismic shift in the workplace that necessitates further exploration into its multifaceted implications.

For instance, the adoption of digital channels in the workplace during the pandemic has a different impact on work productivity for single employees who have more flexible working hours but are vulnerable to feelings of loneliness, as opposed to married employees with children under the age of 16 who struggle to focus on their jobs. Similarly, generational differences in the workplace also play a role in shaping experiences and perceptions of remote work. For example, the Baby Boomer generation prioritizes the importance of face-to-face interaction, whereas the millennial generation and Gen Z are accustomed to interacting via social media.

Given these evolving dynamics, gaps in previous literature, and the transformative potential of technology, this study endeavors to provide a more comprehensive and contemporary perspective. The primary objective is to unravel the intricate tapestry of remote work, exploring its impact on productivity across age groups and marital status. This paper aims to explain not only the immediate implications of the pandemic-induced shift but also to gauge how emerging technologies might alter the future of work. Through this exploration, this paper aspires to offer organizations the insights necessary to craft informed work policies and robust support mechanisms for their remote workforce, ensuring resilience and adaptability in the future of work with artificial intelligence.

Literature Review

Prior to the pandemic, remote work was primarily confined to the technology sector, as it was associated with positive outcomes such as greater job satisfaction, a better work-life balance, greater income satisfaction, and, of course, increased work productivity. However, the advent of the pandemic propelled remote work to the forefront of global work dynamics, affecting a vast array of industries and highlighting both its benefits, such as work flexibility and autonomy, and its significant drawbacks, such as isolation and the blurring of work-life boundaries. This section reviews the benefits and challenges of remote working and productivity before and after the pandemic across the globe and explores the possibilities of collaborative partnerships between humans and artificial intelligence.

Remote Working and Productivity Before and After the Pandemic

The contemporary work environment, shaped significantly by the advent of remote working, has been the focal point of numerous studies. These investigations have systematically categorized their findings based on distinct parameters, such as productivity, cost implications, and employee welfare.

From the vantage point of productivity, remote work has consistently demonstrated its potential to enhance both work output and overall employee satisfaction (Panchuk, 2023). The inherent

flexibility of remote work, which empowers employees to customize their work schedules and environments, often translates into heightened efficiency and job satisfaction. On the economic front, organizations stand to gain from substantial cost reductions, primarily attributed to decreased office space expenditures. Furthermore, the global nature of remote work offers companies an unparalleled advantage, enabling them to scout and secure talent without geographical constraints.

Yet, the transition to remote work is not devoid of challenges. Effective communication, a fundamental pillar of successful teamwork, often encounters barriers in virtual settings, leading to potential misinterpretations or ambiguities (Panchuk, 2023). Monitoring and motivating employees—tasks that are relatively straightforward in a conventional office setup—become more intricate in a remote context. A pressing concern that emerges is the potential dilution of organizational culture and values, which could have ripple effects on team cohesion and the overarching corporate identity.

Delving deeper, the efficacy of remote work is also contingent upon the investments made to optimize it. While the promise of heightened productivity through remote work is alluring, realizing this potential often requires significant investments in specialized tools and training (Zolotina et al., 2023). The viability of these investments, however, may differ based on project specifics, suggesting that a judicious blend of remote and in-office work might offer the best outcomes in certain scenarios.

Adding another layer to this discourse, a PwC survey has spotlighted challenges that cannot be overlooked, such as pronounced burnout rates, curtailed innovation, and less-than-ideal work environments (Wei, 2022). These findings accentuate the limitations intrinsic to remote work, especially when it lacks the collaborative essence inherent to physical office spaces.

In synthesizing these insights, it becomes evident that while remote work offers a plethora of advantages, it is accompanied by a unique set of challenges. This research endeavors to navigate this intricate landscape further, especially against the backdrop of technological breakthroughs from Industry 5.0. The central inquiry is whether emerging technologies can bolster the strengths of remote work and simultaneously address its challenges. Could these innovations potentially reshape the trajectory of remote work, solidifying its position as a mainstay in future work paradigms?

Benefits and Challenges of Remote Working During a Pandemic Around the World

Prior to the COVID-19 pandemic, remote work was primarily prevalent in the tech industry, including among software engineers, IT professionals, and digital marketers. With the onset of the COVID-19 pandemic at the beginning of 2020, remote work, which was once a choice primarily in the tech sector, became a necessity across various industries. Many organizations have felt that digital technologies have protected their workforce and productivity from the pandemic, while developing countries still need to accelerate technology adoption (Jaumotte et al., 2023). However, the digitalization gaps persist.

Remote work is considered very useful during the pandemic. For example, the impact of remote work on income satisfaction across 34 European countries revealed that remote workers generally had higher income satisfaction compared to non-remote workers (van der Lippe & Lippényi, 2020). It was possibly due to increased productivity stemming from the flexibility and autonomy associated with remote work.

However, the research by (Khorakian et al., 2023) which explored the relationship between remote working and work performance in Iran, revealed that social isolation, remote work stress, and fear of COVID-19 related to remote work satisfaction decrease remote work performance through the mediation of remote work satisfaction.

Thus, it can be concluded that although several previous studies have found more benefits of remote work, at the same time, there are still challenges. For example, the shift to remote work

provides opportunities for personal growth and skill development but at the same time leads to longer working hours (Russo et al., 2021). The flexibility of remote working in South Africa during the pandemic also presented challenges such as feelings of isolation due to lockdown and difficulty in separating work from personal life (Saurombe et al., 2022).

Therefore, in the post-pandemic era, these insights can guide future decision-making regarding remote work, ensuring that its benefits can be maximized while effectively addressing its challenges.

The Future of Work: Human-Robot Collaborative Artificial Intelligence

The trajectory of technology since the inception of Industry 1.0 has been transformative, with each phase bringing forth innovations that have reshaped the workforce. A notable evolution in recent times is the emphasis on collaborative robotics, suggesting a future where robots and humans work in tandem (Johansen et al., 2022).

Such collaborations are not confined to a single domain but span across various fields, including human-computer interaction, robotics and engineering, ethics, psychology, social sciences, design, architecture, and artificial intelligence. These interdisciplinary collaborations aim to explore both the potential and challenges of effective human-robot synergies, seeking to chart a future where humans and robots coexist in harmony (Johansen et al., 2022).

At the heart of this human-robot collaboration is the harnessing of artificial intelligence to propel productivity and spur innovation. This collaboration is expected to feature enhanced connection speeds, amplified productivity, innovation, and heightened convenience, all converging within the expansive domain of remote work augmented by artificial intelligence. However, in other sectors, they have raised concerns about job displacements and the ethical implications of integrating robots into traditionally human-centric roles, as well as job security and the essence of human roles in an increasingly automated landscape. Therefore, the implications of such a shift necessitate a deeper understanding, especially in the post-pandemic world, because there has been a heightened focus on understanding the evolving dynamics of the workforce in this new technological era (Lund et al., 2021).

The research regarding the anticipated convergence of remote work and artificial intelligence suggests that the future of robotics is poised to be even more collaborative. Consequently, organizations must plan to chart a trajectory that envisions a harmonious coexistence between humans and robots.

By understanding and intelligently utilizing these elements, both the business world and society at large will be ready to take advantage of various opportunities while also swiftly navigating the challenges that exist in this transformative work era.

By delving into the experiences, perceptions, and aspirations of the workforce in this new era, the study seeks to provide a roadmap for businesses and policymakers to harness the benefits while effectively navigating the challenges of the future of work, as well as offering insights into the nuanced interplay between humans and robots.

In summation, the research delineated herein illuminates the multifarious dimensions of the impending era of remote work, intertwined with artificial intelligence. The symbiosis of collaborative robotics, the transformative potential of Industry 5.0, and the collective endeavors of diverse disciplines to sculpt efficacious human-robot collaborations constitute the bedrock of this dynamic paradigm. By astutely discerning and capitalizing on these elements, both the corporate realm and broader society stand poised to seize the myriad opportunities while adeptly navigating the challenges inherent to this transformative epoch of work.

Methods

The data was gathered during the peak of the COVID-19 pandemic, specifically between May and June 2020, after lockdown measures were enforced globally. To answer the research

questions, targeted participants were filtered to ensure that they met the selection criteria, which were employees who worked from home (WFH) or a combination of WFH and working from the office (WFO). After answering the filter questions through a Google Form survey link, participants were asked to provide demographic details, including marital status, number of children, age, and location of their job. In this study, a total of 276 participants voluntarily participated, comprising 143 males (51.8%) and 133 females (48.2%).

The participants were classified based on their marital status, a factor that could affect an individual's remote work productivity. Based on marital status, the composition of participants was 29.7% single, 16.3% married without children, 24.3% married with children aged over 16 years, and 29.7% married with 16-year-old children and above. Single individuals may have more flexibility in managing their work hours and workspace but may also be prone to feelings of loneliness due to reduced social interactions. Individuals who are married may have additional support at home, which can be beneficial for managing household tasks. Married individuals with children under the age of 16 may face the most significant challenges when working from home, as young children especially require constant attention and care, making it difficult to focus on work tasks. This may cause parents to struggle with adjusting their work schedules. On the other hand, married individuals with 16-year-old children or older may have an easier time, as their children do not require much direct supervision and can assist in household commitments and technology-related challenges.

Age was also grouped by generation using Strauss-Howe's (1991) generational theory to facilitate understanding of patterns, preferences, and challenges unique to each generation, resulting in a more comprehensive understanding of the remote work experience across generations. Participants were grouped into different generational groups: Gen Z (24 years and younger), Millennials or Gen Y (25–40 years), Gen X (41–56 years), and Baby Boomers (57–75 years) in 2020. Participants in this study consisted of 10.5% Gen Z, 43.1% Gen Y, 34.4% Gen X, and 12.0% Gen BB.

Data was also obtained from the participants' job locations in Asia and Europe. Of the 276 participants, 251 were from Asia (90.9%), while 25 were from Europe (9.1%). Comparisons of participants from Asia and Europe across generations and marital statuses (including the number of children) were presented for exploration.

Content analysis is used to answer research questions based on the data obtained in this study through three open-ended questions: 1) Benefits of working from home and the reasons why they are beneficial; 2) Challenges encountered when working from home and how to overcome them; and 3) Reasons for achieving or failing to achieve productivity or performance targets while working from home.

As outlined by Krippendorff (2004), content analysis is a systematic and replicable technique where numerous textual data are reduced to manageable content categories based on specific criteria. Participants' responses to those three open-ended questions were interpreted and analyzed to discern patterns, themes, and meaning within the data. Those responses were further analyzed in terms of the meaning and relationship of certain words to draw conclusions about the messages in the responses.

Participant responses were coded into manageable content categories, which is a selective reduction process. For example, a benefit of saving travel time mentioned by participants may become a new theme, "saving travel time," if that theme has not been previously identified. After all responses were categorized, the frequency of each theme was tabulated to provide a comprehensive picture of the benefits and challenges experienced by participants when working from home, so that performance or productivity targets could be achieved.

To ensure the reliability and validity of the content analysis carried out in this study, it was checked whether the classification of participants' responses was correct. For example, categorizing or coding data consistently when analyzing participant responses (stability),

classifying category membership in the same way (reproducibility), coding content according to certain standards (accuracy), and using multiple classifiers to obtain a precise definition for a particular category by using implicit or synonymous variables (category closeness).

Furthermore, the analysis of the current study integrates findings on technological advancements, especially in the realm of artificial intelligence, to project the evolving landscape of work. By amalgamating participants' experiences with academic reviews and existing research on these technologies, a comprehensive perspective on the interplay between remote work and technological progression is sought. This nuanced approach elucidates the ramifications of remote work on productivity and, when intertwined with developments from Industry 5.0, provides insights into emerging work trends, thereby offering invaluable directives for shaping post-pandemic work policies and practices.

Findings

The primary aim of this study was to understand the benefits and challenges faced by the employees while working from home (WFH) during the pandemic. In total, there were 968 responses from 276 participants. They felt more benefits (622 responses) than challenges (346 responses) when working from home.

The order of benefits of working from home is 1) better planning and time management (26.2%), 2) being able to adjust and be more productive (25.7%), 3) mental health and a safe environment (25.4%), and 4) time and cost savings (22.7%). Meanwhile, the order of challenges during work from home is 1) lack of work-related resources (32.7%), 2) lack of coordination due to less face-to-face (25.1%), 3) need to adapt to new conditions (22.3%), and 4) unmotivated and hard to adjust (19.9%).

The analysis was carried out based on generational cohorts, marital status, and job location. The findings are presented in the form of tables. Tables 1 and 2 show the benefits and challenges faced by the participants based on their generations and job locations (Asia and Europe). While Tables 3 and 4 highlight the benefits and challenges experienced by the participants based on their marital status in Asia and Europe.

In Table 1, it was observed that the older generations reported finding WFH beneficial, with 37.3% of Baby Boomers and 29.1% of Gen X participants specifically noting the adjustability and productivity of their work schedule in Asia. Gen X participant P7 shared that WFH assists in "avoiding thoughts of my missing evenings and parties itself is rejuvenating and giving me fresh air for work." This shows that the older generation benefits from the flexibility of their work schedule, thus allowing them to be more productive.

Following closely behind is the younger generation, with 31.0% of Gen Y and 37.7% of Gen Z noting the mental health benefits of WFH environments in Asia. Gen Y participant, P55, shared that working from home gave them flexible work hours, therefore allowing them to spend more time with their family, learn new things and attend webinars for their professional development, and read the latest research articles to stay updated. This echoes the previous sentiment of the older generations, once again noting the increased productivity caused by more flexible work schedules.

Another Gen Y participant, P11, expressed that working from home was much more productive as they found it to be a "quieter, more private, and better environment to focus on work. I can complete my task faster and get better results." This response discusses the potential mental health benefits WFH may offer by allowing individuals to work more productively in a safe and comfortable environment.

Though the number of participants from Europe was less than that from Asia, they still reported the same experience of increased productivity due to reduced surrounding disturbances. Gen Y participant P94 cited a "higher concentration because no one is around me," which noted similarities to their peers in Asia. A Gen X participant, P109, also expressed that they were

able to adapt to the new normal as there was "the need to use different contact technologies: Teams, Zoom, BigBlueButton, and Skype."

Table 1. Benefits of Working from Home among Generations in Asia and Europe

BENEFITS	Asia								Europe								TOTAL	
	Z		Y		X		BB		Z		Y		X		BB			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
More productive	3	5.7	15	6.6	19	8.0	4	7.8	0	-	3	11.5	1	4.2	0	-	45	7.2
Learn new things and opportunities	3	5.7	7	3.1	11	4.6	4	7.8	0	-	0	-	0	-	1	50	26	4.2
Able to adjust to New Norms	6	11.3	16	7.1	25	10.5	7	13.7	0	-	5	19.2	3	12.5	0	-	62	10.0
No difficulty at all	0	-	9	4.0	14	5.9	4	7.8	0	-	0	-	0	-	0	-	27	4.3
Able to adjust & more productive	12	22.6	47	20.8	69	**29.1**	19	37.3	0	-	8	30.8	4	16.7	1	50	160	25.7
Healthier work-life environment	1	1.9	4	1.8	5	2.1	0	-	0	-	0	-	0	-	0	-	10	1.6
Save from Covid-19	2	3.8	14	6.2	15	6.3	1	2.0	0	-	1	3.8	0	-	0	-	33	5.3
Less pressure, more relaxed	8	15.1	12	5.3	10	4.2	5	9.8	0	-	2	7.7	1	4.2	0	-	38	6.1
Spend quality time with family & self	9	17.0	40	17.7	24	10.1	1	2.0	0	-	2	7.7	1	4.2	0	-	77	12.4
Mental health & safe environment	20	**37.7**	70	**31.0**	54	22.8	7	13.7	0		5	19.2	2	8.3	0	-	158	25.4
Better time management to have job done	2	3.8	22	9.7	25	4.0	5	9.8	0	-	3	11.5	3	12.5	1	50	61	9.8
Good internet connection	1	1.9	6	2.7	9	3.8	2	3.9	0	-	0	-	1	4.2	0	-	19	3.1
Devoting extra time to work hard and motivated	0	-	8	3.5	11	4.6	1	2.0	1	33.3	0	-	2	8.3	0	-	23	3.7
Flexibility of work hours	11	20.8	18	8.0	20	8.4	6	11.8	0	-	2	7.7	3	12.5	0	-	60	9.6
Better planning & time management	14	26.4	54	23.9	65	27.4	14	27.5	1	33.3	5	19.2	9	37.5	1	50	163	26.2
Saving traveling time	1	1.9	21	9.3	19	8.0	5	9.8	1	33.3	4	15.4	3	12.5	0	-	54	8.7
Less commuting, no traffic	3	5.7	15	6.6	14	5.9	2	3.9	1	33.3	3	11.5	5	20.8	0	-	43	6.9
Transport and meal cost saving	3	5.7	19	8.4	16	6.8	4	7.8	0	-	1	3.8	1	4.2	0	-	44	7.1
Time and cost saving	7	13.2	55	24.3	49	20.7	11	21.6	2	**66.7**	8	**30.8**	9	**37.5**	0	-	141	22.7
TOTAL RESPONSES	53		226		237		51		3		26		24		2		622	100

However, overall, most participants in Europe felt that the biggest benefit of WFH was time and cost savings. For example, Gen X participant, P38, mentioned that WFH was beneficial in terms of saving time: "No traveling every day." This condition was also felt by Gen Z participant, P57, who expressed a "gain of personal time. Avoid daily trips to the office and avoid the stress of traffic."

Another Gen X participant, P46, shared the benefits in terms of reduced commute time and highlighted that working from home was beneficial in terms of getting exposure to sunlight and fresh air, which greatly improved their mental and physical health as their office had no windows. They also highlighted that working at home without interruptions and stress improved both the quality and quantity of work.

In Table 2, participants in Europe, Gen Z (50%) and Gen Y (31.8%) felt unmotivated and found it hard to adjust to circumstances, while Gen X (35.7%) felt the need to adapt to new conditions. The most common response given is as said by Gen X participant, P46, who expressed difficulty in adapting to the new normal because of a lack of resources like an office setup, a laptop, a desk, etc., in addition to family distractions because of small kids and limited working space. Gen Y participant, P94, felt demotivated because of the lack of team spirit.

Participants who have a profession as teachers or lecturers expressed their concern for their students. For example, Gen X participant, P38, shared that "not all students have access to the internet. The college must provide support to be sure that all students have means for WFH." Gen Y participant, P57, shared that "our students need more motivation, and they need to adapt to the online learning and teaching environment." On similar lines, according to BB participant, P55, "less close contact with students. I miss them, and I also miss my colleagues. I work with my students and colleagues on Zoom."

Table 2. Challenges of Working from Home among Generations in Asia and Europe

CHALLENGES	Asia								Europe								TOTAL	
	Z		Y		X		BB		Z		Y		X		BB			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Lack of work-related resources	4	12.5	19	12.6	10	9.3	2	11.1	0	-	3	13.6	1	7.1	0	-	39	11.3
Internet Connection Issues	11	34.4	36	23.8	21	19.6	5	27.8	0	-	0	-	1	7.1	0	-	74	21.4
Lack of work-related resources	**15**	**46.9**	**55**	**36.4**	**31**	**29.0**	**7**	**38.9**	0	-	3	13.6	2	14.3	0	-	113	32.7
No face-to-face and social interaction	3	9.4	8	5.3	9	8.4	3	16.7	0	-	3	13.6	3	21.4	0	-	29	8.4
Miscommunication & coordination issues	2	6.3	9	6.0	11	10.3	0	-	1	-	2	9.1	0	-	0	-	25	7.2
Lack of coordination	4	12.5	16	10.6	8	7.5	3	16.7	0	-	1	4.5	1	7.1	0	-	33	9.5
Lack of Coordination due to less F2F	9	28.1	33	21.9	28	26.2	6	33.3	1	50	6	27.3	4	28.6	0	-	87	25.1
Need to adapt to new conditions	2	6.3	11	7.3	13	12.1	4	22.2	0	-	3	13.6	3	21.4	0	-	36	10.4
Need to multitask	0	-	4	2.6	3	2.8	0	-	0	-	0	-	0	-	0	-	7	2.0
Working longer hours	0	-	13	8.6	9	8.4	1	5.6	0	-	2	9.1	1	7.1	0	-	26	7.5
Difficulties in time management	0	-	3	2.0	3	2.8	0	-	0	-	1	4.5	1	7.1	0	-	8	2.3
Need to adapt to new conditions	2	6.3	31	20.5	28	26.2	5	27.8	0	-	6	27.3	5	**35.7**	0	-	77	22.3
Unmotivated, bored, uncertain	3	9.4	4	2.6	2	1.9	0	-	0	-	2	9.1	1	7.1	0	-	12	3.5
No benefit at all	1	3.1	5	3.3	2	1.9	0	-	0	-	1	4.5	0	-	0	-	9	2.6
Non-work-related distraction	2	6.3	17	11.3	12	11.2	0	-	0	-	2	9.1	2	14.3	0	-	35	10.1
Hard to focus & adjust to New Norms	0	-	6	4.0	4	3.7	0	-	1	50	2	9.1	0	-	0	-	13	3.8
Unmotivated and hard to adjust	6	18.8	32	21.2	20	18.7	0	-	1	**50**	7	**31.8**	3	21.4	0	-	69	19.9
TOTAL RESPONSES	32		151		107		18		2		22		14		0		346	

Table 2 also demonstrated that most participants in Asia felt a lack of work-related resources (46.9% of Gen Z, 36.4% of Gen Y, 29.0% of Gen X, and 38.9% of Baby Boomers). Almost all the participants in Asia cited internet connection issues as the primary cause of their challenges. For instance, Gen Y participant P175 noted that "the internet is slow and often disconnects during conference calls." In contrast, participants from Europe do not have as many grievances about their internet connectivity.

This may reveal a larger-scale problem about the development and ready resources to assist individuals to work from home in Asia, including a lack of access to a stable internet connection, an uneven spread of cellular radio systems in certain regions, and/or cellular infrastructures that are not well equipped to withstand harsh weather conditions.

Other challenges faced regarding a lack of work-related resources are the lack of training and working spaces required for certain tasks. Gen X participant P92 reported that there was "no training provided for online classes" and "no working space," which reveals that many corporations and institutions were not prepared for the WFH environment and did not provide mitigation and adaptation efforts. This further extends to the inability to perform certain tasks; as Gen Y participant P95 reported, "Field activities cannot be performed, e.g., engine maintenance due to implanted travel restrictions."

This situation may cause a significant lack of coordination, as seen in the 33.3% of Baby Boomers in Asia who reported miscommunication and coordination due to a decrease in face-to-face meetings. Gen X participant P112 disclosed their difficulty in coordinating jobs among the staff, as "online meetings are not as efficient as face-to-face meetings. So, I had to constantly be in contact with staff, do online reporting, and create different SOPs."

The lack of coordination causes stress for the older generation, specifically those working in positions with several subordinates, as they would have to spend extra time managing employees' work progress. Their age could play a factor in their discomfort, as the older generation is much more used to a face-to-face work environment and would have trouble adjusting. The distressing lack of coordination is also a recurring problem with the younger

generation, who also reported a lack of motivation to complete their tasks due to non-work-related distractions and no coordination or interaction from their co-workers.

The next analysis is related to the benefits and challenges of working from home by marital status in Asia and Europe, which can be seen in Tables 3 and 4. Based on marital status, the composition of participants was 29.7% single, 16.3% married with no children, 24.3% married with children aged over 16 years, and 29.7% married with 16-year-old children and above. Interestingly, the results of the survey generally indicate that Asian married participants find the WFH to be more beneficial than those who are single (71.1% and 28.9%, respectively). While in Europe, most single participants (56.4%) found it more beneficial than married participants (43.6%).

Table 3. Benefits of Working from Home by Marital Status in Asia and Europe

BENEFITS	Asia								Europe								TOTAL	
	Single		Married no child		M<16 years		M≥16 years		Single		Married no child		M<16 years		M≥16 years			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
More productive	8	4.9	5	6.3	10	7.7	18	9.3	2	6.5	0	-	2	20	0	-	45	7.2
Learn new things and opportunities	6	3.7	4	5.1	4	3.1	11	5.7	0	-	0	-	1	10	0	-	26	4.2
Able to adjust to New Norms	18	11.0	5	6.3	8	6.2	23	11.9	4	12.9	0	-	1	10	3	25.0	62	10.0
No difficulty at all	6	3.7	5	6.3	3	2.3	13	6.7	0	-	0	-	0	-	0	-	27	4.3
Able to adjust and more productive	38	23.2	19	24.1	25	19.2	65	**33.5**	6	19.4	0	-	4	**40**	3	25.0	160	25.7
Healthier work-life environment	1	0.6	3	3.8	2	1.5	4	2.1	0	-	0	-	0	-	0	-	10	1.6
Save from Covid-19	7	4.3	8	10.1	10	7.7	7	3.6	1	3.2	0	-	0	-	0	-	33	5.3
Less pressure, more relaxed	19	11.6	3	3.8	5	3.8	8	4.1	1	3.2	1	50	1	10	0	-	38	6.1
Spend quality time with family & self	15	9.1	15	19.0	27	20.8	17	8.8	1	3.2	0	-	1	10	1	8.3	77	12.4
Mental health & safe environment	42	25.6	29	**36.7**	44	**33.8**	36	18.6	3	9.7	1	50	2	20	1	8.3	158	25.4
Better time mngmt to have job done	15	9.1	4	5.1	14	4.0	21	10.8	5	16.1	0	-	1	1	1	8.3	61	9.8
Good internet connection	4	2.4	2	2.5	3	2.3	9	4.6	1	3.2	0	-	0	-	0	-	19	3.1
Devoting extra time to work hard and motivated	5	3.0	2	2.5	5	3.8	8	4.1	1	3.2	0	-	1	10	1	8.3	23	3.7
Flexibility of work hours	19	11.6	7	8.9	14	10.8	15	7.7	2	6.5	1	50	0	-	2	16.7	60	9.6
Better planning and time management	43	**26.2**	15	19.0	36	27.7	53	27.3	9	29.0	1	50	2	20	4	33.3	163	26.2
Saving traveling time	13	7.9	7	8.9	11	8.5	15	7.7	6	19.4	0	-	1	10	1	8.3	54	8.7
Less commuting and no traffic	12	7.3	5	6.3	6	4.6	11	5.7	5	16.1	0	-	1	10	3	25.0	43	6.9
Transport and meal cost saving	16	9.8	4	5.1	8	6.2	14	7.2	2	6.5	0	-	0	-	0	-	44	7.1
Time and cost saving	41	25.0	16	20.3	25	19.2	40	20.6	13	**41.9**	0	-	2	20	4	**33.3**	141	22.7
TOTAL RESPONSES	164		79		130		194		31		2		10		12		622	100

The benefits vary for married participants. For example, the greatest benefits vary for married participants. For example, in Asia, married couples with 16-year-old children and above (33.5%) feel "able to adjust and be more productive," while married couples with no children (36.7%) and married couples with children younger than 16 years (33.8%) consider that the greatest benefits are mental health and a safe environment.

For example, married participants from Asia reveal that the WFH has also been able to provide a healthier and more supportive environment for them, outlining that they can spend more time with their family, leading to less worry and allowing them to better focus on work. Married participant P92 shared that they could get more rest during the WFH, highlighting that they did not have to wake up early for work and adding that they felt "less stress" caused by the workplace. This indicated that the WFH allowed more leniency and freedom during their workdays, allowing employees to take more time to rest and recover from fatigue and stress. Another Gen X participant, P7 (married with children less than 16 years old), expressed that working from home was relaxing, as "no proximity to the boss itself is another relaxation." Likewise, a participant P123 married with 16-year-old children and older shared that working

from home provided them with more "time for physical activity and family activities, which led to reduced stress and more sleep."

Meanwhile, for participants in Europe, those married with no children consider mental health and a safe environment (50%), and better planning and time management (50%) to be equally beneficial. Married participants with children younger than 16 years (40%) considered being able to adjust and be more productive, and 33.3% married with children 16 years and older (33.5%) considered time and cost savings more useful.

Table 4. Challenges during Work from Home by Marital Status in Asia and Europe

CHALLENGES	Asia								Europe								TOTAL	
	Single		Married no child		M<16 years		M≥16 years		Single		Married no child		M<16 years		M≥16 years		TOTAL	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Lack of work-related resources	13	15.7	7	11.1	6	6.3	9	13.4	3	27.3	0	-	0	-	1	16.7%	39	11.3
Internet Connection Issues	20	24.1	15	23.8	21	22.1	17	25.4	1	9.1	0	-	0	-	0	-	74	21.4
Lack of work-related resources	33	**39.8**	22	34.9	27	28.4	26	**38.8**	4	36.4	0	-	0	-	1	16.7	113	32.7
No face-to-face & soc.interaction	3	3.6	8	12.7	9	9.5	3	4.5	0	-	3	27.3	3	30	0	-	29	8.4
Miscommunication and coordination issues	2	2.4	9	14.3	11	11.6	0	-	1	9.1	2	18.2	0	-	0	-	25	7.2
Lack of coordination	4	4.8	16	25.4	8	8.4	3	4.5	0	-	1	9.1	1	10	0	-	33	9.5
Lack of Coordination coz less F2F	9	10.8	33	**52.4**	28	**29.5**	6	9.0	1	9.1	6	**54.5**	4	**40**	0	-	87	25.1
Need to adapt to new conditions	8	9.6	1	1.6	6	6.3	15	22.4	2	18.2	1	9.1	2	20	1	16.7	36	10.4
Need to multitask	2	2.4	0	-	4	4.2	1	1.5	0	-	0	-	0	-	0	-	7	2.0
Working longer hours	7	8.4	4	6.3	6	6.3	6	9.0	0	-	0	-	2	20	1	16.7	26	7.5
Difficulties in Time Management	3	3.6	0	-	0	-	3	4.5	1	9.1	0	-	0	-	1	16.7	8	2.3
Need to adapt to new condition	20	24.1	5	7.9	16	16.8	25	37.3	3	27.3	1	9.1	4	**40**	3	**50.0**	77	22.3
Unmotivated, bored, uncertain	6	7.2	0	-	1	1.1	2	3.0	1	9.1	0	-	1	10	1	16.7	12	3.5
No benefit at all	4	4.8	1	1.6	2	2.1	1	1.5	0	-	1	9.1	0	-	0	-	9	2.6
Non-work-related distraction	7	8.4	2	3.2	17	17.9	5	7.5	2	18.2	1	9.1	1	10	0	-	35	10.1
Hard to focus on work and adjust to New Norms	4	4.8	0	-	4	4.2	2	3.0	0	-	2	18.2	0	-	1	16.7	13	3.8
Unmotivated & hard to adjust	21	25.3	3	4.8	24	25.3	10	14.9	3	27.3	4	36.4	2	20	2	33.3	69	19.9
TOTAL RESPONSES	83		63		95		67		11		11		10		6		346	

Single participants have also expressed that they find that the WFH has also given them a more productive environment. For example, a single participant, P4, expressed that they felt more productive during the WFH, elaborating that they "work better at night" and that they do not get distracted by their superiors and colleagues. Another single participant, P162, shared that they felt that WFH has provided them with more privacy, allowing them to work at their own pace. These two responses consider the benefits of WFH for those who prefer isolation, allowing them to be in a comfortable space that lacks disturbance from their colleagues.

Among the single participants, 25.0% of the responses from Asia and 41.9% of the responses from Europe report that they find the WFH to be more time-efficient, cost-efficient, and time-efficient. A single participant, P4, expressed the sentiment that WFH has rendered traffic a nonexistent obstacle in their work life—a sentiment shared by many other participants, with some noting that the lack of concern for traffic has eased the stress of those with particularly long commutes.

Table 4 reflects the challenges that participants faced during the WFH due to their different marital status and job location. Almost all participants in Asia experienced a lack of work-related resources, but the ones who felt it the most were single (39.8%), followed by married participants with 16-year-old children and above (38.8%). In Europe, it was also experienced by single participants (36.4%). It is also important to note that, regardless of marital status, all

participants commonly cited internet connection issues as the main factor for their lack of coordination in the workplace. For example, a single participant, P175, who said that their network often dropped, and the video quality was bad, would also regularly get disconnected from the calls. The participant stated that moving the call to a different application still did not improve the call quality. The participant also stated that it is difficult to download materials due to internet connection issues, so they would often have to download their materials overnight. This reinforces the possibility of a larger-scale problem about the lack of mitigation and adaptation efforts to assist in WFH, such as a lack of access to a stable internet connection due to an uneven spread of cellular infrastructures that are not well-equipped and the lack of preparation from the corporation and institutions themselves.

A single participant, P100, shared that they encountered a lot of issues regarding checking certain things when they needed to test on a specific device, but they were unable to do so as they had a limited number of devices at home. These factors contribute to the lack of motivation the participants describe feeling, as the non-work-related distractions and uncertainty of their work schedule cause them to have difficulty focusing. On similar lines, another single participant, P125, shared that they felt safe working at home: "Since only one other person was living with me at home, little risk for COVID."

Lack of coordination because of no face-to-face interaction was also claimed as the major challenge by participants in Asia and Europe, especially for married participants with no child (52.4% and 54.5%, respectively) and married participants with children younger than 16 years old (29.5% and 40%, respectively). For example, in Asia, a single participant (P53) who teaches statistics preferred teaching physically in the classroom rather than online because of better face-to-face interaction with students as well as "writing on a physical white board is more convenient than the online white board." A married participant (P69) with a child younger than 16 years stated that "response from a team member sometimes takes a long time," which affects the continuity of work. They overcame it by communicating a lot and sending multiple reminders to their team to respond. A single participant, P97, shared that, "when presenting the ideas during online meetings, it is more difficult because I cannot understand the ambience of the audience. [There is] no solution yet for this." Similarly, single participants P94 and P102 in Europe expressed inconvenience due to a lack of coordination and discussion with the team members. They tried to overcome the issue by being patient, communicating the best, and taking advantage of different technologies like FaceTime and Zoom for efficient and clear communication.

In Europe, the need to adapt to new conditions was also felt as a real challenge for married participants with 16-year-old children and above (50%) and married participants with children younger than 16 years (40%). A Gen Y married participant (P9) reported being "struggling" to adapt to the new conditions. Likewise, a married participant (P41) proposed "bureaucratization" to organize their workplace into a formalized structure by creating fewer official documents.

Discussion and Conclusion

This study examines the benefits and challenges of working from home (WFH) and highlights the extent to which performance targets can be achieved during the pandemic era. The benefits of working from home for participants in Asia are that they have a safe environment and feel that their mental health is better maintained because they experience less pressure and can be more relaxed. WFH also allows individuals to have a healthier work-life environment, as it prevents them from contracting COVID-19 and is overall enriching for their mental health (Ahmadi et al., 2022). Therefore, creating better planning and time management, as well as being able to adapt and become more productive.

On the other hand, the challenges experienced by participants in Asia are the lack of work-related resources, especially internet connections, which causes a lack of coordination due to the lack of face-to-face contact, so they must be willing to adapt to new conditions. Many participants share that they are often disconnected from conference calls, and their slow internet connection prevents them from communicating with their coworkers (Panchuk, 2023). This shows that there is a larger-scale problem about the ready resources to assist individuals in WFH, as the environment does not accommodate certain task requirements that must be done physically (Wax et al., 2022; Aczel et al., 2021; Bao et al., 2022).

There is a lack of coordination due to the inability for coworkers to meet each other face-to-face, and therefore work schedules are difficult to maintain between each other. It is also because of the nature of WFH that certain tasks cannot be performed, such as field work. This shows that the challenges faced by the two generations are intertwined, as the workplace is not coordinated due to internet connectivity issues.

The benefits of working from home that are felt by participants in Europe are time and cost savings, resulting in better planning and time management, as well as being able to adapt and be more productive. This is in line with the flexibility and productivity of their work schedules (Rahman & Arif, 2020; Toscano & Zappalà, 2021). However, they feel the challenge of lack of coordination due to the lack of face-to-face contact, so they need to adapt to new conditions to stay connected.

Evidently, the effects of remote working on individuals across different generations and geographical locations have been both transformational and multifaceted. As explored in this research paper, the global movement towards remote labor, which was hastened by the events of the last decade, in particular the necessity to adopt digital channels, has had a significant impact on how people work, live, and interact. Obviously, generational differences have played a role in shaping the various experiences and perceptions of remote work. Baby boomers struggle with planning and time management, showing their value of in-person interactions and traditional office structures. On the other hand, millennials, and Gen Z, who have embraced the digital age, report having a much safer and mentally healing environment during their remote work. Understanding and addressing these generational nuances is crucial for organizations seeking to create inclusive and effective remote work environments.

Across generations, remote work has offered increased flexibility and autonomy through greater control over their schedules. This flexibility enables individuals to better balance their personal and professional lives. The data show a vast majority of responders spend an increased amount of time spending quality time with family and themselves. This investigation also examines the cost benefits of remote work during the pandemic era, with data showing that respondents reduce the stress and time of commuting to work, along with saving money on work attire and daily expenses. This financial benefit is particularly attractive to individuals of all generations, as it assists them in achieving greater financial stability. It can also be seen that remote workers feel a higher level of productivity than their in-office counterparts. This can benefit all individuals across the globe by allowing them to accomplish more in less time, preventing work-related stress.

However, remote working has not been without its challenges. The blurring of boundaries between work and personal life, the increased feelings of isolation, and the digital divide have posed significant obstacles that individuals and organizations must navigate. Remote working brought to light the complex challenges of disengagement rates, innovation barriers, and unfavorable working conditions.

Evidently, the findings of this study provide a thorough contextualization of the evolving remote labor landscape. There are differences in the benefits and challenges felt by participants in Asia and Europe. The biggest benefit felt by participants in Asia when working from home is that they feel they are in a safe environment and that their mental health is better maintained

because there is less pressure from their superiors and they can be more relaxed in completing their work. The impact was an increase in job satisfaction, work-life balance, and income satisfaction, which ultimately contributed to increasing work productivity. Meanwhile, participants from Europe felt that time and cost savings resulted in better planning and time management, as well as being able to adapt and be more productive.

Even though more benefits are felt, challenges are still felt, such as internet connection problems in Asia, which result in a lack of coordination due to minimal face-to-face contact. Participants in Europe did not experience internet connection problems but still felt a lack of coordination due to minimal face-to-face contact. It turns out that face-to-face is the most effective way to motivate employees to be more engaged in their work and encourage them to work towards a common goal.

It can be concluded that the results of this study accentuate the intricate interplay among employees, organizations, and their surrounding ecosystems in the context of remote work with accelerated digital adoption. Such insights are pivotal for the formulation and implementation of novel systems tailored to the future of work in the human-robot collaborative AI domain. Consequently, top management must pay special attention to the main challenges that many employees experience when working remotely, such as internet connection disruptions, unclear boundaries between work and personal life, and increased feelings of isolation, which may lead to fatigue and exhaustion.

These issues cast a critical eye on the future of work as a basis for designing transparent rules and regulations regarding human-robot interactions so that employees do not have to worry about ethical issues related to replacing employees with AI systems. Organizations need to develop training and development programs to create digital literacy in the era of human-robot interaction that will impact business success.

Practical and Social Implications

Recognizing the transformative trajectory of technology from Industry 1.0 to Industry 5.0, this discussion also casts a critical eye on the future of work, specifically in the domain of human-robot collaborative artificial intelligence (AI). This progression, characterized by the synergy of collaborative robotics and human-robot interactions, demonstrates instances of increased productivity and innovation in certain industries while simultaneously evoking concerns regarding job displacement and ethical considerations. Ultimately, this exhaustive discussion serves as a guide for organizations seeking to maximize the benefits of remote work while addressing the complex challenges it presents in an ever-changing work environment.

This study examines the benefits and challenges of remote work during the pandemic era, highlighting its potential to increase organizational productivity and reduce costs. Nonetheless, it simultaneously revealed complex obstacles, including effective communication barriers, the complexities of monitoring and motivating a remote workforce, and concerns regarding the erosion of organizational culture. The prevalence of disengagement rates, innovation constraints, and suboptimal work environments highlighted the complexity of remote work issues.

The findings of this study reiterate the literature suggestion regarding the transformative potential of technology in transforming the workforce (Lund et al., 2021; Malhotra, 2021), while highlighting the critical need to address job security and ethical concerns in this context. Additionally, these findings complement and extend the existing body of knowledge, presenting a nuanced perspective on remote work dynamics and their intersection with technological advancements and providing organizations and policymakers with valuable insights for navigating the complex landscape of work in the post-pandemic era. In the realm of the future of work, the transformative potential of technology, particularly human-robot collaborative AI, has been a focal point in both the literature and recent research findings.

Through an enhanced comprehension of WFH and the intricate interplay among employees, organizations, and their contextual ecosystems, the observed insights can assist in the formulation and implementation of novel systems that can accommodate the contemporary development of Industry 5.0 within enterprise environments. Through the observed results, identifying and resolving the deficits of WFH with effective and accessible solutions takes precedence, offering a transformed system with a WFH framework that workers will gradually be introduced to, featuring human-robotic communication facilitated by artificial intelligence (AI) systems that oversee onsite machinery.

This transition signifies a shift from work taking place in a conventional environment, identified by its potentially stressful and hazardous conditions, towards a more accommodating home-based work model. In this new model, humans can engage in synergistic and mutual collaboration with machinery that is equipped with the specifications needed to undertake labor in a demanding or perilous environment. Notably, Japan has already embarked on a project that can be considered a precursor to this concept, exemplified by the deployment of a prototype robot called 'OriHime-D,' developed by 'The Ory Lab'. This robot can be remotely operated by individuals with disabilities, allowing them to perform manual labor, as demonstrated by their role as waitstaff at a Japanese Pop-Up Cafe (Hyper Japan, 2019).

The research findings can articulate the potential benefits of adopting a WFH system, while simultaneously rationalizing the inherent constraints and limitations of WFH. These insights can then guide targeted interventions that would ease the transition into Industry 5.0.

Future Research

Future research endeavors in the realm of remote work and its convergence with technology could explore several promising avenues. Firstly, a longitudinal study tracking the sustained impacts of remote work post-pandemic, considering variables like job satisfaction, work-life balance, and organizational culture, would offer a comprehensive view. Secondly, investigations into the ethical considerations and job security implications of AI integration in remote work settings, combined with in-depth qualitative interviews, could provide a nuanced understanding of the evolving nature of work in the industry 5.0 era. Finally, a comparative analysis of remote work experiences across different Industries and geographic regions could reveal industry-specific and cultural factors influencing remote work dynamics. These suggestions provide a roadmap for future research, ensuring a balanced exploration of gaps while maintaining a focus on the substantial findings presented in this study.

As time moves forward, it is imperative to understand that remote work is a continuously evolving lifestyle. Policymakers, employers, and employees must work together to maximize its advantages and address its challenges. The future of remote work will be shaped by investments in technology infrastructure, mental health support, and flexible work policies created by individuals across the globe, regardless of their generation. It is through these collective efforts that remote work remains a positive force for change in global-scale working industries.

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