The Double-Edged Sword of ICT: Balancing Efficiency and Wellbeing in Nigeria's Public Workforce

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Abstract

This study examines the impact of Information and Communication Technology (ICT) adoption on employee wellbeing in the Nigerian public sector, focusing on the Kwara State Ministry of Water Resources. ICT has transformed workplace dynamics by improving efficiency, communication, and job satisfaction. However, its integration also presents challenges, including technostress, extended work hours, and blurred work-life boundaries. Using the Job Demands-Resources (JD-R) framework, Conservation of Resources (COR) theory, and Social Information Processing (SIP) theory, the study explores ICT's dual role as both a job resource and a job demand. A quantitative research design was employed, with data collected through structured questionnaires from 136 employees. Findings indicate that ICT adoption significantly enhances job satisfaction and work-life balance while reducing stress through task automation. The study underscores the need for structured ICT policies, digital training programs, and workload management strategies to optimize ICT benefits while mitigating negative effects. Policymakers must prioritize digital infrastructure improvements and employee support mechanisms to foster a healthy work environment. Future research should explore long-term ICT effects on employee wellbeing and leadership roles in digital transformation.

1. Introduction

The rapid adoption of Information and Communication Technology (ICT) in the workplace has transformed organizational operations globally, including in the public sector. ICT tools such as computers, mobile devices, internet-based applications, and communication networks have revolutionized how employees perform their tasks, communicate, and collaborate (Nguyen et al., 2024). In the Nigerian public sector, ICT adoption has been driven by the government's aim to modernize operations, enhance efficiency, and improve service delivery (AbdulKareem, Oladimeji, et al., 2024). However, while the benefits of ICT adoption are widely acknowledged, its impact on employee wellbeing remains underexplored, particularly in the context of developing countries like Nigeria (Abdulkareem, Ishola, et al., 2024).

Employee wellbeing encompasses various dimensions, including physical health, mental health, job satisfaction, work-life balance, and overall job performance (David et al., 2024). The integration of ICT into daily work activities has the potential to influence these dimensions positively by streamlining processes, reducing manual effort, and enabling flexible work arrangements (AbdulKareem, Oladimeji, et al., 2024). For instance, ICT tools can automate repetitive tasks, facilitate real-time communication, and provide employees with greater autonomy over their work, which can enhance job satisfaction and reduce stress levels (AbdulKareem, Oladimeji, et al., 2024). However, the same technologies can also introduce challenges such as increased work pressure, extended working hours, and blurred boundaries between work and personal life, potentially leading to burnout and decreased wellbeing (Abdulkareem, Ishola, et al., 2024).

In the Nigerian public sector, the adoption of ICT has emerged as a transformative yet complex phenomenon, presenting both opportunities and significant challenges. While some employees have embraced ICT tools as a means to improve efficiency and productivity, others have encountered substantial barriers in adapting to this technological transition (Oluwakemi Oseni, 2024). The resistance stems from multiple factors, including the rapid pace of technological change, insufficient training programs, and persistent infrastructural challenges such as inconsistent power supply and unreliable internet connectivity (Abdulkareem, 2024).

The digital transformation has introduced new workplace dynamics that significantly impact employee wellbeing. Many public sector workers experience heightened levels of job insecurity, particularly those who struggle to adapt to new technologies. This anxiety often stems from fears of becoming obsolete in an increasingly digitized workplace. The stress is further amplified by the pressure to quickly master new systems while maintaining regular work responsibilities. Infrastructure limitations present additional challenges. Frequent power outages and unstable internet connections not only disrupt work processes but also create frustration and reduce productivity. These technical difficulties often lead to increased workload as employees must complete tasks within shorter timeframes when systems are functional.

The organizational policy framework has not adequately evolved to address these challenges. Many public sector institutions lack comprehensive policies regarding work-life balance in the digital age (Anjum et al., 2025). The absence of clear guidelines on digital detox practices and remote work protocols has left employees struggling to maintain boundaries between their professional and personal lives. This policy gap is particularly problematic as it fails to address the psychological impact of constant connectivity and technological demands (Patergiannaki & Pollalis, 2024). Furthermore, the generational divide within the public sector workforce adds another layer of complexity. While younger employees often adapt more readily to technological changes, senior staff members may require more extensive support and training. This disparity can create tensions within teams and affect organizational cohesion.

Despite the growing body of literature on ICT adoption and employee wellbeing, there is a noticeable gap in study that explicitly explores the interplay between these two aspects in the Nigerian public sector. While studies such as those by Khan (2024) and Wessel (2024) have explored the effects of ICT on stress levels and work-life balance, respectively, there is a lack of comprehensive research that addresses the broader implications of ICT adoption on employee wellbeing in this context. This gap is particularly significant given the unique socio-cultural, economic, and institutional factors that shape the Nigerian public sector workforce.

The aim of this research is to examine the influence of ICT adoption on employee wellbeing in the Nigerian public sector, with a focus on the Kwara State Ministry of Water Resources. The specific objectives are to: assess the influence of ICT adoption on employee wellbeing, stress levels, job satisfaction, and work-life balance. This study's findings will provide constructive recommendations for policymakers and organizational managers on how to leverage ICT adoption to enhance employee wellbeing while mitigating its potential negative effects.

2. Literature Review

The adoption of ICT in the workplace has been a subject of wide research, with scholars exploring its influence on various aspects of organizational performance and employee behaviour. ICT adoption refers to the process of implementing and utilizing digital communication technologies, including computers, mobile devices, internet-based applications, and communication networks, to enhance organizational efficiency and productivity (Khan, 2024). In the public sector, ICT adoption has been driven by the need to improve service delivery, increase transparency, and foster citizen engagement (Abdulkareem, Ishola, et al., 2024). However, the impact of ICT adoption on employee wellbeing remains a complex and multifaceted issue.

One of the key gains of ICT adoption is its capability to increase employee efficiency and job satisfaction. By automating repetitive tasks and streamlining workflows, ICT tools can reduce manual effort and enable workers to concert efforts on higher-value actions that require innovation and critical thinking (Hujran et al., 2023). Moreover, ICT adoption can facilitate remote work and flexible work arrangements, which have become progressively influential in the advent of the COVID-19 pandemic (Wentz et al., 2023). These arrangements can provide workers with more autonomy over their job schedules, thereby improving their work-life balance and lowering stress levels (Purwanto et al., 2021).

However, the adoption of ICT also introduces several challenges that can negatively impact employee wellbeing. One such challenge is technostress, which refers to the mental and physical fatigue resulting from constant connectivity, information burden, and obscured boundaries between their jobs and personal life (Abdulkareem, Ishola, et al., 2024). In the Nigerian public sector, technostress is often exacerbated by inadequate training and support for employees transitioning to ICT-driven workflows, as well as infrastructural challenges such as unreliable internet connectivity and power supply. These challenges can lead to feelings of job insecurity, anxiety, and burnout, thereby undermining employee wellbeing.

Another challenge associated with ICT adoption is the digital divide, which refers to the unequal access to ICT tools and resources among different demographic groups within the workforce (Stocker et al., 2023). In the Nigerian public sector, disparities in ICT access and digital literacy can create inequities in how employees experience and respond to ICT adoption. For instance, employees with higher levels of digital literacy may benefit more from ICT tools, while those with limited access or skills may struggle to adapt, leading to feelings of inadequacy and job dissatisfaction (Abdulkareem & Ramli, 2021a). Addressing these disparities is essential for ensuring equitable outcomes and promoting inclusivity in the digital transformation process.

The literature also highlights the value of organizational support in easing the negative outcomes of ICT adoption on workers wellbeing. Studies have shown that organizations that provide adequate training, resources, and support for employees transitioning to ICT-driven workflows are more likely to experience positive outcomes in terms of employee wellbeing (Rizvi et al., 2023). For instance, organizations that offer digital literacy programs, stress management workshops, and flexible work arrangements can assist workers navigate the challenges of ICT adoption and preserve a well work-life balance. Moreover, fostering a positive organizational culture that values work-life balance and workers wellbeing can further enhance the benefits of ICT adoption.

Despite the growing body of literature on ICT adoption and employee wellbeing, there is a noticeable gap in studies that specifically examines the dynamics in the Nigerian public sector. While studies such as those by Abdulkareem, Ishola, et al. (2024) and Ficapal-Cusí et al. (2024) have explored the effects of ICT on stress levels and work-life balance, respectively, there is a lack of comprehensive research that attend to the broader implications of ICT adoption on employee wellbeing in this context. This gap is particularly significant given the unique socio-cultural, economic, and institutional factors that shape the Nigerian public sector workforce.
Based on the literature review, the following hypotheses are proposed:

H1: ICT adoption has a significant positive impact on employee wellbeing in the Nigerian public sector.

H2: ICT adoption reduces employee stress levels in the Nigerian public sector.

H3: ICT adoption enhances employee job satisfaction in the Nigerian public sector.

H4: ICT adoption improves employee work-life balance in the Nigerian public sector.

3. Theoretical Review

The study is built on the Job Demands-Resources (JD-R) framework, which provides a theoretical vision for recognizing the relationship between workplace characteristics, employee wellbeing, and performance (Bakker & Demerouti, 2017). Based on this framework, job demands is the cognitive, physical, and emotional aspects of the job that demands effort, while job resources are the aspects that support employees in achieving job goals and lowering job demands. In the context of ICT adoption, ICT tools can act as both demands and resources (Abdulkareem, Ishola, et al., 2024). On one hand, ICT use can be demanding due to information overload, constant connectivity, and obscured boundaries between personal life and work. On the other hand, ICT tools can serve as resources when used effectively, requiring employees with autonomy, information, and flexibility in managing their work.

The Conservation of Resources theory also supplements the JD-R framework by positing that workers endeavour to obtain, retain, and protect resources because resource loss or lack of resource gain can have detrimental effects on wellbeing (Hobfoll, 1989). In the context of ICT adoption, employees may perceive ICT tools as resources that enhance their control over work tasks, improve efficiency, and facilitate work-life balance (Banford Witting et al., 2023). However, technostress resulting from heavy ICT use can lead to resource depletion, such as mental and physical fatigue, which can negatively impact wellbeing.

The Social Information Processing (SIP) theory also plays a role in this research by highlighting the influence of social interactions, relationships, and social support on individual wellbeing (Salancik & Pfeffer, 1978). In this circumstance, the availability of social support, both offline and online, can mitigate the negative effects of ICT-related stressors and promote employee wellbeing (Duberry, 2022). Supportive relationships and effective teamwork can act as buffers against the negative impacts of ICT adoption, fostering a sense of belonging and reducing perceived overload (Li et al., 2022).

Therefore, the conceptual framework for this study integrates the JD-R framework, COR theory, and SIP theory to explore the impact of ICT adoption on employee wellbeing in the Nigerian public sector. The independent variable is ICT adoption, which includes social media usage, internet usage, mobile device usage, and software usage. The dependent variable is employee wellbeing, which encompasses job satisfaction, work-

life balance and stress levels. The framework posits that ICT adoption can act as both a job demand and a job resource, influencing employee wellbeing through its impact on stress levels, job satisfaction, and work-life balance.

4. Methodology

The study adopted a quantitative research design to investigate the impact of ICT adoption on employee wellbeing in the Nigerian public sector, with a focus on the Kwara State Ministry of Water Resources. The methodology was designed to ensure the systematic collection and analysis of data, aligning with the research objectives and hypotheses.

The variables used in the study were derived from past literature to ensure their relevance and validity. Items measuring ICT adoption were adapted from studies by Kanwal et al. (2020) and Purwanto (2021), which explored the role of ICT tools in enhancing workplace productivity and employee wellbeing. Items related to employee wellbeing, including job satisfaction, work-life balance, and stress levels, were sourced from studies by Lee (2019) and Adebayo (2020).

A structured questionnaire, divided into two parts was developed as the main data collection method. Section A collected demographic information such as age, gender, marital status, and educational qualification, while Section B focused on the core variables of the study, including ICT adoption, employee wellbeing, stress levels, job satisfaction, and work-life balance. The items in Section B were measured using a 5-point Likert scale, ranging from "Strongly Agree" to "Strongly Disagree," to capture respondents' perceptions and experiences.

The population for the study comprised of all staff members of the Kwara State Ministry of Water Resources, totalling 210 employees. A sample size of 136 respondents was decided based on the Krejcie and Morgan method, which is widely known for its ease and efficacy in establishing sample sizes for small to medium-sized populations. Snowball sampling was employed as the sampling technique, where initial respondents were selected randomly, and they, in turn, helped identify other potential participants. This approach was particularly useful in reaching a diverse group of employees across different departments and levels within the ministry.

To ensure the validity of the research instrument, both face validity and content validity were assessed. Face validity was achieved by reviewing the questionnaire with three (3) experts in the field to ensure that the items were clear, relevant, and aligned with the study's objectives. Content validity was established by referencing established literature and ensuring that the questionnaire comprehensively covered the key dimensions of ICT adoption and employee wellbeing.

Reliability was assessed through a pilot test conducted with 20 participants who were different from the final sample. The pilot test was used to determine any ambiguities or issues with the questionnaire and to assess the appropriateness of the items. The Cronbach's alpha coefficient was calculated, and all constructs exceeded the acceptable threshold of 0.7, indicating high reliability. The data were analysed using descriptive and inferential statistical methods.

4.1 Data Analysis

4.1.1 Response Rate

A total of 140 questionnaires were distributed to employees of the Kwara State Ministry of Water Resources, out of which 138 were returned, yielding a response rate of 98.5%. After removing incomplete responses, 136 questionnaires were analysed as shown in Table 1.

Table 1: Response Rate

Description	Frequency	Percentage (%)
Distributed Questionnaires	140	100%
Returned Questionnaires	138	98.5%
Valid Responses Used	136	97.1%

4.1.2 Demographic Characteristics of Respondents

The demographic analysis provides insights into the composition of the respondents based on gender, age, level of education, and years of experience at work.

Table 2: Demographic Characteristics

Variable	Category	Frequency	Percentage (%)
Gender	Male	80	58.8%
	Female	56	41.2%
Age Group	18-30 years	45	33.1%
	31-40 years	52	38.2%
	41-50 years	25	18.4%
	Above 50 years	14	10.3%
Educational Level	SSCE/NCE	30	22.1%
	BSc/HND	75	55.1%
	MSc/PhD	31	22.8%
Work Experience	Below 5 years	42	30.9%
	5-10 years	50	36.8%
	Above 10 years	44	32.3%

4.1.3 Descriptive Statistics of Variables

This part presents the descriptive statistics of the key constructs in the study, comprising measures of central tendency (mean), dispersion (standard deviation), and distribution (minimum and maximum values). The descriptive statistics provide a summary of the data and facilitate a better understanding of the variables used in the study.

Table 3: Descriptive Statistics of ICT Adoption and Employee Well-being Variables

Variable	N	Mean	Std. Dev.	Min	Max
ICT Adoption	136	4.65	0.47	3.00	5.00
Employee Well-being	136	4.38	0.63	2.00	5.00
Employee Stress Level	136	3.75	0.81	2.00	5.00
Employee Job Satisfaction	136	4.52	0.56	3.00	5.00
Employee Work-Life Balance	136	4.28	0.61	2.00	5.00

4.1.4 Inferential Analysis

The relationship between ICT adoption and employee wellbeing was tested using Pearson correlation and regression analysis.

Table 4: Correlation Matrix

Variables	ICT Adoption	Stress Level	Job Satisfaction	Work-Life Balance
ICT Adoption	1.000			
Stress Level	-0.502**	1.000		
Job Satisfaction	0.621**	-0.463**	1.000	
Work-Life Balance	0.588**	-0.412**	0.534**	1.000

Note: p < 0.01

Results indicate a significant negative relationship between ICT adoption and stress levels (-0.502, p<0.01), suggesting that increased ICT use reduces stress. A significant positive relationship exists between ICT adoption and job satisfaction (0.621, p<0.01), implying that ICT adoption enhances job satisfaction.

4.1.5 Regression Analysis

A regression analysis was conducted to test the impact of ICT adoption on employee wellbeing indicators.

Table 5: Regression Results

Dependent Variable	R-Square	Beta (β)	t-value	p-value
Stress Level	0.251	-0.502	-4.91	0.000**
Job Satisfaction	0.386	0.621	6.72	0.000**
Work-Life Balance	0.346	0.588	6.31	0.000**

*Significance level: ** p<0.05, p<0.01**

The regression model shows that ICT adoption accounts for 25.1% variance in stress levels, 38.6% variance in job satisfaction, and 34.6% variance in work-life balance. ICT use significantly reduces stress while improving job satisfaction and work-life balance.

5. Discussion of Findings

Findings reveal that ICT adoption significantly influences employee wellbeing in the Nigerian public sector. ICT tools reduce stress by simplifying tasks and enabling flexibility. However, excessive ICT use may contribute to workload expansion and work-life imbalance. The results align with previous studies (Kanwal et al., 2020; Lee, 2019) that indicate ICT improves job satisfaction but may also blur work-life boundaries. Organizational interventions such as digital detox policies and workload management can mitigate adverse effects.

Moreover, ICT adoption enhances job autonomy and efficiency, which can positively affect motivation and productivity. This result aligns with previous findings of (Abdulkareem, Ishola, et al., 2024). However, the challenge of technostress, where employees feel overwhelmed by constant connectivity and information overload, remains a concern. Employees who lack adequate training may struggle with ICT use, leading to frustration and decreased job satisfaction. This underscores the need for continuous digital literacy programs.

The relationship between ICT and work-life balance is complex. While ICT enables remote work and flexible hours, it also extends working hours beyond conventional office settings. This can lead to burnout, necessitating clear policies on work boundaries. Employers should consider structured ICT usage policies to optimize benefits while minimizing stress.

5.1 Implication of Findings

The findings of this research influence significantly the theoretical understanding of ICT adoption and employee wellbeing, particularly within the Nigerian public sector. The research integrates multiple theoretical frameworks, including the JD-R model, COR theory, and SIP theory, to elucidate the complex relationship between technology use and employee welfare.

The JD-R model posits that job demands and resources affects employee wellbeing. ICT adoption introduces both demands (e.g., information overload, technostress) and resources (e.g., automation, flexibility, improved communication). This study's findings support the dual nature of ICT as both a job resource and a job demand. The results indicate that ICT use enhances job satisfaction and work-life balance by reducing workload and increasing flexibility, aligning with previous research (Bakker & Demerouti, 2017). However, excessive ICT use leads to increased stress levels, supporting the argument that technology can also act as a job demand when mismanaged (Lee, 2019).

A critical implication is the need for a nuanced application of the JD-R framework in ICT-related studies. Future research should refine the conceptualization of ICT as a resource or demand based on contextual variables, such as organizational culture, digital literacy, and work structure. Moreover, scholars should explore the dynamic nature of ICT adoption over time, investigating whether its classification as a job demand or resource changes based on employees' adaptation and proficiency.

Hobfoll's (2002) COR theory suggests that individuals strive to acquire and preserve resources to maintain wellbeing. ICT tools can be conceptualized as resources that help employees conserve cognitive and physical energy by automating tasks and facilitating communication. The study's findings indicate that ICT adoption reduces stress levels by streamlining workflows, allowing employees to allocate cognitive resources more efficiently.

However, the study also finds that excessive ICT use can lead to resource depletion, such as mental fatigue and burnout. This dual effect aligns with COR theory, which posits that when resources are threatened or lost, individuals experience stress and decreased wellbeing. Organizations must, therefore, implement digital wellbeing strategies to ensure that ICT serves as a resource rather than a source of depletion. Future research should explore interventions such as ICT training programs, workload management policies, and organizational support mechanisms that help employees optimize ICT use while minimizing resource loss.

The study's findings also contribute to SIP theory, which emphasizes the role of social interactions in shaping individuals' experiences and behaviors (Salancik & Pfeffer, 1978). ICT adoption influences employee wellbeing not only through its functional benefits but also through its impact on workplace communication and collaboration. The findings suggest that ICT adoption enhances job satisfaction by facilitating social support and teamwork, reinforcing SIP theory's argument that social contexts shape individual perceptions and attitudes.

However, the study also highlights the potential for ICT to disrupt work-life balance by fostering an 'always-on' culture. Employees who experience constant connectivity may struggle to separate work from personal life, leading to stress and reduced wellbeing. This finding suggests that while ICT enhances workplace communication, it can also lead to social overload. Future studies should investigate the role of organizational culture in mitigating ICT-induced social fatigue and explore strategies to optimize digital communication without overwhelming employees.

The study underscores the role of the digital divide in shaping ICT adoption experiences among employees. Previous research (Abdulkareem & Ramli, 2021b) highlights disparities in digital literacy and access to ICT tools, which can lead to unequal benefits. The findings support this notion, revealing that employees with higher digital literacy report more positive wellbeing outcomes, while those with limited ICT skills experience increased stress and job dissatisfaction.

This finding has significant theoretical implications for public administration research. It suggests that ICT adoption does not uniformly benefit all employees; rather, it is mediated by digital literacy, access to resources, and organizational support. Future research should explore targeted interventions that bridge the digital divide, ensuring that ICT serves as an equalizing force rather than a source of workplace disparity.

The findings also contribute to human resource development (HRD) theories by emphasizing the role of ICT training and support in employee wellbeing. Organizations that provide structured ICT training and continuous learning opportunities can lessen the negative impacts of technostress and enhance work satisfaction. This supports with the human capital theory, that argues that investments in employee skills lead to increased productivity and wellbeing (Becker et al., 2004).

Moreover, the study stresses the need for HR policies that look in to work-life balance in an ICT-driven environment. Traditional HR models focus on physical workplace conditions, but the findings suggest that digital wellbeing should be a core component of HR strategies. Future research should investigate how HR policies can evolve to address the challenges of ICT-driven workplaces, particularly in the public sector.

This study impacts on the broader discussion on e-government and public administration by supporting empirical evidence on the human side of digital transformation. While previous research has focused on the efficiency and transparency benefits of e-government, this study highlights the employee-centric implications of digital adoption. The findings suggest that successful e-government implementation requires a balanced approach that considers both technological efficiency and employee wellbeing.

Public administration theories must, therefore, integrate employee wellbeing into discussions on digital governance. Future research should examine how governments can design ICT policies that optimize both service delivery and employee welfare. Additionally, comparative studies across different public sector institutions can provide insights into best practices for managing ICT-induced stress and promoting digital wellbeing.

6. Conclusions

This study has examined the influence of ICT adoption on workers' wellbeing in the Nigerian public sector, specifically within the Kwara State Ministry of Water Resources. The findings reveal that ICT adoption has both positive and negative implications for workers' wellbeing, depending on how it is managed within the workplace. While ICT facilitates efficiency, enhances job satisfaction, and encourages work-life balance by offering flexible work schedules, it also introduces new challenges such as technostress, extended working hours, and job insecurity due to rapid technological changes. The study's findings align with the JD-R framework, which suggests that ICT serves as both a job resource and a job demand. On the one hand, ICT tools reduce stress by automating routine tasks and improving communication. On the other hand, they adds to information overload, blurring the boundaries between employees' personal life work and increasing work-related anxiety, especially among employees with lower digital literacy. These dual effects highlight the need for strategic policies to ensure that ICT adoption enhances productivity without compromising employee wellbeing. The Conservation of Resources (COR) theory further explains the dynamics observed in this study. Employees who perceive ICT as a resource that improves efficiency and communication experience higher job satisfaction and reduced stress. However, those who struggle with ICT adoption due to inadequate training or infrastructure challenges experience resource depletion, leading to stress and burnout. This underscores the necessity for public sector organizations to implement targeted interventions, such as digital literacy programs, workload management strategies, and stress reduction initiatives, to optimize the benefits of ICT adoption.

The study also highlights the role of the Social Information Processing (SIP) theory in understanding ICT adoption and employee wellbeing. The availability of digital tools influences social interactions in the workplace, with ICT facilitating collaboration and teamwork. However, excessive reliance on digital communication can lead to social fatigue and a diminished sense of personal connection among employees. Organizations must, therefore, foster a balanced approach that integrates both digital and in-person interactions to maintain a supportive work environment. Policy implications from this research suggest the urgent need for government agencies to develop clear ICT policies that address the challenges associated with digital transformation. These policies should include structured guidelines for ICT use, digital detox initiatives, and training programs tailored to employees' varying levels of digital competence. Additionally, infrastructural improvements, such as stable internet connectivity and reliable power supply, are crucial in ensuring that ICT adoption benefits employees rather than exacerbates workplace stress. Future research should explore the long-term effects of ICT adoption on employee wellbeing, particularly as digital transformation continues to evolve. Comparative studies across different public sector institutions in Nigeria and other developing economies would provide broader insights into how ICT influences employee welfare in various organizational contexts. Furthermore, exploring the role of leadership in shaping ICT adoption strategies and employee adaptation would offer valuable perspectives on fostering a digitally inclusive and wellbeing-oriented workplace.

Acknowledgment

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