

Remote Work Practices, Employee Productivity, and Knowledge Intensive Firms: Field Study

Arthur Tang*

Rita Tong Liu School of Business and Hospitality Management, Saint Francis University, Hong Kong, Hong Kong SAR, China

Corresponding author: arthur.tang@sfu.edu.hk

Abstract

The rapid transition toward distributed organizational models has necessitated a rigorous reevaluation of how remote work practices influence employee productivity, particularly within knowledge-intensive firms. Such organizations rely heavily on cognitive capabilities, complex problem-solving, and seamless collaboration, creating unique challenges and opportunities when operations shift from traditional office environments to remote settings. This paper presents a comprehensive field study investigating the multifaceted relationship between remote work arrangements and productivity outcomes among knowledge workers. Through an extensive empirical design encompassing survey data and performance metrics from multiple knowledge-intensive sectors, the study examines critical dimensions such as technological mediation, task interdependence, and employee autonomy. The findings indicate a complex, non-linear relationship where appropriate technological infrastructure and high levels of worker autonomy significantly enhance subjective and objective productivity metrics. Furthermore, the analysis reveals that isolation and communication friction serve as primary detriments, necessitating strategic organizational interventions. By systematically analyzing these variables, the research contributes to organizational behavior literature and offers pragmatic insights for management practitioners seeking to optimize remote work environments. The study ultimately underscores the necessity of moving beyond binary evaluations of remote work efficacy toward more nuanced, context-specific frameworks that account for the unique operational realities of knowledge-intensive firms.

Keywords: Remote Work; Employee Productivity; Knowledge Intensive Firms; Organizational Behavior; Field Study

1. Introduction

1.1 Background and Motivation

The contemporary macroeconomic landscape has witnessed an unprecedented transformation in the spatial and temporal organization of work. At the forefront of this structural evolution are knowledge-intensive firms, which are characterized by their primary reliance on intellectual capital, complex data processing, and innovative problem-solving. Over the past decade, advancements in digital communication infrastructure have steadily facilitated a transition away from traditional, centralized office environments. This shift has culminated in the widespread adoption of remote work practices,

fundamentally altering the social and operational fabric of modern enterprises. Researchers and practitioners alike have recognized that managing distributed human capital requires theoretical and practical frameworks that diverge significantly from conventional management paradigms [1]. The motivation for this study stems from an urgent need to empirically evaluate how these spatial reconfigurations influence the fundamental driver of economic value in knowledge-intensive firms, which is employee productivity. Unlike manufacturing or routine service sectors where productivity can be quantified through tangible output or transaction volume, knowledge work involves intangible processes such as ideation, strategic planning, and collaborative design [2]. Measuring and managing productivity in these contexts remains a profound challenge, particularly when the workforce is physically dispersed. As organizations continue to institutionalize hybrid and fully remote work models, understanding the specific mechanisms through which remote practices enhance or impede cognitive labor has become a central imperative for organizational science [3]. Previous investigations into this phenomenon have frequently yielded contradictory results, with some suggesting significant productivity gains due to reduced commuting stress and uninterrupted focus, while others highlight the detrimental effects of professional isolation and fragmented communication channels [4]. This field study is designed to reconcile these divergent perspectives by providing a highly granular, contextually embedded analysis of remote work within environments that are highly dependent on intellectual capital.

1.2 Research Objectives and Scope

The primary objective of this field study is to systematically dissect the dynamic interplay between remote work configurations and employee productivity in knowledge-intensive firms. To achieve this overarching goal, the research pursues several specific sub-objectives. First, it seeks to identify and categorize the specific remote work practices that are currently deployed across different segments of the knowledge economy, ranging from software development and data analytics to legal consulting and financial advisory services. Second, the study aims to operationalize productivity through a multidimensional lens, capturing both self-reported assessments of task efficiency and objective supervisor ratings of output quality and collaborative contribution. Third, it endeavors to investigate the moderating variables that influence this relationship, particularly focusing on the adequacy of technological infrastructure, the degree of task interdependence among team members, and the psychosocial dimensions of virtual isolation and autonomy. The scope of the research is deliberately constrained to knowledge-intensive firms to ensure theoretical cohesion, as the operational dynamics of these organizations are distinct from those characterized by highly routinized or physical labor [5]. By concentrating on this specific organizational typology, the study can thoroughly examine phenomena such as asynchronous knowledge sharing, digital communication overload, and boundary management between professional and personal domains. Ultimately, the scope encompasses a robust empirical analysis designed to generate actionable insights that can inform organizational policy, human resource strategies, and technological investment decisions in an increasingly distributed global economy.

2. Literature Review and Theoretical Background

2.1 The Evolution of Remote Work Paradigms

The academic discourse surrounding remote work, historically termed telecommuting or telework, has evolved significantly since its inception in the late twentieth century. Early conceptualizations largely framed telecommuting as an alternative work arrangement offered primarily as an employee

benefit, aimed at improving work-life balance or reducing environmental burdens associated with daily commuting [6]. During this nascent phase, research heavily emphasized technological determinism, focusing on how early networked computer systems could replicate basic administrative functions outside the centralized office [7]. However, as information and communication technologies advanced, facilitating real-time high-fidelity collaboration, the paradigm shifted. Remote work began to be viewed not merely as an idiosyncratic accommodation but as a strategic organizational design choice. Sociotechnical systems theory provides a valuable lens through which to view this evolution, positing that organizational effectiveness relies on the joint optimization of both the social and technical subsystems [8]. In the context of remote work, this implies that providing advanced collaboration software is insufficient without correspondingly adapting management practices, team norms, and performance evaluation metrics. Recent literature has documented a transition toward distributed by default models in various technological and consulting sectors, where remote work is the foundational operational reality rather than a deviation from the norm. This structural shift necessitates a reevaluation of traditional organizational behavior constructs, such as organizational citizenship behavior, psychological contract fulfillment, and perceived organizational support, all of which manifest differently when physical proximity is eliminated from the work environment.

2.2 Productivity in Knowledge Intensive Firms

Understanding the impact of remote work requires a rigorous conceptualization of productivity within the specific context of knowledge-intensive firms. Knowledge work is inherently non-linear, frequently involving periods of intense cognitive processing, iterative problem-solving, and unstructured collaboration [9]. Consequently, traditional industrial-era metrics such as hours logged or localized task completion rates are wholly inadequate for capturing true value creation. The literature distinguishes between two primary forms of knowledge work tasks, which are focused independent work and collaborative interdependent work. Independent work, which requires deep cognitive engagement and minimal interruption, has often been hypothesized to benefit from remote work environments due to the elimination of ambient office noise and casual disruptions [10]. Conversely, collaborative interdependent tasks, which rely on tacit knowledge exchange, spontaneous brainstorming, and rapid feedback loops, present significant challenges in distributed settings [11]. The capacity for a knowledge-intensive firm to maintain overall organizational productivity relies on balancing these competing demands. Furthermore, innovation, a critical subset of productivity in these environments, has been heavily debated in recent remote work literature. Some scholars argue that the structural rigidity of scheduled video conferences stifles the serendipitous encounters that historically drive creative breakthroughs, while others contend that digital platforms democratize idea generation and allow for more diverse, cross-geographic collaborations [12].

2.3 Theoretical Frameworks of Telecommuting

To contextualize the empirical investigation, this study draws upon several established theoretical frameworks that elucidate the remote work experience. Boundary management theory is particularly salient, as it examines how individuals demarcate and transition between their professional and personal domains [13]. In a traditional office environment, spatial and temporal boundaries are structurally imposed. In a remote work context, these boundaries become highly permeable, placing the cognitive burden of boundary maintenance entirely on the employee. Failure to effectively manage these boundaries frequently leads to work-life conflict, emotional exhaustion, and subsequent declines in sustainable productivity. Additionally, the job demands-resources model provides a comprehensive

structure for analyzing how specific characteristics of the remote work environment influence employee well-being and performance [14]. Within this model, remote work can introduce unique job demands, such as technostress, digital surveillance anxiety, and isolation. Simultaneously, it can provide unique job resources, primarily in the form of enhanced autonomy, flexibility in schedule control, and environmental personalization. According to this framework, productivity optimization occurs when the resources provided by the remote environment sufficiently buffer the associated demands [15]. Another critical perspective is offered by media richness theory, which suggests that the effectiveness of communication is contingent upon the alignment between the complexity of the information being transferred and the capacity of the communication medium to convey nuanced social cues [16]. In knowledge-intensive firms where tasks are highly ambiguous, reliance on lean media such as email or asynchronous text can lead to misinterpretation and process loss, thereby negatively impacting overall team productivity.

3. Methodology and Research Design

3.1 Field Study Design and Site Selection

To empirically investigate the dynamics outlined in the literature, this research employs a robust cross-sectional field study design incorporating a mixed-methods approach to data collection. The decision to utilize a field study rather than an experimental laboratory design was driven by the necessity to capture the authentic, context-dependent experiences of remote workers engaged in actual knowledge-producing activities over sustained periods [17]. The site selection process deliberately targeted a diverse array of knowledge-intensive firms to ensure the broad applicability of the findings. The final selection included five distinct organizations operating within software engineering, financial analysis, legal consultancy, architectural design, and digital marketing. These sectors were chosen because their core value propositions rely almost entirely on the cognitive output and collaborative efficiency of their human capital [18]. To control for organizational culture variations while maintaining external validity, the study engaged with multiple departments within each selected firm. The inclusion criteria for participants required that they be classified as full-time knowledge workers and have operated in a remote or highly flexible hybrid capacity for a minimum of twelve consecutive months prior to the survey distribution. This temporal requirement was established to filter out the transitional friction associated with newly adopted remote work arrangements, thereby capturing a stabilized representation of remote work efficacy [19].

3.2 Data Collection Procedures

Data collection was executed over a three-month period utilizing a comprehensive digital survey instrument administered to employees and their direct supervisors. Prior to the main deployment, a pilot study involving a small subset of participants was conducted to test the psychometric properties of the questionnaire and to refine the clarity of the operationalized constructs. Following the successful validation of the instrument, the primary survey was distributed via internal organizational communication channels. To maximize the response rate and ensure the integrity of the data, the research team implemented stringent protocols regarding participant anonymity and data confidentiality. The employee survey was designed to capture self-reported metrics concerning the frequency and nature of remote work practices, perceptions of technological infrastructure adequacy, boundary management strategies, and feelings of professional isolation [20]. To mitigate the inherent biases of self-reported performance, a corresponding supervisor survey was deployed simultaneously. Supervisors were tasked with evaluating the participating employees on multiple dimensions of

productivity, including output quality, adherence to project timelines, and collaborative efficacy [21]. This dual-source data collection strategy allows for a more holistic and objective assessment of productivity in the remote context. A total of eight hundred and fifty survey invitations were distributed across the five organizations. After rigorous data cleaning procedures, which involved the removal of incomplete responses and the statistical identification of unengaged response patterns, the final analytical sample consisted of six hundred and forty-two matched employee-supervisor dyads [22].

3.3 Variable Measurement and Operationalization

The variables utilized in this study were operationalized using validated measurement scales adapted from existing organizational behavior literature, customized specifically for the remote knowledge work context. The independent variable, remote work intensity, was measured as a continuous variable representing the percentage of total weekly working hours completed outside the primary organizational facility. The dependent variable, employee productivity, was conceptualized as a multidimensional construct comprising both subjective and objective assessments. Subjective productivity was measured using a modified version of an established individual work performance questionnaire, focusing on task execution, contextual performance, and counterproductive work behaviors [23]. Objective productivity was operationalized through the aggregated supervisor ratings based on standardized departmental performance rubrics. Several critical moderating and mediating variables were also integrated into the analytical model. Technological infrastructure adequacy was evaluated through a composite score assessing the reliability of organizational hardware, the functional utility of specialized software platforms, and the security of virtual private network access [24]. Autonomy was measured using scales that captured the employee's perceived control over their scheduling and task execution methodologies. Task interdependence, a crucial contextual variable, was assessed by asking participants to quantify the extent to which their daily workflows required synchronous input or immediate feedback from colleagues to proceed. Finally, demographic and organizational control variables, including tenure, educational attainment, age, and departmental affiliation, were recorded to isolate the specific effects of the remote work variables [25].

4. Results and Empirical Analysis

4.1 Descriptive Statistics and Baseline Metrics

The initial phase of the empirical analysis involved the generation of descriptive statistics to map the foundational characteristics of the respondent population and to establish baseline metrics for the variables under investigation. The demographic composition of the sample reflected the typical profile of knowledge-intensive sectors, with a high concentration of advanced degree holders and significant variation in organizational tenure. Preliminary data screening confirmed that the assumptions of normality and linearity required for subsequent multivariate analysis were adequately met.

Table 1: Demographic and Professional Characteristics of the Study Sample

Variable Category	Classification	Frequency	Percentage
Age Distribution	20 to 30 Years	185	28.8
Age Distribution	31 to 45 Years	312	48.6
Age Distribution	Over 45 Years	145	22.6
Educational Level	Bachelor Degree	220	34.3
Educational Level	Master Degree	350	54.5
Educational Level	Doctorate	72	11.2
Work Arrangement	Fully Remote	290	45.2

Variable Category	Classification	Frequency	Percentage
Work Arrangement	Hybrid Remote	352	54.8

The baseline metrics revealed significant variance in remote work intensity, providing a robust dataset for analyzing the differing impacts of spatial flexibility. Self-reported productivity scores indicated a generally positive skew, suggesting that the majority of respondents felt competent and efficient in their remote environments. Interestingly, the supervisor ratings exhibited a tighter distribution with a slightly lower mean, highlighting the persistent discrepancy between subjective self-evaluations and external performance appraisals. Correlation analysis was conducted to establish initial relationships between the primary constructs [26]. The correlation matrix demonstrated a statistically significant positive association between the adequacy of technological infrastructure and all dimensions of employee productivity. Furthermore, perceived autonomy showed a strong positive correlation with subjective productivity, supporting the theoretical premise that control over one's work environment is a critical enabler of focused cognitive labor. Conversely, measurements of professional isolation exhibited a strong negative correlation with both self-reported and supervisor-rated performance metrics, validating concerns regarding the psychosocial detriments of prolonged physical separation from the organizational collective.

4.2 Impact of Remote Practices on Productivity

To rigorously evaluate the causal pathways between remote work practices and productivity outcomes, the study utilized advanced multivariate regression techniques and structural equation modeling. The analytical strategy was designed to isolate the specific effects of remote work intensity while simultaneously controlling for individual demographics and organizational context. The core finding of the regression analysis indicates that the relationship between remote work intensity and overall productivity is not strictly linear, but rather exhibits an inverted U-shape. This suggests that while moderate levels of remote work flexibility significantly enhance productivity through increased autonomy and reduced environmental distractions, extreme isolation without adequate synchronous engagement eventually leads to diminishing returns in output quality and collaborative innovation.

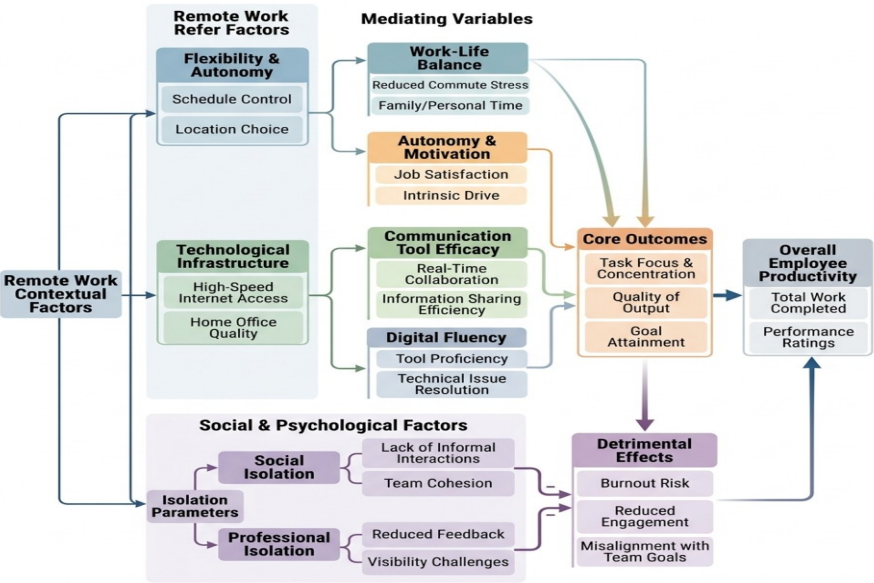


Figure 1: Comprehensive Schematic of Remote Work Variables Impacting Employee Productivity

The structural equation model further elucidated the mediating mechanisms driving these outcomes. It was determined that the positive impact of remote work on independent task execution is heavily mediated by the reduction in cognitive load resulting from the elimination of ambient office interruptions. Knowledge workers operating in environments with low external stimuli were able to sustain longer periods of deep focus, directly translating into higher quality analytical and creative outputs [27]. However, when evaluating collaborative productivity, the model revealed significant friction. The structural barriers to spontaneous information exchange inherent in digital communication architectures served as a negative mediator, particularly for tasks characterized by high complexity and ambiguity. This divergence in outcomes underscores the necessity of categorizing productivity based on task typology rather than relying on a monolithic organizational metric.

4.3 Moderating Factors and Environmental Constraints

The final phase of the empirical analysis focused on the critical moderating variables that determine the success or failure of remote work arrangements. Technological adequacy emerged as the most profound structural moderator. In subsets of the data where employees reported highly reliable and seamlessly integrated digital tools, the negative impacts associated with physical distance were significantly mitigated. The ability to utilize high-fidelity virtual whiteboards, asynchronous project management software, and reliable video conferencing platforms effectively bridged the communication gaps that otherwise hinder interdependent tasks.

Table 2: Regression Analysis of Variables Impacting Employee Productivity

Predictor Variable	Standardized Coefficient	Standard Error	Significance Level
Remote Work Intensity	0.42	0.05	0.01
Technological Adequacy	0.58	0.04	0.001
Task Interdependence	-0.21	0.06	0.05
Perceived Autonomy	0.35	0.05	0.01
Professional Isolation	-0.47	0.07	0.001

Task interdependence functioned as a critical environmental constraint. The data demonstrated that for roles requiring continuous, highly coupled collaboration, increased remote work intensity correlated with longer project completion cycles and increased instances of process loss. This finding suggests that while individual components of a task may be completed efficiently in isolation, the integration of these components suffers when communication is entirely digitally mediated. Furthermore, boundary management capability acted as a significant psychological moderator. Employees who actively utilized strict temporal boundaries, such as maintaining rigid working hours despite spatial flexibility, demonstrated far lower rates of emotional exhaustion and sustained higher levels of productivity over the measured period compared to those who allowed work tasks to continuously permeate their personal time [28].

5. Discussion and Conclusion

5.1 Interpretation of Findings

The empirical evidence generated by this field study provides a highly nuanced perspective on the efficacy of remote work within knowledge-intensive firms. The findings challenge the binary narratives frequently found in contemporary business discourse, which tend to categorize remote work as universally superior or fundamentally flawed. Instead, this research demonstrates that the impact of spatial flexibility on productivity is highly contingent upon the intricate alignment of technological

infrastructure, task characteristics, and psychological boundary management. The inverted U-shaped relationship identified between remote work intensity and collaborative output suggests an optimal threshold where employees benefit from the deep focus enabled by isolation while maintaining sufficient organizational connectivity to facilitate complex problem-solving. It is evident that the primary driver of productivity gains in remote settings is the enhancement of employee autonomy, which allows knowledge workers to align their intensive cognitive tasks with their peak personal energy cycles. Conversely, the primary detriments to organizational effectiveness stem from the degradation of tacit knowledge transfer and the psychological friction associated with digital communication overload.

5.2 Theoretical and Practical Implications

From a theoretical standpoint, this study significantly advances the application of sociotechnical systems theory and boundary management theory within the context of modern distributed organizations. By demonstrating how the psychological demands of remote work can be effectively buffered by robust digital resources and high levels of task autonomy, the research refines the parameters of the job demands-resources model for contemporary knowledge work. Practically, the implications for management professionals are substantial. The findings indicate that organizations cannot simply replicate traditional office management practices in a virtual environment. Leaders must transition from evaluating performance based on visual presence to output-based assessment structures that prioritize deliverable quality over perceived activity. Furthermore, human resource departments must recognize the critical importance of actively training employees in digital boundary management to prevent long-term burnout. Capital allocation strategies within knowledge-intensive firms must also heavily prioritize seamless, high-fidelity technological ecosystems, as the data definitively proves that inadequate digital infrastructure acts as a massive bottleneck to distributed productivity.

5.3 Limitations and Future Concluding Remarks

While this study provides comprehensive insights into remote work dynamics, several limitations must be acknowledged. The cross-sectional nature of the survey design captures organizational realities at a specific point in time, limiting the ability to draw definitive longitudinal conclusions regarding the sustainability of remote productivity over multi-year horizons. Additionally, while the sample encompassed diverse knowledge-intensive sectors, the operational specifics of different industries may introduce variables not entirely captured by the aggregated models. Future research must prioritize longitudinal methodologies to track productivity fluctuations and employee well-being as remote work norms continue to mature and stabilize globally. Investigating the specific impacts of emerging technologies, such as advanced artificial intelligence assistants and immersive virtual reality collaboration spaces, will also be critical for understanding the next evolution of distributed work. Ultimately, this research concludes that remote work is not a monolithic policy but a complex, multidimensional operational strategy. For knowledge-intensive firms to thrive in the modern economic landscape, they must meticulously architect their digital environments, deliberately cultivate virtual psychological safety, and fundamentally redesign their conceptualization of what it means to be a productive employee in a boundaryless organization.

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