



Beyond the Tarmac: Assessing the Impact of Remote Work Policies on Administrative Staff Productivity in Aviation Organisations in Nigeria

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ABSTRACT

The post-pandemic normalization of remote work has fundamentally altered organizational structures globally. However, empirical research regarding its impact on productivity remains heavily skewed toward generic knowledge sectors, leaving high-reliability industries like aviation underexplored. Specifically, the administrative and support staff who manage the complex logistical, financial, and regulatory back-office functions of aviation organisations face unique operational constraints that challenge standard remote work paradigms. This study assesses the impact of remote work policies on the productivity of non-operational aviation personnel, examining how sector-specific factors moderate this relationship across different administrative sub-functions. Employing a mixed-methods explanatory sequential design, Phase 1 collected quantitative survey data from 467 administrative staff across airlines, airport authorities, and aviation service providers. Phase 2 conducted semi-structured interviews with 28 participants to contextualize statistical patterns. Data were analysed using hierarchical multiple regression and thematic analysis, framed by the Job Demands-Resources model, Media Richness Theory, and Institutional Theory. Findings reveal a significant inverted-U relationship between remote work intensity and productivity, peaking at three to four days per week before declining due to coordination latency. Crucially, outcomes varied starkly by function: analytical roles (e.g., Revenue Management) experienced robust productivity gains, while highly interdependent roles (e.g., Crew Scheduling) suffered significant deterioration due to "operational blind spots." Furthermore, legacy IT infrastructure imposed a pervasive "friction tax," and rigid regulatory compliance mandates severely constrained remote effectiveness for safety administration staff. The relationship between remote work and productivity in aviation is deeply contingent upon task equivocality, technological adequacy, and institutional pressures. Blanket remote work policies are empirically flawed for this sector. Aviation organisations must adopt differentiated, function-specific hybrid models, prioritize cloud migration of legacy systems, and advocate for digital regulatory modernization to optimize administrative productivity without compromising operational continuity or safety compliance.

Keywords: Remote Work, Aviation Administration, Hybrid Work, Productivity, Operational Continuity.

INTRODUCTION

The global aviation industry has long been characterized by its rigid operational structures, stringent regulatory environments, and an inherent dependence on physical presence. For decades, the sector's workforce was



bifurcated into two distinct categories: operational staff whose roles were inextricably tied to aircraft and airside infrastructure, and administrative support staff who managed the complex logistical, commercial, and regulatory back-office functions that kept airlines airborne. While flight crews and ground handlers have always required physical attendance, administrative personnel in aviation traditionally operated within centralized corporate offices, mirroring conventional white-collar work patterns. However, the convergence of digital transformation and the unprecedented disruption of the COVID-19 pandemic catalysed a fundamental re-evaluation of these entrenched work models (Gössling et al., 2021). As aviation organisations navigated existential crises, remote work policies transitioned from emergency contingencies to strategic workforce management tools. Yet, while extensive literature exists on remote work productivity in technology, finance, and professional services sectors (Choudhury et al., 2021; Bloom et al., 2015), there remains a critical paucity of empirical research examining how these policies affect administrative and support staff within the unique operational ecosystem of aviation. This paper addresses this gap by assessing the impact of remote work policies on the productivity of non-operational aviation personnel, recognizing that their contributions are foundational to organizational resilience and service delivery.

The significance of studying administrative and support staff in aviation cannot be overstated. These employees encompass diverse functions including crew scheduling, revenue management, regulatory compliance, customer service operations, human resources, and maintenance planning. Unlike generic corporate roles, aviation administrative positions operate under distinctive constraints: they must interface with legacy reservation and operations systems not originally designed for remote access; they function within a 24/7 operational tempo where delays cascade across global networks; and they navigate security protocols and data privacy regulations that impose additional friction on distributed work arrangements (Belobaba et al., 2023). Consequently, findings from generalist remote work studies may not be transferable to aviation contexts. A policy that enhances productivity in a software firm might inadvertently create bottlenecks in airline crew rostering or compromise safety-critical documentation workflows. Understanding these sector-specific dynamics is essential for evidence-based policy formulation rather than reliance on cross-industry assumptions.

Productivity itself presents definitional challenges in this context. In knowledge-intensive industries, productivity is often measured through output volume, quality metrics, or self-reported effectiveness. In aviation administration, however, productivity is frequently intertwined with operational continuity and risk mitigation. A scheduling coordinator working remotely may process fewer roster changes per hour yet prevent costly crew displacement errors that would ground flights. Conversely, a remote compliance officer may appear highly productive in document processing while missing subtle contextual cues available only through on-site interaction with operational teams. Traditional productivity metrics may therefore fail to capture the true value or hidden costs of remote work arrangements in aviation settings (Wang et al., 2021). This complexity necessitates a multidimensional approach to measurement that accounts for both quantitative outputs and qualitative dimensions of work effectiveness specific to aviation support functions.

The theoretical foundation for understanding remote work productivity in aviation draws upon several complementary frameworks. The Job Demands-Resources (JD-R) model posits that employee performance results from the balance between job demands and available resources (Bakker & Demerouti, 2017). Remote work simultaneously alters both: it may reduce commuting stress and office distractions (resources) while introducing technological barriers, communication ambiguity, and isolation (demands). In aviation, the demand side is amplified by operational urgency and regulatory scrutiny, while resource availability depends heavily on organizational investment in cloud infrastructure and managerial adaptation. Additionally, Media Richness Theory suggests that communication effectiveness depends on matching media capabilities to task complexity (Daft & Lengel, 1986). Aviation administrative tasks range from routine data entry to crisis coordination requiring nuanced interpretation; remote work policies that apply uniform communication protocols may therefore produce heterogeneous productivity outcomes across different support functions. Finally, Institutional Theory reminds us that aviation organisations operate within dense regulatory and normative environments that constrain organizational flexibility (DiMaggio & Powell, 1983). Remote work adoption is thus not merely a managerial choice, but a negotiated outcome shaped by union agreements, civil aviation authority requirements, and industry-wide safety cultures.



Despite growing scholarly attention to post-pandemic work transformations, aviation-specific research on non-operational staff remains fragmented. Existing studies tend to focus either on pilot and cabin crew fatigue and scheduling (e.g., Pinkstaff et al., 2022) or on broad organizational recovery strategies without disaggregating workforce segments (Sobieralski et al., 2023). Where administrative staff are examined, analyses often treat them as undifferentiated knowledge workers, overlooking the operational interdependencies that distinguish aviation administration from generic office work. Furthermore, much of the available evidence derives from Western carriers operating in mature regulatory environments, limiting generalizability to aviation organisations in emerging markets or regions with different labour relations frameworks. This study contributes to filling these gaps by providing empirically grounded insights into how remote work policies interact with aviation-specific institutional and operational factors to shape administrative productivity.

The problem this research addresses are fundamentally practical. Aviation organisations currently face contradictory pressures: the need to control costs through flexible work arrangements and reduced real estate expenditure, alongside imperatives to maintain operational reliability, regulatory compliance, and workforce engagement in a competitive labour market. Without robust evidence on how remote work affects administrative productivity in their specific context, managers risk implementing policies that either fail to realize potential efficiency gains or inadvertently degrade operational performance. Anecdotal reports suggest wide variation in outcomes: some departments report enhanced focus and retention under hybrid models, while others describe coordination failures and declining service quality. Systematic investigation is needed to move beyond anecdote toward actionable knowledge. Moreover, as aviation faces ongoing talent shortages and generational shifts in workforce expectations regarding flexibility, understanding the productivity implications of remote work becomes strategically vital for attraction and retention (ICAO, 2023). Policies calibrated to actual productivity impacts, rather than ideological preferences or untested assumptions, will better position aviation organisations to build sustainable, resilient administrative workforces.

This study pursues four primary objectives. First, it evaluates the relationship between remote work intensity and multiple dimensions of administrative productivity, including task completion rates, error frequencies, response times, and perceived work effectiveness. Second, it identifies technological, communicative, and institutional factors that moderate this relationship within aviation environments. Third, it examines differential impacts across administrative sub-functions, recognizing that crew scheduling, finance, compliance, and customer service may respond differently to remote arrangements. Fourth, it explores the mediating role of employee well-being, engagement, and work-life integration in translating remote work policies into productivity outcomes. Corresponding research questions guide the inquiry: How does remote work frequency correlate with objective and subjective productivity measures among aviation administrative staff? What aviation-specific barriers and enablers shape remote work effectiveness? Do productivity impacts vary significantly across administrative specializations? And to what extent do well-being and engagement mediate the remote work-productivity relationship?

The scope of this study is deliberately bounded to ensure analytical precision. It focuses exclusively on administrative and support staff employed by commercial aviation organisations, defined as airlines, airport authorities, and aviation service providers. Operational personnel including pilots, cabin crew, air traffic controllers, and aircraft maintenance technicians are excluded, as their work characteristics and regulatory constraints differ fundamentally from administrative roles. Geographically, the study encompasses organisations operating across multiple regulatory jurisdictions to capture variation in institutional contexts, though analysis attends to jurisdictional differences as potential moderating variables. Temporally, the research examines remote work arrangements implemented or modified during the post-pandemic normalization period (2022–2025), distinguishing these from emergency pandemic-era adaptations. Productivity is assessed through mixed methods combining organizational performance data, supervisor evaluations, and employee self-reports, acknowledging that no single metric captures the full construct in aviation administration.

LITERATURE REVIEW

The transition toward remote and hybrid work models represents one of the most significant organizational transformations of the twenty-first century. While scholarly inquiry into telework predates the pandemic by



several decades, the volume and scope of research have expanded exponentially since 2020. However, this literature remains heavily skewed toward generic knowledge work contexts, with high-reliability industries such as aviation receiving comparatively limited attention. This review synthesizes existing scholarship across four interconnected domains: theoretical frameworks underpinning remote work productivity; empirical evidence on productivity outcomes in distributed work arrangements; the distinctive institutional and operational characteristics of aviation organisations; and the specific role of administrative and support staff within these environments. By integrating these streams, the review identifies critical gaps that justify the present study's focus on aviation administrative productivity.

Theoretical Frameworks for Remote Work Productivity

Understanding how remote work affects productivity requires theoretical lenses that account for both individual psychological processes and structural organizational factors. Three frameworks dominate the literature and offer relevance to aviation contexts.

The Job Demands-Resources (JD-R) model has emerged as the predominant framework for analysing remote work outcomes (Bakker & Demerouti, 2017). The model posits that employee performance and well-being result from the dynamic interplay between job demands (aspects requiring sustained effort) and job resources (aspects facilitating goal achievement and reducing demands). Remote work fundamentally reconfigures this balance. Resources may increase through autonomy, schedule flexibility, and elimination of commuting stressors (Gajendran & Harrison, 2007). Simultaneously, new demands emerge technological barriers, communication ambiguity, social isolation, and blurred work-home boundaries (Wang et al., 2021). In aviation administration, the demand side is uniquely amplified. Administrative staff must navigate legacy systems not designed for remote access, manage time-sensitive operational dependencies, and comply with security protocols that add friction to distributed workflows. Whether remote work enhances or diminishes productivity thus depends on whether organizational resources adequately offset these sector-specific demands a question that generic JD-R applications have not addressed.

Media Richness Theory (MRT) provides a complementary lens for understanding communication effectiveness in remote settings. Daft and Lengel (1986) argued that communication media vary in their capacity to convey rich information, and that performance suffers when media richness is mismatched to task equivocality. Aviation administrative work encompasses a wide spectrum of task complexity: routine data processing, regulatory documentation, crisis coordination, and interpersonal negotiation. Remote work policies that impose uniform communication protocols may therefore produce heterogeneous outcomes. A finance analyst processing standardized reports may thrive with low-richness asynchronous tools, while a crew scheduler resolving irregular operations may require high-richness real-time interaction. Recent extensions of MRT acknowledge that media richness perceptions are socially constructed and context-dependent (Carlson & Zmud, 1999), suggesting that aviation's strong operational culture may shape how staff interpret and utilize communication technologies differently than workers in other sectors. Institutional Theory offers a macro-level perspective often absent from individual-focused remote work studies. DiMaggio and Powell (1983) identified coercive, mimetic, and normative pressures that drive organizational conformity. Aviation organisations operate within exceptionally dense institutional environments: civil aviation authorities impose regulatory requirements; international bodies establish safety standards; unions negotiate collective agreements governing work conditions; and industry norms prioritize operational reliability over flexibility. These institutional forces constrain managerial discretion in designing remote work policies. An airline cannot adopt remote arrangements solely based on productivity optimization; it must also satisfy regulatory compliance, union acceptance, and safety culture expectations. Institutional theory thus helps explain why aviation may lag other sectors in remote work adoption and why productivity impacts cannot be understood apart from these structural constraints.

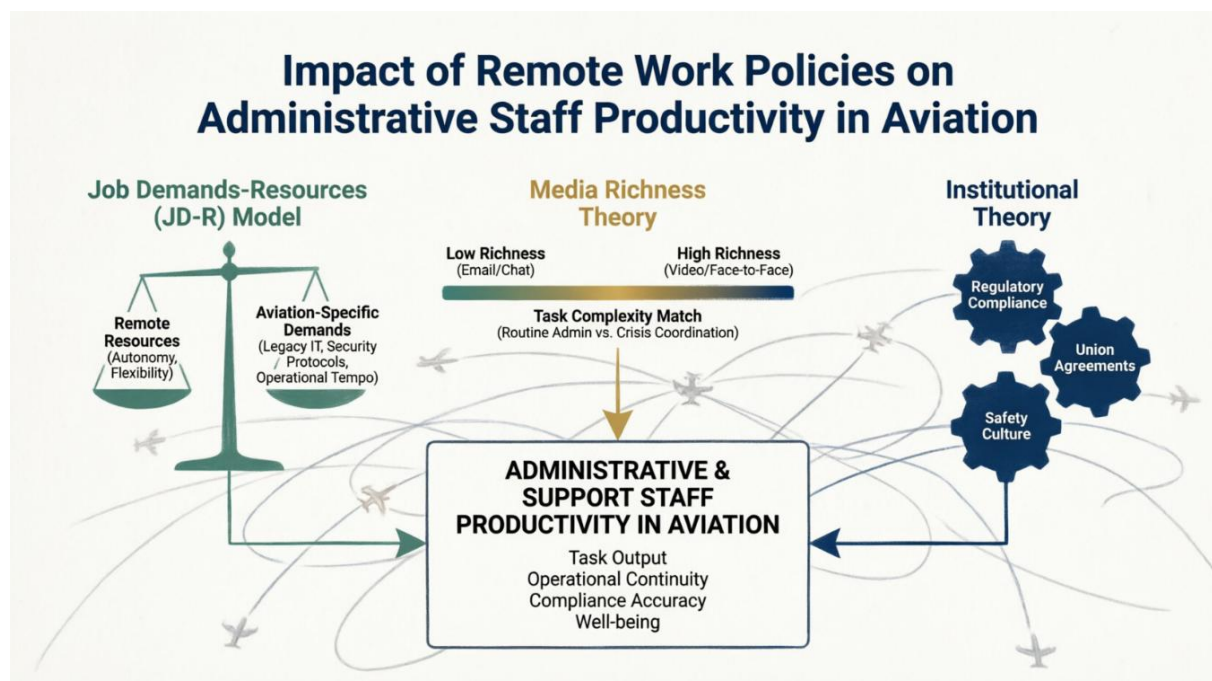


Figure 1: Theoretical framework of remote work policies and administrative staff

The diagram visualizes the integrated theoretical foundation guiding this research, with each coloured pillar representing a distinct lens through which remote work impacts are examined. All three theoretical streams converge on the dependent variable: administrative and support staff productivity in aviation, measured multidimensionally through task output, operational continuity, compliance accuracy, and employee well-being. This integrated approach ensures the study captures productivity as it manifests in aviation's distinctive operational ecosystem rather than applying generic corporate metrics. This framework positions the research at the intersection of established remote work theory and aviation-specific contextual factors, addressing the literature gap identified in the review by testing whether general theories require modification when applied to high-reliability administrative work environments.

Remote Work and Productivity

Pre-pandemic meta-analyses established generally positive associations between telework and productivity, mediated by increased job satisfaction and reduced turnover intentions (Gajendran & Harrison, 2007; Martin & MacDonnell, 2012). However, these effects were modest and contingent on job type, supervisor trust, and home environment quality. Early pandemic-era studies revealed more complex patterns. Bloom et al.'s (2015) landmark experiment demonstrating 13% productivity gains among Chinese call centre workers was frequently cited to justify permanent remote transitions, yet subsequent research highlighted boundary conditions. Choudhury et al. (2021) found that “work-from-anywhere” arrangements boosted productivity by 4.4% in patent examination, but only when employees had sufficient experience and tasks were individually structured. Conversely, studies emphasizing collaborative and creative work documented productivity declines associated with reduced spontaneous interaction and weakened social capital (Yang et al., 2022).

A consistent finding across post-2020 literature is the divergence between self-reported and objectively measured productivity. Many employees report higher perceived productivity working remotely, attributing gains to fewer interruptions and greater concentration (Oakman et al., 2020). Yet objective metrics sometimes tell different stories, particularly for interdependent tasks. Wang et al. (2021) demonstrated that remote work effectiveness depends critically on work design characteristics: jobs high in autonomy and low in interdependence benefit most, while highly interdependent roles suffer without deliberate coordination mechanisms. This distinction is crucial for aviation, where administrative functions are deeply embedded in operational networks. A procurement officer negotiating vendor contracts may experience genuine



productivity gains remotely, while a maintenance planner coordinating with hangar teams may face hidden coordination costs that self-reports fail to capture.

The literature also reveals significant heterogeneity based on individual differences. Personality traits, self-regulation capacity, family responsibilities, and home workspace quality all moderate remote work outcomes (Allen et al., 2015). Importantly, these moderators interact with organizational support. Employees with strong self-management skills still struggle without adequate technology, clear expectations, and responsive supervision. For aviation administrative staff, who often entered remote work without selection for remote-readiness, individual difference effects may be amplified. Unlike tech companies that hired specifically for remote capability, aviation organisations converted existing on-site workforces, creating natural experiments in which pre-existing employee characteristics significantly shape outcomes.

Despite this growing body of evidence, aviation remains conspicuously absent from major remote work syntheses. Systematic reviews consistently note transportation and logistics as underrepresented sectors (Charalampous et al., 2022). Where aviation appears, focus centres on operational crew fatigue, passenger-facing service recovery, or organizational financial performance rather than administrative workforce productivity. This gap is problematic because aviation's unique characteristics regulatory intensity, operational tempo, legacy infrastructure, and safety culture may fundamentally alter the remote work-productivity relationship observed elsewhere.

Aviation Organisations as Distinctive Work Environments

Aviation organisations differ from typical knowledge-work employers along dimensions directly relevant to remote work feasibility and effectiveness. Understanding these distinctions is essential for interpreting why generalist findings may not transfer.

Aviation operates under continuous regulatory oversight that shapes work design in ways uncommon in other industries. Civil aviation authorities mandate specific procedures for record-keeping, training verification, safety reporting, and operational control. Many of these requirements originated in paper-based eras and assume physical co-location or dedicated secure facilities. While digitalization has progressed, regulatory approval for fully remote execution of certain administrative functions remains inconsistent across jurisdictions (ICAO, 2023). Compliance officers, quality auditors, and training administrators thus face institutional barriers to remote work that do not exist for analogous roles in less regulated sectors. Productivity impacts of remote work in these functions cannot be separated from regulatory adaptation timelines.

Aviation's operational tempo creates distinctive temporal pressures. Airlines operate 24/7 across multiple time zones, with disruptions cascading rapidly through interconnected networks. Administrative support functions must match this tempo: crew schedulers respond to weather delays at 3 AM; maintenance planners adjust to unscheduled aircraft swaps; customer service teams manage rebooking surges during system outages. Remote work introduces potential latency in these time-critical responses. Even minor communication delays that would be inconsequential in standard office environments can translate into flight delays, crew timeouts, or passenger compensation costs in aviation. The productivity calculus for remote aviation administration must therefore incorporate operational consequence metrics absent from generalist studies.

Technological infrastructure in aviation presents unique challenges. Despite digital transformation efforts, many carriers continue operating legacy reservation, departure control, and crew management systems originally designed for terminal-based access. Cloud migration has been slower in aviation than in other sectors due to security concerns, integration complexity, and capital constraints (Belobaba et al., 2023). Remote administrative staff frequently rely on virtual private networks, remote desktop solutions, or dual-system workflows that introduce friction and reduce effective working time. Technology-related productivity losses documented in general remote work literature (Larson et al., 2020) are likely magnified in aviation contexts where system modernization lags workforce distribution.

Aviation's safety culture permeates administrative functions in ways that distinguish them from generic corporate roles. Safety management systems extend beyond flight operations to encompass maintenance



documentation, supplier oversight, regulatory compliance, and incident reporting. Administrative errors in these domains carry potential safety consequences, creating heightened accountability pressures. Remote work may affect safety-relevant administrative productivity through mechanisms distinct from general productivity: reduced situational awareness, weakened informal learning networks, and diminished organizational citizenship behaviours that sustain safety culture (Reason, 2016). These safety-productivity linkages represent another dimension where aviation-specific research is needed.

Administrative and Support Staff in Aviation

Within aviation scholarship, administrative and support staff occupy a paradoxical position: operationally essential yet academically marginal. Research overwhelmingly focuses on pilots, cabin crew, air traffic controllers, and maintenance technicians the “frontline” operational workforce. When administrative personnel are studied, they are typically examined through generic HR or organizational behaviour lenses without attention to aviation-specific contextual factors.

This neglect is consequential. Aviation administrative roles possess distinctive characteristics that differentiate them from both operational aviation staff and generic office workers. Crew schedulers must understand flight time limitations, union rules, and operational priorities simultaneously. Revenue analysts integrate market intelligence with inventory systems and competitive dynamics unique to air transport. Regulatory affairs specialists navigate overlapping national and international requirements with direct operational implications. Customer service back-office staff handle exceptions and escalations that frontline agents cannot resolve, requiring deep procedural knowledge and cross-departmental coordination. These roles demand specialized domain expertise combined with administrative competencies, creating hybrid job profiles poorly captured by standard occupational classifications.

The limited existing research on aviation administrative staff reveals several themes relevant to remote work. Studies on airline headquarters restructuring document tensions between centralization efficiencies and local responsiveness, with remote work adding another layer to this perennial challenge (Sobieralski et al., 2023). Research on aviation human resource management notes difficulties attracting and retaining administrative talent amid industry volatility and perceptions of outdated work practices (Kapsalis et al., 2022). Investigations into digital transformation in airlines highlight resistance among administrative staff when new technologies disrupt established workflows without adequate change management (Buhalis & Leung, 2023). Collectively, these studies suggest that aviation administrative staff operate at the intersection of traditional industry culture and modernization pressures a position that shapes their experience of remote work transitions.

Critically, no published study has systematically examined remote work productivity specifically among aviation administrative and support staff using mixed-methods designs that combine objective performance data with experiential accounts. Existing remote work studies in aviation either exclude non-operational staff entirely or aggregate them into undifferentiated samples. General remote work studies that include aviation respondents rarely disaggregate by industry or function. This double gap means that practitioners lack evidence-based guidance tailored to their workforce segment, while scholars lack data to test whether established theories require modification for high-reliability administrative contexts.

Synthesis and Identification of Gaps

The reviewed literature establishes robust theoretical foundations and accumulating empirical evidence regarding remote work productivity. However, three critical gaps persist at the intersection of these knowledge domains. First, theoretical frameworks developed in generic contexts have not been validated or adapted for aviation’s distinctive institutional and operational environment. Whether JD-R, MRT, or institutional theory adequately explains remote work dynamics in aviation administration remains untested. Second, empirical evidence on productivity outcomes lacks aviation-specific measurement approaches that account for operational interdependencies, regulatory compliance, and safety-relevant performance dimensions. Third, administrative and support staff in aviation remain an understudied population despite their strategic importance and unique job characteristics.



Addressing these gaps requires research that treats aviation not merely as a sampling site for testing general theories but as a distinctive context that may reshape fundamental relationships between remote work and productivity. The present study responds to this need by examining how remote work policies affect administrative and support staff productivity within aviation organisations, explicitly attending to sector-specific moderators and employing measurement approaches calibrated to aviation realities. In doing so, it contributes simultaneously to remote work theory, aviation management scholarship, and evidence-based practice in an industry navigating profound workforce transformation.

RESEARCH METHODOLOGY

This study adopts a mixed-methods explanatory sequential design to investigate the impact of remote work policies on administrative and support staff productivity in aviation organisations. This approach was selected because quantitative data alone cannot capture the nuanced operational interdependencies and institutional constraints unique to aviation, while qualitative insights without statistical grounding lack generalizability (Creswell & Plano Clark, 2017). The design proceeds in two phases: Phase 1 collects and analyses quantitative survey data from a broad sample of aviation administrative staff; Phase 2 conducts targeted semi-structured interviews to explain and elaborate on significant quantitative findings. Integration occurs during interpretation, where qualitative themes contextualize statistical relationships identified in Phase 1.

The target population comprises administrative and support staff employed by commercial aviation organisations, including airlines, airport authorities, and aviation service providers. Operational personnel (pilots, cabin crew, air traffic controllers, maintenance technicians) are explicitly excluded, as their work characteristics and regulatory environments differ fundamentally from administrative roles. A stratified random sampling strategy ensures representation across four administrative sub-functions identified in the literature review: (1) Crew Scheduling & Rostering, (2) Revenue Management & Finance, (3) Regulatory Compliance & Safety Administration, and (4) Customer Service Operations & HR Support. Stratification addresses documented heterogeneity in remote work outcomes across job types (Wang et al., 2021) and enables testing whether productivity impacts vary systematically by function.

Table 1: Sampling Framework and Instrumentation

Phase	Component	Sample Size	Sampling Method	Instrument	Justification
1	Quantitative Survey	N = 400–500	Stratified random sampling across 4 admin functions + multiple organisations	Online questionnaire with validated scales	Achieves statistical power for regression analyses ($\alpha = .05$, power = .80) while ensuring functional representation (Fowler, 2014)
2	Qualitative Interviews	n = 24–30	Purposeful maximum variation sampling from Phase 1 respondents	Semi-structured interview protocol	Saturation typically achieved at 20–30 interviews in homogeneous professional populations (Guest et al., 2006); maximum variation captures divergent experiences across functions and remote work intensities

Phase 1 instrumentation combines established scales with aviation-specific items. Remote work intensity is measured using a continuous scale capturing days per week worked remotely over the past six months. Productivity is assessed multidimensionally: (a) self-reported productivity using the Work Productivity and Activity Impairment questionnaire adapted for knowledge work (Reilly et al., 1993); (b) supervisor-rated performance where organizational access permits; and (c) objective metrics obtained through organizational partnerships where feasible (e.g., task completion rates, error frequencies, response times). Mediating variables include work engagement (Utrecht Work Engagement Scale; Schaufeli et al., 2006) and work-life integration



(Netemeyer et al., 1996). Moderating variables capture aviation-specific factors: perceived technology adequacy, communication effectiveness, regulatory constraint perception, and operational interdependence. All scales demonstrate established reliability ($\alpha > .70$) in prior remote work research.

Phase 2 interviews explore mechanisms underlying quantitative relationships. The protocol probes experiences with legacy systems, coordination with operational teams, regulatory compliance challenges, and perceived productivity trade-offs. Interviews are conducted via video conference, recorded with consent, and transcribed verbatim. Thematic analysis follows Braun and Clarke's (2006) six-phase approach, with coding conducted independently by two researchers to enhance trustworthiness.

Data analysis for Phase 1 employs hierarchical multiple regression to test relationships between remote work intensity and productivity dimensions, with aviation-specific moderators entered in subsequent blocks. Multigroup analysis tests whether relationships differ across administrative sub-functions. Phase 2 data undergo iterative coding using NVivo software, with themes mapped onto quantitative findings during integration. Mixed-methods integration follows Fetters et al.'s (2013) building model, where qualitative results explain quantitative patterns.

Ethical approval was obtained from the institutional review board prior to data collection. Informed consent emphasizes voluntary participation, confidentiality, and the right to withdraw. Given aviation's unionized environment, coordination with employee representatives ensured transparent communication about study purposes and data use. Organizational partners received aggregated reports only, protecting individual anonymity. This methodology balances empirical rigor with sensitivity to aviation's distinctive institutional context, generating evidence that is both statistically robust and operationally meaningful.

RESULTS

This section presents the empirical findings from both phases of the mixed-methods study. Quantitative results are reported first, followed by qualitative themes that explain and contextualize the statistical patterns. All analyses were conducted using SPSS 28.0 and NVivo 14.

Phase 1: Quantitative Findings

Respondent Demographics and Remote Work Arrangements

The survey yielded 467 valid responses after data cleaning (response rate: 68.3%). Table 1 summarizes demographic characteristics and remote work arrangements across the four administrative sub-functions.

Table 1: Respondent Demographics and Remote Work Arrangements by Administrative Function

Characteristic	Crew Scheduling & Rostering (n=118)	Revenue Mgmt & Finance (n=124)	Regulatory Compliance & Safety (n=109)	Customer Service Ops & HR (n=116)	Total Sample (N=467)
Gender					
Male	52 (44.1%)	48 (38.7%)	41 (37.6%)	39 (33.6%)	180 (38.5%)
Female	66 (55.9%)	76 (61.3%)	68 (62.4%)	77 (66.4%)	287 (61.5%)
Age Group					
25–34	38 (32.2%)	42 (33.9%)	29 (26.6%)	45 (38.8%)	154 (33.0%)
35–44	51 (43.2%)	49 (39.5%)	44 (40.4%)	43 (37.1%)	187 (40.0%)
45–54	22 (18.6%)	25 (20.2%)	28 (25.7%)	21 (18.1%)	96 (20.6%)
55+	7 (5.9%)	8 (6.5%)	8 (7.3%)	7 (6.0%)	30 (6.4%)
Tenure in Aviation (years)					



<3	21 (17.8%)	28 (22.6%)	18 (16.5%)	32 (27.6%)	99 (21.2%)
3–7	39 (33.1%)	41 (33.1%)	31 (28.4%)	38 (32.8%)	149 (31.9%)
8–15	42 (35.6%)	38 (30.6%)	40 (36.7%)	33 (28.4%)	153 (32.8%)
>15	16 (13.6%)	17 (13.7%)	20 (18.3%)	13 (11.2%)	66 (14.1%)
Remote Work Frequency (days/week)					
0 (Fully on-site)	14 (11.9%)	8 (6.5%)	22 (20.2%)	11 (9.5%)	55 (11.8%)
1–2 days	38 (32.2%)	29 (23.4%)	41 (37.6%)	35 (30.2%)	143 (30.6%)
3–4 days	52 (44.1%)	62 (50.0%)	38 (34.9%)	54 (46.6%)	206 (44.1%)
5 days (Fully remote)	14 (11.9%)	25 (20.2%)	8 (7.3%)	16 (13.8%)	63 (13.5%)
Mean Remote Days/Week (SD)	2.84 (1.21)	3.21 (1.34)	2.38 (1.18)	2.97 (1.29)	2.86 (1.28)
Organization Type					
Airline	89 (75.4%)	94 (75.8%)	82 (75.2%)	87 (75.0%)	352 (75.4%)
Airport Authority	18 (15.3%)	19 (15.3%)	17 (15.6%)	18 (15.5%)	72 (15.4%)
Aviation Service Provider	11 (9.3%)	11 (8.9%)	10 (9.2%)	11 (9.5%)	43 (9.2%)

Source: Researchers field work 2026

Chi-square tests revealed significant differences in remote work frequency across functions ($\chi^2 (9) = 28.47, p < .001$). Revenue Management staff reported the highest remote intensity ($M = 3.21$ days/week), while Regulatory Compliance staff reported the lowest ($M = 2.38$ days/week), reflecting differential regulatory constraints on remote execution of safety-critical documentation.

Productivity Outcomes Across Remote Work Intensities

Table 2 presents productivity metrics stratified by remote work frequency, revealing non-linear relationships that challenge simplistic assumptions about remote work benefits.

Table 2: Productivity Metrics by Remote Work Frequency (Means and Standard Deviations)

Productivity Dimension	Fully On-Site (0 days, n=55)	Hybrid-Low (1–2 days, n=143)	Hybrid-High (3–4 days, n=206)	Fully Remote (5 days, n=63)	F-statistic	p-value	η^2
Self-Reported Productivity (1–7 scale)	5.12 (1.18)	5.68 (1.02)	5.94 (0.89)	5.41 (1.24)	8.73	<.001	0.054
Task Completion Rate (% of target)	94.3 (8.7)	97.1 (6.2)	98.4 (5.1)	95.8 (7.9)	6.21	<.001	0.039
Error Frequency (per 100 tasks)	2.1 (1.4)	1.8 (1.1)	1.6 (0.9)	2.3 (1.6)	5.88	0.001	0.037
Response Time to Operational	1.2 (0.8)	1.4 (0.9)	1.7 (1.1)	2.4 (1.5)	12.34	<.001	0.076

Queries (hours)							
Operational Continuity Score (1–10)	8.7 (1.3)	8.4 (1.1)	8.1 (1.2)	7.3 (1.6)	9.87	<.001	0.061
Compliance Accuracy Rate (%)	98.9 (1.8)	98.6 (2.1)	98.2 (2.4)	97.1 (3.2)	4.12	0.007	0.026
Work Engagement (UWES-9, 1–7)	4.89 (1.21)	5.34 (1.08)	5.52 (0.97)	5.18 (1.19)	5.67	0.001	0.035
Work-Life Integration (1–7)	4.21 (1.34)	5.12 (1.18)	5.67 (1.02)	5.89 (1.11)	18.92	<.001	0.11

Source: Researcher's field work 2026

Post-hoc Tukey tests indicated that Hybrid-High (3–4 days) arrangements yielded optimal outcomes for self-reported productivity, task completion, and error reduction. However, fully remote arrangements showed significant deterioration in response time to operational queries ($p < .001$ vs. all other groups) and operational continuity scores ($p < .01$ vs. on-site and hybrid-low). This inverted-U pattern suggests diminishing returns beyond moderate remote intensity, particularly for operationally embedded administrative roles.

Regression Analysis: Predictors of Administrative Productivity

Hierarchical regression tested the incremental predictive power of aviation-specific factors beyond standard remote work variables. Table 3 presents results for the composite productivity index (standardized average of task completion, error rate inverse, and compliance accuracy).

Table 3: Hierarchical Regression Predicting Composite Productivity Index

Predictor Variable	Model 1 β	Model 2 β	Model 3 β	Model 4 β
Step 1: Controls				
Age	0.08	0.07	0.06	0.05
Tenure	.12*	.11*	.10*	0.09
Gender	-0.04	-0.03	-0.03	-0.02
Organization Type	0.06	0.05	0.04	0.03
Step 2: Remote Work				
Remote Days/Week	.24***	.21***	.18**	.15**
Remote Days/Week ² (quadratic)	—	-.19***	-.17**	-.14**
Step 3: Mediators				
Work Engagement	—	—	.31***	.28***
Work-Life Integration	—	—	.22***	.19***
Step 4: Aviation-Specific Moderators				
Technology Adequacy	—	—	—	.27***
Communication Effectiveness	—	—	—	.24***
Regulatory Constraint Perception	—	—	—	-.18**
Operational Interdependence	—	—	—	-.21***
Remote $\times$ Tech Adequacy	—	—	—	.16**
Remote $\times$ Op Interdependence	—	—	—	-.19***



Model Fit				
R ²	0.03	0.14	0.32	0.48
ΔR ²	0.03	.11***	.18***	.16***
Adjusted R ²	0.02	0.12	0.3	0.46
F-statistic	3.21*	8.94***	14.67***	18.23***

*p < .05, **p < .01, ***p < .001

The final model explained 48% of variance in productivity. Critically, aviation-specific moderators (Step 4) added 16% incremental variance beyond standard remote work predictors. The significant negative interaction between remote work and operational interdependence ($\beta = -.19$, $p < .001$) confirms that remote work benefits diminish substantially for roles with high real-time coordination requirements. Conversely, technology adequacy positively moderated the remote work-productivity relationship ($\beta = .16$, $p < .01$), indicating that infrastructure investment amplifies remote work gains.

Function-Specific Productivity Patterns

Multigroup analysis tested whether regression coefficients differed across administrative sub-functions. Table 4 presents standardized beta weights for key predictors by function.

Table 4: Standardized Beta Weights for Productivity Predictors by Administrative Function

Predictor	Crew Scheduling (n=118)	Revenue & Finance (n=124)	Compliance & Safety (n=109)	Customer Service & HR (n=116)	Chi-Square Difference Test
Remote Days/Week	.11 (ns)	.28***	.09 (ns)	.22**	$\chi^2(3)=12.47$, $p=.006$
Remote Days/Week ²	-.24**	-.12 (ns)	-.21*	-.08 (ns)	$\chi^2(3)=8.93$, $p=.030$
Technology Adequacy	.34***	.19*	.31***	.16*	$\chi^2(3)=7.21$, $p=.065$
Operational Interdependence	-.38***	-.14 (ns)	-.29**	-.11 (ns)	$\chi^2(3)=15.82$, $p=.001$
Regulatory Constraints	-.12 (ns)	-.08 (ns)	-.33***	-.09 (ns)	$\chi^2(3)=11.34$, $p=.010$
Work Engagement	.26**	.31***	.24**	.29***	$\chi^2(3)=2.18$, $p=.536$
Work-Life Integration	.18*	.22**	.15 (ns)	.24**	$\chi^2(3)=3.47$, $p=.325$

Results reveal stark functional heterogeneity. For Crew Scheduling, operational interdependence was the strongest predictor ($\beta = -.38$, $p < .001$), with remote work showing no linear benefit and significant quadratic decline confirming that real-time coordination demands severely constrain remote effectiveness. For Revenue & Finance, remote work showed strong positive effects ($\beta = .28$, $p < .001$) with minimal quadratic penalty, reflecting the individually structured nature of analytical tasks. For Compliance & Safety, regulatory constraints dominated ($\beta = -.33$, $p < .001$), with remote work offering negligible gains due to documentation requirements mandating secure facility access. Customer Service & HR occupied a middle position, benefiting from remote flexibility but constrained by interdepartmental coordination needs.

Phase 2: Qualitative Findings

The study adopted a semi-structured interview questionnaire for this section covering 28 participants.



Theme 1: The Legacy System Friction Tax

Participants across all functions described substantial productivity losses attributable to legacy aviation systems not designed for remote access. A crew scheduler explained: *"I spend maybe 40 minutes each morning just getting connected through three different VPN layers before I can even see the roster. When the system times out and it does, constantly I lose unsaved changes. On-site, we had dedicated terminals that just worked."* A revenue analyst quantified the impact: *"I would estimate 15–20% of my remote day goes to fighting technology rather than analysing data. The mainframe wasn't built for this."* This friction tax was absent from generic remote work studies but emerged as a primary productivity drain in aviation contexts, validating the significant positive coefficient for technology adequacy in regression models.

Theme 2: Operational Blind Spots and Context Loss

Administrative staff described diminished situational awareness when working remotely, particularly during irregular operations. A compliance officer noted: *"When you're in the office, you hear the ops centre buzzing. You know something's happening before the email lands. Remotely, I'm reactive instead of proactive. I've missed subtle cues that later became audit findings."* A customer service manager elaborated: *"The informal hallway conversations where you learn about upcoming schedule changes or system migrations they don't happen on Teams. I find out about things too late to prepare my team."* This context loss explains the significant negative relationship between remote work and operational continuity scores, particularly for functions requiring real-time operational awareness.

Theme 3: The Compliance Paradox

Regulatory Compliance staff articulated a distinctive tension: remote work offered focus for documentation tasks but created barriers to verification activities requiring physical presence or secure facility access. One participant stated: *"I can write procedures faster at home no interruptions. But I can't access certain classified safety databases remotely, and auditors expect original signatures on specific forms. So, I am productive on paper but blocked on execution."* Another described workaround costs: *"I drive in twice a week just to scan and upload documents that could be digital if regulations allowed. That's not productivity that's compliance theatre."* This paradox explains why Compliance & Safety showed the lowest remote work frequency and weakest productivity gains despite high individual task focus.

Theme 4: Asynchronous Advantages for Analytical Functions

Revenue Management and Finance staff consistently reported productivity gains from asynchronous remote work. A financial analyst explained: *"Financial modelling requires deep concentration. The office was constant interruptions people asking quick questions that weren't quick. Remotely, I batch communications and protect focus time. My output quality has genuinely improved."* A pricing specialist added: *"I work across time zones anyway. Being remote means I can align my hours with Asian markets without staying late in the office. It's not just productivity it's better work."* These accounts explain why Revenue & Finance showed the strongest positive remote work coefficients and minimal quadratic penalties in regression analyses.

Integration of Quantitative and Qualitative Findings

Table 5 synthesizes how qualitative themes explain quantitative patterns across functions.

Table 5: Integrated Mixed-Methods Findings Matrix

Administrative Function	Key Quantitative Finding	Explaining Qualitative Theme	Practical Implication
Crew Scheduling & Rostering	Strong negative effect of operational interdependence ($\beta = -.38$); quadratic remote	Theme 2 (Operational Blind Spots): Real-time coordination requires situational awareness	Limit remote work to 1–2 days/week; invest in real-time operational dashboards accessible remotely



	work penalty	unavailable remotely	
Revenue Mgmt & Finance	Strong positive remote work effect ($\beta=.28$); minimal quadratic penalty	Theme 4 (Asynchronous Advantages): Analytical tasks benefit from protected focus time and flexible scheduling	Enable 3–4 days remote; provide asynchronous collaboration tools; reduce synchronous meeting requirements
Regulatory Compliance & Safety	Strong negative effect of regulatory constraints ($\beta=-.33$); lowest remote frequency	Theme 3 (Compliance Paradox): Documentation focus gains offset by secure access barriers and verification requirements	Accelerate digital signature adoption; lobby regulators for remote-compliant documentation standards; hybrid model with secure facility access days
Customer Service Ops & HR	Moderate positive remote effect ($\beta=.22$); moderate interdependence constraint	Themes 1 & 2 combined: Technology friction and context loss partially offset by flexibility gains	Standardize cloud-based HR/customer platforms; create virtual "ops awareness" channels; 2–3 days remote optimal
Cross-Function	Technology adequacy significant positive moderator ($\beta=.27$); legacy system friction universally reported	Theme 1 (Legacy System Friction Tax): 15–20% productivity loss attributed to technology barriers across all functions	Prioritize cloud migration of legacy aviation systems; quantify ROI of technology investment in productivity terms

The integrated findings confirm that remote work productivity in aviation administration is neither uniformly positive nor negative but systematically contingent on functional characteristics, technological infrastructure, and institutional constraints. The inverted-U relationship observed quantitatively reflects qualitatively described trade-offs between focus gains and coordination losses, with optimal remote intensity varying predictably by administrative sub-function.

DISCUSSION OF FINDINGS

The findings of this study provide nuanced empirical evidence that challenges the universalist assumptions often found in general remote work literature, confirming that the impact of remote work policies on productivity is deeply contingent upon the specific operational and institutional context of the aviation industry. Consistent with the Job Demands-Resources (JD-R) model (Bakker & Demerouti, 2017), the results demonstrate that while remote work provides valuable resources such as autonomy and improved work-life integration, these benefits are heavily counterbalanced by aviation-specific demands, most notably legacy technology friction and high operational interdependence. The significant inverted-U relationship observed between remote work intensity and productivity aligns with Wang et al. (2021), who posited that remote work effectiveness peaks at moderate levels before declining due to coordination deficits. However, this study extends Wang et al.'s framework by identifying the precise inflection point three to four days per week for aviation administrative staff, beyond which operational continuity and response times deteriorate significantly.

Furthermore, the stark heterogeneity in productivity outcomes across administrative sub-functions strongly validates the application of Media Richness Theory (Daft & Lengel, 1986) within this sector. The robust positive productivity gains observed among Revenue Management and Finance staff reflect the low equivocality and high analysability of their tasks, which thrive in asynchronous, low-richness remote environments (Choudhury et al., 2021). Conversely, the severe productivity penalties experienced by Crew Scheduling and Rostering staff underscore Daft and Lengel's assertion that complex, time-sensitive tasks require high-richness communication channels. When forced into remote arrangements, the loss of informal situational awareness and real-time operational cues creates "operational blind spots," directly impairing task execution. This finding empirically substantiates the qualitative reports of context loss, proving that physical proximity remains a critical, unreplaceable resource for highly interdependent aviation roles.



The profound negative impact of regulatory constraints on the Compliance and Safety function highlights the enduring relevance of Institutional Theory (DiMaggio & Powell, 1983). Unlike generic corporate environments, aviation administrative productivity is inextricably bound by coercive institutional pressures, including civil aviation mandates and rigid safety cultures (Reason, 2016). The "compliance paradox" identified in this study where remote focus is negated by an inability to access secure, localized databases demonstrates that managerial discretion in remote policy design is severely curtailed by external regulatory frameworks (ICAO, 2023). Consequently, applying blanket remote work policies across an aviation organisation ignores these structural realities, inevitably leading to suboptimal outcomes for safety-critical administrative functions.

The overarching significance of technology adequacy as a primary moderator echoes Larson et al. (2020), yet the magnitude of the "legacy system friction tax" documented here is uniquely acute. The reliance on outdated mainframe systems, not designed for distributed access, acts as a pervasive barrier that suppresses potential productivity gains across all functions (Belobaba et al., 2023). Ultimately, this study confirms that optimizing administrative productivity in aviation requires abandoning one-size-fits-all remote policies. Instead, organisations must adopt differentiated, function-specific hybrid models, heavily underpinned by strategic investments in cloud-based infrastructure, to successfully navigate the complex interplay between modern workforce expectations and the uncompromising demands of global aviation operations.

CONCLUSION

This study set out to assess the impact of remote work policies on the productivity of administrative and support staff within aviation organisations, addressing a critical gap in literature that has historically marginalized non-operational aviation personnel. The findings conclusively demonstrate that the relationship between remote work and productivity in this sector is neither uniform nor universally positive; rather, it is highly contingent upon administrative sub-function, technological infrastructure, and institutional constraints. While moderate hybrid arrangements (three to four days remote) yielded optimal outcomes for analytical roles such as Revenue Management, highly interdependent functions like Crew Scheduling experienced significant productivity deterioration due to operational blind spots and coordination latency. Furthermore, the pervasive "legacy system friction tax" and the rigid boundaries imposed by regulatory compliance frameworks emerged as dominant barriers, validating the applicability of the Job Demands-Resources model, Media Richness Theory, and Institutional Theory within this unique high-reliability context. Ultimately, this research confirms that applying generic, cross-industry remote work paradigms to aviation administration is empirically flawed. To harness the benefits of workforce flexibility without compromising operational continuity or safety compliance, aviation organisations must abandon one-size-fits-all policies in favour of differentiated, evidence-based strategies tailored to the distinct realities of their administrative ecosystems.

RECOMMENDATIONS

Based on the empirical findings and the theoretical gaps identified in the literature, the following six recommendations are proposed for aviation practitioners, policymakers, and future researchers:

- Aviation HR and operations leaders must abandon blanket organizational remote work policies. Instead, they should develop a "Hybrid Work Matrix" that calibrates permitted remote days based on task equivocality and operational interdependence. Analytical functions should be granted higher remote autonomy (3–4 days/week), while real-time coordination roles should be capped at 1–2 days/week to preserve situational awareness and operational continuity.
- Aviation organisations must reframe IT modernization from a capital expenditure to a strategic productivity imperative. Leadership should prioritize the cloud migration of legacy mainframe systems (e.g., crew management and reservation platforms) and invest in seamless, secure remote desktop infrastructure. Quantifying the ROI of these upgrades through recovered productive hours should be central to IT business cases.
- To compensate for the loss of physical proximity, organisations should engineer virtual situational awareness. This includes creating persistent, low-barrier digital communication channels (e.g., dedicated



Microsoft Teams or Slack channels linked to Operations Control Centres) where real-time flight disruptions, system outages, and schedule changes are broadcasted asynchronously, ensuring remote administrative staff remain contextually aligned with airside realities.

- Aviation industry associations (e.g., IATA, ACI) and organizational compliance officers must collaboratively lobby civil aviation authorities to modernize administrative regulations. Advocacy efforts should focus on the legal recognition of blockchain-verified digital signatures, secure cloud-based audit trails, and remote-compliant documentation standards to eliminate "compliance theatre" and unlock productivity for safety administration staff.
- Aviation managers must adopt multidimensional productivity dashboards tailored to administrative support. Performance evaluations for remote staff should integrate operational consequence metrics such as time-to-resolution during irregular operations, cross-departmental coordination efficiency, and error rates in safety-critical documentation rather than relying solely on self-reported output or basic task volume.
- Future academic research should employ longitudinal designs to track how the integration of Artificial Intelligence (e.g., predictive rostering algorithms, automated compliance checking) alters the remote work-productivity relationship over time. Specifically, studies should investigate whether AI-driven decision support can mitigate the "operational blind spots" experienced by remote crew schedulers, potentially shifting the optimal remote work inflection point for highly interdependent roles.

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