

Impact of COVID-19 on Workforce Productivity: A Comparative Efficiency Analysis of Remote vs. On-Site Models in Health, Banking, and Insurance Sectors of Raipur, Chhattisgarh

Sarita Mohanty¹, Dr. Smita Premanand²

¹Research Scholar, ²Assistant professor

^{1,2}Department of commerce and management Kalinga University, Naya Raipur [C.G.], India

ABSTRACT

The COVID-19 epidemic triggered an extreme reorganization of the relationships in the workplace, imposing a dichotomy of remote and on-site patterns of activity all over the world. Whereas the metropolitan centers were able to quickly adapt owing to already developed digital infrastructures the Tier-2 Indian cities encountered individual and under-explored issues. This paper examines the relative efficiency, labor productivity and psychological involvement in three different industries such as Healthcare, Banking, and Insurance in Raipur, Chhattisgarh within the critical time frame of 2020-2022. The study is based on the Job Demands-Resources (JD-R) theoretical framework and compares the impact structural changes in modalities of work created on output and employee well-being.

A cross-sectional, mixed-method design was used based on retrospective time-tracking data and standardized psychometric measures (UWES-9, OLBI) of a stratified sample (n=342, n=120 Healthcare, n=112 Banking, n=110 Insurance). In particular, the paper will examine the effectiveness of digital collaboration applications and compare the usefulness of Microsoft Teams and Zoom, as well as quantify the productiveness paradox in sectors.

Findings show that there is a great sectoral divergence ($p < 0.001$). The Insurance industry was used to show a 14.5% increment in task-based productivity under remote models, which is caused by high autonomy and effective usage of Zoom in acquiring external clients. The hybrid model was resilient in the Banking industry, as Microsoft Teams is preferred due to its secure, asynchronous collaboration features. On the other hand, the Health care industry, which has to be on-site, registered a statistically significant decrease in per-unit efficiency even though working hours have been increased 22 percent, due to the depletion of resources and mental fatigue. The results indicate that remote work was more effective in the productivity of financial services in Raipur as it removed the commute stressors and leveraged the digital resources; however, the absence of the structural resources of the job in on-site healthcare environments triggered the efficiency-destroying burnout. The presented insights play a central role in developing sector-specific hybrid work policies in the developing urban economies.

Keywords: COVID-19, Workforce Productivity, Job Demands-Resources Model, Remote Work Efficiency, Raipur, Healthcare, Banking, Insurance, Digital Transformation.

1. INTRODUCTION

The beginning of the SARS-CoV-2 (COVID-19) crisis in early 2020 was an unforeseen shock to the global labor market that forced thousands of millions to instant and

unprecedented remote work. This was not simply a change of gears but a complete change of the so-called psychological contract between employer and employee [1]. When considering the idea of this transition in the Indian context, it has been widely discussed through the major metropolitan centers such as Bengaluru, Delhi, and Mumbai, where the Information Technology (IT) industry has been leading the pack when it comes to digital adaptability [2]. Yet, there is a substantial gap in the research on how this change in the emerging Tier-2 cities of India, including Raipur, Chattisgarh, where the digital infrastructure was emerging, affected the organizational culture, which was traditionally based on face-to-face communication.

1.1 Economic and Geographic Background: Raipur.

The capital city of Chattisgarh, Raipur, is an important case study of the economic experience of middle India. However, unlike the service-export-based metros, the economy of Raipur is a mixture of heavy administration, regional banking centres and an emerging healthcare industry covering Central India. Throughout the pandemic years (2020-2022), there occurred a peculiar combination of harsh lockdowns and the need to provide continuity of essential services in the city [3]. The employees in Raipur had their unique set of difficulties: on one hand, people could get to work more quickly than in metros, on the other hand, the internet at home in the outskirts (Naya Raipur or Tatibandh) was intermittent and this variable could directly influence the possibility of remote work [4].

1.2 Sectoral Vulnerabilities and Pivot Strategies.

There was a difference in the operational requirements of the three sectors reviewed, which included Healthcare, Banking and Insurance.

Healthcare: This industry was in an existential crisis. The services demand was so high and the channel of delivery was also physically limited. Frontline workers had to face the burden of huge patient workload and the personal threat of infection, a phenomenon that the literature refers to as the drain of resources [5].

- **Banking:** Banks were required to ensure that they were liquid and serviceable to customers with minimal footfall according to the requirements of the Reserve Bank of India (RBI) and the Ministry of Finance. This increased the use of Phygital (physical + digital) banking that moved employees to secure in-house tools such as Microsoft Teams to carry out back-office functions [6].

- >• **Insurance:** Previously dependent on field agents and personal networks, the insurance industry experienced an explosion in sustainable demand of health policies. Physical impossibility to meet the clients necessitated a move to video-conferencing solutions, which fundamentally changed the process of sales [7].

1.3 Theoretical Framework: The Job Demands-Resources (JD-R) Model.

In order to examine these changes scientifically, this paper will utilize the Job Demands-Resources (JD-R) Model offered by Demerouti and Bakker [8]. The model assumes that the equilibrium between: the employees well-being and productivity is the result of the balance between:

4. Job Demands: Physical, psychological, social, or organizational factors of the job that must be worked at over time (e.g., work pressure, emotional demands, "Zoom fatigue").

5. Job Resources: Functional (e.g., autonomy, technology support, peer feedback), motivational (e.g., reward, coercive control), or strategic (e.g., task structure) resources that are useful in accomplishing work objectives and minimizing physiological expenditure.

This equation was changed radically by the pandemic. Remote work imposed new requirements (social isolation, work-life boundaries) but also provided new opportunities (flexibility, safety). On-site labor in the vital industries, on the other hand, experienced an acute rise in demands without a corresponding rise in resources [9].

1.4 The impact of digital intermediaries.

One important, but much neglected, aspect of productivity analysis is the actual toolset used. The debate between Zoom and Teams is not just a software issue, but a question of the workflow structure. Microsoft Teams provides an all-encompassing ecosystem that can be used in the internal environment (High Security/Synchronous and Asynchronous), and Zoom is commonly chosen due to its easy entry in external communication [10]. The tool selection may have a profound impact on productivity in a city such as Raipur where there is a digital literacy variance.

1.5 Research Gap and Objectives

Although the productivity of remote work has been studied internationally [11], not many studies have conducted a comparative efficiency analysis in these particular areas in a non-metro Indian setting. Moreover, the issue of the relationship between a particular digital tool and sectoral productivity is not properly developed.

Thus, the aims of this research are:

- To measure and compare the productivity change of the workforce in the fields of Healthcare, Banking, and Insurance in Raipur in the period of pandemic (2020-2022).
- To interpret the JD-R framework to examine the effectiveness of remote and on-site models.
- To determine the effect of digital teamwork tools (Zoom vs. Teams) on employee engagement and fatigue.

2. MATERIALS AND METHODS

2.1 Study Design

The study design used in this research was a retrospective quantitative, cross-sectional study design. The research took the mixed-methods approach in terms of triangulating objective productivity measures (secondary measures) with subjective employee opinions (primary survey data).

2.2 Geographic location and Time period.

The localization of the study was to the urban and the peri-urban boundaries of Raipur, Chhattisgarh. The productivity analysis was to be based on the following reference period:

Phase 1 (Shock): April 2020 -September 2020 (Strict Lockdown).

Phase 2 (Adaptation/Crisis): October 2020- June 2021 (Includes the Delta wave).

- Phase 3 (New Normal): July 2021 – March 2022.

2.3 Strategy and participants in the sampling.

The stratified random sampling was employed to have proper representation of all the three sectors. The sample consisted of employees in large institutional centres in Raipur, such as AIIMS and Mekahara (Healthcare), Jaistambh Chowk financial centre (Banking), and Pandri/Civil Lines (Insurance).

- Inclusion Criteria Full time employees that have been employed at least 3 years (pre-pandemic) and are within the age range of 24-55 years old and own a company-provided or personal computer.

- Exclusion Criteria: The contractual employees, interns, and those who were furloughed or on prolonged medical leave of greater than 3 months at the time of the study.

Calculation of the Sample size: According to the estimation of the formal workforce in these areas in Raipur with a level of 95 percent and margin error of 5 percent, the sample size was 384. After cleaning the data, the distributable sample size was $N = 342$.

- Health care: $n=120$ (Doctors, Nurses, Hospital Administrators).
- Banking: $n=112$ (Branch Managers, Loan Officers, IT Support).
- Insurance: $n=110$ (Claims Processors, Underwriters, Sales Managers).

2.4 Instruments and Measures

Two streams were used in the data collection:

Objective Productivity Measures (Secondary Data): Anonymized performance logs on a scale of Percentage of Target Achieved were given by the departmental heads.

Banking/Insurance: Metrics were claims per day, ticket resolutions and conversion of sales.

Healthcare: Time of patient turnaround, Time of administrative discharge processing (non-clinical staff), and Shift compliance.

Self-Reported Survey (Primary Data): A questionnaire is a structured online survey, and it is sent through a secure corporate mail.

Job Demands & Resources: Custom items based on the Job Content Questionnaire (JCQ) that measures workload, time pressure, and technology assistance.

/Author: The Utrecht Work Engagement Scale (UWES-9) was used to assess vigor, dedication, and absorption (Cronbach 0.89).

Burnout: The Oldenburg Burnout Inventory (OLBI) that evaluates exhaustion and disengagement (Cronbach-alpha = 0.86).

The System Usability Scale (SUS) used in specific cases of Zoom and Microsoft Teams, including some extra questions on the topic of Videoconference Fatigue (VF).

2.5 Procedure

The institutional review boards of the participating hospitals and corporate regional offices provided ethical clearance. The questionnaire was conducted in January-March 2023, to reduce recency bias, whereas the respondent was requested to rate their experience retrospectively during the specified stages.

2.6 Statistical Analysis

The data was analyzed with SPSS Version 26.0 (IBM Corp).

Mean $\pm$ SD, Frequency Descriptive statistics were used to describe the demographic profile.

One way ANOVA was employed to establish statistically significant differences between the productivity indices of the three sectors.

- Post-hoc Tukey HSD tests revealed group specific differences.
- Independent samples t-tests were used to compare the levels of fatigue among the users of various software platforms.
- The correlation between the Job resources (Tech Support) and Engagement was analyzed using Pearson Correlation Coefficient (r).
- Significance was set at $p < 0.05$.

3. RESULTS

3.1 Demographic and Operational Characteristics

The demographic profile shows that there is a relatively young population of workers, which can be attributed to the fact that Raipur is an emerging economic center. Banking and Insurance had a skewed gender distribution with a higher number of males whereas Healthcare was more gender balanced.

Table 1: Demographic Profile and Operational Mode (N=342)

Variable	Healthcare (n=120)	Banking (n=112)	Insurance (n=110)	Aggregate
Mean Age (Years)	36.2 $\pm$ 7.1	33.4 $\pm$ 5.8	33.8 $\pm$ 6.0	34.5 $\pm$ 6.2
Gender (Male/Female)	55% / 45%	63% / 37%	68% / 32%	62% / 38%
Predominant Work Mode	On-Site (91.7%)	Hybrid (55.4%)	Remote (64.5%)	-
Home Internet Quality	Moderate	High	High	-
Avg. Work Hours/Day	10.8 $\pm$ 1.5	9.2 $\pm$ 1.1	9.5 $\pm$ 1.2	9.8 $\pm$ 1.4

3.2 Comparative Productivity Analysis

The indexation of productivity was based on a 2019 base (since 100). The analysis showed a sharp difference in the performance of the sectors. The Insurance sector has always been performing higher than the baseline, whilst the Healthcare has experienced a "Productivity Paradox" - longer hours worked yield less efficiency.

Table 2: Sectoral Productivity Index (2019 Baseline = 100)

Phase	Healthcare	Banking	Insurance	F-Value	p-value
2020 (Phase 1)	88.4 ± 12.3	98.2 ± 9.5	108.5 ± 11.2	14.23	<0.001
2021 (Phase 2)	82.1 ± 14.5	103.4 ± 8.8	112.3 ± 10.5	19.56	<0.001
2022 (Phase 3)	94.5 ± 8.2	105.1 ± 7.4	110.1 ± 9.1	8.45	0.02
Trend Analysis	<i>Significant Decline</i>	<i>Moderate Growth</i>	<i>Significant Growth</i>	-	-

Interpretation: The dip in Healthcare productivity during Phase 2 (Delta wave) coincides with the period of highest physiological demand. Conversely, Insurance peaked during this time, correlating with the digital shift.

3.3 Digital Tool Efficacy and Platform Fatigue

The participants were requested to mark the main collaboration tools. There was a distinct division: Teams were used by Banking to secure and manage the internal workflow, and Zoom was used by Insurance to be agile externally.

Table 3: Digital Tool Usability and Fatigue Scores

Metric	Microsoft Teams (Primary: Banking)	Zoom (Primary: Insurance)	p-value
Perceived Efficiency (1-10)	8.8 ± 1.1	8.5 ± 1.2	0.34 (NS)
Ease of External Use	6.2 ± 1.8	9.1 ± 0.9	<0.001
Security Perception	9.4 ± 0.6	6.5 ± 1.5	<0.001
"Video Fatigue" Incidence	42% (Moderate)	71% (High)	<0.01

NS = Not Significant.

The data indicates that while both tools were rated as efficient, Zoom users reported significantly higher fatigue (71%), likely due to the high frequency of video-on client interactions compared to the document-centric, asynchronous nature of Teams in banking.

3.4 Application of the JD-R Model

The regression analysis of the JD-R variables highlights the drivers of the observed productivity outcomes.

Table 4: JD-R Outcomes: Demands, Resources, and Engagement (Scale 1-5)

Variable	Healthcare (On-Site)	Banking (Hybrid)	Insurance (Remote)
Job Demands (Workload)	4.8 ± 0.3	3.9 ± 0.6	4.1 ± 0.7
Emotional Demands	4.7 ± 0.4	3.2 ± 0.8	2.9 ± 0.9
Job Resources (Autonomy)	2.1 ± 0.8	3.5 ± 0.6	4.2 ± 0.5
Tech Support Availability	2.8 ± 1.1	4.1 ± 0.7	3.9 ± 0.8
Burnout (OLBI Score)	4.5 ± 0.5	3.1 ± 0.8	2.8 ± 0.9

Work Engagement (UWES)	3.2 ± 0.9	3.8 ± 0.7	4.0 ± 0.6
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Key Finding: There is a strong negative correlation ($r = -0.68$) between Emotional Demands and Productivity in Healthcare, while Job Resources (Autonomy) showed a strong positive correlation ($r = +0.72$) with Productivity in Insurance.

4. DISCUSSION

This paper gives a fine-grained examination of the disparate effects of the COVID-19 pandemic on workforce productivity in Raipur, a representative Tier-2 Indian city. The results contradict the unitary discourse that remote work enhances productivity. Rather, the statistics validate a more subtle perspective: the effectiveness of remote models depends on the balance between Job Demands and Resources in particular, the industry, and the digital tools.

Raipur Insurance was the undoubted winner of the remote work framework, continuing to experience a Productivity Index of over 110 during the pandemic. With the use of the JD-R model, this is explained by an increase in the number of Job Resources [12]. Prior to the pandemic, the insurance agents in Raipur used to spend a lot of time going through traffic to meet their clients in the far-off suburbs. Remote work has removed this dead time, thereby providing the ability to have a greater number of clients through Zoom interactions. The reason is that the high score of autonomy (4.2/5) indicates that as soon as the employees are provided with a control over their environment (which is vital in a home-based environment) engagement rises. This is similar to the international findings by Bloom et al. who reported that task based jobs are highly suitable in remote working environments as the number of interruptions is minimised [13].

One of the essential discoveries is the Productivity Paradox in Healthcare. Although the number of the working hours (10.8/day) was the highest, the efficiency decreased to 82.1 in 2021. This goes against the logic of industrial age which states that Input (Hours) = Output. The requirements of the job of healthcare workers, in the conditions of the pandemic, were not only physical but also extremely emotional (fear of death, absence of PPE). The JD-R theory includes the assumption that under circumstances of surplus demands over resources, impairment arises [14]. The administrative load of the hospitals in Raipur was not reduced, but the cognitive capability of the staff was exhausted because of burnout (OLBI score 4.5). This resulted in time-consuming jobs that would have taken 10 minutes requiring a backlog. This brings out the point that presence is not productivity in the high-stress environments [15].

The performance of the Banking sector (Index ~103) implies that the Hybrid model can be the best long-term strategy Raipur. The high score in terms of liking Microsoft Teams (Efficiency 8.8) indicates the reality of the sector. Banking is a highly secure activity (as compared to Insurance) that involves complex workflow and heavy interdependence. Teams were an imitative of the office as it was offered a digital environment, which served as a structural resource [16]. The reduced fatigue ratings than the Insurance indicate that the asynchronous quality of Teams (chat, file collaboration) is not as exhausting as the continuous gaze as well-conversely as it is with Zoom video calls [17].

There is a unique dimension to the literature of the study being conducted in Raipur. In contrast to Mumbai or Delhi, where the housing is crowded, in Raipur, the average middle-class worker has a bigger home, which allows him or her to work at home-offices more easily [18]. Nonetheless, differences in perception of Tech Support were also observed in the study. On one hand, it seems that Banking employees felt supported (4.1/5), and on the other hand, Healthcare workers felt digitally abandoned (2.8/5). This digital divide in the same city highlights the fact that digital change in Tier-2 cities has not been even, with corporate financial centers benefiting more than vital service providers [19].

Hypothetically, the JD-R model is extended by this research when considering the Digital Proficiency to be a critical Resource of Job. When the employee has difficulty with the tool (e.g., Zoom), then the tool itself is a Demand, and not a Resource. In practice, the HR managers in Tier-2 cities should be aware that Zoom Fatigue is a legitimate work hazard. Insurance agents should have mandatory "camera-off" time so as to maintain a long-term productivity. In the case of Healthcare, productivity cannot be pressured back through the requirement of more hours, instead, it needs to be replenished and consumed by the means of psychological support and automation of the administration [20].

The research is based partly on self-reported retrospective data which can be subjected to recall bias. Also, it does not include the contract workers (significant assumption of the informal economy in Raipur) which restricts the generalizability of findings to the formal sector alone.

5. CONCLUSION

The analytical study of the comparative efficiency of the Raipur workforce during the pandemic shows that it is a broken landscape of productivity. The claim of remote work being the future is only confirmed in the case of the Insurance, and, to a lesser degree, the Banking sector wherein digital tools were able to successfully close the gap between the worker and the task. In these industries, remote model in Raipur opened up efficiency with commuting time exchanged with productive freedom.

The experience of the Healthcare sector is however an eye-opener. When applied on the site and in a crisis situation, the on-site model resulted in a slump in efficiency caused by cognitive overload and burnout. The research concludes that the productivity is not only dependent on the location (Home vs. Office) or the tool (Teams vs. Zoom), but on the resource-demand equilibrium. Since Raipur is still in the phase of development as a smart city, the implementation of a hybrid work policy will have to be industry-specific: flexible and technology-driven in finance, but intensive and resource-dependent in healthcare. Organizational resilience in the future will not be determined by working harder, but rather by the creation of work models that can be in line with the cognitive and psychological limits of human beings.

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