



# Work Environment and Work Stress: The Mediating Role of Job Satisfaction in a State-Owned Pharmaceutical Company

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## ABSTRACT

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This study examined whether the work environment influences work stress directly and indirectly through job satisfaction at PT Bio Farma (Persero). Rising stress scores and concentration problems indicated psychosocial risks within this pharmaceutical setting. Identifying manageable organizational determinants is essential for employee well-being and operational reliability. A cross-sectional explanatory design involved 170 employees selected through stratified sampling across seven directorates. Data were collected using Likert questionnaires and analyzed with PLS-SEM in SmartPLS 4.0. Employees reported a high work environment score (3.61), high job satisfaction (3.55), and moderate work stress (2.62). The measurement model demonstrated reliability and convergent and discriminant validity. The work environment negatively influenced work stress ( $\beta = -0.334$ ,  $p < .001$ ). It positively influenced job satisfaction ( $\beta = 0.482$ ,  $p < .001$ ). Job satisfaction negatively influenced work stress ( $\beta = -0.394$ ,  $p < .001$ ). Job satisfaction partially mediated the work environment–stress relationship through an indirect effect ( $\beta = -0.190$ ,  $p < .001$ ). The findings support a resource-based explanation of stress in pharmaceutical operations. Management should improve lighting, grievance mechanisms, career development, promotion transparency, rest quality, and support for concentration.

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## INTRODUCTION

Workplace stress is no longer a private difficulty confined to employees; it is a societal issue because sustained psychological strain affects health, household stability, organizational reliability, and national productivity. Modern organizations intensify performance expectations through accelerated production, technological change, regulatory scrutiny, and continuous coordination, while employees often have limited resources for recovery.

Systematic evidence indicates that work intensity, interpersonal conflict, inadequate control, and unsupportive conditions are recurring sources of daily occupational stress (Lukan et al., 2022). Prospective research further links adverse psychosocial environments with subsequent treatment for depression, indicating that workplace conditions can shape clinically meaningful outcomes rather than temporary discomfort (Mathisen et al., 2024). Work stress also impairs attention, psychological health, and employee performance when demands persist without adequate support (Chen et al., 2022). Therefore, protecting employee well-being is a public interest and an essential responsibility of contemporary organizational governance.

Organizations matter to society because they produce goods and services and structure environments in which adults spend substantial portions of their lives. When jobs provide supportive leadership, clear roles, autonomy, fair opportunities, and constructive relationships, these resources can sustain motivation and protect health. Conversely, excessive workload, conflicting expectations, limited development, and weak social support consume emotional and cognitive resources. Job Demands-Resources research explains these contrasting processes: demands activate health impairment, whereas resources promote engagement and effective functioning (Tummers & Bakker, 2021; Galanakis & Tsitouri, 2022). Empirical findings also show that demands increase burnout and reduce task performance, while resources strengthen engagement and performance (Tu et al., 2022). Consequently, research identifying manageable organizational sources of stress has broad value. It supports healthier employment, more dependable services, lower human costs, and policies that address stress through work design rather than individual blame.

The general problem is that organizations recognize stress only after absenteeism, burnout, errors, conflict, or turnover become visible. This reactive approach overlooks how conditions, relationships, leadership practices, career opportunities, and workload accumulate into psychosocial risk. Studies report that occupational stress is inversely associated with job satisfaction and positively associated with burnout and intentions to leave (Anzar et al., 2022; Lin et al., 2024). Reviews identify supervisor support, autonomy, scheduling flexibility, professional status, and development opportunities as predictors of satisfaction and engagement (Thielmann et al., 2023). Even when stress appears moderate, repeated increases may signal diminishing resources and emerging strain. The central challenge is not simply determining whether employees feel stressed, but explaining which workplace conditions contribute to stress and how. Job satisfaction is important because it may translate employees' evaluations of their work environment into weaker stress responses.

This problem is especially consequential at PT Bio Farma (Persero), where vaccine and biopharmaceutical operations require accuracy, hygiene, documentation discipline, cross-unit coordination, and consistent procedural compliance. Internal company records supplied for this study show that mean work-stress scores increased from 14.65 in 2021 to 15.74 in 2022, 16.45 in 2023, and 17.81 in 2024. The preliminary survey similarly found emotional exhaustion among 56.67% of respondents, anxiety when facing job demands among 50%, and concentration difficulties among 40%. Dissatisfaction was particularly evident regarding career development, co-worker relationships, and selected environmental conditions, including temperature, ventilation, and interunit coordination. Evidence from other high-reliability settings indicates that favorable work environments are associated with lower burnout and greater job satisfaction (Nikpour & Brooks Carthon, 2023), while adequate staffing, resources, and supportive leadership are associated with lower burnout (Al Sabei et al., 2023). These patterns justify organizational investigation.

Literature establishes relationships relevant to the proposed model. Work environments can be conceptualized as configurations of demands and resources, including workload, role clarity, autonomy, leadership, social support, and development opportunities. Reviews show that unfavorable environmental exposures generate daily stress, whereas supportive resources reduce psychological costs (Lukan et al., 2022; Tummers & Bakker, 2021). Large-sample evidence indicates that job resources positively predict job satisfaction and subjective well-being, while job demands negatively predict both; job satisfaction also transmits part of these effects to broader well-being (Claes et al., 2023). Multilevel research demonstrates that employees' evaluations of their work environment influence psychological distress and outcomes through need satisfaction (Morin et al., 2023). Collectively, these findings support a resource-based explanation: employees experience less strain when their environment helps them accomplish work, maintain supportive relationships, exercise control, and perceive opportunities for competence, recognition, and growth.

However, existing evidence does not fully resolve the research problem. Many studies examine direct associations between work conditions and burnout, performance, turnover, or well-being, rather than testing job satisfaction as the mechanism connecting the work environment to work stress. Mediation studies frequently examine alternative sequences, treating burnout and satisfaction as mediators between psychosocial risk and turnover (Felicia et al., 2023), or focus on nurses, emergency personnel, dentists, and bank employees (Anzar et al., 2022; Quesada-Puga et al., 2024; Thielmann et al., 2023). Although these studies confirm an inverse relationship between satisfaction and strain, cross-sectional designs and sector-specific samples limit transferability. Evidence remains scarce in regulated pharmaceutical manufacturing, where psychological strain may

affect employee welfare and process reliability. A context-specific mediation test is needed to clarify whether a supportive work environment reduces stress directly and indirectly by strengthening overall job satisfaction.

This study advances the literature by integrating physical and non-physical work-environment conditions, job satisfaction, and work stress within a mediation model in an Indonesian state-owned pharmaceutical and biotechnology company. Its state-of-the-art contribution shifts attention from isolated stress symptoms toward a pathway management can modify. The model treats job satisfaction not merely as an outcome, but as an evaluative psychological resource through which employees interpret environmental quality and respond to demanding work. The study extends organizational stress research into a regulated production context where concentration, documentation accuracy, hygiene, and procedural consistency are critical. By combining longitudinal trends in internal stress, employee evidence, and hypothesis testing, the research offers an early-warning perspective rather than a post-crisis explanation. This contribution matters because interventions targeting environmental design, coordination, relationships, and career development may improve employee well-being while supporting pharmaceutical operations, quality assurance, and institutional resilience.

Accordingly, the research problem concerns whether the work environment influences employee stress at PT Bio Farma and whether job satisfaction explains that relationship. The proposed argument is that a supportive work environment provides practical and psychological resources that reduce strain. Comfortable facilities, effective communication, cooperative relationships, accessible leadership, clear coordination, and development opportunities should make demands manageable and improve employees' evaluations of their jobs. Greater job satisfaction should, in turn, lessen anxiety, emotional pressure, concentration problems, disrupted recovery, and perceived declines in effectiveness. Four hypotheses follow: the work environment negatively influences work stress; the work environment positively influences job satisfaction; job satisfaction negatively influences work stress; and job satisfaction mediates the effect of the work environment on work stress. Testing these relationships contributes an actionable explanation of rising stress and identifies organizational levers for prevention, employee support, and operational reliability.

## RESEARCH METHODS

This study used a quantitative, cross-sectional explanatory design to examine the relationships among work environment, job satisfaction, and work stress. The work environment was treated as an exogenous variable, job satisfaction as a mediator, and work stress as an endogenous variable. Data were analyzed using PLS-SEM because the model involved multiple latent constructs,

reflective indicators, and mediation, while accounting for measurement error and predictive relevance (Hair & Alamer, 2022). The approach was chosen based on model characteristics and explanatory-predictive objectives rather than sample size alone (Becker et al., 2023; Guenther et al., 2023). As the design was cross-sectional, results are interpreted as associative rather than causal.

The study was conducted at the PT Bio Farma (Persero) Bandung headquarters, selected for its high demands for compliance, coordination, and quality assurance, as well as rising work stress from 2021-2024. The population consisted of 1,182 employees across seven directorates, with 170 respondents selected using proportionate stratified random sampling to ensure balanced representation across units.

Data were collected using a structured online questionnaire with a five-point Likert scale. The work environment was measured with 12 items, job satisfaction with 10 items, and work stress with 7 items. Secondary data were obtained from company reports and the literature, while preliminary interviews and a pilot test (n=30) confirmed the instrument's validity and reliability. Common method bias was minimized through anonymity, neutral wording, and randomized items (Kock et al., 2021; Podsakoff et al., 2024; Yao & Xu, 2024).

Data analysis was conducted using SmartPLS 4.0. The measurement model was assessed using reliability, validity, and HTMT, while the structural model was evaluated using R<sup>2</sup>, f<sup>2</sup>, Q<sup>2</sup>, VIF, and path coefficients. Hypotheses were tested via bootstrapping at a 5% significance level, with mediation assessed through indirect effects; significant direct and indirect effects indicated partial mediation. Procedures followed established PLS-SEM reporting standards (Becker et al., 2023; Guenther et al., 2023; Hair & Alamer, 2022; Magno et al., 2024).

Credibility was strengthened through stratified sampling, pilot testing, and bias-reduction procedures, although common method bias and cross-sectional limitations remain. Therefore, the findings are interpreted as theoretical associations, and generalization is limited to the studied organization, with further longitudinal or multisource studies recommended (Kock et al., 2021; Podsakoff et al., 2024; Yao & Xu, 2024).

**Table 1. Operationalization of Research Variables**

| Variable             | Dimension      | Key Indicators                                                              | Items |
|----------------------|----------------|-----------------------------------------------------------------------------|-------|
| Work Environment (X) | Physical       | colour, cleanliness, air circulation, lighting, safety, noise               | 12    |
| Work Environment (X) | Non-physical   | supervisor support, communication, co-worker relations, grievance mechanism |       |
| Job Satisfaction (Z) | Five facets    | pay, job itself, promotion, supervisor, co-workers                          | 10    |
| Work Stress (Y)      | Three outcomes | physiological, emotional, behavioural responses                             | 7     |



## RESULTS AND DISCUSSION

### Results

#### Respondent Characteristics and Descriptive Findings

A total of 170 questionnaires were analyzed. Male respondents numbered 98 people (57.65%), while women numbered 72 (42.35%). The largest age group was 25-30 years old at 32.35%, followed by 31-40 years old at 25.88% and those under 25 at 19.41%. As many as 45.29% of respondents came from the Directorate of Production and Supply Chain, according to the largest proportion of the population in the directorate. The majority of respondents were in Band-4 (70.59%), and 45.29% had worked for more than 5 years. This composition shows that respondents have sufficient experience to assess daily working conditions.

The work environment received an average of 3.61 (72.2%) and was in the high category. The highest indicators were the comfort of the room's colours and the ease of working with colleagues, each with an average of 3.71. Air circulation, sense of security, noise level, superior support, and communication were also rated relatively well. However, lighting obtained the lowest average of 3.41. The clarity of the complaint mechanism received an average of 3.43, and the seriousness of handling complaints received an average of 3.51. These findings show that the quality of the work environment is generally good, but it is not even across all facilities and organizational mechanisms.

Job satisfaction was 3.55 (71.0%) and was in the high category. Satisfaction with friendly colleagues had the highest average score at 3.64, followed by compensation fairness at 3.63. Competent peer support, supervisory care, attractive jobs, and learning opportunities are also highly valued. On the other hand, satisfaction with promotion opportunities reached only 3.30, and satisfaction with career development opportunities reached 3.37, so both were in the medium category. These results align with an earlier phenomenon that identifies career development as an issue requiring attention.

Work stress averaged 2.62 (52.4%), indicating a medium level. The decrease in work effectiveness when stress increases is an indicator with the highest average of 2.82. Feelings of distress due to work, physical condition disorders, and concentration difficulties had average scores of 2.76, 2.71, and 2.70, respectively. Physical complaints and emotional propensity are in the low category, but impaired effectiveness, rest, anxiety, and concentration still show stress that can interfere with work function. In the pharmaceutical industry, concentration is a key factor because it affects the accuracy of task execution.

**Table 2. Summary of Descriptive Results**

| Variable         | Red  | Category | Highest Aspect                       | Priority Aspect                  |
|------------------|------|----------|--------------------------------------|----------------------------------|
| Work environment | 3.61 | High     | Room Color and Co-worker Cooperation | Lighting and grievance mechanism |

|                         |      |          |                                    |                                  |
|-------------------------|------|----------|------------------------------------|----------------------------------|
| <b>Job satisfaction</b> | 3.55 | High     | Friendly and supportive co-workers | Career Development and Promotion |
| <b>Work stress</b>      | 2.62 | Moderate | Declining Work Effectiveness       | Rest quality and concentration   |

Table 2 shows that the work environment received the highest mean score of 3.61 and was categorized as high, indicating that employees generally perceived their working conditions positively, particularly regarding room color and cooperation among co-workers. However, lighting and the grievance-handling mechanism remain priority areas for improvement. Job satisfaction also fell into the high category, with a mean score of 3.55, mainly supported by friendly, supportive relationships among co-workers. At the same time, career development and promotion opportunities require greater organizational attention. Meanwhile, work stress had a mean score of 2.62 and was categorised as moderate, indicating that employees experienced a manageable yet meaningful level of stress. Declining work effectiveness was the most prominent stress-related aspect, whereas rest quality and concentration should be prioritized to prevent further negative effects on employee performance and well-being.

### Measurement Model Evaluation

All indicators on the main model have an outer loading above 0.70. In the work environment, loadings range from 0.707 to 0.798. The cleanliness indicator of the work area has the highest loading of 0.798. Regarding job satisfaction, loading is 0.706-0.818. Interesting jobs as well as jobs that provide learning opportunities and responsibilities have the highest loading of 0.818. At work stress loading is in the range of 0.714-0.774. Difficulty concentrating when under pressure has the highest loading of 0.774. All indicators meet convergent validity.

The AVE values for job satisfaction, work environment, and work stress were 0.606, 0.555, and 0.547, respectively. All values are above 0.50, indicating that the construct explains more than half of the indicator's variance. The square root of the AVE of each construct is also higher than its correlation with the other constructs. The HTMT values were 0.515 between job satisfaction and work environment, 0.617 between job satisfaction and work stress, and 0.580 between work environment and work stress. All values are below the conservative threshold of 0.85. The cross-loadings also show that each indicator has the highest loading on its own construct.

Internal reliability meets the criteria. Cronbach's alphas for job satisfaction and work environment were 0.927 and 0.862, respectively, while work stress was 0.862. Composite reliability of job satisfaction was 0.939, work environment 0.937, and work stress 0.894. These values show strong internal consistency, with

no indication of low reliability. Thus, the measurement model is feasible for assessing the structural relationships between variables.

**Table 3. Measurement Model Quality**

| Construct        | Loading Range | AVE   | Cronbach Alpha | Composite Reliability |
|------------------|---------------|-------|----------------|-----------------------|
| Work environment | 0.707-0.798   | 0.555 | 0.927          | 0.937                 |
| Job satisfaction | 0.706-0.818   | 0.606 | 0.927          | 0.939                 |
| Work stress      | 0.714-0.774   | 0.547 | 0.862          | 0.894                 |

Table 3 indicates that all constructs demonstrated satisfactory measurement quality. The indicator loadings ranged from 0.706 to 0.818, meeting the recommended minimum threshold of approximately 0.70 and confirming adequate indicator reliability. The AVE values ranged from 0.547 to 0.606, exceeding the 0.50 criterion and therefore supporting convergent validity. In addition, Cronbach's alpha values ranged from 0.862 to 0.927, while composite reliability values ranged from 0.894 to 0.939, all above the recommended threshold of 0.70. These results confirm that the work environment, job satisfaction, and work stress constructs have strong internal consistency, reliability, and convergent validity, indicating that the indicators adequately measure their respective constructs.

### Structural Model and Hypothesis Testing

The SRMR value of 0.057 is below 0.08, indicating the model is adequately suitable. The entire VIF value for the indicator is 1,640-3,223 and does not indicate multicollinearity. The R-square for job satisfaction is 0.233, indicating that the work environment explains 23.3% of the variation in job satisfaction. The R-square for work stress is 0.393, indicating that the work environment and job satisfaction explain 39.3% of the variation in work stress. The Q-square values for job satisfaction (0.137) and work stress (0.208) indicate the model's predictive relevance.

The effect size for the work environment on job satisfaction was 0.303, in the medium range. The effect size for the work environment on work stress was 0.141, in the small category. The effect size for job satisfaction on work stress was 0.196, in the medium range. This pattern shows that the work environment makes the strongest contribution to shaping job satisfaction, while job satisfaction makes an important psychological contribution to explaining work stress.

The bootstrapping results support the entire hypothesis. The work environment negatively affected work stress, with a coefficient of -0.334, a t-statistic of 4.500, and a p-value of 0.000. The work environment has a positive effect on job satisfaction, with a coefficient of 0.482, a t-statistic of 8.612, and a p-value of 0.000. Job satisfaction was negatively associated with work stress, with a coefficient of -0.394, a t-statistic of 5.001, and a p-value of 0.000. The indirect

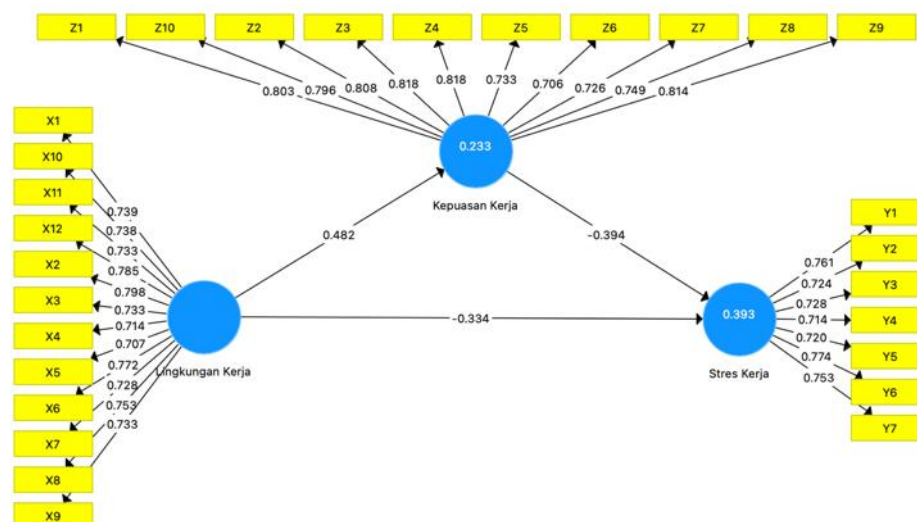


effect of the work environment on stress via job satisfaction was -0.190, with a t-statistic of 4.602 and a p-value of 0.000. Because direct and indirect influences are equally significant, job satisfaction serves as a partial mediator.

**Table 4. Direct and Indirect Effects**

| Path                                              | Coefficient | t-statistic | p-value | Decision    | Effect            |
|---------------------------------------------------|-------------|-------------|---------|-------------|-------------------|
| Work environment → Work stress                    | -0.334      | 4.500       | 0.000   | H1 accepted | Negative          |
| Work environment → Job satisfaction               | 0.482       | 8.612       | 0.000   | H2 accepted | Positive          |
| Job satisfaction → Work stress                    | -0.394      | 5.001       | 0.000   | H3 accepted | Negative          |
| Work environment → Job satisfaction → Work stress | -0.190      | 4.602       | 0.000   | H4 accepted | Partial Mediation |

Table 4 shows that all proposed hypotheses were supported. The work environment had a significant negative direct effect on work stress ( $\beta = -0.334$ ,  $t = 4.500$ ,  $p < 0.001$ ), indicating that a more favorable work environment was associated with lower employee stress. The work environment also had a significant positive effect on job satisfaction ( $\beta = 0.482$ ,  $t = 8.612$ ,  $p < 0.001$ ), meaning that better working conditions increased employees' satisfaction. Furthermore, job satisfaction had a significant negative effect on work stress ( $\beta = -0.394$ ,  $t = 5.001$ ,  $p < 0.001$ ), indicating that more satisfied employees experienced lower work stress. The significant indirect effect of the work environment on work stress through job satisfaction ( $\beta = -0.190$ ,  $t = 4.602$ ,  $p < 0.001$ ) confirms a mediating effect. Because both the direct and indirect effects were significant, job satisfaction partially mediated the relationship between the work environment and work stress, indicating that the work environment reduced stress both directly and indirectly by increasing job satisfaction.



**Figure 1. Structural Model Estimation Results**

Figure 1 shows that the work environment has a positive effect on job satisfaction ( $\beta = 0.482$ ) and a negative effect on work stress ( $\beta = -0.334$ ), while job satisfaction also negatively affects work stress ( $\beta = -0.394$ ). These relationships indicate that a more favourable work environment is associated with higher job satisfaction and lower work stress, both directly and indirectly through increased job satisfaction. The  $R^2$  value of 0.233 shows that the work environment explains 23.3% of the variance in job satisfaction. In contrast, the  $R^2$  value of 0.393 indicates that the work environment and job satisfaction jointly explain 39.3% of the variance in work stress. In addition, all indicator loadings are above approximately 0.70, ranging from 0.707 to 0.798 for the work environment, 0.706 to 0.818 for job satisfaction, and 0.714 to 0.774 for work stress, indicating that the indicators adequately represent their respective constructs.

## Discussion

The descriptive pattern reveals a productive but imperfect workplace: employees rated the work environment high ( $M = 3.61$ ) and job satisfaction high ( $M = 3.55$ ), yet reported moderate work stress ( $M = 2.62$ ). This coexistence suggests that favourable general perceptions do not eliminate specific psychosocial and operational pressures. The prominence of room colour and co-worker cooperation corresponds with evidence that industrial employees' health, happiness, and productivity depend on both physical and social workplace qualities (Wagdi & Sayed, 2023). It also aligns with manufacturing evidence indicating that organizational support, work-life support, recognition, compensation, and career growth are central determinants of satisfaction (Loo et al., 2024). However, the present study differs by identifying lighting, grievance mechanisms, promotion, rest quality, and concentration as localized weaknesses within an otherwise positive setting. Thus, aggregated "high" ratings should not be interpreted as uniform adequacy across all workplace dimensions.

The significant negative path from the work environment to work stress ( $\beta = -0.334$ ,  $p < .001$ ) confirms that better physical and non-physical conditions function as protective resources. This result aligns with Khoshakhlagh et al. (2021), who found that physical conditions, social support, job satisfaction, and stress were associated with safety climate and accident occurrence among industrial workers. It also supports Cho's (2023) finding that leadership and group interactions can reduce employee stress and its consequences. Nevertheless, the small effect size ( $f^2 = 0.141$ ) indicates that environmental improvement alone cannot resolve stress. In Bio Farma's compliance-intensive pharmaceutical context, workload, role demands, production targets, regulatory accountability, and individual coping may remain influential. The finding therefore refines prior literature by showing that environmental resources reduce stress, but their effect is bounded when employees perform accuracy-sensitive work requiring sustained concentration and procedural discipline.

The positive effect of the work environment on job satisfaction ( $\beta = 0.482$ ,  $p < .001$ ) was the strongest structural relationship and produced a medium effect size ( $f^2 = 0.303$ ). This finding is consistent with López-Cabarcos et al. (2022), who showed that co-worker support, leadership behaviour, and meaningful work contribute to favourable employee outcomes, and with Boakye et al. (2023), who found that workplace support strengthens effectiveness and satisfaction. It also resembles Salleh et al. (2024), whose oil-and-gas study identified career growth and supervisory support as predictors of job satisfaction. The results add detail: friendly co-workers and cooperation supported satisfaction, whereas promotion and career development remained weak. Satisfaction therefore appears to arise from relational resources and future opportunities. Organizations may sustain daily interactions while generating dissatisfaction when career pathways, advancement criteria, or developmental access are perceived as unclear or limited.

Job satisfaction significantly reduced work stress ( $\beta = -0.394$ ,  $p < .001$ ), with a medium effect size ( $f^2 = 0.196$ ), indicating that employees' job evaluations constitute a psychological resource. This result aligns with Padmanabhan (2021), who reported an inverse relationship between workplace stress and job satisfaction, and with Lin et al. (2024), who found that job stress was associated with lower job satisfaction among bank employees. It is also compatible with Wang and Zhang's (2025) evidence that stress and satisfaction operate as interrelated psychosocial mechanisms linking work schedules to mental health. A difference concerns causal ordering: much literature models stress as an antecedent of dissatisfaction, whereas this study specifies satisfaction as a predictor of stress. Given the cross-sectional design, the path should be understood as a theory-consistent explanatory association, potentially reciprocal, rather than proof that satisfaction temporally precedes reduced stress.

The significant indirect effect of the work environment on work stress through job satisfaction ( $\beta = -0.190$ ,  $p < .001$ ) establishes partial mediation and reveals a dual mechanism. First, workplace conditions directly influence stress through physical comfort, safety, communication, cooperation, and complaint resolution. Second, those conditions shape employees' evaluations of compensation, work content, supervision, co-workers, and advancement, which, in turn, relate to stress. This mechanism extends studies positioning job satisfaction as a bridge between workplace resources and employee outcomes, including retention and mental health (Salleh et al., 2024; Wang & Zhang, 2025). Theoretically, the result integrates job-demands-resources reasoning with social-exchange and two-factor perspectives: environmental resources reduce strain while signalling organizational care, and employees reciprocate by providing favourable job evaluations. Partial mediation is important because it confirms that satisfaction cannot substitute for correcting deficient lighting, grievance processes, workload conditions, or other direct stressors.

Practically, Bio Farma should pursue an integrated intervention rather than an employee-satisfaction program. Physical improvements should begin with lighting audits based on task requirements, especially in units where visual accuracy, documentation, and concentration are essential. Organizational improvements should establish confidential, accessible, time-bound grievance channels with transparent follow-up and protection from retaliation. Career dissatisfaction requires published promotion criteria, competency maps, development plans, internal mobility, mentoring, and equitable access to training. However, Udayar et al. (2026) caution that promotion can produce temporary satisfaction while increasing responsibilities and stress; therefore, advancement should include workload recalibration and transition support. Moderate stress also warrants protected rest periods, fatigue-risk monitoring, concentration-sensitive scheduling, supervisor training, and psychological support. These priorities are consistent with Yasin et al. (2024), who identified working conditions, staff relationships, and career opportunities as major influences on job satisfaction and employee well-being in healthcare environments.

The study's novelty lies in demonstrating a satisfaction-mediated environmental pathway to work stress within the headquarters of an Indonesian state-owned pharmaceutical and biotechnology company. Unlike studies focused on hospitals, universities, banking, police work, or manufacturing, this model captures a setting in which employee well-being affects procedural compliance, documentation accuracy, product quality, and operational safety. Its contribution is threefold: it integrates physical and relational work-environment dimensions, quantifies direct and indirect mechanisms, and identifies a paradox in which high environment and satisfaction scores coexist with moderate stress. The model explains 23.3% of job-satisfaction variance and 39.3% of work-stress variance, offering meaningful but nonexhaustive explanatory power. The practical impact is a shift from broad wellness initiatives to targeted interventions for environmental, career, grievance, and fatigue. Theoretically, the findings support a dual-pathway resource model, while longitudinal, multisource, and multisite studies should test temporal ordering, reciprocal effects, and generalizability.

## CONCLUSION

The most important conclusion is that a favourable work environment reduces work stress, both directly and indirectly, by increasing job satisfaction. Although employees generally reported a high-quality work environment and high job satisfaction, moderate work stress remained, particularly in relation to declining work effectiveness, rest quality, and concentration. This finding demonstrates that positive overall perceptions do not necessarily mean that all workplace conditions are adequate. Specific weaknesses, including lighting,

grievance mechanisms, career development, and promotion opportunities, may continue to generate psychological strain. The central lesson is that employee well-being should be managed through an integrated approach that combines physical workplace improvement, supportive interpersonal relationships, transparent complaint procedures, and equitable career opportunities. The study's principal scientific strength lies in demonstrating a partial mediation mechanism in which job satisfaction explains part of the relationship between the work environment and work stress, thereby contributing a more comprehensive explanatory model within the context of an Indonesian state-owned pharmaceutical and biotechnology company.

Nevertheless, the findings should be interpreted with several limitations in mind. The cross-sectional design does not establish temporal ordering or definitive causality, and the relationships may be reciprocal; for example, stress may also influence employees' perceptions of satisfaction and the work environment. The use of self-reported data from a single source may introduce common-method bias and socially desirable responses, despite procedural controls. Moreover, the sample was limited to employees at the Bandung headquarters of one organization, limiting generalizability to other branches, pharmaceutical companies, public enterprises, or industrial sectors. Future research should employ longitudinal or time-lagged designs to examine causal direction, use multisource data from employees, supervisors, occupational health records, and performance indicators, and compare across different organizational units or companies. Additional variables, such as workload, leadership, organizational support, work-life balance, psychological safety, and coping strategies, should also be incorporated to explain the remaining variance in job satisfaction and work stress.

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