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Job Attitude of Indian Scientists Based on Job Demands and Resources Model

Pooja Singh

Vidya Mandir Degree College, Uttar Pradesh, India

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Abstract: This study evaluates scientists' job attitudes based on their perceptions of job characteristics and examines whether work engagement mediates the relationship between job challenges and recognition. An online survey collected data from scientists at various research institutes and laboratories of the Council of Scientific and Industrial Research (CSIR) in India. The findings indicate that work experience has a significant impact on scientists' perceptions of job challenges, contributions, recognition, and satisfaction, with no notable gender differences observed. Additionally, job contributions, recognition, and challenges significantly affect job satisfaction, with job challenges directly linked to the desire for recognition. This paper highlights the job demands of scientists and offers recommendations for governments and organizations to enhance scientists' well-being, implement effective recognition systems, and promote career development.

1. Introduction

India has been steadily progressing toward becoming a developed economy and has established itself as a major player in science, technology, and research. Government organizations, such as research institutions and laboratories, exemplify teamwork, group effort, ongoing coordination, and team cohesion. These organizations require employees to demonstrate higher levels of work engagement. However, the bureaucratic management style often used in Indian government organizations has led to centralization of authority and delays in decision-making. Organizations, especially scientific research institutes, are top priorities for the nation. They help the country achieve sustainable growth and progress through continuous research and development. Recent examples include landing 'Chandrayan-3' on the Moon's south pole, Aditya-L1, and Ganganyaan. This remarkable achievement reflects the hard work, dedication, commitment, and engagement of our scientists (Singh, 2025). Undoubtedly, scientists face demanding jobs that require increased energy, time, and motivation. Furthermore, the institutions where they work often become their most important community—sometimes replacing their own family, friends, and social groups. Therefore, governments should recognize that scientists are more than just a cost to the nation; they have souls, dreams, and a need to feel a-sense of purpose and fulfillment in their work.

According to Fisher et al. (2017), jobs that involve high mental, physical, and stressful demands can affect employees' cognitive abilities. Additionally, changes in brain function over a person's lifespan can influence workplace behavior, including motivation, learning, development, performance, and job security. In this context, Jena and Pradhan (2018) emphasized that workplaces should be as humane as possible, treating employees as individuals with unique sensitivities that must be respected, fostering a mutually coexisting environment. Furthermore, Sypniewska et al. (2023) advocated for sustainable human resource management (SHRM) practices to enhance organizational effectiveness by building long-term relationships with employees. Essentially, SHRM focuses on developing personnel to drive organizational growth, which includes promoting a healthy work-life balance, enhancing employee engagement, job satisfaction, commitment, productivity, and overall well-being. It is proven that the work environment is closely linked to employees' attitudes, behaviors, and performance (Brown & Leigh, 1996; Walumbwa et al., 2017; Kleine et al., 2019). To foster a healthy relationship between employees and the organization characterized by increased engagement, job satisfaction, commitment,

and productivity, organizations should implement sustainable human resource management practices (Al Kurdi et al., 2021; Diriye et al., 2021; Mira et al., 2019).

The current study applies the Job Demands-Resources (J-D-R) model to assess scientists' job attitudes. This model provides a structured framework for examining job characteristics and their impact on employee health and well-being (Bakker & Demerouti, 2007; Demerouti et al., 2001; Meijman & Mulder, 2013). In the J-D-R framework, job characteristics are classified as either demands or resources. Job demands, such as emotionally demanding interactions or high-pressure situations, refer to the physical, psychological, social, or organizational aspects of a job that require sustained effort and can lead to physiological or psychological costs. When these demands require significant effort and employees are unable to recover correctly, they can become sources of stress (Meijman and Mulder, 1998). Conversely, job resources—such as supportive work relationships—are elements that help reduce demands, support goal achievement, and foster personal growth, learning, and development. Therefore, job resources not only help employees manage demands but also serve as motivational factors.

Thus, in accordance with the J-D-R Model, this study aims to assess scientists' perceptions of their job demands, which encompass aspects such as job challenges, work engagement, and contributions, as well as job resources, including recognition and job satisfaction. Furthermore, it aims to examine variations in scientists' perceptions based on gender and work experience, while also investigating the mediating role of work engagement between scientists' job challenges and their recognition. This study aims to expand the field of Industrial/Organizational Psychology by addressing specific questions and providing valuable insights to the Indian government and related organizations, such as the Council of Scientific and Industrial Research (CSIR) and the Ministry of Science and Technology. The focus is on enhancing job satisfaction, managing stress, improving recognition and rewards, promoting overall well-being, and advancing the careers of scientists. Additionally, it seeks to refine human resource management practices within research institutes across India.
Research Questions:

RQ1: How do job challenges, contributions, and recognition within Indian scientific institutions influence the job satisfaction of scientists?

RQ2: Does work engagement among scientists act as a mediator between job challenges and recognition?

RQ3: Are the job challenges faced by scientists directly linked to their desire for recognition?

RQ4: How do gender and work experience affect scientists' perceptions of job challenges, contributions, recognition, and satisfaction within research institutes in India?

2. Review of Literature

2.1. Job-Demand and Resource (J-D-R) Model

According to Sulea et al. (2012), occupational risk factors for job-related stress can be categorized into job demands and job resources. Job demands refer to the physical, psychological, social, or organizational factors related to work that require a consistent amount of effort or skills. These demands can lead to various costs, such as mental stress, job burnout, and feelings of dissatisfaction in the workplace. While these demands are not necessarily negative, they can become stressors when the effort required goes beyond what the employee can recover from (Meijman & Mulder, 1998). On the other hand, job resources are the physical, psychological, social, or organizational elements that ease the workload, mitigate the impact of job demands, foster personal growth, and provide opportunities for learning. These resources serve as motivating factors that enhance job engagement, increase job satisfaction, and promote behaviors that extend beyond the typical job role (Demerouti & Bakker, 2011; Sulea et al., 2012).

Scientific organizations often have rigorous work environments with irregular working hours. In this context, scientists' work challenges and contributions are job demands, while recognition and satisfaction at work are job resources.

2.2. Linkage between Job Challenges, Contribution, Recognition, and Satisfaction

According to Kauppila (2025), job challenges, recognition, perceived contribution, and job satisfaction are evaluative phenomena that employees form perceptions based on their observations and experience. These evaluations can be both cognitive (involving beliefs or thoughts) and affective (involving feelings) in nature. Job satisfaction, for example, is defined as an attitude or favourable feeling or perception of employees towards their job or work task (Schneider & Snyder, 1975; Kauppila, 2025). Several factors, such as individuals' personality, working environment, and job characteristics, influence employees' job satisfaction (Agho et al., 1993; Singh, 2025). In addition to satisfaction, the nature of job challenges also shapes employee experience. For instance, Zimmerer & Baglione (2009) defined a work challenge as something that inspires employees' determination to improve their ability to overcome problems, which may include new problems, tasks to be solved, and finding suitable solutions.

Furthermore, Yang & Li (2021) observed that work challenges and hindrances act as workplace stressors, potentially resulting in emotional responses such as anger, anxiety, and heightened attentiveness. In parallel, recognition for work is defined as the expression of non-financial appreciation in response to exceptional achievement or performance (Weziak-Bialowolska & Bialowolski, 2022). Studies have shown that recognition positively influences job performance, psychological health at work, and employee satisfaction (Weziak-Bialowolska & Bialowolski, 2022; Wydyanto, 2022). Building on these findings, Haitao (2022) reported that both work challenges and recognition have a significant impact on employees' job satisfaction in the workplace. Similarly, Singh (2023, 2025) described the unique context for scientists, whose jobs are very rigorous, creating mental stress and solitude, while the perceived recognition for their contributions remains insufficient. Based on the previous finding, we proposed that:

H1: Job satisfaction among scientists is directly impacted by their job characteristic elements, such as challenges, contribution, and recognition for work.

H2: The job challenges of the scientists are directly linked to their desire for recognition.

2.3. Association between Gender, Work Experience, Job Attitude, and Job Characteristics

According to Singh & Jain (2013) and De Frias & Schaie (2001), demographic features such as personality, education, expectations, age, gender, and occupation each have a significant impact on individuals' work motivation. For instance, work tenure has a direct and positive impact on job satisfaction (Mothema et al., 2025), indicating that increased tenure typically leads to greater job satisfaction. More specifically, Ng & Sorensen (2008) found that workplace social support and socialization contribute more to job satisfaction among women than men. According to Konrad & Harris (2002), a rise in gender equity may prompt men to adopt values traditionally considered feminine, while also encouraging women to adopt traditionally masculine values. Building on these findings, work tenure emerges as a significant variable influencing employees' work behavior and performance within organizations (Ng & Feldman, 2013).

Conversely, Han et al. (2024) highlighted that the working environment, job characteristics, interpersonal relationships within the workplace, work-life balance, as well as income and benefits, are significant factors influencing employees' happiness and commitment. Kumar and Giri (2009) confirmed that individuals' work experience, satisfaction, and commitment at the workplace are positively correlated with one another. In comparisonYeo & Ha (2025) found that individuals' age, marital status, work experience, monthly household income, health, and work-life balance significantly impacted their work satisfaction.

In the context of India, an emerging developed country, the government has in recent years strongly emphasized women's workforce participation in various sectors, including politics, science, space, finance, banking, and entrepreneurship. Therefore, we assume that the scientists' gender and work experiences significantly influenced their job attitudes. Thus, the hypotheses of the study are-

H3: There is a difference in scientists' perceptions of job challenges, contributions, recognitions, and satisfaction at research institutes based on gender.

H4: There is a difference in scientists' perceptions of job challenges, contributions, recognitions, and satisfaction at research institutes based on their work experience.

2.4. Mediator Role of Work Engagement

Work engagement (WE) refers to the physical, cognitive, and emotional involvement of individuals in their workplace (Kahn, 1990; Yalabik et al., 2013). It is characterized as an affective-motivational, work-related state comprising vigour, dedication, and absorption. Vigour encompasses an employee's energy, mental resilience, willingness to invest effort, and persistence in the face of job challenges. Dedication involves a psychological identification with one's work, accompanied by feelings of significance, enthusiasm, inspiration, pride, and a sense of challenge. Absorption describes deep immersion and concentration in work, resulting in a loss of awareness of time and difficulty detaching from tasks (Schaufeli et al., 2006). Engaged employees typically demonstrate greater accountability for their performance and closely associate their work outcomes with their identity (Bakhshi & Gupta, 2016). Recent studies suggest that work engagement acts as a complete mediator in the relationship between subjective well-being and both work performance and mental health issues. Furthermore, it acts as a partial mediator in the correlation between subjective well-being and work withdrawal behaviors, as well as physical health concerns (Garg & Singh, 2020). Additionally, work engagement has been found to mediate the relationships between affective commitment, job performance, and intention to quit (Yalabik et al., 2013). Previous studies have found that scientists' jobs are highly challenging and stressful (Singh, 2023), and that scientists often perceive a lack of recognition (Singh, 2025). Despite these challenges, scientists exhibit high levels of work engagement, i.e., vigour, absorption, and dedication (Singh, 2025). Hence, we proposed that:

H5: Work engagement significantly mediates the linkage between job challenges and recognition of work.

3. Research Methodology

3.1. Sampling Design

Data were gathered from scientists affiliated with various research institutes and laboratories of the Council of Scientific and Industrial Research (CSIR) in India. An online survey, administered through Google Forms via email and WhatsApp, was employed to collect data using both probability (random) and non-probability (convenience or snowball) sampling techniques. The data collection period extended over three months, from December 2023 to February 2024. We reached out to over 2,000 scientists using their official email addresses and received responses from approximately 230 individuals. Out of these, 55 responses were excluded due to incompleteness, resulting in 175 usable questionnaires. The respondents included 78% male and 22% female scientists. The majority of the respondents were married (80%), aged between 30 and 40 years (47%), and held a Doctorate (76%). An examination of the respondents' tenure within their respective organizations revealed that most possessed over 15 years of experience (35%), followed by those with 5 to 10 years of experience (28%), forming the principal groups (see Table 1). This study employs a causal research design using cross-sectional data. Additionally, the cross-sectional survey method is more effective in elucidating the relationships among variables (Cooper & Schindler, 2014).

Table 1: Details of the Respondents

Demographic Features		Number	Percentage
Gender	Male	137	78%
	Female	38	22%
Age	Below 30 years	17	10%
	30-40 years	81	47%
	40-50 years	47	26%
	Above 50 years	30	17%
Education	Master	43	24%
	Doctorate	132	76%
Marital Status	Married	34	20%
	Unmarried	141	80%
Work Experience	Below 5 years	33	19%
	5-10 years	49	28%
	10-15 years	33	18%
	More than 15 years	60	35%

Source: Primary data.

3.2. Instruments

To measure job challenges, contributions, and recognition of the work of scientists at their workplace, we have adapted items from Brown & Leigh's (1996) scale. The Affective Job Satisfaction index, developed by Thompson & Phua (2012), is used to measure the job satisfaction of the scientists. Respondents were asked to use a seven-point Likert-type scale, ranging from "strongly disagree" (1) to "strongly agree" (7), to indicate their perceptions. The Utrecht Work Engagement Scale (UWES-9 items), developed by Schaufeli, Bakker, and Salanova (2006), is used to measure work engagement among scientists. The scale has three dimensions, such as vigor, dedication, and absorption, and was measured on a seven-point Likert-type scale, ranging from "never" (1) to "always" (7). Table 2 presents the reliability coefficient, along with descriptive statistics, for these variables.

Descriptive statistics such as Mean and S.D., t-test, One-way ANOVA, Pearson correlation, multiple linear regression, and PROCESS Macro model 4 in SPSS Version 4.2 beta are employed for data analysis in this study. Figure 1 provides a visual representation of the framework for the present study.

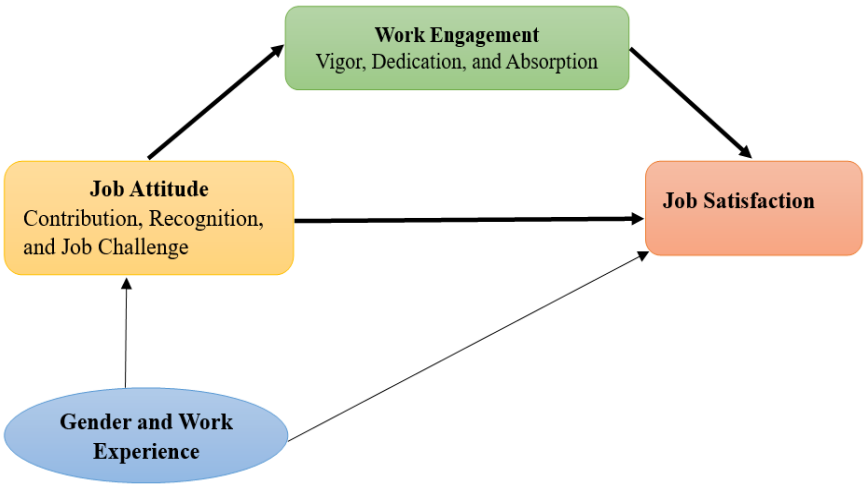

Figure 1: Model of the Study

4. Result and Discussion

The means and standard deviations for all variables are presented in Table 2, along with the reliability coefficients. The results are as follows: Job Contribution (CN) (α = 0.88), (M = 5.64, SD = 1.13); Recognition to Work (RN) (α = 0.74), (M = 4.97, SD = 1.21); Job Challenges (JC) (α = 0.74), (M = 5.64, SD = 1.11); WE total (α = 0.91), (M = 5.55, SD = 1.06); VI (α = 0.75), (M = 5.15, SD = 1.19); DE (α = 0.89), (M = 5.92, SD = 1.19); AB (α = 0.85), (M = 5.59, SD = 1.12); and JS (α = 0.91), (M = 5.66, SD = 1.21). It is found that all scales exceed the criterion of 0.70 for Cronbach's alpha, indicating satisfactory internal consistency (Nunnally and Bernstein, 1994). A quick inspection of the mean scores reveals that all values are higher than the midpoint of their respective scales. This suggests that respondents reported higher levels of job challenges and contributions compared to work recognition, as well as reasonably high levels of work engagement and job satisfaction.

Table 2 Correlation matrix along with Descriptive Statistics and Cronbach Alpha

Variables	Job Contribution	Job Recognition	Job Challenge	Work Engagement	Job Satisfaction
Job Contribution	1				
Job Recognition	0.64**	1			
Job Challenge	0.33**	0.23**	1		
Work Engagement	0.69**	0.49**	0.39**	1	
Job Satisfaction	0.69**	0.58**	0.26**	0.80**	1
Mean	5.64	4.97	5.64	5.55	5.66
S.D.	1.13	1.21	1.11	1.06	1.21
Cronbach Alpha	0.88	0.74	0.74	0.91	0.91

Note: **p< 0.01 level (2-tailed)
Source: Primary data.

According to the outcomes in Table 2, significant positive correlations were found among all variables ($p < 0.05$). The job contribution strongly and positively correlated with scientists' job recognition (r = .64), satisfaction (r =.69), and work engagement (r =.69). Similarly, work engagement strongly correlated with job satisfaction (r =.80). Additionally, there is a moderate correlation between job recognition, satisfaction (r = .58), and work engagement (r = .49). However, the increase in job challenges leads to lower job contribution (r = .33), recognition (r = .23), work engagement (r = .39), and satisfaction (r = .26) to the scientists.

The outcomes of Table 3 illustrate that job characteristics variables, such as contribution, recognition, and challenges, caused 47%, 34%, and 6% changes in the job satisfaction of scientists. Additionally, job contribution (β = .74, t = 12.48, F = 155.74), job recognition (β = .58, t = 8.83, F = 88.89), and job challenges (β = .28, t = 8.93, F = 12.01) of the scientists significantly impacted their job satisfaction ($p<0.05$). It is also noted that the job challenges faced by scientists caused only a 5% change in their desire for work recognition. Moreover, the job challenges of scientists are directly and significantly linked to their desire for recognition ($\beta = 0.25$, $t = 3.06$, $F = 9.36$, $p < 0.05$). Thus, we accepted H1 and H2.

Table 3: Causal Relationship among Job Characteristics and Outcomes

Path coefficient	B	t-value	R^2	F-statistic	p
CN → JS	0.737	12.48	0.474	155.74	0.000
RN → JS	0.579	8.83	.339	88.89	0.000
JC → JS	0.277	8.93	.065	12.01	0.001
JC → RN	0.247	3.06	.051	9.36	0.003

Note: p<0.05; CN-Job Contribution; RN-Job Recognition; JC-Job Challenges; JS-Job Satisfaction.
Source: Primary data.

The outcomes of Table 4 indicate that there is no significant difference found in job contribution, recognition, challenges, and satisfaction among scientists based on their gender ($p > 0.05$).

Table 4: Relationship between Job Characteristics and Outcomes based on scientists' gender

Job Characteristics & Outcome	Male	Female	t-test	p
Contribution	5.69 (1.11)	5.47 (1.15)	1.12	.263
Recognition	4.99 (1.22)	4.96 (1.22)	.131	.896
Job Challenge	5.63 (1.14)	5.71 (1.02)	-.405	.686
Job Satisfaction	5.71 (1.19)	5.48 (1.27)	1.055	.293

Source: Primary data.

However, there is a significant difference in the job contribution, recognition, challenges, and satisfaction among scientists based on their work experience. In other words, higher work experience among scientists leads to greater job contributions, recognition, challenges, and satisfaction (Table 5). Thus, we reject H3, whilst accepting H4.

Table 5: Relationship between Job Characteristics and Outcomes based on scientists' work experience

Job characteristics & Outcome	<5 years	5-10 years	10-15 years	>15 years	F	p
Contribution	5.54 (.96)	5.21 (1.23)	5.59 (1.08)	6.09 (1.01)	6.19	0.001
Recognition	5.07 (.99)	4.59 (1.17)	4.80 (1.29)	5.33 (1.23)	3.86	0.01
Job Challenge	5.19 (1.27)	5.70 (.88)	5.40 (1.27)	5.97 (1.01)	4.26	0.006
Job Satisfaction	5.32 (1.48)	5.31(1.21)	5.78 (.86)	6.07 (1.08)	4.93	0.003

Source: Primary data.

The result of Table 6 shows that job challenges impacted 24% (R^2 = .24) changes in the job recognition after adding the mediating effect of WE (F = 26.82; p<0.05). Moreover, results show the total effect [β = .25, SE = .081, 95% CI (.088, .407)], direct effect [β = .048, SE = .079, 95% CI (-.108, .204)], and indirect effect [β = .199, SE = .049, 95% CI (.114, .307)] of scientists' job challenges on their recognition. Thus, we accepted H5.

Table 6: Work Engagement as Mediator between Job Challenges and Job Recognition

Model Summary						
R^2	SE	F	p			
.24	1.136	26.82	0.000			
Path	**B**	**SE**	**95% CI**		**t-value**	**p**
			LLCI	**ULCI**		
JC → RN	0.048	0.079	-0.108	0.204	0.61	0.545
JC → WE	0.372	0.067	0.240	0.504	5.57	0.000
WE → RN	0.536	0.083	0.373	0.699	6.48	0.000
Relationship						
Total Effect	0.247	0.081	0.088	0.407		
Direct Effect	0.048	0.079	-0.108	0.204		
Indirect Effect	0.199	0.049	0.114	0.307		

Note: p<0.05; RN- Job Recognition; JC- Job Challenges; WE- Work Engagement.
Source: Primary data.

In research-based organizations, scientists face high job demands. Their work often involves mental stress, complex problem-solving, rigorous experiments, extensive laboratory work, long hours, irregular schedules, and challenging fieldwork. To support them effectively, it is crucial to provide job resources such as inclusivity, greater rewards and recognition, as well as emotional and instrumental support from their institutions and colleagues. Organizing programs that aid in stress management and conflict resolution can also be beneficial (Sulea et al., 2012). These resources can promote positive behavior, enhance scientists' well-being, support their psychological, social, and physical health, and improve their work-life balance and relationships within the workplace.

This study aims to measure scientists' job attitudes by analyzing the causal links between job demands (such as challenges, engagement, and contributions) and job resources (including recognition and satisfaction). It also investigates differences in perception based on gender and work experience and examines the mediating effect of work engagement on the relationship between job challenges and recognition. The results indicate that male and female scientists perceive similar levels of job demands, including work challenges and contributions. However, perceptions vary based on work experience. More experienced scientists tend to contribute more, take on greater job challenges, and achieve higher levels of recognition and satisfaction. These findings align with previous research (Ng and Feldman, 2013; Mothema et al., 2025; Yeo & Ha, 2025).

Additionally, the study highlights that scientists' job challenges can lead to lower satisfaction and recognition. It concludes that the scientists' work requires significant mental effort and long hours, which can lead to stress and negatively impact health, performance, and work-life balance. Conversely, when scientists feel they are making a greater contribution, it enhances their job satisfaction and recognition, supporting the findings of Kutty et al. (2019). Finally, the current study concludes that scientists' perceptions of job challenges do not directly influence the recognition of their work. However, when these challenges are paired with high work engagement, they can have a significantly positive impact on recognition in the workplace.

5. Conclusion

This study aims to assess scientists' job attitudes by examining the causal relationships between job demands, such as challenges, engagement, and contributions and job resources, including recognition and satisfaction. It also explores how perceptions vary by gender and work experience, as well as the mediating role of work engagement in the relationship between job challenges and recognition. The findings indicate that work experience has a significant impact on scientists' perceptions of challenges, contributions, recognition, and job satisfaction. However, there is no notable correlation between gender and job characteristics. Moreover, job factors such as recognition and challenges have a significant influence on job satisfaction, with job challenges closely linked to the desire for recognition.

This study provides both theoretical and practical insights, focusing on how job and personal characteristics influence employees' job attitudes in research-based organizations. Theoretically, our findings contribute to the field of organizational behavior management by simultaneously examining these characteristics for the first time, thereby advancing the Job Demands-Resources (J-D-R) literature. We clarify how demographic variables and job characteristics shape employees' mindsets and workplace behaviors. By fostering engagement and implementing adequate rewards and recognition systems, organizations can enhance effectiveness, reduce dissatisfaction, and boost employee morale and motivation, which in turn leads to increased work contribution and job satisfaction.

Practically, these insights can help government bodies, such as the Ministry of Science and Technology and the Council of Scientific and Industrial Research (CSIR), understand how job resources drive motivation, resulting in greater organizational commitment and job satisfaction (Hakanen, Bakker, & Schaufeli, 2006). Satisfied employees tend to be more enthusiastic, productive, and less prone to burnout (Javidpour et al., 2025). This research also advocates for CSIR's investment in emotional intelligence training and psychological capital programs to promote teamwork, encourage extra-role behaviors, and alleviate workplace stress (Singh, 2025). Organizations that cultivate emotional intelligence foster harmonious work environments that support cooperation, reduce stress, and enhance job satisfaction (Woime & Shato, 2025).

In a research-oriented work culture, work engagement catalyzes group performance (Salanova et al., 2003). Grounded in self-determination theory, this study demonstrates that work contexts that promote autonomy, competence, and relatedness are beneficial for fostering intrinsic motivation and well-being (Ryan and Frederick, 1997). Effective practices, such as providing proper feedback and social support, further enhance learning, engagement, satisfaction, and commitment (Salanova & Schaufeli, 2008). Overall, this study advocates for sustainable human resource practices - such as

timely project funding, social support, and initiatives improve that promote psychological and emotional intelligence - to proactively encourage positive work behavior, strengthen work-life balance, and enhance job satisfaction and engagement while effectively managing job demands. However, the current study has certain limitations. First, our results may be affected by common method variance, as we relied on self-report questionnaires to assess job characteristics, work engagement, and job satisfaction. Although many studies in this field use self-reports (Salanova & Schaufeli, 2008; Sulea et al., 2012), future research could improve our model by incorporating expert ratings and interviews to evaluate job demands and resources, work engagement, well-being, and satisfaction. Additionally, it would be beneficial for future studies to examine the influence of ethical leadership and perceived social support on reward and recognition. Lastly, since our study used a cross-sectional design with a small sample size, future research should involve larger samples within a longitudinal framework.

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