Flexible Human Resource Management and Innovation in the Digital Economy: The Moderating Role of Work-Related Stress in Pakistan's IT Sector

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ABSTRACT: While there is general agreement that flexible human resource management (FHRM) is an enabler of organizational innovativeness, the processes by which the three-dimensional aspect of FHRM (skill flexibility, behavioral flexibility, and HR-practice flexibility) both positively and negatively influence innovation generation and innovation adoption, and the reasons why each aspect of FHRM interacts with employees' psychological experience of work-related stress are not coherent enough. Based on the Resource Based View, Dynamic Capabilities theory and Job Demands-Resources (JD-R) model, this research conceptualizes and examines the moderation model using primary data collection with questionnaire survey from employees of software houses working in Pakistan's Information Technology sector. The current study employed data analysis using PLS-SEM (Partial least squares sequential modeling) to investigate the reliability and validity of the data, discriminant validity through Heterotrait-Monotrait ratio, and bootstrapped significance. Skill and behavioral flexibility significantly predict both innovation generation and adoption, while HR-practice flexibility is generally less influential. Behavioral flexibility is the strongest predictor of innovation adoption. Work-related stress weakens the positive effect of skill flexibility on innovation outcomes but does not significantly affect behavioral flexibility. These findings show that Flexible HRM dimensions differ in their contribution to innovation and in their sensitivity to workplace stress. The study recommends further research in emerging economy technology sectors using PLS-predict, necessity-condition analysis, and longitudinal designs, while also encouraging deeper examination of Flexible HRM dimensions and stress as a boundary condition within the JD-R framework.

KEYWORDS: Flexible Human Resource Management, Skill Flexibility, Behavioral Flexibility, HR Practices Flexibility, Innovation Generation and Adoption Resource-based View, JD-Resource, Information Technology

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Introduction

Organizations in technology-based competitive markets face intense global competition and must continuously innovate to remain viable. At the same time, employees are expected to accomplish more work and prepare for

changing competitive pressures. However, heavy workloads, role ambiguity, and time pressure may negatively affect the psychological environment needed for innovation. It is anticipated that Human resource flexibility is accomplished by a firm's ability, and the degree to which its employees have flexible skills and behaviors, as well as the changeability of the firm's HR practices, may overcome this tension (Wright & Snell, 1998; Bhattacharya, Gibson, & Doty, 2005). However, empirical studies investigating all three components of the tripartite model of skill, behavioral and HR-practice flexibility have been few and have not systematically tested all three dimensions simultaneously with both phases of the innovation generation (the origination of new ideas) versus, adoption (assimilation of ideas originated elsewhere), and, more importantly, considered the psychological cost of flexibility (Stress related to the work aspects of flexibility).

The difference is significant in the emerging-economy IT sectors where flexible work, quick project timelines and 24/7 servicing of customers are something that is expected to be part of the job, and therefore the stress load that comes with it is equally high. The IT and IT-enabled services (ITeS) industry is an important sector of Pakistan's economy, and it is an appropriate place to consider this tension. Based on the Pakistan's Economic Survey 2025-26, the export receipts of the ICT sector increased 19.7 percent Year-on-Year to USD 3.38 billion for the period July-March FY2025-26, while as of March 2026, Pakistan registered more than 34,420 IT and Information Technology-enabled Services companies through the Securities and Exchange Commission of Pakistan and monthly export receipts exceeded USD 400 million for the first time in December 2025 (Ministry of Finance, 2026; PSEB, 2025). The digital transformation has happened alongside global digital transformation initiatives, such as the Digital Nation Pakistan framework and the Artificial Intelligence Policy 2025, where a policy emphasis is being laid on firms' ability to create and adapt to innovation quickly. Thus, it is expected that flexible HRM practices would add to the innovative output from these high-growth, high-pressure contexts; and this conversion would depend on the pressure level an HR would experience in the organization. For the Pakistani software companies and HR in similar high-growth, and high-pressure technology economies, it is therefore expected that the practice of flexible HRM would contribute to the company's innovative output from these contexts. This conversion would be reliant on the stress level experienced by HR in the firm.

Problem Statement and Research Gap

The problem statement and research gap are identified. This study is motivated by three limitations in the existing literature. First, the previous studies have tended to examine HR flexibility as a unidimensional concept which covers three aspects: skill-based flexibility, behavioral flexibility, and HR practice-based flexibility, and the focus was on only one of these aspects (Camps et al., 2016). Second, while flexibility and innovation research have each pointed out the importance of acknowledging that innovation is a complex process that spans the stages of generation and adoption (Dewar & Dutton, 1986; Damanpour & Wischnevsky, 2006). Few studies have modeled both the generation and the adoption stages in the same design, leaving the field unable to make statements about which of the dimensions of flexibility is more important for the generation or integration of innovations. Third, and most critically, work-related stress has been investigated less frequently in combination with all three flexibility dimensions and the two innovation outcomes in a single empirical model, thus leaving it open whether it is a moderator as predicted by the Job Demands-Resources model (Bakker & Demerouti, 2007). The existing literature on the relationship between stress and creativity is still inconclusive, with some studies reporting a negative effect of stress on creative behavior (Bani-Melhem et al., 2020), others reporting a curvilinear effect (Baer & Oldham, 2006), and further reporting no significant effect (Van Dyne et al., 2003). This is because, even in the IT sector, there is a lack of considerable evidence from that region available for large samples.

Research Objectives

The study aims at achieving the following goals:

- To examine the direct effects of skill flexibility, behavioral flexibility, and HR-practice flexibility on innovation generation and innovation adoption in IT software houses.
- To test the moderating role of work-related stress on each of these six direct relationships.
- To integrate Resource-Based View, dynamic capabilities theory, and the JD-R model into a single boundary-conditioned framework explaining when flexible HRM translates into innovative outcomes.
- To evaluate the empirical model against current PLS-SEM best-practice standards and to propose a methodological agenda—incorporating predictive and necessity-based techniques—for future replication.

Contribution of the Research Study

This research study makes a number of contributions to the literature. It theoretically breaks down Flexible-HRM into its individual aspects, and also conceptualizes work-related stress as a boundary condition instead of merely a control variable within JD-R theory, in response to the suggestion of better specified contingency models of strategic HRM (Wright & Snell, 1998; Lepak & Snell, 1999). It offers one of the first large-sample (N = 398), dual-outcome (generation/ adoption) tests in an emerging-economy setting in which the IT sector is rapidly expanding, yet has received little empirical attention in Pakistan. This study follows the current reporting standards for PLS-SEM used in HRM research and incorporates complementary analytical methods to improve the credibility and robustness of the variance-based SEM results.

Literature Review, Theoretical Framework, and Hypotheses Development

Flexible Human Resource Management: Conceptual Foundations

The human resource management's adaptability is referred to as the extent to which the human resources of the firm have skills and behaviors that can be relocated across the evolving situations and the extent to which the HR function can quickly reconfigure its practices to respond to the emerging needs of the organization (Wright & Snell, 1998; Bhattacharya et al., 2005). This construct is broken down into three factors: Skill flexibility (breadth and transfer of skills) and Behavioral flexibility (employees' willingness to change work habits, take on non-routine tasks), and HR-practice flexibility (organizational ability to change recruitment, training, appraisal and reward practices), Bhattacharya et al., (2005), myriad HR-trend analyses validate this three-part perspective's continued relevance to today's practice: Individual industry surveys indicate that flexible-work arrangements are among the most promising strategies HR leaders employ to attract and retain innovation-critical talent (SHRM Talent Trends, 2025; cited in Forbes Councils, 2026), and Concurrently, recent workforce literature highlights a shift toward skills- and capability-based workforce planning and more flexible, cross-functional organizational structures as mechanisms for strengthening organizational adaptability and innovation. The constructs operationalized by Bhattacharya et al. (2005) twenty-one years ago continue to describe the live performance of HRM as opposed to it being a historical artifact of pre-digital HRM.

Innovation Generation and Innovation Adoption as Distinct Outcomes

Idea generation involves generating ideas, processes, and/or products new to the firm and often to the marketplace (Dewar & Dutton, 1986; March, 1991); and Innovation adoption is the reception and internal diffusion of externally developed innovations (Premkumar & Potter, 1995; Damanpour & Wischnevsky, 2006). They are conceptually and managerially two different processes: generation relies on exploratory, experimentation-based knowledge processes elsewhere, while adoption relies on absorptive capacity and a willingness to import and adapt

other solutions and processes that have been developed (Pérez-Luño et al., 2011). This study models both outcomes in parallel structural models to avoid masking the differential antecedent effects, as did much prior flexibility research when they treated them as a single variable, "innovation performance".

Skill Flexibility and Innovation

Skill flexibility is the speed and ease at which employees can learn new skills (Arulampalam & Booth, 1998; Pulakos et al., 2000). Employees with broader and more transferable skill sets can approach problems from multiple perspectives. They can combine existing knowledge in novel ways and respond rapidly to changing technical requirements. These capabilities enhance both the generation of new ideas and the successful adoption of external innovations (Grant & Baden-Fuller, 2004; Lado & Wilson, 1994). If we move toward the most recent research taking place on flexibility in HR and the capability of organizational learning, it can be seen that, across the different organizational contexts, functional and extended HR flexibility are still strong predictors of innovation performance, and although not always uniform based on the organizational-learning-capability designs. Building on dynamic capabilities theory that posits that a firm needs to continually reconfigure internal resources such as human resources skills to adapt to a changing environment (Teece et al., 1997), this study suggests that firms:

H1: Employee skill flexibility is positively related to innovation generation.

H2: Employee skill flexibility is positively related to innovation adoption.

Behavioral Flexibility and Innovation

Behavioral Flexibility refers to the willingness of employees to change their behavior, perform tasks outside of their normal routines and accept ambiguity (Bhattacharya et al., 2005). Zhou and George (2001) found that employees who are adaptable and willing to change are more likely to generate creative and innovative ideas. Innovation is a process of learned and novel behavior (Reader & Laland, 2002), and individuals who are willing and able to engage in change of roles are more likely to generate innovative ideas and to promote their internal spread (West & Anderson, 1996). This interpersonal adaptability is conducive to the cross-functional job collaboration that is crucial to team-based innovation. Organizations and individuals who are more adaptable are more likely to adopt and implement innovations successfully. The results indicated that employee behavioral flexibility is positively related to innovation generation.

H3: Employee behavioral flexibility is positively related to innovation generation.

H4: Employee behavioral flexibility is positively related to innovation adoption.

HR-Practice Flexibility and Innovation

HR-practice flexibility is the adaptability of the HR systems, that is, the speed and effectiveness with which HR recruitment, training, appraisal and reward practices can be rearranged (Martínez-Sánchez et al., 2011). In theory, flexible HR systems should foster innovation with experimentation and ongoing renewal of skills (Lepak et al., 2006). However, empirically, this relationship is questioned: some research indicates a direct relationship (Nesheim et al., 2007), whereas others find that formal flexibility in HR practices has to be accompanied by other relevant factors, such as organizational culture, leadership support, and resources, to drive the innovation process (Camps et al., 2016; Chen & Huang, 2009). But, in the realm of IT, innovation can be directly related to technological capability and responsiveness to the market rather than to HR policy architecture (Zhou & Wu, 2010). The present

study aims to assess the more theoretically and traditional positive hypothesis, and assumes that a null result is meaningful:

H5: HR-practice flexibility is positively related to innovation generation.

H6: HR-practice flexibility is positively related to innovation adoption.

Work-Related Stress as a Boundary Condition: The JD-R Lens

According to the JD-R theory, job resources such as autonomy and adaptability provided by flexible HRM systems are most beneficial when job demands (e.g., workload-related stress) are low; however, job demands must be high to drain the available resources or turn them unfruitful (Bakker & Demerouti, 2007). This fundamental proposition has been extended over the past decade using person-by-situation and multilevel analyses (Bakker et al., 2014), as reviewed in the ten-years-later retrospective for the JD-R model) and, most recently, by research that connects job crafting and digitization-era demands to innovative and proactive behaviors (De Clercq & Pereira, 2024), on the digitization-era JD-R extension). Cognitive-resource theories support this idea by suggesting that, under high stress, employees have less capacity to engage in creative problem-solving and skill deployment (Eysenck, 1995), and that under chronic stress, employees become "used up" and less willing to try their new behaviors or learn new skills from outside sources (Crawford et al., 2010). Not all of the literature, however, on the relationship between stress and creativity is negative: some research shows that a moderate level of challenge stressors, when experienced in a supportive environment, can facilitate increased focus and the creative problem-solving, (Bani-Melhem et al., 2020; Antwi et al., 2019), whereas, Other research suggests that interpersonal flexibility, such as behavioral adaptability, may be less cognitively demanding than skill-based or systems-based flexibility (Baer & Oldham, 2006), Therefore, behavioral adaptability may be less sensitive to work-related stress. This suggests that work-related stress may not affect all three dimensions of flexibility equally, making this an important empirical question for the present study.

H7: Work-related stress weakens the positive relationship between skill flexibility and innovation generation.

H8: Work-related stress weakens the positive relationship between skill flexibility and innovation adoption.

H9: Work-related stress weakens the positive relationship between behavioral flexibility and innovation generation.

H10: Work-related stress weakens the positive relationship between behavioral flexibility and innovation adoption.

H11: Work-related stress weakens the relationship between HR-practice flexibility and innovation generation.

H12: Work-related stress weakens the positive relationship between HR-practice flexibility and innovation adoption.

Integrated Theoretical Framework

The study is multi-theoretical, applying three lenses. The Resource-Based View (RBV) provides that human resources can be a valuable firm-specific and difficult-to-imitate asset that can lead to a sustainable competitive advantage (Spender, 1996). In a volatile technology market, the dynamic capabilities theory addresses why there is a lack of adequate foundation for sustained competitive advantage in static stocks of resources: firms need to actively sense, adopt, and reconfigure their resources (including the skills and behaviors of their workforce) to maintain competitive advantage (Teece et al., 1997). The contingency mechanism of the JD-R model helps to understand why the innovation-driving capacity of flexible human resources is dependent upon the work-related stress demand-side variable. Together, these three theoretical lenses provide a framework in which Flexible HRM is viewed as a key organizational capability, while its effect on innovation depends on employees' psychological well-being. This study

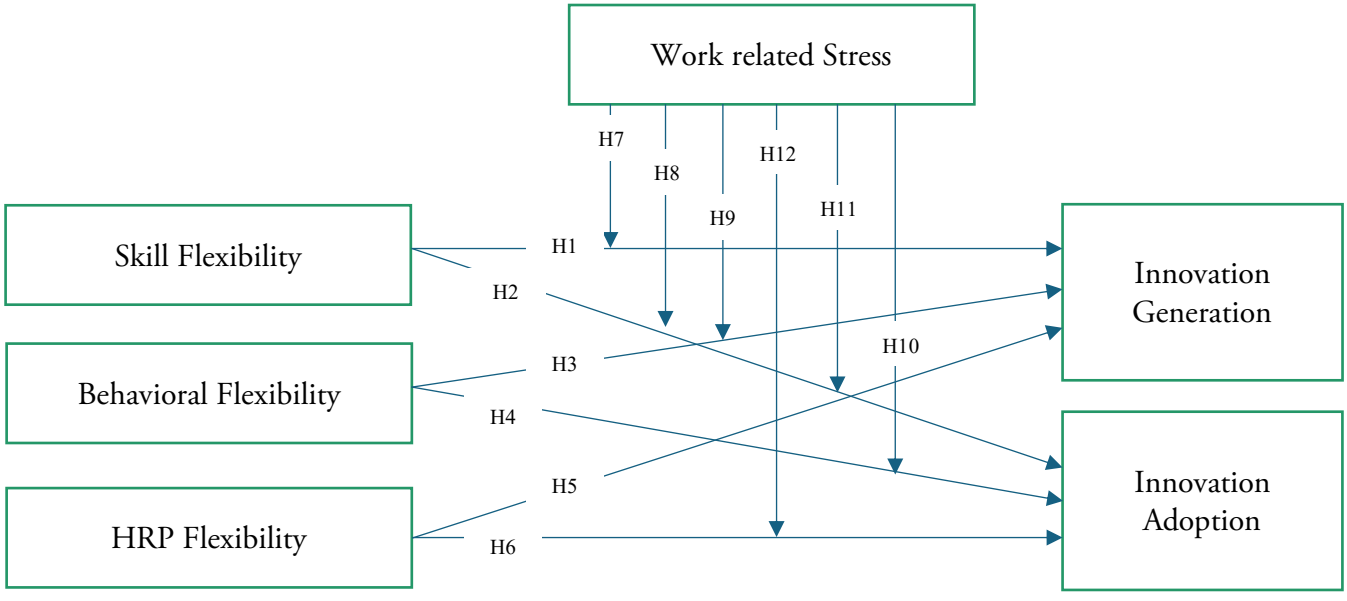
examines this relationship across both stages of innovation in an emerging-market IT sector, offering a comprehensive model that has not previously been tested in a single sample.

Conceptual Model

Three exogenous constructs, SF, BF, and HRPF, are modeled as direct predictors of two endogenous outcomes, (IG) and (IA), with (WRS) specified as a moderator on all six SF/BF/HRPF → IG/IA paths, consistent with Hypotheses H1–H12.

Figure 1

Conceptual Model



Research Gap Statement

Reviewing the literature, it can be seen that (a) Flexible- HRM has been rarely broken down into skill, behavioral and practice dimensions in a single test, (b) rarely modelled in terms of distinct outcomes of innovation generation and adoption, and (c) has never explicitly been explained by applying JD-R theory with dimension-specific moderation hypotheses, and (d) has very limited large-sample evidence from the IT sector in Pakistan despite its rapid growth. This study aims to bridge this gap in the literature.

Research Methodology

Research Philosophy, Approach, and Design

This study is grounded in a positivist approach toward research philosophy and adopts a deductive approach using a quantitative research method, as the problem is set against a predetermined set of hypotheses that were drawn from the existing research and theory (Saunders, 2009; Easterby-Smith et al., 2012). For collecting primary data, a cross-sectional survey design was used, where employees of software houses in the IT industry in Pakistan were contacted.

Data Collection

This study included middle and top-level employees of Software Houses who are registered with the Securities and Exchange Commission of Pakistan (SECP) and the Pakistan Software Export Board (PSEB, 2024-25), which includes software developers, supervisors, Assistant HR manager, HR manager and senior executives. Convenience sampling was employed in gathering the data with a structured questionnaire that employed a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was administered in person, by WhatsApp and by email to collect the data from the employees of software houses.

Measures

All constructs were assessed with the existing validated scales modified for their context. Skill flexibility (4 items) and behavioral flexibility (3 items) were adapted from Bhattacharya et al. (2005); HR-practice flexibility (6 items) was a combination of four items adapted from Bhattacharya et al. (2005) and two items adapted from Ngo and Loi (2008); from Pérez-Luño et al. (2014) adapted innovation generation (3 items) and innovation adoption (3 items), as operationalized by Dost et al. (2016); and work-related stress (4 items) was taken from Sosik and Godshalk (2000). All items had a 5-point Likert scale.

Data Analysis Technique

There were two stages of data analysis. The analysis was done using preliminary descriptive and correlation analysis by IBM SPSS 28. Due to the prediction-oriented nature of the study, the focus of the study was moderation instead of mediation and the use of reflective constructs, variance-based partial least squares structural equation modeling (PLS-SEM) was adapted for its ability to address the study's goals of predicting latent factors and handling non-normal data distributions (Hair et al., 2019; Kline, 2010). Following the integrated approach to conditional-effect and interaction analysis as implemented in SmartPLS by Hayes (2018), the analysis was conducted in two steps. (i) reflective measurement model assessment by indicator loadings, as well as internal consistency reliability (Cronbach's alpha and composite reliability cr), convergent validity (average variance extracted, AVE ≥ 0.50), and discriminant validity via the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio (HTMT); and (ii) structural model assessment through collinearity assessment (VIF), path coefficients, and coefficient of determination (R^2) was carried out along with the bootstrapped (5,000+ resamples) significance tests for direct effects as well as moderation effects.

To complement the original fit-based approach (Hayes et al., 2018), three alternative complementary techniques are documented in this study and are recommended for full application in future replications with the underlying raw data: (a) PLSpredict, assessing model's out-of-sample predictive power based on k-fold cross validation instead of in-sample fit only (Shmueli et al., 2019); (b) necessary condition analysis (NCA) which also examines the necessity of the flexibility dimension as a condition for innovation as well as sufficiency, and as some flexibility dimensions could be merely contributory conditions for innovation outcomes (Richter et al., 2020); and (c) Gaussian-copula-based endogeneity correction as an alternative method which takes care of the possibility that unobserved factors jointly affect flexibility and innovation measures, as this has been increasingly emphasized in the latest methodological developments of the PLS-SEM literature (Liengaard et al., 2025). These methods are not firmly part of the original data collection strategy, but are given special emphasis as the next step in methodological developments in this research stream, which will be developed.

Data Analysis and Results

Descriptive Statistics

Means and standard deviations for the study's continuous constructs are reported in Table 1. The scores for skill flexibility (M = 4.02, SD = 0.49) and behavioral flexibility (M = 3.94, SD = 0.56) were rated moderately high, suggesting that respondents' impression of their firms and associates as flexible. Work-related stress was relatively low (M = 2.49, SD = 0.26), while the adoption of innovation (M = 3.82, SD = 0.38) was rated higher than the production of innovation (M = 3.28, SD = 0.48), as this reflects the IT sector's unique need for both adapting and integrating external technologies and the development of new in-house technologies.

Table 1

Descriptive Statistics

Constructs Construct	Mean	Standard deviations
Skill Flexibility (SF)	4.018	0.485
Behavioral Flexibility (BF)	3.942	0.556
HR-Practice Flexibility (HRPF)	3.652	0.354
Work-Related Stress (WRS)	2.493	0.259
Innovation Generation (IG)	3.276	0.479
Innovation Adoption (IA)	3.822	0.383

Source: Authors' survey data, five-point Likert scale (1 = strongly disagree, 5 = strongly agree).

Measurement Model Assessment

Both the innovation generation and innovation adoption models demonstrated satisfactory internal consistency reliability. Cronbach's alpha test ranged from 0.725 to 0.900, while composite reliability (CR) ranged from 0.816 to 0.924 and exceeded the recommended threshold of 0.70 (Hair et al., 2013). All constructs had convergent validity as represented by the average variance extracted (AVE) ranging from .653 to .730, which is higher than the threshold minimum of 0.50 (Fornell & Larcker, 1981). The Fornell-Larcker criterion was used to confirm the discriminant validity, which has the form of the square root of the AVE exceeding the correlations of the constructs with one another for all the construct pairs, and additionally, the HTMT technique, which was within the recommended bounds for all pairs of constructs and consistent with the current recommendations (Henseler et al., 2015).

Table 2

Reliability and Convergent Validity — Innovation Generation Model

Constructs Construct	Cronbach's alpha	Composite relatability (CR)	AVE
Skill Flexibility (SF)	0.875	0.914	0.727
Behavioral Flexibility (BF)	0.735	0.849	0.653
HR-Practice Flexibility (HRPF)	0.900	0.924	0.670
Work-Related Stress (WRS)	0.847	0.897	0.687
Innovation Generation (IG)	0.789	0.877	0.704

IG= Innovation Generation; SF=Skill flexibility; BF= Behavioral flexibility; HRPF=Human resource practice flexibility; WRS=work-related stress. Interpretations: Cronbach alpha, composite reliability and AVE are above threshold.

Table 3

Reliability and Convergent Validity — Innovation Adoption Model

Constructs	Cronbach's alphaα	Composite relatability (CR))	AVE
Skill Flexibility (SF)	0.865	0.904	0.730
Behavioral Flexibility (BF)	0.725	0.839	0.655
HR-Practice Flexibility (HRPF)	0.880	0.908	0.654
Work-Related Stress (WRS)	0.837	0.887	0.690
Innovation Adoption (IA)	0.689	0.867	0.708

IA= Innovation Adoption; SF=Skill flexibility; BF= Behavioral flexibility; HRPF=Human resource practice flexibility; WRS = work-related stress. Interpretations: Cronbach's alpha, composite reliability and AVE are above the threshold.

Structural Model: Direct Effects

As per the Hair and Alamer (2022) recommendations of the conventional benchmarks for the PLS-SEM, both the structural models explained a moderate to substantial amount of variance in the endogenous constructs of innovation (with R^2 values above 0.50). The standardized path coefficients, bootstrapped t-statistics and p-values for the direct effects of SF, BF and HRPF on IG and IA are provided in Table 4.

Table 4

Direct Structural Path Coefficients

Path	β (IG)	t	p	β (IA)	t	p
SF → IG/IA	0.158	2.553	0.011	0.145	2.281	0.023
BF → IG/IA	0.510	9.292	0.000	0.514	9.773	0.000
HRPF → IG/IA	0.047	0.653	0.514	0.058	0.811	0.418

IG = Innovation Generation model; IA = Innovation Adoption model. Bold interpretation: paths with $p < 0.05$ are statistically significant

Skill flexibility had a positive and small impact on innovation generation ($\beta = 0.158$, $p = 0.011$) and innovation adoption ($\beta = 0.145$, $p = 0.023$), thereby supporting H1 and H2. The most consistent and strongest effects were for behavioral flexibility with both outcomes ($\beta = 0.510$, $p < 0.001$ for generation; $\beta = 0.514$, $p < 0.001$ for adoption), which strongly supports H3 and H4. However, HR-practice flexibility had statistically non-significant (small) and slight coefficients in the innovation generation ($\beta = 0.047$, $p = 0.514$) and innovation adoption ($\beta = 0.058$, $p = 0.418$) processes, respectively. The results thus do not support hypotheses H5 and H6.

Moderation Analysis: The Role of Work-Related Stress

Interaction (also referred to as moderation) effects between work-related stress and each of the six flexibility–innovation paths, measured using the two-stage product-indicator approach and bootstrapping, are presented in Table 5.

Table 5

Moderating Effect of Work-Related Stress

Interaction term	β (→IG)	t	p	β (→IA)	t	p
WRS x SKF -> IG/IA	-0.118	2.228	0.026	-0.176	2.212	0.027
WRS × BF-> IG/IA	0.004	0.057	0.955	0.020	0.306	0.760
WRS × HRPF-> IG/IA	-0.153	1.978	0.048	-0.133	1.828	0.018

IG = Innovation Generation and Adoption moderation model; IA =. Bold interpretation: paths with $p < 0.05$ are statistically significant

The skill-flexibility →innovation-generation path (H7) and skill-flexibility →innovation-adoption path (H10) are also negatively moderated by work-related stress, suggesting that as stress increases, the moderation effect of skill flexibility would be lessened: H7 and H10 are supported. Work-related stress did not significantly moderate the behavioral-flexibility relationship with either innovation generation (β = 0.004, p = 0.955) or innovation adoption (β = 0.020, p = 0.760); H8 and H11 are not supported, and suggesting behavioral flexibility's benefits are comparatively stress-resilient. The HR-practice-flexibility →innovation-generation path (β = -0.153, p = 0.048, H9 and HR-practice-flexibility • innovation-adoption (H12 are supported and are negatively moderated by Work-related stress. As work-related stress increases, the effect of HRPF on Innovation generation and adoption decreases.

Table 6

Summary of Hypothesis Testing

Hypotheses	Relationship	Result
H1	SF → IG	Supported
H2	SF → IA	Supported
H3	BF → IG	Supported
H4	BF → IA	Supported
H5	HRPF → IG	Not supported
H6	HRPF → IA	Not supported
H7	WRS x SF → IG	Supported
H8	WRS x SF → IA	Supported
H9	WRS x BF → IG	Not supported
H10	WRS x BF → IA	Not supported
H11	WRS x HRPF → IG	Supported
H12	WRS x HRPF → IA	Supported

Discussion

Skill and Behavioral Flexibility as Robust Innovation Drivers

Skill flexibility is consistently and significantly related to both innovation phases, supporting the dynamic capabilities theory's argument that firms reap the benefits of continuous renewal of the skills of their employees to recombine knowledge in a changing environment (Teece et al., 1997; Laursen & Foss, 2003). A more remarkable finding is the greater effect size of behavioral flexibility compared to skill flexibility for both models (β ≈ 0.51 versus β ≈ 0.15). The findings suggest that in Pakistani IT software houses, employees' willingness to adapt their work behavior and perform non-routine tasks contributes more to innovation than the breadth of their technical skills. This supports the view that behavioral adaptability enhances cross-functional collaboration, which is essential for team-based innovation (West & Anderson, 1996).

The Null Effect of HR-Practice Flexibility

The results confirm that HR-practice flexibility has no significant impact on innovation outcomes, which is in contrast with the more positive perspective revealed in the strategic HRM literature (Lepak et al., 2006; Wright & Snell, 1998), but more closely aligns with more recent, context-specific studies in which formal HR-practice flexibility was regarded as a precondition but not a driver of innovation (Camps et al., 2016; Chen & Huang, 2009; Zhou & Wu, 2010). For the specific condition of highly dynamic environments where technical skills and market responsiveness are key determinants of competition, the concrete institutional design of HR policies (flexible hours, job rotation, flexible remuneration programs) may be a consequence, supporting or supporting a lack of, rather than a cause of, innovative output.

Work-Related Stress as a Selective Boundary Condition

The moderation results provide the study's most theoretically novel finding, that stress at work does not moderate all dimensions of flexibility equally. Its marked negative effect on the skill-flexibility path is consistent with the cognitive-resource theory that stress-induced fatigue reduces the bandwidth of one's brain to use a wide range of technical skills flexibly (Eysenck, 1995; Oldham & Cummings, 1996). Its pronounced negative link with the HR-practice-flexibility path aligns with the JD-R hypothesis that at lower levels of job demands (stress), HR resources (such as HR flexible systems) are most likely to be beneficial; indeed, the employees may be so depleted at high levels of stress that they are unable to make the most of the HR flexibility that is supposed to benefit them. In contrast, the behavioral-flexibility path is not moderated by interpersonal adaptability, indicating that this psychological pathway is somewhat different from the cognitive-skill pathway, and that interpersonal-based adaptability draws on other psychological resources than behavioral flexibility, as well as being more resistant to negative effects arising from workplace stress (Baer & Oldham, 2006). This dimension-specific pattern builds on the existing literature, which has often considered "HR flexibility" and "stress" as two interacting, global constructs, which gives rise to a more fine-grained contingency model where the implications for different managers are not uniform.

Contribution to Theory

The study extends the JD-R model by applying it to Flexible HRM rather than its traditional focus on relationship outcomes. It demonstrates that the effectiveness of Flexible HRM depends on the level of work-related stress experienced by employees. Furthermore, the study responds to calls in the strategic HRM literature for a multidimensional perspective by showing that the dimensions of Flexible HRM differ in their ability to predict innovation. Each dimension exhibits a different level of influence, statistical significance, and sensitivity to psychological strain.

Conclusion, Implications, and Future Research

Conclusion

The present study aimed to establish the relationship between Flexible HRM (skill, behavioral and HR-practice flexibility) and innovation generation and adoption in the IT industry in Pakistan and test the moderating association of employees' work-related stress. The study reveals that skill flexibility and behavioral flexibility, both of which have been investigated, are strong and significantly affecting factors in both stages of innovation, whereas HR-practice flexibility is not. The moderation relationship of skill and HR-practice flexibility is significantly negatively affected by work-related stress in both stages of innovation, but behavioral flexibility is not found to be supportive in the interaction effect. The findings integrate the Resource-Based View (RBV), Dynamic Capabilities Theory, and the JD-R model by addressing a gap in the literature. This study extends previous research on Flexible-HRM by examining its individual dimensions and testing work-related stress as a dimension-specific boundary condition across both phases of innovation in emerging economy technology sectors. Given Pakistan's rapidly expanding ICT export sector, which generated USD 3.38 billion in export remittances during the first nine months of FY2025–26, these findings have increasing practical and theoretical significance.

Theoretical Implications

In future research in strategic HRM and innovation, HR flexibility should be understood and estimated as a multidimensional construct and not as a composite measure. The resource-demand interaction logic of the JD model is extendable to innovation outcomes, but "flexibility" or "job resources" should not be used as a blanket term in future JD-related applications. The specific type of job resource under research should be explained. The level of

skill and behavior renewal supports dynamic capabilities theory; in this context, the formal architecture of HR practices seems to be more like an enabling condition rather than a direct capability.

Managerial and Policy Implications

Compared to formal HR-policy redesign, investments in employee skill development and behavioral adaptability (as measured in the current sample by cross-training, job rotation, and organized exposure to non-routine tasks) are expected to have a higher substantial impact in boosting innovation than the former, which proved to have no direct effects on innovation in this sample. However, employers should not view flexibility and well-being as two distinct HR initiatives; it is important to align flexibility-enhancing HR investments with workload management, role clarity and stress-reduction efforts (e.g., realistic deadline-setting, manager support training) to help manage stress. Development of behavioral flexibility seems to be quite "stress-proof", making it a reliable lever to innovate even in the most pressure-filled delivery environment typical to outsourced software development. Policymakers responsible for implementing Pakistan's Digital Nation Pakistan and AI Policy 2025 should recognize that the continued growth of the export-oriented IT sector depends not only on investments in digital infrastructure but also on effectively managing the work-related stress–innovation trade-off within firms.

Limitations and Future Research Directions

Like any cross-sectional survey study, some conclusions are tentative and suggest a clear agenda for future research. First, the cross-sectional and convenience sampling design does not allow causal inferences and generalizability; future studies should consider a probability sampling design together with, where possible, longitudinal and/or panel designs, and capture the dynamics of the relationship between flexibility and innovation across different levels of stress over time. (Molina-Azorin, 2016). Second, common method variance (CMS) is discussed in the data collection process and is not fully excluded in single-source survey data, but the use of archival innovation-output data (e.g., patents, product launches, client-reported adoption rates) will allow for the triangulation of measures. Third, the current study does not utilize complementary techniques that are becoming part of the rigorous reporting protocol for PLS-SEM such as complementary out-of-sample validation based on PLSpredict, necessary condition analysis (NCA), or Gaussian-copula endogeneity correction to the underlying dataset; application of these techniques represents the next step in the methodological evolution of this research stream and would dramatically support the validity of the claims about the predictive and necessary status of the flexibility dimensions. Moreover, organizational culture, the leadership style, and the adoption of digital tools were not included as mediators or further moderators in the models; as per the current study, this might be culture contingent, and future models should test whether Strategic Human Resource Capabilities-influences can be linked to innovation outcomes through the addition of organizational culture. Furthermore, the results would be replicated across the other high-growth emerging market technology sectors and comparing them to IT companies from mature markets would help determine whether the dimension-specific stress-sensitivity pattern here is a general trend across skill-based and behaviour-based flexibility or a product-specific phenomenon of the IT labour market in Pakistan. Such extensions considered collectively should bring this stream of research from confirming that the flexibility dimensions have different innovation impacts and stress sensitivities into the realm of explaining why they differ and when each dimension can be most effectively applied under organizational circumstances.

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