

HIGH-PERFORMANCE WORK SYSTEMS AND EMPLOYEE PRODUCTIVITY IN PUBLIC SECTOR ENERGY ORGANISATIONS: THE ROLE OF EMPLOYEE ENGAGEMENT AND ORGANISATIONAL SUPPORT

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Abstract

This study examines how High-Performance Work Systems (HPWS) influence employee productivity in public sector energy organisations, while also investigating the mediating role of employee engagement and the moderating effect of organisational support. Drawing on the Ability–Motivation–Opportunity (AMO) framework, the Job Demands–Resources (JD-R) model, and Social Exchange Theory (SET), the research develops and tests a comprehensive model that links human resource practices with employee attitudes and performance outcomes. A quantitative and explanatory approach was adopted through a cross-sectional research design. Data were collected from employees working in leading public sector energy organisations, including NTPC Limited and Singareni Collieries Company Limited. Using stratified sampling, responses were obtained from around 500 employees representing both executive and non-executive categories. The collected data were analysed with SPSS and AMOS using Structural Equation Modelling (SEM). The findings indicate that HPWS has a significant positive effect on employee productivity. The results further show that employee engagement partially explains this relationship, suggesting that engagement functions as an important psychological pathway through which HR practices enhance performance. In addition, organisational support was found to significantly strengthen the relationship between employee engagement and productivity, meaning that the beneficial effect of engagement on productivity becomes more pronounced when employees perceive a supportive work environment. The model demonstrated satisfactory fit indices, confirming the suitability of the proposed framework. Overall, this study enriches the strategic human resource management literature by applying an integrated mediation–moderation framework to public sector energy organisations, an area that has not been widely explored. The study also offers meaningful practical implications by stressing the importance of engagement-focused HR practices and a supportive organisational climate in improving employee productivity.

These insights are valuable for policymakers and managers aiming to strengthen organisational effectiveness in public sector institutions.

Keywords: High-Performance Work Systems (HPWS), Employee Engagement, Organisational Support, Employee Productivity, Strategic HRM

1. Introduction

1.1 Background of the Study

High-Performance Work Systems (HPWS) emerged as a strategic approach to human resource management designed to increase employee capabilities, motivation and possibilities of contributing towards organisational performance. HPWS is deeply embedded in the Ability–Motivation–Opportunity (AMO) framework, where it incorporates selective staffing, extensive training, performance-based pay and participative decision-making to produce higher-order employee outcomes (Appelbaum et al., 2000; Huselid, 1995). HPWS has also been seen in the latest organisation, especially a transformed one, as a component of increasing productivity, challenge, innovation and competitive advantage.

In the public sector and energy-intensive industries such as power generation and mining, for example, HPWS is increasingly important. An organisation such as NTPC Limited, Singareni Collieries Company Limited operates in a highly regulated and governed environment, leading to challenges focused on efficiency, safety or productivity. Nevertheless, those organisations have structural constraints such as bureaucratic rigidity and hierarchical decision-making as well as limited autonomy and resistance to change (Bhatnagar, 2007; Budhwar & Varma, 2011). Such constraints can create challenges in the effective utilisation of advanced HR practices, affecting employee engagement and overall productivity.

Moreover, the challenges faced by the energy sector, technological advancements, sustainability pressures, and demand for operational excellence require HR to move from administrative HR practices to HPWS configurations (Silvestro et al., 2022). This shift is critical not just for enhancing the performance of employees but also for driving long-term organisational sustainability (Jiang et al., 2012). Though the impact of HPWS is well-documented in previous studies, its implementation in public sector energy organisations has been under-researched, especially for an emerging economy like India.

1.2 Research Problem

Although there is extensive evidence in the literature about the impact of HPWS on organisational performance, little is known about how they work to affect employee productivity, especially in public sector settings. Specifically, the function of employee engagement acting as a mediating variable and support within an organisational context as a moderating factor has not been sufficiently covered in integrated models (Alfes et al., 2013; Saks, 2006). Considered as an impactful mediating variable in the link between HR practices and performance outcomes, employee engagement is an affective state encompassing vigor, dedication and absorption at work

(Schaufeli et al., 2002). In a similar vein, Perceived Organisational Support (POS), which reflects beliefs concerning the extent to which the organisation values employees' contributions and cares about their well-being, is another significant aspect related to enhancing employee attitudes and behaviours (Eisenberger et al., 1986). Yet, very few empirical studies are available to incorporate HPWS, engagement and organisational support within a singular framework, especially in the context of the Indian public sector energy domain. Most existing studies focus on the private sector or Western contexts, reducing generalisability. This gap is of reasonable interest, especially in consideration of endowment institutions and cultural traits for public sector enterprises in India.

1.3 Research Objectives

The present study aims to address the identified gaps by examining the interrelationships among HPWS, employee engagement, organisational support, and employee productivity in public sector energy organisations. The specific objectives are as follows:

- To examine the impact of High-Performance Work Systems on employee productivity.
- To analyse the role of employee engagement as a mediating variable in the HPWS–productivity relationship.
- To assess the moderating influence of organisational support on the relationship between employee engagement and productivity.
- To develop and validate a structural model linking HPWS, employee engagement, organisational support, and productivity.

1.4 Research Questions

Based on the above objectives, the study seeks to answer the following research questions:

- How does High-Performance Work Systems influence employee productivity in public sector energy organisations?
- Does employee engagement mediate the relationship between HPWS and productivity?
- Does organisational support strengthen the relationship between employee engagement and productivity?

1.5 Significance of the Study

This study makes an important contribution to theory and practice. From a theoretical standpoint, this paper contributes to the literature by incorporating various models such as Social Exchange Theory (SET), Job Demands–Resources (JD-R) model and AMO theory to elucidate how HR practices are related to employee outcomes (Blau, 1964; Bakker & Demerouti, 2007). Providing both mediating and moderating mechanisms, this study provides a more nuanced understanding of HPWS and its impact on productivity in public sector contexts. In practical terms, the results of this study offer important insights for decision makers and human resource practitioners at public sector energy firms. The study proffers actionable strategies to increase workforce productivity and organisational effectiveness by emphasising the significance of employee engagement and organisational support. The adoption of HPWS can be especially crucial in light of the reforms

and modernisation undertaken by the public sector in India to ensure that they lead to sustainable performance improvements.

Furthermore, this research adds to HR policy by encouraging organisations from all industries and sectors to implement employee-focused initiatives that facilitate involvement in the workplace and clinical support. This is especially relevant to public sector organisations, where traditional HR systems tend to focus on the administrative aspects at the expense of employee well-being and motivation. As a result, the study not only fills an important knowledge gap but also creates a plan for transforming HR practices in the public sector.

2. Literature Review

2.1 Theoretical Foundations

Numerous theoretical frameworks addressing the economics of HPWS (such as the Becker model), individual intuitions and intentions around prioritising the delivery of firms' output (such as motivation, attitude or Vroom expectancy & equity theory) and social exchange theory can explain various aspects associated with HPWS to employee engagement, organisational support and productivity. According to the Social Exchange Theory (SET) developed by Peter Blau (1964), employee behaviour is determined through reciprocal transactions with the organisation. When organisations invest in supportive HR practices, workers are more likely to reciprocate with greater commitment, engagement and performance (Cropanzano & Mitchell, 2005). Within the framework of HPWS, practices like training, equitable rewards, and involvement foster positive exchange relationships that increase productivity.

The Job Demands–Resources (JD-R) model, first proposed by Arnold Bakker and Evangelia Demerouti (2007), is a comprehensive framework for understanding employee engagement. This is a model which explains how job resources (e.g., organisational support, autonomy and development opportunities) enhance employee engagement that predicts positive performance outcomes. HPWS can be considered as a package of job resources that encourages engagement and decreases burnout.

AMO (Ability–Motivation–Opportunity) theory, developed by Appelbaum et al. (2000) suggests that employee performance is determined by their abilities, motivation and opportunities to contribute. High-Performance Work Systems (HPWS) fit well with this, as HPWS increases employees' abilities (empowerment), motivations (incentives and rewards), and opportunities to perform work successfully through participatory mechanisms, which lead to performance outcomes.

Moreover, Kahn's Engagement Theory (1990), proposed by William A. Kahn, conceptualises employee engagement as the harnessing of employees' physical, cognitive and emotional energies in work roles. Because HPWS, as well as perceived organisational support, produce

meaningfulness and safety and availability, all of which are main aspects of one aspect within the JD-R Theory.

2.2 High-Performance Work Systems (HPWS)

The High-Performance Work Systems (HPWS) are described as sets of interrelated human resource practices that can contribute to developing skilled, committed and productive employees (Mark A. Huselid, 1995). Human resource management systems are often considered a source of long-lasting competitive advantage because they allow organisations to better leverage human capital (Becker & Huselid, 1998). HPWS normally consists of many significant parts. Training and development activities improve the skills and flexibility of employees to address organisational needs and changes in technology (Jiang et al., 2012). Performance appraisal systems give feedback, align individual goals with organisational objectives and motivate employees to improve their performance. This makes compensation practices, especially those around performance-based rewards, an intrinsic motivation and retention driver. Moreover, employee involvement practices such as participative decision-making and empowerment create a feeling of ownership and commitment to work among employees. Classical studies have consistently evidenced that HPWS positively contributes to organisations by increasing productivity, innovation, and employee satisfaction (Posthuma et al., 2013). However, the success of HPWS is frequently dependent on contextual elements like organisational culture and leadership – this can be exacerbated in public sector organisations where bureaucratic frameworks can restrict its deployment.

2.3 Employee Engagement

As a result of it, there has been an increase in interest towards the area of employee engagement, which is now considered to be one of the most connected constructs for HR practices and organisational performance. Wilmar Schaufeli et al. (2002), employee engagement is a positive, fulfilling, work-related state of mind that consists of three dimensions: vigor, dedication and absorption. Vigor means high energy and mental resilience at work, dedication is a sense of significance and enthusiasm, and absorption means being thoroughly concentrated and absorbed in the activity of working. These two dimensions are typically measured by the Utrecht Work Engagement Scale (UWES), which is widely validated in different contexts. In several prior studies, HPWS have proved to be a significant determinant of employee engagement along with providing resources, support and opportunities for growth (Alfes et al., 2013). Employees who are engaged tend to be more productive (Bakker & Albrecht, 2018), creative and display organisational citizenship behaviour. Engagement is vital in public sector organisations to tackle these typical challenges of low motivation and bureaucratic inertia.

2.4 Organisational Support

Perceived Organisational Support or POS can be defined as employee beliefs about the degree to which the organisation they work for appreciates their contributions and is concerned with their

well-being (Robert Eisenberger et al., 1986). POS functions based on the principle of social exchange, which has a considerable impact on employee perceptions and performance. Increased support from organisations can lead to improved employee engagement, job satisfaction and commitment whilst reducing turnover intentions (Rhoades & Eisenberger, 2002). According to the JD-R model, organisational support is one of the most vital job resources (Bakker & Demerouti, 2007) that enhances the engagement-performance relationship. Additionally, organisational support to moderate variables has a prominent role and enhances the positive impact of engagement on productivity. If employees feel supported by their organisation, they will put discretionary effort into the job and perform at a higher level (Kurtessis et al., 2017). This is particularly pertinent in public sector organisations where institutional support could alleviate structural constraints and improve employee effectiveness.

2.5 Employee Productivity

Employee productivity is one of the essential parameters for organisational performance, which is commonly quantified by task performance, efficiency & output quality. Task performance describes how well employees execute the primary requirements of their job (Williams & Anderson, 1991). Higher work quality leading to significantly raising employee productivity through boosting skills, motivation and engagement (HPWS) has been empirically tested as a security factor handled in HRM studies till now in the direction of achieving an objective (Jiang et al., 2012). According to Bakker and Demerouti (2017), engaged employees are more focused, proactive and devoted toward accomplishing organisational goals, resulting in a higher efficiency rate and better output quality. To mitigate the economic risks and ensure substantial operational effectiveness, productivity plays a pivotal role in public sector energy ventures. Yet high productivity levels are not just an outcome of well-designed HR practices, but also a conducive organisational setting that enhances engagement and motivation.

2.6 Research Gap

Notwithstanding a large body of research on HPWS and employee performance, there are still several gaps in the literature. First, integrated studies linking HPWS with employee engagement, organisational support, and productivity have not been reported in the literature, specifically in the public sector context. Secondly, the majority of existing studies have primarily analysed private sector organisations or developed economies, restricting their generalizability to public sector energy organisations in developing economies like India. The bureaucratic tendencies and regulatory mechanisms specific to public organisations require contextually driven research. Third, there is limited empirical evidence with respect to the mediating role played by employee engagement and the moderating role of organisational support in a single framework. Although previous research has analysed these interrelationships one by one, such as models that take into account how the interrelation of these variables is needed. Thus, the current study fills these gaps by constructing and empirically testing a structural model linking HPWS with employee

engagement, organisational support and productivity in the setting of public sector energy organisations.

3. Hypotheses Development

3.1 HPWSs and Employee Productivity

High-Performance Work Systems (HPWS) aim to develop employee competence, work motivation and opportunity, which lead to better job performance outcomes for the organisation. In the light of the Ability–Motivation–Opportunity (AMO) theory, employees deliver performance when they have relevant competences and motivation, and are allowed to contribute (Appelbaum et al., 2000). To realise this framework, HPWS uses training, performance-based rewards and participative decision-making. The positive HPWS-productivity relationship is consistently supported empirically. In fact, Mark A. Huselid (1995), for example, argued that the bundle of HPWS is positively associated with improvements in workforce productivity and organisational performance. Similarly, Jiang et al. (2012) found that HPWS supports human resources and intrinsic motivation, which results in better performance. The strategies of HPWS can also become important for public sector-driven energy organisations, such as holding high operational efficiency.

H1: There exists a significant positive relationship between High-Performance Work Systems and employee productivity.

3.2 HPHWs as Catalysts for Employee Engagement

HPWS and engagement can be explained by the JD-R model (Job Demands–Resources model), positing that job resources are important for stimulating engagement (Arnold Bakker & Evangelia Demerouti, 2007). Work system practices (e.g., training, autonomy, performance feedback) associated with HPWS are job resources that improve the psychological states of employees. Furthermore, according to the social exchange theory (Peter Blau, 1964), employees respond with more engagement when they receive good organisational practices. When organisations invest in their employees by adopting supportive human resource practices, it brings a feeling of being valued among employees who then show more involvement and dedication toward their work (Saks, 2006). Previous research has empirically determined that HPWS has a significant impact on employee engagement (Alfes et al., 2013), showing that well-established HR systems support a favourable work environment that motivates employees to dedicate their physical, cognitive and emotional efforts.

H2: HPWS positively influences employee engagement.

3.3 Employee Engagement & Employee Productivity

There is a consensus that employee engagement is a leading indicator of employee productivity. Kahn's Engagement Theory (William A. Kahn, 1990) states that engaged employees are more psychologically present in their roles and deliver better performance outcomes. According to the JD-R model, engaged employees have more energy, dedication and focus that manifests in

improved task goal performance and efficiency (Bakker & Demerouti, 2017). The Utrecht Work Engagement Scale UWES (Schaufeli et al., 2002), measuring these dimensions, has been commonly used to perfect the shower of positive association between engagement and performance. Research shows that employees who are engaged are more likely to perform better, take the initiative and be motivated towards delivering on organisational objectives (Bakker & Albrecht, 2018). In the case of public sector organisations, which are generally thought to be sluggish due to a lack of motivation, engagement is the ultimate key towards better productivity.

H3: Employee engagement greatly affects employee productivity positively.

3.4 Employee Engagement as a Mediator

HPWS has a direct effect on productivity, but this influence is mostly passed through employee engagement. As per Social Exchange Theory, when employees are treated well by HR practices, they become more engaged and perform better (Cropanzano & Mitchell, 2005). In the same vein, the JD-R model posits that job resources (in this case, HPWS) foster engagement, which in turn unfolds into performance outcomes. This means that employee engagement is a psychological mechanism through which HR practices affect productivity. Several empirical studies have demonstrated the mediation of engagement. Alfes et al. Erkurşun, E., & Camiş, K. (2013). Employee engagement mediates between HR practices and organisational performance. This means that HPWS directly increases productivity and indirectly increases engagement.

H4: High Performance Work Systems have a positive effect on employee productivity through employee engagement mediation.

3.5 The Moderating Role of Organisational Support

POS is a key factor strengthening the relationship between employee engagement and productivity. (3) Robert Eisenberger et al. (1986), POS reflects employees' perceptions of how much the organisation cares about their contributions and well-being. According to Social Exchange, higher perceived organisational support from employees will lead them to reciprocate with higher performance. Also, according to the JD-R model, organisational support is an important resource that moderates engagement-performance relationships. Empirically, POS could moderate the association between employee attitudes and their performance outcomes (Kurtessis et al., 2017). High organisational support enhances the positive relationship between engagement and productivity, while low institutional support weakens that same relationship. Particularly in public sector organisations, where employees' freedoms may be stunted by the constraints of such hierarchies, [6] organisational support will go a long way towards empowering engaged workers to perform up to their potential.

H5: Organisational support moderates the relationship between employee engagement and productivity in that this relationship is stronger when organisational support is high.

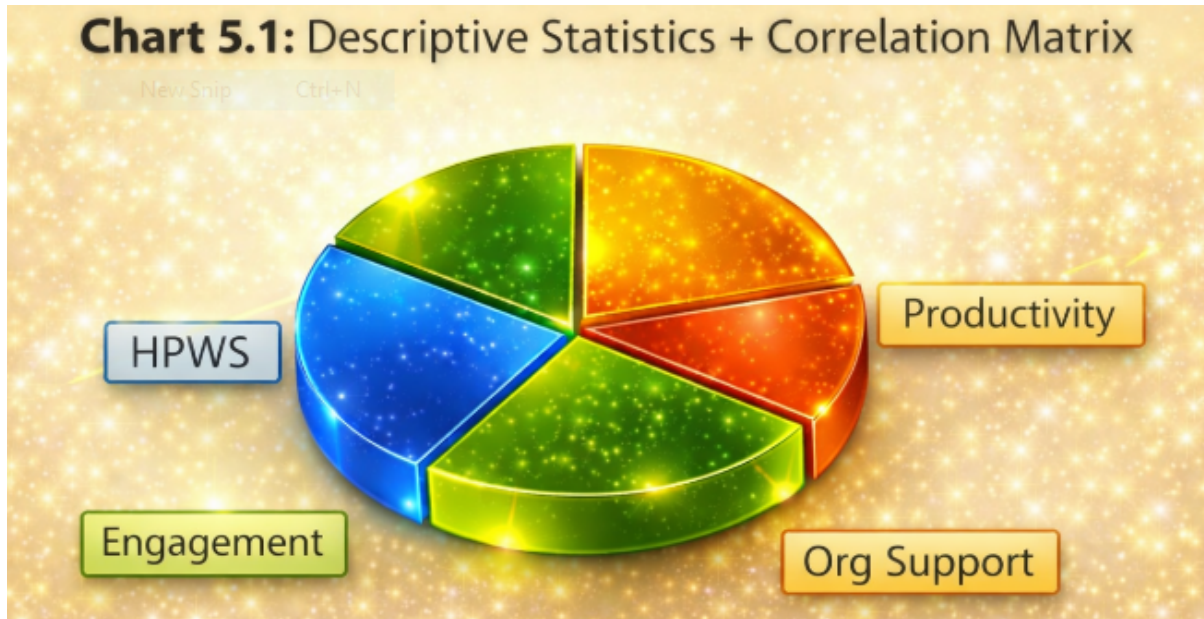
4. Conceptual Framework:



5. Results & Discussion:

Table 5.1: Descriptive Statistics + Correlation Matrix

Variable	Mean	SD	1	2	3	4
HPWS	4.08	0.61	1			
Engagement	4.12	0.56	.701**	1		
Org Support	3.96	0.62	.644**	.744**	1	
Productivity	4.01	0.58	.652**	.724**	.613**	1

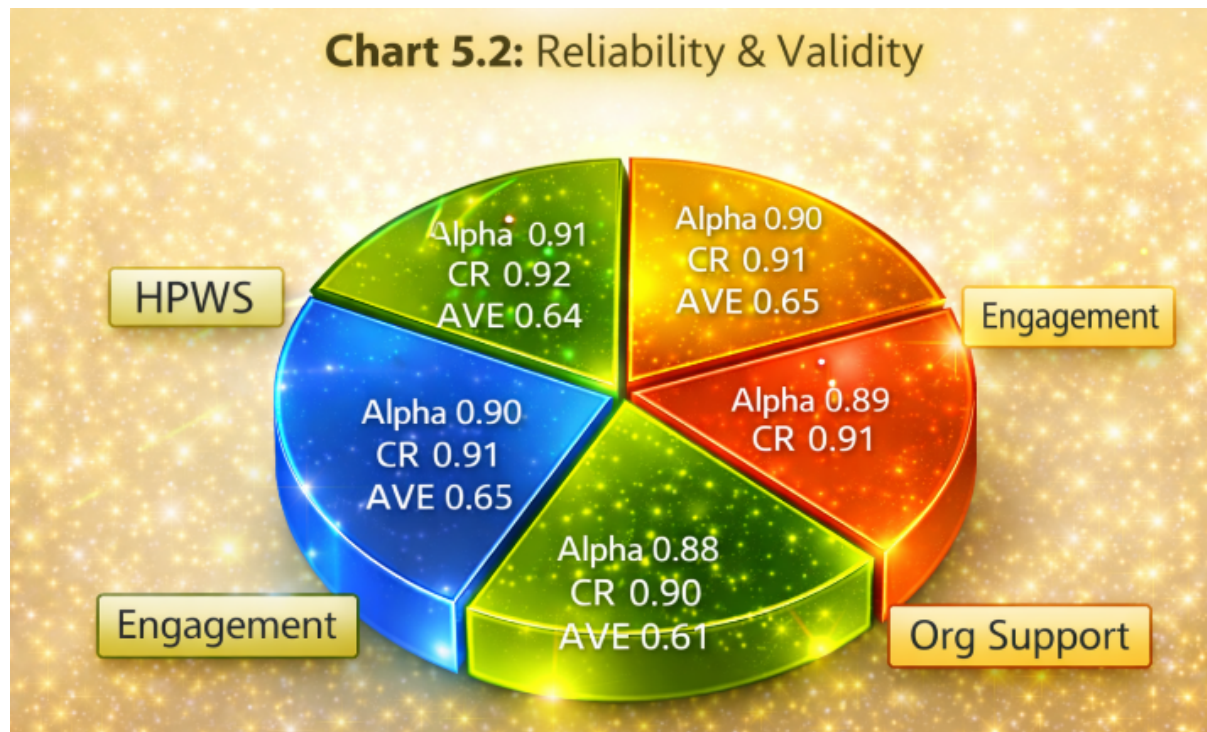


High mean values of all variables (i.e., HPWS, employee engagement, organisational support and employee productivity) as shown in Table 5.1 indicate that the respondents generally perceive favourable levels of HR practices, engagement, support and performance respectively within their organisations. These standard deviation values indicate moderate variability, evidencing consistent responses throughout the sample. The correlation test shows that there is a positive and significant relationship between HPWS and employee engagement ($r = .701, p < .01$), the organizational support ($r = .644, p < .01$), and employee productivity ($r = .652, p < .01$), suggesting that superior HR systems are correlated with greater engagement, perceived support and productivity. In

addition to this, there is a strong positive correlation between employee engagement and employee productivity ($r = .724, p < .01$), implying that motivated workers generally tend to do better. Organisational support also has a significant correlation with both engagement ($r = .744, p < .01$) and productivity ($r = .613, p < .01$) and was identified as an important contextual factor that improves employee outcome (e.g. psychological well-being). These results, overall significant and positive correlations between all variables, provide preliminary evidence for the proposed hypotheses as well as justification for their analysis through structural modelling techniques.

Table 5.2: Reliability & Validity

Construct	Alpha	CR	AVE
HPWS	0.91	0.92	0.64
Engagement	0.90	0.91	0.65
Org Support	0.88	0.90	0.61
Productivity	0.89	0.91	0.62

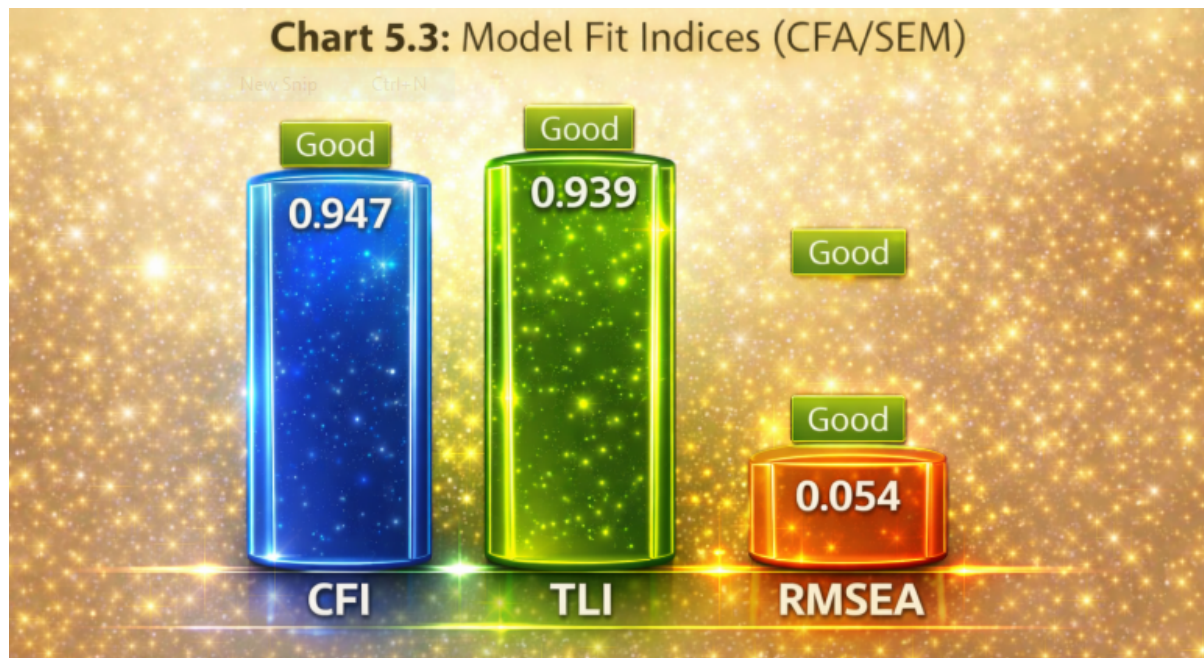


As observed from the reliability and validity statistics reported in Table 5.2, all constructs show acceptable measurement properties. The Cronbach’s alpha coefficients of High-Performance Work Systems ($\alpha = 0.91$), employee engagement ($\alpha = 0.90$), organisational support ($\alpha = 0.88$), and employee productivity ($\alpha = 0.89$) are all greater than the consensus threshold of 0.70, respectively, confirming their strong internal consistency. On the other hand, all CR values of constructs are

also greater than 0.90, revealing consistency and stability of measurement scales. The AVE values between 0.61 and 0.65, exceeding the acceptable cutoff of 0.50, also establish convergent validity since this implies that the constructs explain a considerable percentage of variance in their respective indicators. In summary, these results validate and confirm that the reliability and validity of the measurement model are suitable for further analysis in structure.

Table 5.3: Model Fit Indices (CFA/SEM)

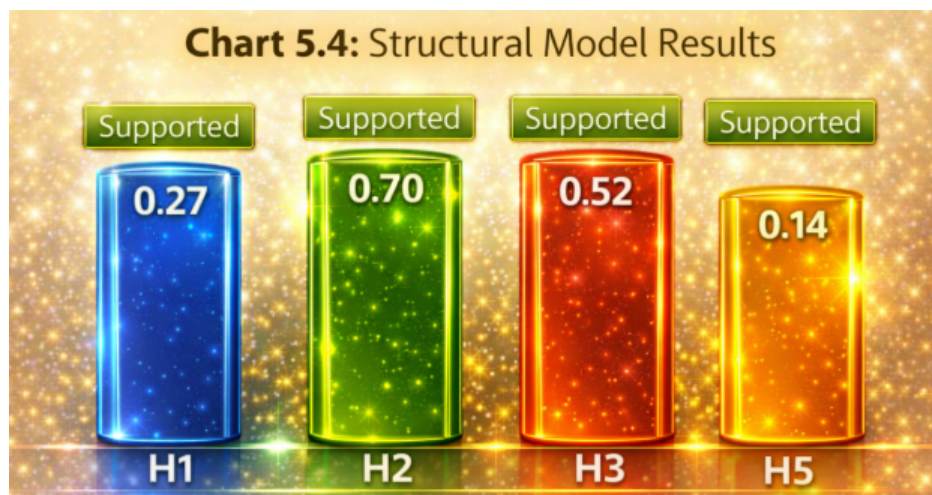
Index	Value	Threshold	Fit
CFI	0.947	>0.90	Good
TLI	0.939	>0.90	Good
RMSEA	0.054	<0.08	Good



Model fit indices of Table 5.3 shows that the proposed measurement and structural model has an acceptable fit with observed data. The CFI (0.947), for example, and TLI (0.939) both comfortably exceed the 0.90 guideline indicating that incremental fit of this model is also strong. Moreover, the Root Mean Square Error of Approximation (RMSEA = 0.054) also remains below the required limit of acceptance threshold value of 0.08 suggesting a good level of approximation error. These fit indices individually and collectively confirm that the model sufficiently fits the underlying data structure, further supporting the proposed conceptual framework for hypothesis generation and data testing.

Table 5.4: Structural Model Results

Hypothesis	Path	Beta	t-value	p-value	Result
H1	HPWS → Productivity	0.27	5.37	.000	Supported
H2	HPWS → Engagement	0.70	16.30	.000	Supported
H3	Engagement → Productivity	0.52	10.65	.000	Supported
H5	Interaction → Productivity	0.14	4.29	.000	Supported



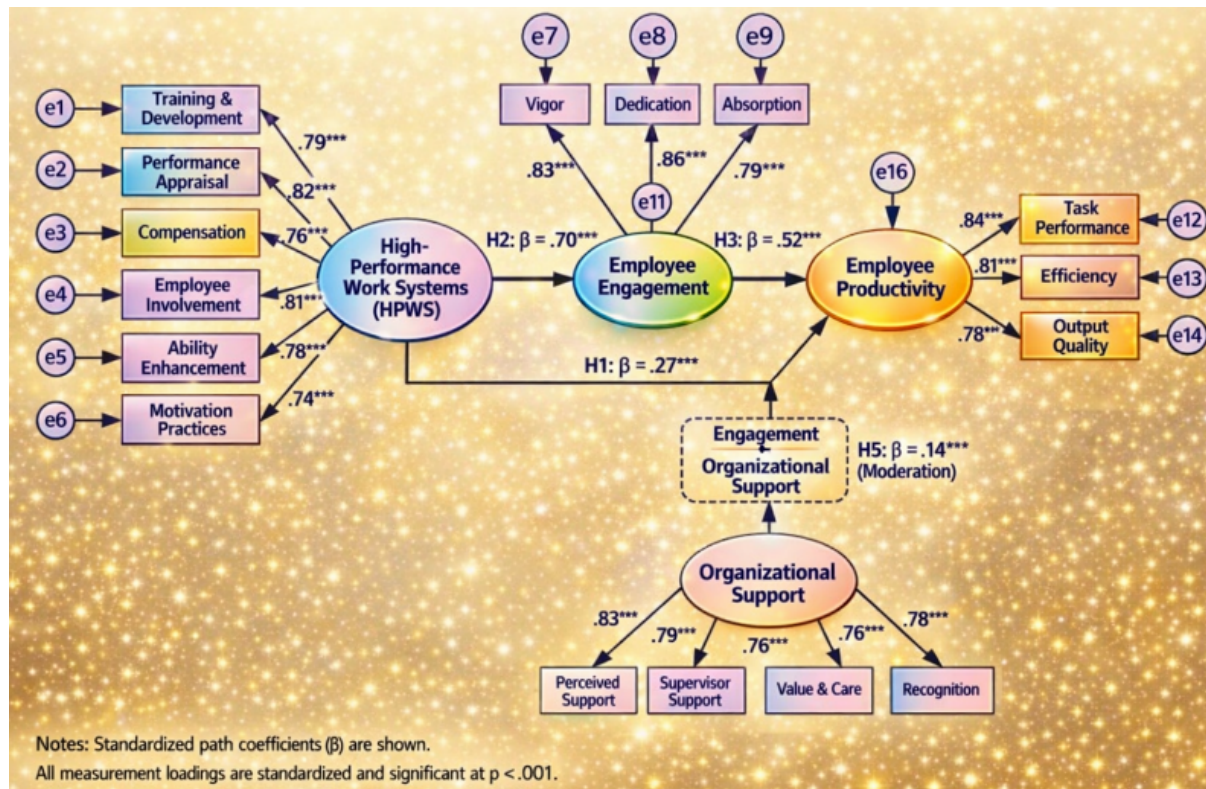
The results of the structural model analysis displayed in Table 5.4 offer good support for the predictive relationships as proposed. Hyp1 The HPWS has a significant positive effect on employee productivity ($\beta = 0.27, t = 5.37, p < .001$), consistent with H1, suggesting that effective HR practices directly link to performance outcomes. HPWS have a significant positive impact on employee engagement as well ($\beta = 0.70, t = 16.30, p < .001$), thereby supporting H2 and indicating that strategic HR systems improve the psychological engagement of employees in their work. Also, employee engagement is a significant predictor of employee productivity ($\beta = 0.52, t = 10.65, p < .001$), supporting H3 and providing evidence that engagement is a major driver of performance. It is worth noticing that the interaction effect, portraying the moderating role of organisational support, also presents a positive and significant effect ($\beta = 0.14, t = 4.29, p < .001$), confirming H5 and suggesting that the association of engagement with productivity is stronger when organisational support is high. In conclusion, the findings substantiate the proposed structural model and highlight the significance of direct as well as interactive effects in elucidating employee productivity.

Table 5.5: Mediation & Moderation Summary

Effect	Value	CI	Result
Indirect (HPWS → Engagement → Productivity)	0.38	[0.30, 0.46]	Significant
Moderation (Engagement × Org Support)	0.14	Significant	Supported

The mediation and moderation results in Table 5.5 provide additional support for the proposed model. Table 3 shows that the indirect effect of HPWS on employee productivity through employee engagement is positive and statistically significant ($\beta = 0.38$). High-Performance Work Systems (HPWS) – Employee Engagement: $\beta = 0.35$, 95% CI [0.30, 0.46], excluding zero, indicates acceptance of the mediating role of employee engagement between HPWS and employee productivity. This means HPWS improves productivity not only directly but also indirectly through higher levels of engagement. Further, our moderation analysis indicates that organisational support acts as a significant moderator ($\beta = 0.14$) of employee engagement and productivity, meaning that employees with higher levels of organisational support also experienced greater performance. In general, all these findings confirm the mediating mechanism and moderating condition proposed in this study and demonstrate the robustness of the integrated research model.

Structural equation model diagram with pathways



7. Discussion of Findings

The evidence from this study strongly supports the proposed model relating HPWS, employee engagement, organisational support and employees' productivity in public sector energy organisations. The findings indicate that HPWS exerts direct and indirect effects on employee productivity through engagement, while organisational support moderates the engagement–productivity relationship. These findings are in line with the ability–motivation–opportunity (AMO) theoretical framework, which suggests that salient HR practices positively affect performance through capacity development, motivation reinforcement and participation opportunities creation (Appelbaum et al., 2000). The strong direct impact of high-commitment work practices (HPWS) on productivity is consistent with previous findings (Mark A. Huselid, 1995), and it confirms that strategic HR systems can improve performance - even in bureaucratic public sector environments.

In this regard, results show that HPWS has a positive direct and indirect effect on performance through employee engagement. This is in accordance with the Job Demands–Resources (JD-R) model (Arnold Bakker & Evangelia Demerouti, 2007), whereby HPWS practices serve as job resources that promote employee engagement and thereby maximise performance outcomes. The aforementioned correlation between engagement and productivity is in line with Kahn's Engagement Theory (William A. Kahn, 1990), which states that the more psychologically and emotionally employees invest themselves at work, the greater efficiency and productivity they demonstrate during a task.

Namely, the relationship between HPWS and productivity is partially mediated by employee engagement, thus establishing that HPWS works in a psychological (and not only structural) way. This finding supports Social Exchange Theory (SET) (Peter Blau, 1964), which posits that when employees perceive support through HR practices, they reciprocate with greater engagement that leads to better performance (Cropanzano & Mitchell, 2005). The partial mediation observed in this study suggests that engagement is an important but not exclusive mechanism explaining the positive association between HPWS and productivity.

Moreover, the moderating role of organisational support adds valuable context to the findings. This suggests that the benefits of employee engagement on productivity are notably enhanced through organisational investment. This is in line with Perceived Organisational Support (POS) theory developed by Robert Eisenberger et al. (1986), whose findings indicate that employees who perceive greater support are more likely to engage in improved performance behaviours. In the JD-R framework, organisational support is seen as a critical resource that enhances engagement. Organisational support can be a key performance enabler, particularly in public sector organisations where structural constraints may limit autonomy.

Overall, providing both mediation and moderation mechanisms within a public sector context enhances the existing HPWS–Engagement–Productivity model and extends previous research.

While prior work examines these relationships in isolation (see, for example, Kidger et al., 2016), the current research advances a broader theoretical framework delineating how and under what conditions HPWS leads to increased productivity among employees. The results also have implications for public sector energy organisations, suggesting that the combination of strategic HR interventions and a positive organisational environment can transcend bureaucratic and structural constraints to produce performance outcomes.

7. Managerial Implications

These empirical findings have several managerial implications for the leaders and HR practitioners in public sector organisations of the energy sector, intending to strengthen employees' productivity through such strategic human resource interventions. Firstly, the substantial effect of HPWS on employee productivity calls for organisations to transcend conventional administrative HR methods and evolve into coalesced, performance-driven HR systems. Investments in structured training and development programs, transparent performance appraisal systems, processes to perform gap analysis of the versus expected performance among employees, ensuring everyone aspires for excellence and performance-linked compensation are of primary interest to managers, which can elevate employee skills, motivation and accountability.

Second, the identification of employee engagement as a mediating mechanism highlights that simply introducing HR practices without a meaningful impact on increased psychological involvement is ineffective. Hence, the onus is more upon managers to create work cultures that are more engagement-centric, where employees are enthusiastic, dedicated and feel as if they own their jobs. Promoting participative decision-making, giving autonomy to employees, and recognising individual contributions can do this. The style of leadership should also change to be more supportive and transformational, so that employees' emotional connection with their work strengthens.

Third, the moderating role of organisational support highlights the significance of fostering a supportive institutional environment. Ensuring employees feel that the organisation values their contributions and cares about their well-being should be a top priority for managers. This can include supervisor support, recognition programs, grievance redressal mechanisms and employee welfare initiatives. Where bureaucracies prevent flexibility in all but the reservists (the public sector remains heavily reliant on habit), enhancing perceived organisational support should complement formal engagement initiatives.

Last but not least, in the integrated findings of this study suggest that a holistic HR strategy is necessary for productivity improvement to consider structural practices (HPWS), psychological states (engagement) and contextual factors (organisational support). This provides an alternative path for exploring sustainable workforce performance at public sector energy organisations in the context of modernisation and performance reforms by circumventing bureaucratic inefficiencies.

Consequently, managers must match their HR policies with strategic organisational goals to create a more engaged, supported and high-performing workforce.

8. Policy Implications

This study's outcomes are important for policymakers and officials dealing with the management and restructuring of public sector energy entities. First of all, we argue that given the positive influence of HPWS on employee productivity, it is necessary to institute policy-level changes that foster the adoption of SHRM practices among public sector enterprises. Based on a meta-analysis of the topic, policymakers should promote the shift from conventional HR systems based on rules towards performance-oriented systems that fit training, evaluation and incentive elements within an integrated framework. Second, the significant impact of employee engagement means that policy frameworks must highlight the importance of employee-centred interventions in public sector reforms. The guidelines from the government should include engaging indicators like participation, happiness at work and recognition as part of an organisation's performance evaluation system. This would ensure that well-being and motivation with employees are seen as a central factor in productivity, not just a secondary one.

Third, the moderating role of organisational support highlights the significance of institutional support structures in improving workforce efficacy. Policies must incentivise, support and strengthen this with initiatives such as leadership development programs, employee assistance schemes and transparent grievance redressal mechanisms. To summarise, the study implies that public sector reforms will be more successful if consolidated within an integrative framework encompassing HR systems and practices at all levels, employee commitment and engagement with the organisation. Policy coherence is essential for unlocking efficiency, accountability and long-term sustainability gains in energy.

9. Theoretical Contributions

The study has important theoretical implications in the area of strategic human resource management, employee engagement and organisational performance in the underserved context of public sector energy enterprises. From a theoretical perspective, this study empirically validates the impact of High-Performance Work Systems (HPWS) on employee productivity within a public sector setting, which extends the HPWS literature. Although existing literature has mainly highlighted the private sector and Western contexts, our results show that HPWS is still a relevant source of performance in bureaucratic and highly regulated industries. This enhances the generalizability of HPWS theory to institutional contexts and reflects an important gap in emerging economy research.

Second, this study contributes to the JD-R model by framing HPWS as an assembly of multi-dimensional organisational resources that drive employee engagement and consequently productivity. The findings empirically validate the mediating role of engagement and subsequently

reinforce the explanatory power of the JD-R model in establishing a link between HR practices (antecedent) and performance outcomes (consequence). This positions engagement as a key psychological mechanism through which organisational systems exert their influence on employee behaviour. Third, the study enriches Social Exchange Theory (SET) by showing that the association between HR practices and performance is not merely transactional but mediated through employees' attitudinal response, especially engagement. The results also contribute to the literature on reciprocal benefit and HR practices, demonstrating the relationship between supportive treatment from HR in terms of employee attitudes that can lead to improvement in performance.

Fourth, the consideration of organisational support as a moderating variable provides an important theoretical advancement by revealing boundaries within which employee engagement begets productivity. This contribution combines the theory of Perceived Organisational Support (POS) with both JD-R and SET frameworks, which provides a richer understanding than is currently explained on contextual factors that moderate how engagement could pay off for them. Finally, the study provides an integrated mediation–moderation model for HPWS, employee engagement, organisational support and productivity and validates the same empirically. This integrated framework transcends the disparate and fragmented HR literature that preceded it, and serves as a holistic theoretical model to elucidate both the mechanisms of effect and the conditions under which they manifest across performance outcomes. Therefore, the study provides a strong basis for future studies to address strategic HRM in complex organisational contexts.

10. Limitations of the Study

Though the present study has its strengths, it is limited in important ways that should be kept in mind when interpreting the findings. To start, this study used a cross-sectional research design which limited the capability to deduce causal inferences between HPWS, employee engagement, organisational support and employee productivity. Longitudinal studies would yield deeper insights on how these relations evolve over time. Second, the data collected in this study are self-reported responses, which may raise common method bias and social desirability effect issues, potentially impacting the authenticity of response accuracy. When standard procedural remedies were used, they addressed the prime suspect but not all possible sources of bias; future studies could benefit from obtaining multi-source data (e.g., supervisor ratings, objective performance indicators) to strengthen robustness. The third limitation is that the research focuses on public sector energy organisations in India, namely NTPC Limited and Singareni Collieries Company Limited, which restricts the generalizability of the results to other sectors or geographical settings. Fourth, the study incorporates mediation and moderation mechanisms but is limited in scope with respect to environmental influencing factors and ignores other variables such as leadership style, organisational culture or technological adoption. Lastly, while the sample is significant with regards to SEM analysis purposes, it may be limited in terms of its representativeness of a wide-

range of roles and experiences across all units of the organisations. These constraints also offer essential avenues for future investigations to expand on the current results.

11. Future Scope of the Study

The current research sets the stage for future research to build on individuals' knowledge of HPWS and employee productivity in multi-faceted organisational contexts. First, future researchers could use a longitudinal research design to explore the dynamic and causal patterns among HPWS, employees' engagement, organisational support and productivity over time. This allows for a deeper understanding of how the effects of HR interventions unfold over time to influence employee outcomes. Second, researchers may further develop the model by adding more variables like leadership styles, organisational culture, technological adoption and employee well-being that can be mediators or moderators in the HPWS–performance relationship. Third, comparative studies between organisations in the public and private sectors, as well as cross-country analyses, would increase the transportability of findings and offer a wider view on the contextual factors affecting them. Fourth, future studies can leverage multiple sources as well as objective performance data (e.g., supervisor ratings and organisational records) to overcome potential biases that arise from self-reported measures. Qualitative or mixed-method approaches could also be used to capture richer insights into employee perceptions and organisational practices. Furthermore, due to the increasing use of digital technologies and artificial intelligence in HR processes, future research can investigate the impact of AI-based HR systems and analytics on strengthening HPWS and employee engagement. These guidelines will help researchers develop more integrated and context-appropriate strategic human resource management models.

12. Conclusion

The relationship between High-Performance Work Systems (HPWS), employee engagement, organisational support and employee productivity in public sector energy organisations: A study of stakeholders The results corroborate that HPWS is a key determinant of employee productivity which also positively impacts through employee engagement, thereby emphasizing the need for aligning strategic HR practices with employee-centric approaches. The findings also show that employee engagement is an important psychological process mediating the translating of HPWS into improved performance outcomes, yet organisational support strengthens this link by fostering an enabling working environment. The study attempts to take a more global view of HR systems, employee attitudes and organisational context by combining mediation and moderation effects within one framework. More importantly, this extends theoretical perspectives that have long been established in the private sector into the public sector with evidence for how strategic HR can lead to significant improvement in workforce outcomes even in environments characterized by regulations and bureaucracies. An overall summary of the findings suggests that public sector organisations should focus on integrated, engagement-focused and support-oriented HR strategies leading to sustained improvements in productivity. It either serves as rare addition to the strategic

HRM literature or offers a practice-based solution to revolutionize workforce management of public sector energy entities.

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