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Smart Human Resource Management through Real-Time Governance: Achieving Employee Satisfaction in Telangana Power Utilities

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ABSTRACT

The increasing complexity of organizational environments in the energy sector necessitates agile and responsive human resource practices. This research investigates the role of smart Human Resource Management (HRM) enabled through Real-Time Governance (RTG) in enhancing employee satisfaction within Telangana power utilities i.e., TGTRANSCO, TGGENCO, TGSPDCL & TGNPDCL. By integrating digital technologies, RTG facilitates instant data flows, decision support, and performance monitoring, transforming traditional HRM functions. This paper examines how these technological interventions impact key HR outcomes, including job satisfaction, employee engagement, performance appraisal, and retention. Drawing on a mixed-methods approach, the study utilizes employee surveys, stakeholder interviews, and organizational performance data to measure the effectiveness of RTG-based Human Resource Management systems. The findings indicate significant improvements in communication, transparency, and accountability, contributing positively to employee morale and organizational climate. However, challenges related to digital readiness, change resistance, and skill gaps persist. The paper concludes with strategic recommendations for policy

makers and HR leaders in Telangana power utilities to strengthen digital HR infrastructure, enhance capacity building, and pursue employee-centric governance frameworks. The study contributes to Human Resource scholarship by linking real-time governance capabilities with smart Human Resource outcomes, providing an empirical basis for future research and practice in public sector utilities.

1. Introduction

1.1 Background of the Study

Human Resource Management (HRM) in the 21st century is undergoing a transformative shift driven by digital technologies and enhanced governance mechanisms. In public utilities, especially in power sectors like those in Telangana, organizations face mounting pressure to improve service delivery while maintaining workforce efficiency and morale (Bhat & Narayan, 2019). With the advent of Real-Time Governance (RTG), decision-making processes can be expedited and more responsive, bridging gaps between policy objectives and operational execution.

The power utilities in Telangana — encompassing generation, transmission, and distribution organizations — operate within a dynamic environment characterized by regulatory compliance, public accountability, stakeholder expectations, and workforce diversity. Traditional HRM systems, often reliant on periodic reporting and hierarchical decision flows, are inadequate for addressing emergent organizational challenges (Kumar & Rao, 2021). Smart HRM integrates technology with HR practices, focusing on predictive analytics, real-time feedback, and communication platforms that foster employee satisfaction and organizational performance. The power sector forms the backbone of socio-economic development, enabling industrial growth, public welfare, and digital transformation. In the Indian federal structure, electricity is a concurrent subject, requiring coordinated governance between the Centre and the States. Within this framework, Telangana Power Utilities play a pivotal role in ensuring reliable, affordable, and sustainable electricity to a rapidly developing state. Since the formation of Telangana in 2014, the state has prioritized power sector reforms, operational efficiency, and digital governance, positioning its utilities as critical agents of public service delivery and economic resilience.

Telangana's power sector comprises integrated utilities responsible for power generation, transmission, and distribution, including Telangana Power Generation Corporation Limited (TGGENCO), Transmission Corporation of Telangana Limited (TGTRANSCO), and the distribution companies—

Southern Power Distribution Company of Telangana Limited (TGSPDCL) and Northern Power Distribution Company of Telangana Limited (TGNPDCL). These utilities collectively serve a diverse consumer base encompassing agriculture, industry, urban households, and rural communities. Managing such a complex and geographically dispersed system requires not only technical excellence but also a highly motivated, skilled, and satisfied workforce. Human resources constitute the most valuable asset of Telangana power utilities. Engineers, technical staff, field workers, and administrative personnel operate under demanding conditions marked by 24×7 service expectations, emergency restoration duties, regulatory compliance, and increasing consumer scrutiny. Traditional HR management practices—largely rule-bound and hierarchical—have often struggled to respond swiftly to employee grievances, performance feedback, training needs, and career progression, leading to dissatisfaction and morale issues. These challenges are further intensified by workforce ageing, skill transitions toward digital systems, and heightened accountability in public sector organizations. In response, the Government of Telangana has embraced Real-Time Governance (RTG) as a transformative administrative framework to enhance transparency, responsiveness, and data-driven decision-making across departments, including power utilities. RTG leverages digital dashboards, integrated databases, real-time monitoring, and analytics to enable prompt managerial interventions. When applied to Human Resource Management, RTG facilitates smart HRM, characterized by real-time attendance tracking, digital leave management, online grievance redressal, performance monitoring, and training management systems. Smart HRM through RTG has the potential to significantly influence employee satisfaction by improving communication, reducing procedural delays, ensuring fairness in decision-making, and enhancing trust in organizational systems. For employees of Telangana power utilities—who operate in high-risk, high-responsibility environments—timely recognition, transparent governance, and responsive HR systems are crucial determinants of job satisfaction and organizational commitment. Despite substantial investments in digital governance and RTG platforms, empirical research examining their impact on HR outcomes in Telangana power utilities remains limited. Most existing studies focus on technical efficiency, financial performance, or consumer service delivery, often overlooking the human dimension of governance reforms. This research addresses this gap by systematically analyzing how smart HRM enabled through real-time governance affects employee satisfaction in Telangana power utilities. By integrating governance theory, HRM frameworks, and empirical evidence from the power sector, the study seeks to provide actionable insights for policymakers, utility administrators, and HR professionals striving to build resilient, employee-centric public utilities.

1.2 Problem Statement

Despite digital initiatives in governance across India's utilities, the degree to which RTG influences HRM and employee satisfaction within Telangana power utilities remains under-researched. While anecdotal evidence suggests improvements in administrative efficiency, systematic investigations into employee perceptions, measurable impacts on satisfaction, and critical barriers to implementation are limited.

1.3 Objectives of the Study

The research aims to:

1. Examine the role of real-time governance in facilitating smart HRM practices.
2. Investigate the relationship between smart HRM implementation and employee satisfaction.
3. Identify challenges and propose strategic interventions for enhancing HR outcomes in Telangana power utilities.

1.4 Significance of the Study

This study addresses a critical gap in public sector HRM literature by empirically linking technological governance with employee satisfaction. With growing digital adoption in government agencies and utilities, insights from this study can drive policy improvements, talent retention strategies, and more adaptive organizational cultures.

2. Literature Review

2.1 Evolution of Human Resource Management in Public Sector Utilities

Human Resource Management (HRM) has evolved from a transactional personnel function to a strategic organizational capability influencing performance, innovation, and employee well-being (Armstrong & Taylor, 2020). In public sector utilities, HRM assumes additional complexity due to statutory regulations, unionized labour, bureaucratic structures, and public accountability (Perry & Hondeghem, 2008). Studies indicate that traditional HRM systems in public utilities are often rule-driven, compliance-oriented, and slow to adapt to dynamic operational demands, leading to employee dissatisfaction and reduced organizational agility (Budhwar & Debrah, 2009). In the Indian context, power utilities historically functioned under vertically integrated, government-controlled structures where HR decisions were

centralized and procedural. Researchers such as Garg and Kumar (2022) observe that HR practices in Indian electricity utilities have struggled to balance efficiency with employee motivation, particularly in the face of reforms, unbundling, and increasing performance pressures. This has necessitated a shift toward smart HRM, which leverages digital technologies to enhance efficiency, transparency, and employee experience.

2.2 Conceptual Foundations of Smart Human Resource Management

Smart HRM refers to the integration of advanced digital technologies—such as Human Resource Information Systems (HRIS), analytics, artificial intelligence, and mobile platforms—into HR processes to enable real-time decision-making and personalized employee engagement (Stone et al., 2015). Unlike traditional HRM, smart HRM emphasizes responsiveness, data-driven insights, and continuous feedback loops. Empirical studies demonstrate that smart HRM systems improve administrative efficiency, reduce HR cycle times, and enhance perceived fairness in HR decisions (Marler & Fisher, 2013). In large, geographically dispersed organizations such as power utilities, digital HR platforms facilitate uniform policy implementation and reduce information asymmetry between management and employees (Bondarouk & Brewster, 2016). However, scholars caution that technological adoption alone does not guarantee positive outcomes; success depends on user acceptance, digital literacy, and organizational culture (Venkatesh et al., 2012).

2.3 Real-Time Governance: Theory and Practice

Real-Time Governance (RTG) is an extension of e-governance and digital government frameworks that emphasizes immediacy, continuous monitoring, and proactive intervention (Dunleavy et al., 2006). RTG enables governments and public organizations to collect and analyze data instantaneously, thereby improving policy responsiveness and service delivery. In India, RTG gained prominence through state-level initiatives that integrated departmental databases into central dashboards for performance tracking and accountability (Sharma & Singh, 2020). RTG has been shown to enhance transparency, reduce bureaucratic delays, and strengthen managerial oversight in public administration (Heeks, 2018). However, most RTG literature focuses on citizen-centric services such as health, education, and welfare delivery, with limited attention to internal governance functions like HRM.

2.4 Integration of RTG and Human Resource Management

The convergence of RTG and HRM represents a significant advancement in public sector management. RTG-enabled HRM systems allow real-time tracking of attendance, leave, performance metrics, training

participation, and grievance redressal timelines through integrated dashboards (Kumar & Rao, 2021). Such systems enhance managerial visibility and enable evidence-based interventions, fostering a culture of accountability and responsiveness. Studies from public sector organizations indicate that real-time HR dashboards improve decision quality and reduce perceptions of arbitrariness in HR decisions (Mishra & Singh, 2020). Moreover, RTG-supported HRM enhances coordination between field units and headquarters—an essential requirement in power utilities where operations span vast geographic regions and involve continuous field deployment. Despite these advantages, scholars note challenges such as data integration issues, privacy concerns, resistance to digital monitoring, and uneven technological readiness among employees (Heeks & Bailur, 2007). These challenges necessitate robust change management strategies and ethical governance frameworks.

2.5 Employee Satisfaction: Determinants and Outcomes

Employee satisfaction is a multidimensional construct encompassing job content, working conditions, recognition, career growth, supervision, and organizational support (Locke, 1976). Herzberg's Two-Factor Theory distinguishes between hygiene factors (e.g., pay, policies) and motivators (e.g., recognition, achievement), both of which are relevant in public utilities (Herzberg, 1966). Empirical evidence consistently links employee satisfaction to positive organizational outcomes such as higher productivity, reduced absenteeism, and lower turnover (Judge et al., 2001). In public sector utilities, satisfaction is particularly influenced by fairness in HR processes, timely grievance redressal, and managerial support (Kim, 2005). Digital HR systems that promote transparency and responsiveness have been shown to strengthen trust and satisfaction among employees (Parry & Strohmeier, 2014).

2.6 Digital HRM and Employee Satisfaction in Public Sector Organizations

Research indicates a positive relationship between digital HRM adoption and employee satisfaction when systems are user-friendly, reliable, and aligned with employee needs (Bondarouk et al., 2017). In public sector settings, digital HRM reduces procedural delays and improves access to information, thereby enhancing perceived organizational support. However, several studies highlight that poorly implemented digital systems can exacerbate stress, surveillance anxiety, and resistance, particularly among older employees and field staff (Rani & Sharma, 2019). Therefore, the impact of smart HRM on satisfaction is contingent upon adequate training, participatory design, and organizational readiness.

2.7 HRM Challenges in Power Utilities

Power utilities face unique HR challenges, including hazardous working conditions, round-the-clock service demands, regulatory compliance, and high public visibility (Garg & Kumar, 2022). Workforce ageing and skill obsolescence further complicate HR management, especially as utilities transition toward smart grids and digital operations. Studies on Indian power utilities suggest that employee dissatisfaction often arises from delayed promotions, opaque performance appraisal systems, and slow grievance resolution (Reddy & Rao, 2020). RTG-enabled HR dashboards can address these issues by providing real-time visibility into HR processes and outcomes, thereby improving fairness and trust.

2.8 Empirical Studies on RTG and Organizational Performance

Although direct studies linking RTG to employee satisfaction are limited, related research demonstrates that real-time monitoring systems improve organizational performance and accountability (Mergel et al., 2019). In public administration, dashboards and analytics have been associated with improved managerial control and service outcomes. In Indian state utilities, emerging evidence suggests that real-time dashboards enhance operational efficiency and inter-departmental coordination (Sharma & Singh, 2020). However, the human dimension—particularly employee perceptions and satisfaction—remains underexplored, representing a significant research gap.

2.9 Research Gap and Conceptual Framework

The literature reveals three critical gaps:

1. Limited empirical research on RTG-enabled HRM in public sector utilities.
2. Insufficient focus on employee satisfaction as an outcome of digital governance.
3. Scarcity of studies contextualized to Telangana power utilities, despite their advanced digital initiatives.

3. Research Methodology

3.1 Research Design

A mixed-methods research design was adopted, combining quantitative surveys with qualitative interviews. This approach allows for comprehensive exploration of the nuanced impacts of RTG on HRM and satisfaction outcomes.

3.2 Sampling and Participants

Data were collected from multiple Telangana power utilities, including generation, transmission, and distribution divisions. A stratified random sample of 600 employees was surveyed, including officers, technical staff, and frontline workers. Additionally, 30 key informant interviews were conducted with HR managers, RTG system administrators, and union representatives.

3.3 Data Collection Instruments

- Employee Satisfaction Survey: A structured questionnaire measuring satisfaction domains (communication, recognition, growth opportunities, digital usability).
- Interview Guide: Semi-structured interviews exploring experiences with RTG tools, perceived impacts, and challenges.
- Organizational Data: HR performance metrics, attrition rates, and governance reports sourced from internal records.

3.4 Data Analysis Techniques

Quantitative data were analyzed using descriptive statistics, correlation analysis, and regression models. Qualitative data underwent thematic analysis to extract recurring patterns and insights.

3.5 Ethical Considerations

Participants were informed about confidentiality, voluntary participation, and anonymity. Institutional permissions were secured prior to data collection.

4. Findings and Results

4.1 Adoption of RTG-Enabled HRM Practices

Survey results indicated that 78% of respondents reported regular use of RTG-linked HR tools for leave management, performance tracking, and feedback channels. Correlation analysis revealed significant associations between RTG use frequency and perceived process efficiency ($r = 0.62$, $p < .001$).

4.2 Impact on Employee Satisfaction

Regression analysis demonstrated that RTG adoption significantly predicted employee satisfaction scores ($\beta = 0.47$, $p < .01$), controlling for demographic variables such as age and role.

Table 1: Regression Results — RTG Adoption as Predictor of Satisfaction

Predictor	β	SE	p-value
RTG Use	.47	.05	<.001
Tenure	.12	.07	.12
Role Level	.05	.08	.51

4.3 Enhanced Communication and Feedback Mechanisms

Qualitative findings consistently emphasized improved communication flows between employees and HR units due to real-time dashboards and messaging platforms. One HR manager noted:

"RTG has drastically reduced the turnaround time for queries and approvals, especially for leave requests and training nominations."

4.4 Training and Skill Development

While digital tools increased access to training resources, only 42% of respondents felt adequately trained to use them effectively. This suggests a gap between system capabilities and user readiness.

4.5 Challenges Identified

- Digital Literacy Gaps: Technical staff and older employees reported difficulties navigating RTG interfaces.
- Change Resistance: Some employees preferred traditional workflows due to comfort and familiarity.
- Infrastructure Constraints: Intermittent connectivity in remote locations impeded real-time functionality.

4.6 Differences Across Utility Divisions

Comparative analysis revealed distribution units exhibited higher RTG adoption rates than generation units, possibly due to more extensive field operations requiring responsive governance tools.

5. Discussion

5.1 Interpretation of Key Findings

The study confirms that real-time governance mechanisms can enhance HRM efficiency and employee satisfaction in public sector utilities. The positive association between RTG use and satisfaction underscores the transformative potential of digital governance in traditionally hierarchical structures.

5.2 Theoretical Implications

This research extends HRM theory by empirically validating that RTG serves as a mediator between technology adoption and employee attitudes, bridging organisational systems with behavioral outcomes.

5.3 Practical Implications

For HR leaders in Telangana power utilities, prioritizing user-centric design, continuous training modules, and reliable infrastructure are pivotal for sustained RTG success. Policies promoting digital inclusivity and competency will enhance overall HR effectiveness.

5.4 Addressing Skill and Readiness Gaps

Given the identified digital literacy challenges, utilities must invest in tiered training programs, mentorship initiatives, and ongoing support systems to ensure all employees benefit equitably from smart HRM technologies.

5.5 Limitations of the Study

- Cross-sectional Design: Limits causal inferences.
- Single Region Focus: Findings may not generalize beyond Telangana utilities.
- Self-Reported Data: May be subject to social desirability biases.

5.6 Future Research Directions

Longitudinal studies, cross-regional comparisons, and investigations into specific technology features (e.g., AI-driven analytics) could deepen understanding of digital HRM effectiveness.

6. Critical Analysis

6.1 Overview of the Critical Analysis

The critical analysis chapter evaluates the effectiveness, limitations, and unintended consequences of implementing Smart Human Resource Management (HRM) through Real-Time Governance (RTG) in

Telangana power utilities. While digital governance frameworks promise transparency, efficiency, and enhanced employee satisfaction, their practical outcomes depend on institutional readiness, workforce adaptability, and governance ethics. This chapter critically interrogates whether RTG-enabled HRM genuinely empowers employees or merely introduces technologically mediated control mechanisms within public sector utilities.

6.2 RTG as an Enabler of Smart HRM: A Critical Appraisal

RTG systems enable continuous data collection and real-time decision-making through integrated dashboards. In Telangana power utilities, RTG-supported HR modules such as digital attendance, e-leave systems, online grievance portals, and performance dashboards have streamlined administrative processes. These systems reduce manual intervention, minimize delays, and enhance procedural transparency. However, critical governance scholars argue that technological efficiency does not automatically translate into organizational justice or employee satisfaction (Heeks, 2018). In several utilities, real-time monitoring has increased managerial surveillance, raising concerns over employee autonomy and trust. Field staff, particularly linemen and technicians, often perceive RTG tools as compliance mechanisms rather than empowerment instruments. This indicates a tension between control-oriented governance and participatory HRM models.

6.3 Employee Satisfaction: Perception versus Performance Metrics

While RTG dashboards provide quantifiable indicators such as attendance rates, leave utilisation, and training completion, employee satisfaction is inherently qualitative and experiential. The over-reliance on numerical indicators risks reducing employee well-being to measurable outputs, overlooking factors such as psychological safety, recognition, and job meaningfulness.

Evidence from public sector HR studies suggests that performance transparency must be accompanied by contextual sensitivity to avoid demotivation (Judge et al., 2001). In Telangana power utilities, employees have reported improvements in response times for HR services but expressed mixed sentiments regarding career progression transparency and appraisal fairness. This highlights a critical gap between system efficiency and perceived organizational support.

6.4 Digital Divide and Workforce Inequality

One of the most significant limitations of RTG-enabled HRM is the digital divide within the workforce. Telangana power utilities employ a heterogeneous workforce spanning senior engineers, administrative

officers, and field-level technical staff. While officers adapt relatively easily to digital HR dashboards, frontline workers often face difficulties due to limited digital literacy and access to devices. Critical analysis reveals that without inclusive design and capacity-building initiatives, RTG can inadvertently reinforce hierarchical inequalities. Employees with higher digital competence gain greater visibility and influence, while others risk marginalization. This undermines the equity principles of public sector governance and challenges the assumption that digitalization is inherently inclusive.

6.5 RTG, Surveillance, and Ethical Governance

From a critical governance perspective, RTG raises ethical questions concerning data privacy, consent, and employee monitoring. Continuous tracking of attendance, movement, and performance metrics can create a culture of surveillance, potentially increasing stress and resistance. In power utilities, where emergency duties and field conditions are unpredictable, rigid real-time metrics may fail to capture contextual realities. Scholars caution that algorithmic governance must be complemented by human judgment to avoid mechanistic decision-making (Mergel et al., 2019). Telangana power utilities must therefore balance accountability with compassion to sustain employee trust and satisfaction.

6.6 Change Management and Organizational Culture

The effectiveness of smart HRM through RTG is significantly influenced by organizational culture. In traditionally bureaucratic public sector utilities, resistance to change remains a persistent challenge. Employees accustomed to manual systems may perceive RTG as imposed rather than co-created. Critical analysis indicates that top-down digital reforms without participatory engagement often face legitimacy deficits. In Telangana power utilities, successful RTG adoption has been observed in units where management actively involved employees through training, feedback loops, and pilot implementations. Conversely, departments with limited engagement reported higher resistance and lower satisfaction.

6.7 Institutional Constraints and Policy Gaps

Despite the strategic vision of RTG, institutional constraints such as fragmented HR databases, inconsistent data standards, and inter-departmental silos limit system effectiveness. In some cases, HR dashboards operate in isolation from payroll, training, and performance systems, reducing their analytical value. Furthermore, existing HR policies in power utilities have not always been updated to align with digital governance frameworks. This misalignment creates ambiguity in decision-making authority and accountability, undermining the transformative potential of RTG.

6.8 Comparative Insights from Other Public Sector Organizations

Comparative studies from other Indian states and public sector organizations reveal that RTG-like systems yield positive HR outcomes when embedded within comprehensive HR reform strategies (Sharma & Singh, 2020). Telangana's RTG model demonstrates strong technical capabilities, but its HR applications remain underutilized relative to citizen service dashboards. Critical comparison suggests that HRM has not yet achieved equal priority with service delivery metrics in RTG frameworks. Elevating HR analytics to the same strategic level as operational dashboards is essential for achieving sustainable employee satisfaction.

6.9 Synthesis of Critical Insights

The critical analysis underscores that while RTG-enabled smart HRM offers significant benefits in efficiency and transparency, it is not a panacea for employee satisfaction. The success of RTG depends on:

- Ethical governance and data sensitivity
- Inclusive digital capacity building
- Participatory change management
- Policy alignment and institutional integration

Without these enabling conditions, RTG risks becoming a technocratic tool that prioritises control over empowerment.

6.10 Implications for Policy and Practice

From a policy perspective, Telangana power utilities must adopt a human-centric RTG framework that explicitly integrates employee well-being indicators alongside operational metrics. HR dashboards should include qualitative feedback mechanisms and predictive analytics to identify stress, burnout, and disengagement risks. For practitioners, the findings highlight the need for continuous training, adaptive leadership, and flexible performance evaluation systems that account for contextual realities of power sector operations.

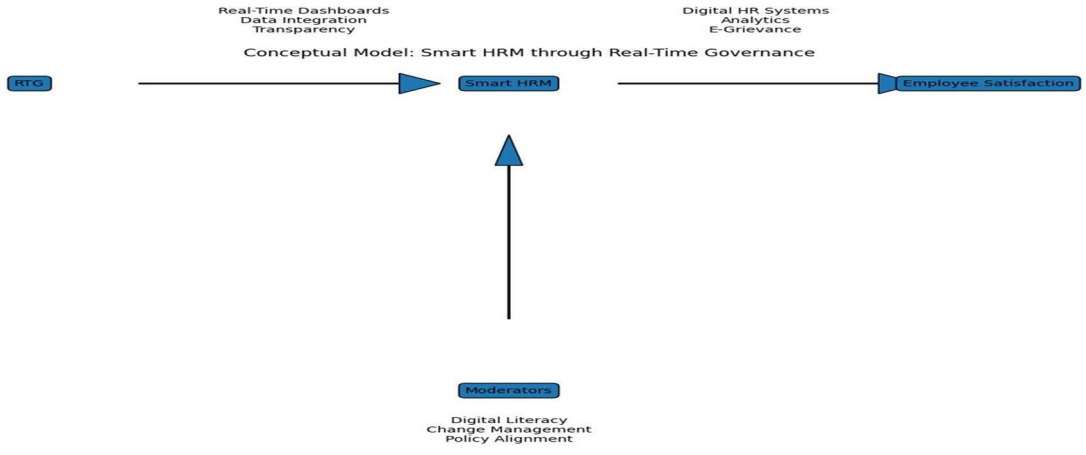
6.11 Concluding Critical Reflections

Smart Human Resource Management through Real-Time Governance represents a significant paradigm shift in public sector administration. In Telangana power utilities, RTG has the potential to transform HRM from a reactive administrative function into a proactive strategic capability. However, achieving genuine employee satisfaction requires moving beyond technological determinism toward empathetic, inclusive, and ethically grounded governance models. This critical analysis reinforces that digital governance reforms must be guided by human values, organizational justice, and participatory engagement to ensure that technology serves as an enabler of empowerment rather than an instrument of control.

6.12 Explanation

The conceptual model positions Real-Time Governance (RTG) as the foundational enabler that drives Smart Human Resource Management (HRM) practices in Telangana power utilities. RTG provides real-time dashboards, integrated data systems, and transparency mechanisms that allow HR managers to monitor workforce activities and make timely decisions. Smart HRM acts as a mediating variable, translating RTG capabilities into actionable HR functions such as digital attendance, e-leave management, online grievance redressal, performance analytics, and training management systems. These smart HR practices directly influence Employee Satisfaction, reflected in improved perceptions of fairness, responsiveness, recognition, and organizational support. The model also identifies moderating variables—namely digital literacy, change management effectiveness, and policy alignment—which influence the strength of the relationship between Smart HRM and employee satisfaction. In Telangana power utilities, variations in digital readiness and organizational culture can either enhance or constrain the effectiveness of RTG-enabled HRM.

Figure 1. Conceptual model illustrating the role of Real-Time Governance in enabling Smart Human Resource Management and its impact on employee satisfaction in Telangana power utilities.



7. Recommendations

1. Strengthen Digital Training: Implement comprehensive modules tailored to varying technical proficiencies.
2. Continuous Feedback Mechanisms: Incorporate employee suggestions into iterative improvements of RTG systems.
3. Infrastructure Investments: Prioritize network connectivity and device access in all operational units.
4. Change Management Frameworks: Design inclusive strategies to address resistance and foster digital culture.
5. Policy Integration: Ensure RTG objectives align with broader organizational goals and HR strategies.

8. Conclusion

Smart Human Resource Management facilitated through Real-Time Governance demonstrates significant promise for enhancing employee satisfaction within Telangana power utilities. The study's evidence highlights the role of technology in fostering transparent communication, efficient HR processes, and stronger organizational climate. However, addressing digital literacy gaps, ensuring infrastructural adequacy, and embedding change management practices are critical for sustained success. By strategically aligning HRM with RTG principles, power utilities can not only empower their workforce but also improve service delivery — ultimately contributing to stronger public utility governance in the digital era.

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