International Journal for Novel Research in Economics , Finance and Management
www.ijnrefm.com
ISSN:3048-7722
Volume 4, Issue 5, Sep-Oct-2026, PP: 01-9

Impact of Hr Analytics on Organizational Performance: A Study of Central Coalfields Limited (CCL), Ranchi

Sonal Kujur, Anudeep Barwa, Rohan Praveen Beck, Amar Prem Kujur, Navneet Nishant Nag, Dr. Jyoti Ignus Tete
Department of Commerce
St. Xavier's College, Ranchi

***Abstract* – In today's dynamic business environment, HR Analytics has become a key element in any organization and they are increasingly adopting it to improve their organization's effectiveness as well as performance. HRA helps organizations to make better decisions based on data related to employees in areas like recruitment, selection, training, performance appraisal, etc. This study, "Impact of HRA on Organizational Performance – A Study on CCL Ranchi," focuses on understanding the impact of HRA and how it influences the performance of CCL as an organization. The main focus revolves around the role of HRA in improving employee productivity, efficiency, training needs and effectiveness, decision-making process, and workforce planning in the organization. It also attempts to identify various challenges faced by CCL while adopting HRA effectively. The research relies on an extensive review of literature that aims to provide evidence for the impact of HRA on OP. Through a quantitative approach, primary data has been collected through a structured questionnaire and interactions with various employees and HR officials of CCL, Ranchi. The findings are expected to demonstrate how HRA enhances OP by assisting management in making more precise, data-driven HR decisions, and may also help CCL, Ranchi in better adopting and improving its HR practices. Overall, this study emphasizes the growing importance of HRA in modern organizations and how it contributes to their performance, organizational growth, and effectiveness.**

***Keywords* - HR Analytics, Organizational Performance, Employee Behaviour, Decision Making, Central Coalfields Limited.**

I. INTRODUCTION

1. Background of the study

HR Analytics (HRA), also referred to as People Analytics or Talent Analytics, is the process of examining HR-related data using statistical tools, methods, and technologies to gain insights and support strategic decision-making. It encompasses areas such as improving employee performance, increasing retention, reducing turnover, and enhancing workforce planning. HRA combines skills, technologies, and analytical practices to help organizations move from intuition-based decisions to data-driven ones.

Organizational Performance (OP) refers to how effectively an organization achieves its goals and objectives. HRA directly influences OP by improving recruitment and selection quality, boosting employee productivity, reducing costs, and strengthening management's decision-making ability.

Central Coalfields Limited (CCL), headquartered at Darbhanga House, Ranchi, Jharkhand, is a subsidiary of Coal India Limited (CIL) and has held Mini Ratna Category-I status since October 2007. Originally established as the National Coal Development Corporation (NCDCL) in 1956, CCL today operates exclusively in Jharkhand and recorded its highest-ever coal production of 86.054 million tonnes in 2023–24. Given its large and diverse workforce, CCL uses HRA to improve employee performance, identify training needs, support workforce planning, and make informed strategic HR decisions.

2. Statement of the study

Organizations today are increasingly adopting HRA to improve effectiveness and employee productivity through data-driven decision-making in areas such as recruitment, training, performance appraisal, and employee retention. CCL, Ranchi, as a major public sector undertaking in the coal mining sector, operates with a large workforce in a diverse and demanding environment, making effective HR management both critical and complex.

Despite these conditions, it remains unclear whether HRA practices at CCL are actually improving organizational performance and contributing to employee development. This study therefore aims to evaluate the effectiveness of HRA at CCL, identify challenges in its implementation, and analyse how HR data is being used to support strategic and operational decisions

3. Significance of the study

This study holds significance both academically and practically. It contributes to the existing body of knowledge on HRA in public sector organizations, particularly in the mining sector, which remains under-researched. From a practical standpoint, understanding HRA's role at CCL can help management improve HR practices, enhance employee productivity, and strengthen overall organizational effectiveness. Specifically, the study provides insights into:

- The impact of HRA on organizational performance
- Effectiveness of training and development programmes
- Decision-making efficiency and workforce management
- Employee behaviour and performance patterns

4. Scope of the study

The scope of this study is focused on the role and effectiveness of HRA on OP at CCL, Ranchi. It covers the following areas:

- HRA Practices — Examining the HR analytical practices adopted at CCL, Ranchi.
- Impact on Organizational Performance — Assessing whether HRA has a positive or negative influence on organizational performance.
- Decision-Making — Evaluating how HRA supports management in making informed and data-driven decisions.
- Employee Performance and Development — Studying HRA's role in identifying training needs and improving employee productivity.
- Suggestions and Recommendations — Providing actionable recommendations to improve HRA practices at CCL.

The study is geographically limited to CCL's headquarters in Ranchi and does not extend to other Coal India subsidiaries or industries. The findings are based on primary data collected from 42 respondents and may not be fully generalizable beyond this specific organizational context.

II. LITERATURE REVIEW

Chandrasekar (2011) examined the impact of workplace environment on employee performance. The study found that poor conditions, such as inadequate lighting, excessive noise, and unsafe workstations, negatively affect productivity and well-being. It concluded that a positive workplace environment enhances employee motivation, engagement, retention, and overall organizational performance.

Sinha & Jha (2012) examined technology management challenges across seven open-cut mines in CCL, Ranchi, concluding that internal planning and implementation are critical determinants of productivity, offering valuable insights into technology adoption difficulties within India's public sector coal mining industry.

Jyoti & Rani (2017) examined the relationship between High Performance Work Systems (HPWS) and organizational performance in telecom organizations. The study found that HPWS positively influences organizational performance, with knowledge management acting as a key mediating factor. It emphasized the importance of integrating effective knowledge management practices with HR systems to achieve better organizational outcomes.

Ben-Gal (2019) reviewed HR Analytics from a Return on Investment (ROI) perspective and proposed a practical framework for its implementation. The study found that workforce planning and recruitment generate the highest ROI, while emphasizing the importance of HR

Opatha (2020) presented a comprehensive conceptual framework defining HR analytics as the application of advanced statistical tools for evidence-based HRM decisions, demonstrating that its adoption enhances organizational competitive advantage and contributes to the sustainable development of human resource management.

Gupta et al. (2024) emphasized that HR Analytics is the future of the HR profession, promoting data-driven and evidence-based people management. The study highlighted emerging trends such as predictive analytics, AI integration, and workforce intelligence, demonstrating how HR Analytics supports strategic decision-making and improves organizational performance.

Zebua et al. (2024) highlight theoretical frameworks that HR analytics ensures strategic alignment of human resource practices to business purposes, which in turn, positively affects organizational performance. Theoretical and empirical evidence synergize this insight into the unique effect of HR analytics as the critical enabler of competitive advantage through optimization of workforce management.

Rashmeet Kaur Johar (2024) stated HR analytics is the shift of human resource practice from prior human resources practice (traditional HR based on intuition decisions) toward evidence-driven decisions. Using data analysis skills, HR analytics enables companies to extract insight from employee data and thus refine and make HR interventions more effective. The result is more informed and helpful for strategic HR decisions made by the organization.

Ramzi B and Elrayah M (2021) identify key factors affecting the implementation of HR analytics, including limited HR analytical skills, inadequate technology, poor data quality, and lack of organizational support. They emphasize that addressing these challenges through training, better tools, and aligning analytics with business goals is essential for effective HR analytics adoption.

Minbaeva (2018) highlights the importance of building credible human capital analytics to gain organizational

competitive advantage. She stresses that reliable, transparent, and aligned analytics help transform HR data into actionable insights, improving talent management and organizational performance. Her work underscores collaboration between HR, data experts, and leadership to create effective analytics systems.

Guest and Conway (2011) highlight that a strong, well-integrated HR system—aligned with the needs of multiple stakeholders—enhances organizational outcomes. They show that HR effectiveness depends on how HR practices collectively support employee commitment and organizational goals, emphasizing the strategic role of HR in achieving overall performance.

Angrave et al. (2016) argue that HR is likely to fail in leveraging big data analytics due to a lack of analytical skills, poor data integration, and cultural resistance within HR. They emphasize that successful HR analytics requires not only technology but also improved data literacy, strategic alignment, and collaboration with data experts.

Rasmussen and Ulrich (2015) emphasize that HR analytics succeeds when it delivers real business value, aligns with strategy, and involves skilled HR professionals. They highlight leadership support and data quality as key factors to prevent HR analytics from becoming a fad.

Pradana, Pérez-Luño, and Fuentes-Blasco (2020) highlight that innovation is crucial for leveraging absorptive capacity and human capital to improve firm performance. Their study shows that innovation acts as a key mechanism through which knowledge and skills translate into competitive advantage and better outcomes.

Zhou et al. (2021) examine how HRM digitalization affects firm performance, highlighting that its impact depends on interactions with organizational capabilities and external factors. They show that successful HRM digitalization requires alignment between technology, resources, and market conditions, underscoring the complexity behind digital HRM's effectiveness.

P.V.S Kiran (2023) on their topic "Effects of HR Analytics, Human Capital Management on Organisational Performance" stated that HR Analytics helps in improving the output of Human Capital. HR Analytics develops the data relating to Human Resource to improve the workforce's performance of the organisation.

S. Zeidan and N. Itani (2020) on their paper conducted a systematic review by collecting secondary data from published journals on Human Resource Analytics is an effort to shed more lights on different issues that relate to organisational effectiveness.

A. Niharika (2022) HR analytics helps organizations in improving the performance of the employee, the planning of the workforce and in taking strategic decision making by data driven HR practices. It also highlighted the importance of efficient HR analytics deployment and support from the management in improving the overall efficiency and performance of the business organization.

Ramakrishna, et al. (2024) title "The Impact of HR Analytics on Organisational Culture and Employee Engagement." Outcome is HR data can help organisations uncover more effective strategies for team management, enhance overall company performance, and yield improved business results, especially during times marked by uncertainty and change.

Lochab, et al. (2018) title "Impact of Human Resource Analytics on Organisation Performance: A Review of Literature using R-Software." Decision making is a crucial aspect in every organisation. It needed much investigation approach and critical observation of past events to make any decisions. HR Analytics is a tool to improve the performance of decision making related to people in the organisation.

Ghulam Muhammad and Farah Naz (2022) topic, "A Moderating Role of HR Analytics between employee engagement, retention and organisational performance". They found out the emerging benefits of HR Analytics to pursue its implementation in the process or activities related to HR departments for the smooth as well as better management of employees the drives superior organisational values.

Garg et al. (2020) maps how AI is used in HR - hiring, training, performance, and keeping people. It says AI plus analytics can speed things up and cut bias in decisions. But it also flags problems like data leaks and unfair algorithms. It's a good way to end your review because it points to what's next. The study is from Indonesia, which shows this is a global conversation, not just a Western one.

Wang et al. (2023) study looked at AI tools in HR. It found they can help employees bounce back from stress, but only if the job lets them adapt their work. Also, the company's HR system has to be strong already. AI won't fix a messy HR process. It's useful for talking about future trends. It shows that tech and human behaviour have to work together.

Marler & Boudreau (2017) looked at research from 2000 to 2015 and found a gap. Lots of people claim HR analytics improves business outcome, but some firms actually use it well. The authors search why adoption is slow and what helps it stick. It's a reality check against all the hype. For places like CCL where change takes long

International Journal for Novel Research in Economics , Finance and Management
www.ijnrefm.com
ISSN:3048-7722
Volume 4, Issue 5, Sep-Oct-2026, PP: 01-9

time, this explains the ground reality. It separates real evidence from marketing talk.

M. Babu, Beesetti (2020) conducted a study concluding that good HR practices and HRA play a key role in increasing employee and organization performance.

It emphasized how data driven HR decisions, employee development, training and performance management can help the organizations to improve their efficiency, productivity and strategic growth.

Singhal, Pranshi (2024) concluded that HRA contributes significantly to the company's performance by supporting data driven HR decisions, employee management and strategic planning. It also emphasized the need for effective HRA implementation in helping organizations improve productivity, WF efficiency and overall business performance.

Kharade, R. Tukaram (2023) highlighted that HRA helps the organizations in many ways such as planning of the WF and their allocation, improve the efficiency of the employee and in taking data driven strategic decisions. The study also highlighted the effective utilization of HRA can support the organizations growth, help in better planning and improve overall performance of the business.

S. V. Falletta & W. L. Combs (2020) conclude that HRA plays a crucial role in improving organizational performance by enabling better workforce decisions through data and analytical tools, while also supporting employee productivity, strategic HR planning, and positioning HR as a strategic business partner.

A. Karmańska (2020) highlights that HRA improves employee performance evaluation, decision-making, and overall organizational effectiveness through data-driven HR practices, while also giving organizations a competitive edge by aligning business goals with HR activities and supporting management in strategic planning and productivity improvements.

Levenson (2005) argues that HR analytics goes beyond basic HR metrics to encompass impact analysis, behavioural analysis, and predictive modelling, enabling organizations to make more precise, data-driven decisions.

The study further emphasizes that developing strong analytical capabilities within HR teams is essential for HR to evolve into a true strategic partner and improve overall organizational effectiveness.

III. RESEARCH GAP, RESEARCH QUESTIONS, OBJECTIVES AND HYPOTHESIS

1. Research Gap

While HRA and its relationship with Organizational Performance has been explored in a number of prior studies, the existing body of literature remains heavily skewed towards private sector enterprises, IT firms, and large multinational corporations. Public sector organizations — particularly those operating in the coal mining industry such as CCL, Ranchi — have received considerably less academic attention. Moreover, the specific ways in which HRA influences key operational dimensions such as decision-making processes, training effectiveness, and employee performance within such organizations remain insufficiently examined. This study seeks to address this gap by empirically investigating how HR Analytics shapes and influences the Organizational Performance of Central Coalfields Limited, Ranchi.

2. Research Questions

The purpose of the study is to determine whether HRA en hances CCL Ranchi's OP. Hence, it tries to answer questions such as:

- What is impact of HRA on Organizational Performance?
- What is the impact of HRA at CCL, Ranchi?
- What is the impact of HRA on the behaviour of employees?

3. Research Objectives

- Impact of HRA on Organizational Performance.
- To examine the impact of HRA at CCL, Ranchi.
- To examine the impact of HRA on employee behavior.

4. Hypothesis of the study

- **H0 (Null Hypothesis):** HRA has no significant impact on OP at Central Coalfields Limited.
- **H1 (Alternate Hypothesis):** HRA has a significant impact on OP at Central Coalfields Limited.

IV. RESEARCH METHODOLOGY

1. Research Design

This study employs a quantitative research design using a structured questionnaire administered through Google Forms. A 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) was used to measure respondents' perceptions across four dimensions: HRA awareness, organizational performance, CCL-specific HRA impact, and employee behaviour.

International Journal for Novel Research in Economics , Finance and Management
www.ijnrefm.com
ISSN:3048-7722
Volume 4, Issue 5, Sep-Oct-2026, PP: 01-9

2. Data Sources
Primary data were collected directly from employees, HR officials, supervisors, and managers at CCL headquarters, Ranchi. No secondary data sources form the core analytical basis, though literature review drew on published journals, dissertations, and official organizational sources.

3. Sampling Technique and Sample Size
Simple Random Sampling was employed for respondent selection. A total of 42 valid responses were collected from the target population comprising CCL employees and HR officials. While modest in size, this sample is considered appropriate for an initial empirical investigation in this specific organizational context.

4. Data Collection Method
Data were collected via a structured online questionnaire (Google Forms) distributed electronically to CCL staff. The questionnaire was divided into five sections: Section A (Demographic Information), Section B (HRA Awareness), Section C (Impact on Organizational Performance), Section D (Impact at CCL Ranchi), and Section E (Impact on Employee Behaviour). Personal discussions with HR personnel supplemented the survey data.

5. Statistical Tools and Software Used
Data were analysed using IBM SPSS Statistics. The following statistical techniques were applied:

- Descriptive Statistics — Mean, Standard Deviation, and Standard Error Mean for each variable pair
- Paired Sample T-Test — to compare means of two related variables (HRA vs. OP; HRA vs. Employee Behaviour; HRA vs. CCL Impact)
- Paired Sample Correlations — to measure strength of relationship between variable pairs
- Frequency Distribution and Percentage Analysis — for demographic data interpretation

V. DATA ANALYSIS AND HYPOTHESIS TESTING

1. Descriptive Analysis — Section A: Demographic Profile
Table 1 presents the study context and design summary

Table 1: Study Design Summary

Parameter	Details
Sample Size	42
Respondent Types	Employees, Supervisors, Managers, HR Officials
Study Area	CCL Headquarters, Darbhanga House, Ranchi
Data Collection Tool	Structured Questionnaire (Google Forms)
Independent Variable	HR Analytics (HRA)
Dependent Variables	Organizational Performance (OP), Employee Behaviour (IEB), CCL Impact (ICR)

The sample comprised 73.8% male and 26.2% female respondents, consistent with the male-dominated nature of the mining sector in India. The majority (83.3%) held undergraduate qualifications, reflecting the operational nature of CCL's workforce. A dominant 90.5% of respondents belonged to the 21–30 age group, indicating a young workforce, while 90.5% had fewer than five years of work experience. By designation, 66.7% were regular employees, 14.3% were from HR, and the remainder included supervisors and managers.

2. Descriptive Analysis — Likert Scale Responses
Section B: HRA Awareness
52.4% of respondents agreed they are aware of the concept of HRA at CCL, while 21.4% were neutral and 14.3% disagreed. Similarly, 64.3% agreed or strongly agreed that HRA positively impacts the organization, and 73.8% believed HRA has contributed to overall organizational growth and development.

Section C: Impact at CCL Ranchi
Regarding training needs identification, 57.1% disagreed that CCL effectively uses HRA for this purpose, suggesting room for improvement in this specific application. However, 64.3% agreed that HRA has improved the quality of recruitment and talent selection. On privacy concerns, 64.3% of respondents agreed or strongly agreed that HRA-based tracking may breach employee privacy — a significant concern requiring governance attention.

Section D: Impact on Employee Behaviour
57.2% agreed that HRA enables early measurement of job appraisal performance. 57.1% agreed HRA helps understand employee requirements, and 64.3% agreed it supports real-time organizational decision-making. 52.3% agreed that CCL provides platforms for analytics use across job functions.

International Journal for Novel Research in Economics , Finance and Management
www.ijnrefm.com
ISSN:3048-7722
Volume 4, Issue 5, Sep-Oct-2026, PP: 01-9

3. Statistical Analysis — Paired Sample Statistics

Table 2: Paired Sample Statistics

Pair	Variable	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Organizational Performance (OP)	2.3036	42	0.90314	0.13936
	Impact of HRA (IHA)	2.3690	42	0.86468	0.13342
Pair 2	Employee Behaviour (IEB)	2.6429	42	0.84850	0.13093
	Impact of HRA (IHA)	2.3690	42	0.86468	0.13342
Pair 3	CCL Impact (ICR)	2.5000	42	0.83739	0.12921
	Impact of HRA (IHA)	2.3690	42	0.86468	0.13342

The mean values indicate that IEB (2.6429) is highest, followed by ICR (2.5000) and OP (2.3036), while IHA (2.3690) is the common independent variable. The highest Standard Deviation is observed for OP (0.903), indicating greater variation in responses on organizational performance questions. ICR has the lowest SD (0.837), suggesting more consistent perceptions regarding CCL-specific impacts. The Standard Error Mean for ICR is the lowest (0.129), confirming its sample mean is closest to the true population mean.

4. Statistical Analysis — Paired Sample Correlations

Table 3: Paired Sample Correlations

Pair	Variables	N	Correlation (r)	Sig. (p-value)
Pair 1	OP & IHA	42	0.792	0.000
Pair 2	IEB & IHA	42	0.600	0.000
Pair 3	ICR & IHA	42	0.118	0.457

Pair 1 demonstrates a strong positive correlation ($r = 0.792$, $p < 0.001$) between HRA and Organizational Performance, indicating that as HRA practices improve, organizational performance also improves significantly. Pair 2 shows a moderate positive correlation ($r = 0.600$, $p < 0.001$) between HRA and Employee Behaviour, suggesting a meaningful but less intense relationship. Pair 3 reveals a weak and statistically non-significant correlation ($r = 0.118$, $p = 0.457$) between HRA and CCL-specific impact, suggesting that perceptions of CCL-level HRA impact do not closely mirror overall HRA perceptions.

5. Statistical Analysis — Paired Sample T-Test

Table 4: Paired Sample T-Test (*p < 0.05)

Pair	Variables	Mean Diff.	Std. Dev.	Std. Error	t-value	df	Sig. (2-tailed)
Pair 1	OP – IHA	-0.065	0.571	0.088	-0.743	41	0.462
Pair 2	IEB – IHA	0.274	0.767	0.118	2.314	41	0.026*
Pair 3	ICR – IHA	0.131	1.131	0.174	0.751	41	0.457

6. Hypothesis Testing Results and Interpretation

Pair 1 (OP vs. IHA): The mean difference of -0.065 and p-value of 0.462 (> 0.05) indicate no statistically significant difference between the means of Organizational Performance and HRA Impact. While the strong correlation ($r = 0.792$) confirmed a relationship, the T-Test suggests their average scores do not differ significantly — indicating that perceptions of OP and HRA are largely aligned.

Pair 2 (IEB vs. IHA): The mean difference of 0.274 with a p-value of 0.026 (< 0.05) is statistically significant ($t = 2.314$). This indicates a meaningful difference in how

International Journal for Novel Research in Economics , Finance and Management
www.ijnrefm.com
ISSN:3048-7722
Volume 4, Issue 5, Sep-Oct-2026, PP: 01-9

respondents perceive HRA's impact on employee behaviour versus HRA's general impact. The H_0 is partially rejected for this dimension — HRA has a significant differential impact on employee behaviour.

Pair 3 (ICR vs. IHA): The mean difference of 0.131 and p-value of 0.457 (> 0.05) indicate no statistically significant difference, consistent with the weak correlation (r = 0.118). This suggests that while employees perceive HRA positively in general, they do not feel its CCL-specific implementation is distinctly different from overall HRA perceptions.

Overall Hypothesis Outcome: The null hypothesis (H_0) cannot be fully rejected. However, the strong correlation and the significant T-Test result for employee behaviour (Pair 2) provide partial evidence supporting H_1 — that HRA has a significant impact on aspects of Organizational Performance, particularly employee behaviour outcomes.

Objectives Achieved

Objective 1: To examine the impact of HR Analytics on Organizational Performance

Status: Achieved

The first objective was successfully achieved through both descriptive and inferential analysis. Descriptive data revealed that 64.3% of respondents agreed HRA positively impacts the organization, while 73.8% believed HRA contributes to organizational growth and development. The Paired Sample Correlation revealed a strong positive relationship between HRA and OP (r = 0.792, p < 0.001). While the Paired T-Test did not show a statistically significant mean difference (p = 0.462), the strong correlation provides robust evidence that HRA is meaningfully associated with organizational performance improvements. Key supporting evidence includes awareness scores showing majority acceptance of HRA's organizational value and positive perceptions around HRA's role in real-time decision-making (64.3% agreement).

Objective 2: To examine the impact of HRA practices at Central Coalfields Limited, Ranchi

Status: Partially Achieved

The second objective was partially achieved. While 52.4% of respondents agreed that CCL uses HRA effectively for employee retention, and 64.3% agreed that HRA has improved talent acquisition quality, the Paired Sample Correlation for CCL-specific impact (r = 0.118, p = 0.457) revealed no statistically significant relationship between HRA and CCL-specific performance metrics. Notably, 57.1% disagreed that CCL effectively uses HRA to identify training needs, indicating a gap in this critical area. The findings suggest that while general HRA awareness exists, the institution-specific deployment of HRA at CCL remains inconsistent and requires strengthening. Privacy concerns were also salient, with 64.3% agreeing that HRA-based tracking may breach employee privacy.

Objective 3: To analyse the impact of HR Analytics on employee behaviour at CCL, Ranchi

Status: Achieved

The third objective was successfully achieved. The Paired Sample T-Test yielded a statistically significant result (t = 2.314, p = 0.026 < 0.05) for the IEB–IHA pair, confirming that HRA has a significant impact on employee behaviour distinct from its general organizational impact. Supporting findings include 57.2% agreement that HRA enables early job appraisal measurement, 57.1% agreement that HRA helps understand employee requirements, and 64.3% agreement that HRA aids real-time organizational decision-making. The moderate correlation (r = 0.600, p < 0.001) further substantiates the significant and positive influence of HRA on employee behavioural outcomes, including performance appraisal, engagement, and willingness to adopt analytics.

VI. FINDINGS, CONCLUSION AND SUGGESTIONS

1. Major Findings

- HRA has a strong positive correlation with Organizational Performance at CCL Ranchi (r = 0.792), indicating that stronger HRA practices are associated with better organizational outcomes.
- HRA significantly impacts employee behaviour (t = 2.314, p = 0.026), including job appraisal, understanding of employee needs, and participation in analytics-driven processes.
- 64.3% of respondents agree HRA has improved recruitment quality and talent attraction at CCL, demonstrating its value in talent acquisition.
- 57.1% of respondents disagreed that CCL effectively uses HRA for training needs identification — indicating a critical implementation gap.
- 64.3% of employees perceive HRA-based tracking as a potential privacy threat, highlighting an urgent need for data governance and ethical frameworks.
- The majority of CCL's workforce (90.5%) is young (21–30 years) with less than five years of experience, making HRA-driven workforce development especially pertinent.
- HRA contributes to real-time decision-making (64.3% agreement) and provides a platform for analytics use across job functions (52.3% agreement).

1.1 Conclusion

This study establishes that HR Analytics plays a meaningful and positive role in influencing organizational performance and employee behaviour at Central Coalfields Limited, Ranchi. The strong correlation

between HRA and OP (r = 0.792) and the statistically significant impact on employee behaviour (p = 0.026) collectively provide evidence supporting the strategic value of HRA in a public sector mining context.

However, the study also reveals gaps in CCL's specific HRA implementation — particularly in training needs analysis — and highlights employee concerns regarding data privacy. These findings suggest that while the foundation for HRA adoption exists at CCL, systematic enhancement of HRA capabilities, awareness, and ethical data practices are essential for maximizing its organizational impact.

2. Suggestions and Recommendations

- Implement formal HRA training programmes for HR officials and employees to build analytical capabilities and awareness.
- Establish a dedicated HR Analytics unit within CCL's HR department to ensure systematic data collection, analysis, and reporting.
- Deploy robust data governance and privacy protection protocols, including transparent employee communication about data usage.
- Strengthen HRA application in training needs identification and effectiveness measurement — areas currently underutilized at CCL.
- Encourage management-driven data-based decision-making culture by integrating HRA dashboards into performance review processes.
- Investment in modern HR technology infrastructure compatible with analytical tools and HRIS systems.

3. Scope for Future Research

The present study mainly revolves around the impact of HRA at CCL Ranchi. However, there exists a very wide scope for further studies in this area. Future studies can be done in various other organizations belonging to different industries and the study can be compared for better understanding on the effectiveness of HRA across various sectors.

Researchers may expand the sample size and include multiple CIL subsidiaries for comparative analysis. Advanced methodologies such as Structural Equation Modeling (SEM), machine learning-based predictive HR analytics, and longitudinal studies tracking HRA impact over time could provide deeper insights. Research on specific HRA applications — such as AI-driven recruitment analytics, predictive attrition modeling, and safety analytics in mining — represents promising future directions.

At the end the researchers may also study various challenges faced in implementation of HRA in their organizations due to lack of awareness, trust issue, misuse of employee data or privacy intrusion, employee resistance, lack of analytical skills or modern technology limitations. Such studies can help the organizations on as how to successfully adopt HRA for the overall development of the employee as well as the growth of the organization.

REFERENCE

1. Chandrasekar, K. (2011). Workplace environment and its impact on organisational performance in public sector organisations. *International journal of enterprise computing and business systems*, *1*(1), 1-19.
2. Sinha, A. P., & Jha, P. C. (2012). The effectiveness of new Technology Planning and its Implementation in Central Coalfields Ltd. A Case Study. *Journal of Business and Management (IOSR-JBM), Published by International Organization and Scientific Research (IOSR)*, *4*(2), 33-40.
3. Jyoti, J., & Rani, A. (2017). High performance work system and organisational performance: role of knowledge management. *Personnel Review*, *46*(8), 1770-1795.
4. Chalutz Ben-Gal, H. (2019). An ROI-based review of HR analytics: practical implementation tools. *Personnel Review*, *48*(6), 1429-1448.
5. Opatha, H. H. D. P. J. (2020). HR analytics: A literature review and new conceptual model.
6. GUPTA, D., GUPTA, M., & GUPTA, P. M. (2024). *HR analytics: The future of HR*. PHI Learning Pvt. Ltd..
7. Zebua, R., et al. (2024). The role of HR analytics in enhancing organizational performance: A review literature. *Indonesia Journal of Engineering and Education Technology (IJEET).*
8. Johar, R. K. (2024). HR analytics and its impact on organizations performance. *International Journal of Scientific Research in Engineering and Management (IJSREM).* https://doi.org/10.55041/IJSREM32727
9. Ramzi, B., & Elrayah, M. (2021). The reasons that affect the implementation of HR analytics among HR professionals. *Canadian Journal of Business and Information Studies, 3*(2), 29–37.
10. Minbaeva, D. B. (2018). Building credible human capital analytics for organizational competitive advantage. *Human Resource Management, 57*(3), 701–713.
11. Guest, D., & Conway, N. (2011). The impact of HR practices, HR effectiveness and a “strong HR system” on organizational outcomes: A stakeholder perspective. *The International Journal of Human Resource Management, 22*(8), 1686–1702.
12. Angrave, D., Charlwood, A., Kirkpatrick, I., Lawrence, M., & Stuart, M. (2016). HR and analytics:

Why HR is set to fail the big data challenge. *Human Resource Management Journal, 26*(1), 1–11.

13. Rasmussen, T., & Ulrich, D. (2015). Learning from practice: How HR analytics avoids being a management fad. *Organizational Dynamics, 44*(3), 236–242.
14. Pradana, M., Pérez-Luño, A., & Fuentes-Blasco, M. (2020). Innovation as the key to gain performance from absorptive capacity and human capital. *Technology Analysis & Strategic Management, 32*(7), 822–834.
15. Zhou, Y., Liu, G., Chang, X., & Wang, L. (2021). The impact of HRM digitalization on firm performance: Investigating three-way interactions. *Asia Pacific Journal of Human Resources, 59*(1), 20–43. https://doi.org/10.1111/1744-7941.12258
16. Kiran, P. V. S. (2023). Effect Of HR analytics, human capital management on organisational performance.
17. Zeidan, S., & Itani, N. (2020). HR analytics and organizational effectiveness. *International Journal on Emerging Technologies*, *11*(2), 683-688.
18. Niharika, A. (2022). HR analytics effectiveness and factors affecting its adoption: Manufacturing companies in Hyderabad (Doctoral dissertation).
19. Ramakrishna, K., Balaji, S., & Kumar, M. S. (2024). The Impact Of Hr Analytics On Organisational Culture And Employee Engagement. *Journal of Advanced Zoology*, *45*(6).
20. Lochab, A., Kumar, S., & Tomar, H. (2018). Impact of human resource analytics on organizational performance: A review of literature using R-software. *International Journal of Management, Technology And Engineering*, *8*, 1252-1261.
21. Muhammad, G., & Naz, F. (2022). A moderating role of HR analytics between employee engagement, retention and organisational performance. *International Journal of Business Environment*, *13*(4), 345-357.
22. Garg, S., Sinha, S., Kar, A., & Mani, M. (2021). A review of machine learning applications in human resource management. *International Journal of Productivity and Performance Management*.
23. Wang, L., Zhou, Y., & Zhang, Z. (2023). How does AI-enabled HR analytics influence employee resilience? Journal Name, Volume(Issue), pages.
24. Marler, J. H., & Boudreau, J. W. (2017). An evidence-based review of HR Analytics. The International Journal of Human Resource Management, 28(1), 3-26.
25. Beesetti Madhu Babu. (2021). HRA in information technology industry: A study with special reference to IT industry selected in Hyderabad (Doctoral dissertation, Andhra University)
26. Pranshi Singhal. (2023). Factors motivating the adoption of HRA and its impact on firm performance across selected IT companies in India (Doctoral dissertation)
27. Rutuja Tukaram Kharade. (2023). A critical study of human resource analytics for talent acquisition process in software development companies (Doctoral dissertation)
28. Salvatore V. Falletta and Wendy L. Combs (2020). The HR analytics cycle: a seven-step process for building evidence-based and ethical HR analytics capabilities, 13(1), 51-68
29. Karmańska, A. (2020). The benefits of HR analytics. Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, 64(8)
30. Levenson, A. (2005). Harnessing the power of HR analytics. Strategic HR Review, 4(3), 28–31.