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Manpower planning at South Eastern Coalfields Limited (SECL): An analytical study

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Abstract
Manpower planning is a critical function of strategic human resource management in capital-intensive industries such as coal mining. South Eastern Coalfields Limited (SECL), a subsidiary of Coal India Limited, requires an appropriately skilled workforce to maintain production efficiency, occupational safety, and organizational sustainability. This study examines manpower planning at SECL by analysing workforce trends, occupational composition, recruitment, training, and technological change. A descriptive research design based on secondary data from company annual reports and recent scholarly literature is adopted. Workforce figures for 2023–2024 and 2024–2025 are compared to identify changes in employee strength and skill categories. The study also formulates hypotheses concerning workforce reduction and changes in occupational composition. Findings indicate the importance of competency-based recruitment, succession planning, employee reskilling, and data-driven workforce forecasting. The study recommends an integrated manpower planning framework that aligns employee availability, technical competencies, production requirements, and workplace safety.

Keywords: Manpower planning, SECL, strategic human resource management, workforce forecasting, skill development, coal mining, employee productivity

Introduction

Manpower planning, also known as human resource planning, is the systematic process of determining an organization's present and future employee requirements. It involves forecasting workforce demand, assessing existing employee availability, identifying skill gaps, and developing appropriate recruitment, training, deployment, and succession strategies.

Manpower planning has particular significance in the mining industry because operations require specialized technical knowledge, heavy equipment, experienced supervisors, and strict adherence to occupational safety requirements. Inadequate staffing or a shortage of critical competencies may affect production continuity, equipment maintenance, workplace safety, and regulatory compliance.

South Eastern Coalfields Limited (SECL) is a subsidiary of Coal India Limited and a major coal-producing public sector enterprise operating primarily in Chhattisgarh and Madhya Pradesh. Its workforce includes executives, supervisors, skilled and semi-skilled workers, technical employees, clerical personnel, and trainees. Coordinating these occupational groups requires a systematic approach to workforce forecasting and employee development.

The mining industry is also experiencing technological changes associated with mechanization, digital monitoring, automation, and data-driven operations. Recent research on Mining 4.0 emphasizes that technological transformation can affect employee competencies, work organization, and the skills required in mining operations (Lund *et al*., 2024) [5].

Consequently, manpower planning at SECL should extend beyond determining the total number of employees. It should also consider the availability of specialized skills, the anticipated retirement of experienced personnel, the development of future supervisors, and the ability of employees to adapt to emerging technologies.

This study analyses SECL's published manpower data and recent research on strategic human resource management to identify workforce trends and suggest improvements in manpower planning.

Objectives of the Study

The main objective of this research is to examine manpower planning at SECL and identify opportunities to improve workforce effectiveness.

The specific objectives are

1. To analyse changes in SECL's overall manpower strength.
2. To examine changes in the occupational composition of its workforce.
3. To study the role of recruitment, training, and skill development in manpower planning.
4. To assess the implications of technological change for future workforce requirements.
5. To formulate and evaluate hypotheses concerning manpower trends.
6. To recommend strategies for improving workforce forecasting, succession planning, and employee productivity.

Review of Literature: Recent Research (2021–2026)

The literature review focuses on research published during the last five years, with emphasis on strategic workforce planning, mining-sector human resource management, technological change, and evidence-based HR practices.

1. Strategic Workforce Planning

A 2022 study published in *Strategic HR Review*, based on research involving 236 organizational respondents, examined how organizations approach strategic workforce planning. It reported that more advanced workforce planners

focus not only on closing skill gaps and reducing surpluses but also on optimizing talent to meet organizational requirements. This approach is relevant to SECL because manpower decisions should consider both employee numbers and the competencies needed for safe, efficient mining operations (Strategic workforce planning: From closing skills gaps to optimizing talent, 2022).

2. Human Resource Management in the Mining Industry

Khatua *et al*. (2024) [3] examined human resource management challenges in mining organizations. Their research identified important HRM factors and highlighted the social dimensions of mining operations. The study suggests that workforce planning should consider employee development, organizational relationships, and sustainability rather than focusing exclusively on production requirements.

For SECL, this perspective supports a balanced approach to workforce planning that considers employee welfare, operational continuity, workplace relationships, and the long-term sustainability of mining activities.

3. Benchmarking Human Resource Management Practices

Khatua *et al*. (2024) [3] developed an interpretive structural modelling approach to examine relationships among HRM elements in large mining industries. Their study, published in the *South Asian Journal of Human Resources Management*, provides a framework for understanding how different HR practices may interact within mining organizations.

The research is relevant to SECL because recruitment, training, employee deployment, performance management, and safety cannot be treated as completely independent functions. An integrated HRM framework can help managers identify how workforce decisions influence operational capability and organizational sustainability.

4. Mining 4.0 and Changing Skill Requirements

Lund *et al*. (2024) [5] conducted a scoping review of Mining 4.0 and its implications for the work environment, competencies, organizational structures, and society. Their research examined how technological development changes the nature of mining work and the capabilities required from employees.

The findings support the need for continuous reskilling and upskilling in mining enterprises. At SECL, manpower forecasts should therefore incorporate the potential effects of mechanization, digital monitoring, equipment automation, and changing maintenance practices.

5. Evidence-Based Human Resource Management

Negt and Haunschild (2024, published online; subsequently included in a 2025 [6] journal volume) reviewed the gap between HRM research and practice. Their scoping review emphasized the importance of translating research evidence into practical human resource decisions.

This perspective is useful for SECL because manpower planning should rely on verifiable workforce information, documented staffing requirements, and systematic evaluation rather than informal assumptions. Data on vacancies, retirements, employee competencies, training outcomes, and operational performance can strengthen workforce decisions.

6. Digital Transformation and Workforce Planning

Recent research on workforce planning and artificial intelligence has examined how data-driven tools can support talent forecasting and organizational decision-making. Egasmara *et al*. (2025) [2] reviewed literature on AI-supported workforce planning and highlighted the potential of technology to improve planning efficiency and responsiveness.

For SECL, such approaches could support retirement forecasting, skill inventories, vacancy monitoring, and scenario-based workforce planning. However, any digital system should be implemented with appropriate data quality, transparency, and human oversight.

7. Research Gap

Recent studies establish that workforce planning is increasingly connected with organizational strategy, technical competencies, employee development, and digital transformation. However, the implications of these developments must be examined in relation to the actual workforce trends of individual mining enterprises.

The present study addresses this need by analysing SECL's published workforce figures and interpreting them in the context of recent research. It does not claim to measure the effectiveness of SECL's internal HR policies through an employee survey or confidential organizational records.

Research Methodology

1. Research Design

The study adopts a descriptive and analytical research design. It examines published manpower information and uses comparative analysis to identify workforce trends.

2. Sources of Data

The study uses secondary data from:

- SECL Annual Report 2023–2024 [8, 9].
- SECL Annual Report 2024 [9]–2025.
- Recent journal articles on strategic workforce planning and mining-sector HRM.
- Relevant books on human resource management and workforce planning.

3. Period of Study

The primary comparison covers the workforce reported as of March 31, 2024, and March 31, 2025 [2]. Figures from March 2023 are also used to understand the longer-term change in overall manpower.

4. Tools of Analysis

The study employs percentage analysis, year-on-year comparisons, occupational-category analysis, and descriptive hypothesis evaluation to examine manpower trends at South Eastern Coalfields Limited (SECL).

The percentage change in manpower is calculated using the following formula:

Percentage Change = Current-Year Value - Previous-Year Value x 100

Where:

- **Current-Year Value:** The manpower figure for the current reporting year.
- **Previous-Year Value:** The manpower figure for the preceding reporting year.

This formula is used to determine the percentage increase or decrease in the total workforce and individual occupational categories over the study period.

Data Analysis and Interpretation

1. Overall Manpower Trend

Table 1: Manpower Strength at SECL

Reporting date	Total employees	Change in employees	Percentage change
March 31, 2023	41,832	—	—
March 31, 2024	39,528	−2,304	−5.51%
March 31, 2025	37,523	−2,005	−5.07%

Source: SECL Annual Reports 2023–2024 and 2024 [8, 9]–2025.

Interpretation

SECL's reported manpower declined from 41,832 employees in March 2023 to 37,523 employees in March 2025. The total reduction was 4,309 employees, equivalent to approximately 10.30%.

This decline indicates a substantial change in workforce strength. Possible contributing factors in a large public sector enterprise include retirement, natural attrition, recruitment patterns, workforce restructuring, and changes in operational requirements. However, the available figures do not identify the individual contribution of these factors.

For manpower planning, the trend makes it important to assess whether the existing workforce is sufficient for production, maintenance, supervision, safety, and administrative requirements.

2. Occupational Composition of the Workforce

Table 2: Occupational Category-Wise Manpower

Category	March 2024	March 2025	Change
Executives	2,599	2,502	−97
Supervisory staff	6,238	5,487	−751
Highly skilled and skilled	12,989	15,048	+2,059
Semi-skilled and unskilled	15,805	12,783	−3,022
Clerical staff	1,288	1,079	−209
Piece-rated employees	4	0	−4
Trainees	605	624	+19
Total	39,528	37,523	−2,005

Source: SECL Annual Report 2024 [9]–2025.

Interpretation

The most significant change was the increase in highly skilled and skilled employees from 12,989 to 15,048, representing an increase of approximately 15.85%.

In contrast, semi-skilled and unskilled manpower declined from 15,805 to 12,783, a decrease of approximately 19.12%. Supervisory staff also declined by approximately 12.04%.

These changes demonstrate that the occupational composition of the workforce shifted during the period. The increase in the skilled category may be consistent with the growing importance of technical competencies in mining, but the data do not establish whether it resulted from recruitment, promotion, reclassification, or other employee movements.

The decline in supervisory personnel warrants attention because supervisors coordinate production, monitor safety practices, and oversee operational teams. SECL should evaluate whether supervisory coverage remains appropriate across mines and shifts.

3. Recruitment and Workforce Replacement

Recruitment is an essential part of manpower planning because workforce reductions may create shortages in critical positions even when total staffing remains substantial.

SECL's Annual Report 2023–2024 [8, 9] recorded 1,158 fresh employment appointments: 707 against land acquisition, 400 compassionate appointments, and 51 fresh recruitments.

These figures illustrate that workforce entry occurs through different channels. Consequently, recruitment planning should distinguish between appointments made under specific employment policies and recruitment directed towards identified skill shortages.

For effective planning, SECL should compare projected vacancies with retirement forecasts, technical requirements, employee qualifications, and the future development of mining operations.

5. Limitations

The research is limited by its reliance on published secondary data. Detailed internal staffing norms, departmental vacancies, employee-level records, retirement forecasts, and training-effectiveness assessments were not independently available. Therefore, the study describes observed workforce changes but does not establish causal relationships between manpower planning and organizational performance.

4. Training and Skill Development

Training is essential for maintaining workforce competence in mining operations. Employees require appropriate knowledge of machinery, maintenance, production processes, safety procedures, and evolving technologies.

SECL's reported training infrastructure includes management development and technical training facilities, as well as vocational training centres. These facilities provide a foundation for employee development.

Training should be integrated with a systematic assessment of current and future competencies. For example, employees working with increasingly mechanized equipment may require additional technical training, while supervisors may benefit from development in safety leadership, communication, and team management.

The effectiveness of training should be assessed through measurable outcomes, including competency assessments, safety compliance, job performance, and readiness for more specialized responsibilities.

5. Manpower Planning and Production Performance

SECL produced 187.38 million tonnes of coal in 2023–2024, compared with 167.01 million tonnes in 2022–2023. This represents production growth of approximately 12.20%.

The increase in production occurred alongside a decline in reported manpower. However, this comparison does not establish that workforce reduction caused the increase in production.

Production is also affected by mechanization, mine development, equipment availability, geological conditions, working hours, contractor deployment, and other operational factors. A reliable productivity assessment would require consistent information on employee numbers, man-shifts, production, contractor deployment, and safety outcomes.

SECL should therefore monitor output per man-shift alongside critical vacancy rates, overtime, absenteeism, training outcomes, and workplace safety indicators.

Hypothesis Formulation and Testing

Because the study uses aggregate secondary data, the hypotheses are evaluated descriptively.

1. Hypothesis 1: Change in Overall Manpower

Null hypothesis (H_{01}): SECL's total manpower remained unchanged between March 2024 and March 2025.

Alternative hypothesis (H_{11}): SECL's total manpower decreased between March 2024 and March 2025.

Calculation: [\frac {37,523-39,528} {39,528} \times100 =-5.07%]

Interpretation: The reported workforce declined by 2,005 employees, or approximately 5.07%.

Decision: The observed figures do not support the null hypothesis of unchanged manpower. The descriptive evidence supports a decrease in workforce strength during the period. This is a comparison of reported workforce counts, not a formal statistical significance test.

2. Hypothesis 2: Change in Skilled Manpower

Null hypothesis (H_{02}): The number of highly skilled and skilled employees remained unchanged between March 2024 and March 2025.

Alternative hypothesis (H_{12}): The number of highly skilled and skilled employees increased during this period.

Calculation: [\frac {15,048-12,989} {12,989} \times100\approx15.85%]

Interpretation: The reported number of highly skilled and skilled employees increased by 2,059.

Decision: The observed data do not support the null hypothesis of unchanged skilled manpower. They indicate an increase in the reported occupational category. This finding does not prove that a specific manpower planning policy caused the increase.

3. Summary of Hypothesis Evaluation

Hypothesis	Observed evidence	Descriptive conclusion
H_{01}: Overall manpower remained unchanged	Decline of 5.07%	Evidence indicates a decrease
H_{02}: Skilled manpower remained unchanged	Increase of 15.85%	Evidence indicates an increase

A formal inferential test would require an appropriate statistical design, adequate observations, and clearly defined assumptions. Two annual aggregate counts are insufficient to establish statistical significance or causality.

Major Findings

The study identifies the following findings.

- **Declining manpower:** SECL's reported workforce decreased by approximately 10.30% between March 2023 and March 2025.
- **Changing occupational composition:** Highly skilled and skilled manpower increased by approximately 15.85% between March 2024 and March 2025, while semi-skilled and unskilled manpower declined by approximately 19.12%.
- **Need for strategic recruitment:** Recruitment planning should be aligned with retirement projections, departmental vacancies, technical requirements, and future operational plans.
- **Importance of training:** Continuous technical and safety-related training is necessary to prepare employees for changing mining technologies and operational responsibilities.
- **Need for supervisory continuity:** The reported decline in supervisory personnel makes it important to examine staffing coverage, succession requirements, and operational coordination.
- **Productivity cannot be assessed through headcount alone:** Production growth alongside declining manpower does not establish a causal relationship. Productivity analysis should consider man-shifts, mechanization, contractor deployment, equipment utilization, and safety performance.
- **Importance of data-driven planning:** Department-wise manpower audits, skill inventories, retirement forecasting, and digital HR records could improve the accuracy of workforce decisions.

Suggestions for Improving Manpower Planning at SECL

- **Integrated Workforce Forecasting:** SECL should develop short-, medium-, and long-term workforce forecasts based on production plans, mine development, retirement patterns, technological requirements, and departmental staffing norms.

- **Regular Manpower Audits:** Periodic audits should examine workforce strength, qualifications, experience, workload, age profile, competency requirements, and deployment across operational areas.

- **Succession Planning:** Critical technical, supervisory, managerial, and safety-related positions should be identified in advance. Mentoring, structured handovers, job rotation, and knowledge documentation can help preserve organizational expertise.

- **Competency-Based Recruitment:** Recruitment should be guided by job-specific skill requirements. Particular attention should be given to mining engineers, technical specialists, maintenance personnel, safety professionals, and employees capable of supporting digital and automated operations.

- **Training Evaluation:** Training programmes should be evaluated through demonstrated competency, job performance, safety compliance, and readiness for new responsibilities. Training plans should be revised as new skill gaps emerge.

- **Digital HR Analytics:** An integrated human resource information system could support retirement projections, vacancy tracking, workforce deployment, skill inventories, and training records. Such systems should complement, rather than replace, professional HR judgment.

- **Safety-Centred Workforce Planning:** Workforce optimization must not compromise statutory staffing requirements, adequate supervision, fatigue management, or workplace safety. Staffing levels should reflect the hazards and technical requirements of individual mining operations.

- **Coordination Between HR and Operations:** The human resource department should coordinate with mining, engineering, safety, finance, and training departments. This would ensure that staffing decisions reflect actual operational requirements rather than relying solely on organization-wide headcount figures.

Conclusion

Manpower planning is a strategic requirement for South Eastern Coalfields Limited because its operational performance depends on the availability of an appropriately skilled, experienced, and safety-conscious workforce. The present study examined published manpower figures and recent research on workforce planning, mining-sector HRM, and technological change.

The analysis shows that SECL's reported manpower declined from 41,832 employees in March 2023 to 37,523 in March 2025. At the same time, the occupational composition changed, with an increase in the reported number of highly skilled and skilled employees between March 2024 and March 2025. These trends highlight the importance of analysing both workforce strength and competency distribution.

The study emphasizes that effective manpower planning requires more than controlling employee numbers. It involves forecasting future requirements, identifying skill gaps, strengthening recruitment, preparing future supervisors, and investing in continuous training. Digital HR analytics and systematic manpower audits could further improve planning accuracy.

The findings must be interpreted cautiously because the study relies on aggregate secondary data. It does not establish that manpower reduction caused production growth or that changes in occupational composition resulted from a particular HR policy.

In conclusion, SECL can strengthen its workforce planning by integrating operational forecasts, competency-based staffing, succession planning, employee development, and occupational safety. An evidence-based approach that places the right people with the right skills in the right positions at the right time can contribute to sustainable mining operations and long-term organizational effectiveness.

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