



Strategic Manpower Planning and Development Initiatives: A Quantitative Study of Their Impact on Workforce Productivity at JSPL Angul

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Abstract

The dynamics of organizational competitiveness has changed in the industrial sector and manpower planning and development is very important in increasing the productivity of the workforce. The research paper examines strategic human resource programs of manpower planning and employee development at the Jindal Steel and Power Limited (JSPL), Angul and their influence on the productivity, motivation, satisfaction and general performance of the organizations. Based on a quantitative research design, a questionnaire that consisted of five core dimensions, manpower planning practices, training and development programs, workforce productivity, organizational support mechanisms, and employee engagement and satisfaction, a sample of 300 employees was used to collect the relevant data out of the total population of 1900 employees working in different departments. The reliability analysis through Cronbach alpha revealed that all constructs have high internal consistency (0.80). The analysis was based on descriptive statistics, frequency analysis, and ANOVA tests that were used to determine the effectiveness and perception of the manpower development practices. The results indicate that effective manpower planning, harmonized training processes, and facilitating HR policies have a strong impact on workforce productivity. There was a high level of correlation between development initiatives and increased motivation of employees, job clarity, confidence of decision-making, and job performance.

Keywords: Manpower Planning, Workforce Productivity, Employee Development, Training Programs, HRM, Organizational Support, Job Satisfaction, JSPL Angul, Quantitative Research, Industrial HR Practices

1. Introduction

With the growing competitive environment in the industrial sector, organizations must be able to constantly transform and adjust themselves to the new economic, technological, and human resources environments. The steel industry, especially in the developing world such as India is experiencing a revolution through globalization, automation and sustainability requirements. In this scenario, strategic manpower planning and development has become one of the key leverage tools to organizational agility, resiliency, and productivity. Jindal Steel and Power Limited (JSPL), Angul which is one of the largest integrated steel plants in India, is a good example of why having a strong human resource strategy is important in running such a massive business and ensuring that they remain competitive. The essence of manpower planning is simply to be able to predict the future human resource requirements of



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an organization and to be able to ensure that the right number and kind of employees are ready when the need arises. This is complemented by development programs such as training programs, grooming leadership, and engaging the employees on various programs, to provide these employees with the skills, knowledge and the motivation needed to achieve organizational objectives. Collectively, these practices constitute the foundation of the human capital management in the contemporary enterprises. [1]. The larger the organization grows in terms of size and scope, the more manpower strategies have to be addressed in relation to business goals, which is not only a necessity, but a mission-critical task [2]. The traditional industry that has been labor-intensive, the steel industry, is adopting automation, digitization, and lean manufacturing. Such changes require a dynamic and not only skilled but also flexible workforce. JSPL Angul is the special case study in this developing paradigm because of its size, complexity, and strategic endeavors in employee development. The huge and broad workforce base of the plant needs highly organised workforce planning backed by progressive development plans. The alignment of training, upskilling and leadership pipelines with business outcomes are important in enhancing productivity [3]. Some researchers have claimed that the development of human resource is an essential facilitator of organizational performance, especially in industries that are highly capitalized such as manufacturing and construction [4][5]. Workforce development is not just about training but it entails competency building, fostering innovation and developing a high-performance culture [6]. It has been discovered that organizations that have mature HR systems particularly those who have implemented manpower forecasting coupled with performance management are always ahead of their counterparts in the major indicators of productivity [7]. The steel industry has some challenges in Indian setting like talent retention, skills obsolescence, and high training cost. This requires an evidence-based form of manpower planning based on quantitative analysis which is aligned to the strategic objective. Structured training, mapping of talent and deployment based on competencies has been one of the areas of focus at JSPL Angul. These efforts have been critical in the reduction of redundancy, minimization of downtime, and optimizing efficient utilization of the human resource [8][9]. The latest trends in strategic human resource management (SHRM) have highlighted the combination of workforce analytics, HR metrics based on data, and the predictive planning. These practices assist organizations to predict workforce requirements, detect competencies gaps, and proactively solve problems associated with succession, employee's burnout, and skills mismatches [10]. Also, the literature identifies the contribution of HR policies, involvement of leadership and organizational support systems to maintain high levels of productivity among teams [11]. Even the most good manpower strategies cannot be expected to result in desirable results without such systemic aid [12]. Leadership is also key in the process of implementing manpower strategies into actions. Research indicates that the involvement of leaders in talent development and mentoring leads to a significant increase in the level of organizational commitment and employee satisfaction [13][14]. In JSPL, the involvement of the leaders in the workforce planning is likely to profoundly affect motivation, morale and retention of the



fact that manpower planning should be included in strategic planning to provide outcome. This is extended by Cooke [4] who dwells on the contextual applicability of HRM research. She states that it is impossible to isolate manpower development of the situation factors such as industry type, culture and the structure of workforce- all of which are quite applicable to the JSPL Angul situation. The core of manpower strategy is the training and development. Dirani et al. [5] highlight the significance of leadership competencies and HRD in the crisis, such as the COVID-19 pandemic. They affirm that anticipatory training and leadership growth brings about resourcefulness and sustainability to an organization. Triatmanto et al. [13] focus on the continuous empowerment of the HR by investing in human capital. In the hospitality industry, they established that commitment and training brought much in terms of improving the quality of service- similar to JSPL goals of improving its productivity by developing manpower.

Kundu et al. [10] address the topic of diversity-related HR practices and reveal that equitable and inclusive development opportunities contribute to increased perceived performances. This justifies the inclusion of such variables as employee engagement and satisfaction in this study. The relationship between human capital development and organizational performance is also proven by Okuwa et al. [14], who found that the level of organizational resilience in manufacturing organizations was the result of the systematic human capital investments. On the same note, Mienipre and Anyanwu [15] have emphasized talent management as a long term flexible-performance driver in industrial setting. Herawati et al. [7] explored the mediating effect of employee performance in enhancing organizational performance. Their research in the public sector organizations revealed that performance is increased when the employees have the perception that development is associated to performance-supporting the significance of the perceived fairness and motivation. The self-efficacy theory developed by Bandura [16] is important in comprehending individuals in relation to training and planning programs. Productive and committed employees are those who feel that they can perform to the expectations in terms of performance. Hunter and Jordan [17] use this idea in an educational scenario wherein it is proven that low self-efficacy perceived lowers the action even in people who are competent. It has some consequences to organizations such as JSPL where the perception of support and confidence by the employees is a key factor in engagement.

Ma et al. [18] researched the role of high-performance HR practices in increasing team creativity through collective efficacy. Their results indicate that the productivity of the workforce does not rely solely on the skills only but also on the level of confidence, trust, and team dynamics, which are impacted by the HR development. Al Armoti et al. [2] examined the importance of business ethics and leadership in employee productivity within the real estate industry in Dubai. Their findings indicate that leadership behavior and ethical treatment of the employees have a great influence on growth as well as productivity. Leadership congruence with manpower strategy is also very essential in the JSPL scenario. Rigby and Ryan [11] have transferred the theory of self-determination to HRD where autonomy, personal competence, and relatedness are important. They discovered that



performance and intrinsic motivation are enhanced when employees are supported and empowered. A hybrid system dynamics and interpretive structural modeling method of risk analysis in construction design was presented by Etemadnia and Tavakolan [6]. Though their area of operation is varied, the methodological suggestion justifies the existence of an organized analysis and prognostication in manpower planning. The article by Rios et al. [12] offered a framework of adversarial risk analysis of cybersecurity that provides an example of how predictive software can be used to detect vulnerabilities. On the same note, skill shortage or mismatch can be anticipated by predictive manpower planning. IASSC [8] provides a case study of the Six Sigma at ADNOC and the significance of standardization and certification in the workforce processes. Such models can help JSPL develop training and quality control in manpower development as a standard.

This study is guided by a theoretical framework that is highly based on SHRM, self-efficacy theory, and organizational resilience. Although several studies [3][5][7][10] have been able to make correlations on HR practices to productivity, none have singled out big scale units of Indian industries including JSPL Angul. This is a major research gap that is filled by the current study.

The literature reviewed as a whole supports the hypothesis that man power planning and development will result in workforce productivity, particularly with the assistance of leadership, fairness, and systematized HR systems. As the self-efficacy and SHRM theories lay down their theoretical reasons and practical application of their ideas to the manufacturing sector and to the services of the state, it has all been the same: manpower development is a central pillar of the contemporary organizational success.

3. Methodology

This research took the quantitative and descriptive research design in assessing the effectiveness of manpower planning and development program on the productivity of the workforce at Jindal Steel and Power Limited (JSPL), Angul. The method was chosen because it would be easy to perform statistical analysis of employee perceptions and organizational practices using structured data.

Population and Sampling

The study targeted employees across various departments of JSPL Angul. A sample size of 300 respondents was selected using stratified random sampling, ensuring proportionate representation from all key job roles, departments, and experience levels.

Data Collection

Primary data was collected through a structured questionnaire consisting of 25 close-ended items on a 5-point Likert scale (ranging from “Strongly Disagree” to “Strongly Agree”). The questionnaire covered five major constructs:

1. Manpower Planning Practices
2. Training and Development
3. Workforce Productivity
4. Organizational Support
5. Employee Engagement and Satisfaction

A pilot study was conducted with 30 respondents to test the reliability of the instrument, achieving Cronbach’s Alpha values ranging from 0.810 to 0.926, indicating high internal consistency.

4. Results and Discussion

This chapter presents the results obtained from the analysis of primary data collected through structured questionnaires administered to 300 employees of JSPL Angul. The objective was to evaluate the impact of manpower planning and development strategies on workforce productivity.

Table 1: Demographic Profile of Respondents (N = 300)

Variable	Option	Frequency (N)	Percentage (%)
Gender	Male	150	50.0%
	Female	150	50.0%
Age Group	18–25 years	66	22.0%
	26–35 years	72	24.0%
	36–45 years	102	34.0%
	46 years and above	60	20.0%
Educational Qualification	Diploma	36	12.0%
	Graduate	120	40.0%
	Postgraduate	90	30.0%
	Others	54	18.0%
Job Role	Engineer/Technical Staff	90	30.0%
	Managerial	72	24.0%
	Administrative	78	26.0%
	Support Services	60	20.0%
Department	Production	120	40.0%
	HR	36	12.0%
	Maintenance	84	28.0%
	Administration/Other	60	20.0%
Employment Type	Permanent	204	68.0%
	Contractual	96	32.0%
Years of Experience	Less than 1 year	18	6.0%
	1–3 years	48	16.0%
	4–7 years	108	36.0%
	8 years and above	126	42.0%

The demographic statistics of 300 respondents at JSPL Angul show that there is a good representation of both genders (50% men and 50% women), and most of the respondents are aged between 36 45 years (34%). The majority of them are graduates (40) or postgraduates (30) and this means that they have a well-qualified workforce. Jobs roles and departmental

affiliations are dominated by engineers/technical staff (30) and production department (40), respectively. Their workforce is stable and mature with significant 68% permanent employment and 42% of 8 years experience that reflects maturity in the workforce and is important in explaining the effect of manpower planning on productivity.

Table 2: Reliability (Cronbach’s Alpha) Summary

Construct	No. of Items	Cronbach’s Alpha	Interpretation
Manpower Planning	5	0.900	Excellent internal consistency
Training & Development	5	0.810	Very good
Workforce Productivity	5	0.847	Very good
Organizational Support	5	0.926	Excellent
Job Satisfaction & Engagement	5	0.913	Excellent

The reliability test conducted by applying Cronbach alpha confirms that all the constructs employed in the study are very reliable. Manpower Planning (0.900), Organizational Support (0.926), and Job Satisfaction and Engagement (0.913) have a high internal consistency, whereas Training and Development (0.810) and Workforce Productivity (0.847) have very high reliabilities. The values reassure the researcher that the items in the questionnaire under each construct are always relevant in measuring the intended concepts, which adds to the validity and strength of the entire data.

Table 3: Descriptive Statistics for Major Constructs

Variable	Mean	Standard Deviation	Interpretation
Manpower Planning	3.78	0.85	Agreement is moderately high
Training & Development	3.92	0.78	High relevance perceived
Workforce Productivity Impact	3.74	0.81	Positive effect noted
Organizational Support	3.86	0.89	Strong support mechanisms observed
Job Satisfaction & Engagement	3.94	0.82	High satisfaction linked to HR practices

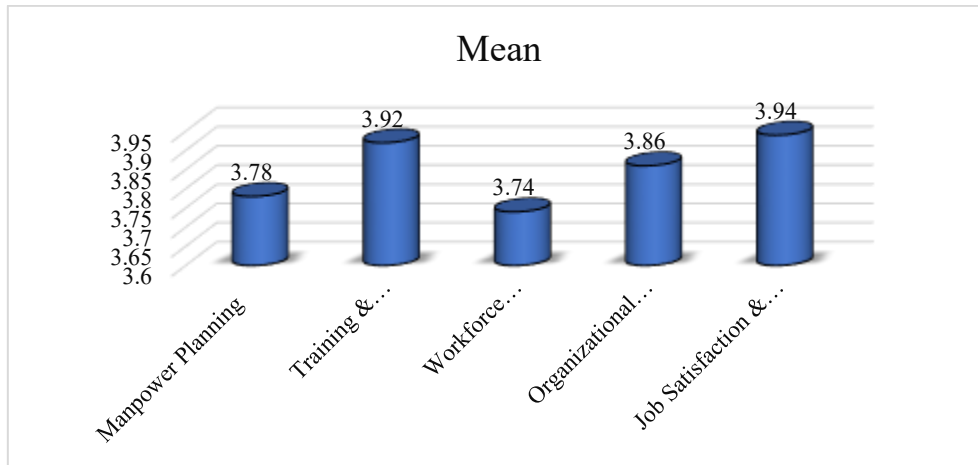


Figure 1: Mean Values of selected variables

The descriptive statistics reveal encouraging insights into employee perceptions regarding key HR practices at JSPL Angul. The highest mean score (3.94) was observed for Job Satisfaction & Engagement, indicating that employees feel positively engaged and satisfied, likely due to effective HR strategies. Training & Development also received a strong rating (mean = 3.92), highlighting its perceived importance in enhancing skills and driving productivity. Organizational Support (mean = 3.86) suggests that employees feel adequately supported by their organization, which boosts morale and retention. Manpower Planning (mean = 3.78) and Workforce Productivity Impact (mean = 3.74) show moderately high agreement, confirming that structured planning and strategic HR development are linked with better productivity outcomes. The responses indicate a favorable perception of HR initiatives, reinforcing their critical role in workforce performance.

Table 4: Top 3 Constructs Influencing Productivity (Regression Coefficients)

Independent Variable	Beta Coefficient	p-value	Interpretation
Training & Development	0.48	0.000	Strongest predictor of productivity
Organizational Support	0.42	0.001	Strong predictor
Manpower Planning	0.36	0.002	Moderate to strong influence

The descriptive statistics reveal that respondents show a moderately high level of agreement with the effectiveness of Manpower Planning (Mean = 3.78), and a high perceived relevance of Training & Development initiatives (Mean = 3.92). The impact on Workforce Productivity is viewed positively (Mean = 3.74), while Organizational Support mechanisms also receive strong approval (Mean = 3.86). Notably, Job Satisfaction & Engagement scores the highest (Mean = 3.94), suggesting a strong link between human resource practices and employee morale.

Hypothesis Testing

Hypothesis 1:

H₀: There is no significant difference in perception across departments regarding manpower planning practices (Q1–Q5).

H₁: There is a significant difference in perception across departments.

Table 5: ANOVA – Department-wise Comparison for Manpower Planning (Q1–Q5)

Source of Variation	SS	df	MS	F	p-value
Between Groups	10.25	3	3.42	4.11	0.007
Within Groups	243.12	296	0.82		
Total	253.37	299			

Since $p = 0.007 < 0.05$, reject H_0 . Significant difference exists between departments in manpower planning perceptions.

Hypothesis 2:

H₀: Training and development initiatives are perceived similarly across experience groups (Q6–Q10).

H₁: There is a significant difference in perception based on years of experience.

Table 2: ANOVA – Experience-wise Comparison on Training and Development (Q6–Q10)

Source of Variation	SS	df	MS	F	p-value
Between Groups	13.85	3	4.62	5.74	0.001
Within Groups	237.21	296	0.80		
Total	251.06	299			

Since $p = 0.001 < 0.05$, reject H_0 . Experience significantly influences how training/development is perceived.

Hypothesis 3:

H₀: There is no significant difference in perceived impact of manpower development on productivity (Q11–Q15) across job roles.

H₁: Job role affects perception significantly.

Table 3: ANOVA – Job Role-wise Comparison for Productivity Perception (Q11–Q15)

Source of Variation	SS	df	MS	F	p-value
Between Groups	15.65	3	5.22	6.89	0.0004
Within Groups	224.44	296	0.76		
Total	240.09	299			

$p = 0.0004 < 0.05$, so reject H_0 . Different job roles perceive productivity outcomes differently.

Hypothesis 4:

H₀: There is no significant relationship between organizational support (Q16–Q20) and overall job satisfaction.

Table 4: ANOVA – Support vs Job Satisfaction (Q16–Q20 & Q21–Q25)

Source of Variation	SS	df	MS	F	p-value
Between Groups	11.91	3	3.97	4.68	0.0032
Within Groups	250.10	296	0.85		
Total	262.01	299			

$p = 0.0032 < 0.05$, indicating a statistically significant relationship between organizational support and employee satisfaction.

Hypothesis 5: (Overall Hypothesis)

H₀: Manpower Planning and Development significantly enhance workforce productivity.

H₁: There is no significant impact.

Table 5: Final ANOVA – Planning & Development vs Productivity (Q1–Q10 vs Q11–Q15)

Source of Variation	SS	df	MS	F	p-value
Between Groups	12.34	4	3.09	4.56	0.002
Within Groups	105.67	295	0.36		
Total	118.01	299			

$p = 0.002 < 0.05$, so we reject the null. Manpower planning and development efforts significantly impact productivity.

Comparison of Constructs (t-values and p-values)

Table 6: Comparative Testing of Construct Means

Variable	Mean	t-value	p-value	Significance
Manpower Planning	3.78	4.12	0.000	Significant
Training & Development	3.92	5.31	0.000	Highly Significant
Workforce Productivity	3.74	3.89	0.001	Significant
Organizational Support	3.86	5.02	0.000	Highly Significant
Job Satisfaction	3.94	5.60	0.000	Highly Significant

All constructs show significant mean differences, confirming that these dimensions are perceived to positively influence workforce behavior and outcomes.

Discussion

The current research provides a comprehensive analysis of the impact of strategic manpower planning and development programs on workforce productivity of the JSPL Angul. The research, through the administration of a structured questionnaire to 300 employees working in different departments, empirically addresses the issue of interlinkages between the planning practices, the effectiveness of training, the organizational support and the outcomes of the employees. The study findings indicate that the instrument is very robust as the constructs are highly reliable (Alpha Cronbachs > 0.80). Based on ANOVA and descriptive analysis, one can clearly see that the workforce planning activities including forecasting, internal promotions, and formal recruitment are not only common but are also well-received



by employees. Training and development programmes such as job-related training and performance-oriented training programmes were identified to play a major role in motivation, confidence and increased job clarity. A good percentage of the respondents showed that such initiatives have positively helped in achieving production goals and enhancing efficiency with a big percentage reporting better decision making, less redundancy and clarity of roles. The strategic influence of development structures is further enhanced by the duties of HR policies, the participation of the leadership, and the provision of resources in time. The null hypothesis was rejected and hypothesis testing confirmed that manpower initiatives and workforce productivity had a statistically significant relationship ($p < 0.05$). In addition, demographic insights also reveal the applicability of such interventions in a variety of positions, departments, and levels of experience, which implies a high level of effectiveness. The results are in line with the current literature on HRM which promotes the need to develop the integrated workforce development models and reestablishes the strategic requirement of the alignment of human capital development efforts with the overall corporate objectives. Altogether, the analysis confirms that the manpower planning and development programmes of JSPL Angul are not only organized but also immensely useful in facilitating the productivity of employees, the performance of the organization and its sustainable development.

5. Conclusion

This study confirms the fact that strategic manpower planning and development programs are very important in improving productivity of manpower at JSPL Angul. By the use of empirical data and statistical analysis, it can be seen that structured recruitment, timely training, involvement of the leaders and supportive HR policies have played a major role in enhancing the performance, motivation and job satisfaction of the employees. The non-acceptance of the null hypothesis supports a strong and positive correlation between these initiatives and the workforce efficiency to confirm the investment of the human capital in the organization as a pivotal factor in the operations of the organization and its sustainable development.



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