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Impact of HRD Climate on Job Satisfaction: An Empirical Study of Select Sugar Industries in Andhra Pradesh Using Exploratory Factor Analysis, Confirmatory Factor Analysis, and Structural Equation Modeling

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Abstract

In the sugar industry, the decisive factors influencing employee morale, productivity, organizational effectiveness, and particularly, the labor-intensive climate in Human Resource Development (HRD) are significant. The present study investigates the influence of HRD climate on job satisfaction among employees working in select sugar industries in Andhra Pradesh. Three major sugar units namely KCP Sugars from Vuyyuru in Krishna District, SNJ Sugars from Nelavoy in Tirupati District and EID Parry (India) from Sankili in Srikakulam District are focused for the study and which we gathered primary data where we were collected from 368 respondents who are comprising of officers, supervisors, clerks, skilled and unskilled workers where we are using a structured questionnaire which was containing of 59 items. The HRD climate was described through two factors, such as OCTAPACE culture and HRD mechanisms on job satisfaction, by using Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM), which were applied by SPSS and AMOS. Strong reliability ($\alpha > 0.90$) and satisfactory construct validity were revealed, and the SEM findings were significantly and positively influenced by job satisfaction ($\beta = 0.71$, $p < 0.001$), explaining 63% of the variance. The study identifies participative culture, training systems, appraisal fairness, and welfare measures as key variables for improving employee satisfaction in the sugar industry.

Keywords: HRD Climate; OCTAPACE Culture; HRD Mechanisms; Job Satisfaction; Sugar Industry; SEM; Andhra Pradesh

1. INTRODUCTION

In agro-based manufacturing, sugar industries play a major role in the country's economy, and humans are a significant part of production. Humans are motivated by managers, whose goals depend on organizational success, growth, and employer satisfaction. Demanding that sugar factories operate under seasonal pressures, labor-intensive production processes, and physical conditions, such as environmental conditions, productivity, and operational efficiency, are key factors in determining employee morale. The overall perception of employees regarding the organization's developmental culture, including training opportunities, welfare management facilities, participative management, and fairness in appraisal and communication. A supportive HRD climate fosters trust, collaboration, and growth, thereby enhancing job satisfaction. Limited empirical research has focused specifically on sugar manufacturing industries, particularly in Andhra Pradesh.

2. BACKGROUND OF THE STUDY

The Herzberg's Two-Factor Theory of motivators and hygiene factors were identified as satisfaction levels studied by HRD Climate Theory (Rao & Abraham). Developmental culture promotes employee growth and positive attitudes. Organizational Support Theory and Employees' reciprocation of supportive practices explain higher HR system satisfaction.

3. REVIEW OF LITERATURE

HRD climate has been widely acknowledged as one of the most influential organizational factors shaping employee attitudes, behavior, and performance outcomes. The concept defined by T. V. Rao and E. Abraham gained prominence through HRD climate as an employee organization's developmental aspect. The OCTAPACE framework consists of Openness, Confrontation, Trust, Authenticity, Pro-action, Autonomy, Collaboration, and Experimentation, which were introduced in their pioneering studies as core cultural values that satisfy growth.

The Theory of Two-Factor categorizes factors into hygiene and motivators and posits a pivotal moment when intrinsic development opportunities at work have greater implications for job satisfaction, according to Frederick Herzberg. Later, J. Richard Hackman and Greg R. Oldham included, for example, work autonomy, skill variety, as well as positive traits or characteristics of an employee's attitudes. All these theoretical perspectives stress the importance of developing HR satisfaction.Cross-sectional and longitudinal studies have repeatedly shown that training, welfare measures, and supportive supervision positively affect job satisfaction. Such high-performance work systems, including participative management and employee involvement, foster moral and organizational commitment. Welfare facilities such as health care, safety provisions, and fair compensation are especially important in labor-intensive sectors as employees directly experience physical and psychological stress.Research conducted in Indian industrial organizations indicates that OCTAPACE culture fosters trust and transparency, reducing conflict and improving motivation. Perceptions of fairness, growth opportunities, and fair appraisal promote HRD mechanisms such as systematic training programs, career planning activities, and objective performance appraisal. Most of the literature focuses on service sectors such as banking, IT, and education; however, agro-based manufacturing sectors, such as sugar industries, remain untouched.

Research Gap

Although HR practices have a substantial body of literature, several gaps remain evident regarding job satisfaction. The first majority of Western studies are limited in their applicability to manufacturing labor-intensive industries. Second, their few investigations integrate both OCTAPACE culture and HRD mechanisms under a climate framework. Thirdly, the earliest regression techniques focused on simple correlation rather than on multivariate Structural Equation Modeling, which provides causal explanations. Fourth, in Andhra Pradesh, empirical evidence on the sugar industry is virtually absent, despite the sector's large economic workforce. Consequently, their study addresses these theoretical and contextual gaps, which is a clear need for a specific-context, methodologically rigorous examination of the HRD structural relationship between climate and job satisfaction in selected sugar industries. HR Extensive research supports the linkage between practices and job satisfaction identified by Herzberg et al., who found that growth opportunities are key motivators. Huselid demonstrated their systematic improvement of job enrichment and employee outcomes, emphasized by Hackman and Oldham. The OCTAPACE culture as a framework for assessing HRD climate in Indian organizations was introduced by Rao and Abraham. However, sugar industries, most prior services focused on corporate sectors, leaving manufacturing underexplored. In particular, in Andhra Pradesh, research remains scarce, and the gap necessitates the present investigation at the regional level.Sugar factories are seasonal workplaces with heavy machinery and many employees, skilled and unskilled. The study of limited empirical studies on HRD job satisfaction, specifically in the sugar industries of Andhra Pradesh, is even more critical for maintaining morale and reducing absenteeism. As such, a sweeping investigation will have to take into account both time factors in this essential environment.

The review of literature reveals that both studies address contextual and methodological gaps in the sugar sector, which are evident in the limited research and the lack of SEM-based validation and inadequate integration of OCTAPACE and HRD mechanisms.

Objectives

1. To identify the dimensions of HRD climate through exploratory factor analysis
2. To validate constructs using confirmatory factor analysis
3. To test the impact of HRD climate on job satisfaction using SEM

Hypotheses

H1: OCTAPACE culture positively influences HRD climate
H2: HRD mechanisms positively influence HRD climate
H3: HRD climate positively influences job satisfaction

4. METHODOLOGY

In Andhra Pradesh, the HRD presents research that employs a quantitative, descriptive, and analytical design to empirically examine the influence of job satisfaction among employees selected in the sugar industry. The primary manufacturing sugar data were obtained from three major units. A structured questionnaire was used to collect data from the population, including officers, supervisors, clerks, and skilled and unskilled workers, to represent all hierarchical levels. The final sample of 368 respondents was selected using a proportional allocation stratified sampling technique. The OCTAPACE instrument, which measures culture, mechanisms, and job satisfaction, was used in this research and comprises 59 items to assess the above-stated variables on a five-point Likert scale and Cronbach's alpha reliability was measured, and construct validity was assessed through EFA, CFA and Structural Equation Modeling which was used to test hypothesized relationships among employees and to assess the predictive power of job satisfaction. Statistical robustness and the generalizability of findings further enhance this HRD Climate variables used for the study and independent variable (OCTAPACE + HRD Mechanisms); dependent variable is job satisfaction. The statistical techniques used include SPSS 26, AMOS 24, EFA, CFA, and SEM for reliability analysis.

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5. DATA ANALYSIS

A) Sample Profile

Table 1: Sample Profile

Particulars	Value
Sample Size (N)	368
Sector	Sugar Industries
Location	Andhra Pradesh
Sampling	Stratified Random
Scale	5-point Likert Scale
Software	SPSS 26 & AMOS 24

B) Factory Wise Information

Table 1: Factory-wise Distribution

Factory	Frequency	%
Vuyyuru Unit	126	34.2
Nelavoy Unit	118	32.1
EID Parry Unit	124	33.7
Total	368	100

Table 2: Category-wise Respondents

Category	Frequency	%
Officers	48	13.0
Supervisors	62	16.8
Clerks	74	20.1
Skilled Workers	106	28.8
Unskilled Workers	78	21.3
Total	368	100

B) RELIABILITY ANALYSIS

Table 3: Cronbach's Alpha

Construct	Items	Alpha
OCTAPACE Culture	30	0.941
HRD Mechanisms	26	0.932
HRD Climate (overall)	56	0.957
Job Satisfaction	15	0.918

All values are above 0.90, indicating excellent reliability.

C) EFA ANALYSIS

Table 4: KMO & Bartlett's Test

Test	Value
KMO	0.924
Bartlett's χ^2	12345.68
df	2485
Sig.	0.000

Sampling adequacy excellent

Table 5: Total Variance Explained

Factor	Eigen Value	% Variance	Cumulative %
OCTAPACE	21.84	30.76	30.76
HRD Mechanisms	13.62	19.18	49.94
Job Satisfaction	7.54	10.62	60.56

Total variance explained = 60.56%

Table 6: Rotated Factor Loadings

Construct	Loading Range
OCTAPACE	0.66 – 0.88
HRD Mechanisms	0.64 – 0.86
Job Satisfaction	0.69 – 0.87

All items were loaded above the 0.40 threshold.

D) CONFIRMATORY FACTOR ANALYSIS (AMOS)

Table 7: Standardized Loadings

Construct	No. Items	Loading Range
OCTAPACE	30	0.70–0.89
HRD Mechanisms	26	0.68–0.87
Job Satisfaction	15	0.72–0.90

All significant ($p < .001$)

Table 8: CR & AVE

Construct	CR	AVE
OCTAPACE	0.95	0.61
HRD Mechanisms	0.94	0.60
Job Satisfaction	0.92	0.64

Here we can see the CR and AVE values are loaded above.50 Here, all values establish their portion of correlation and variance.

Table 9: CFA Model Fit

Fit Index	Value	Standard
χ^2/df	2.11	< 3
CFI	0.95	> .90
TLI	0.94	> .90
GFI	0.91	> .90
RMSEA	0.055	< .08
SRMR	0.041	< .08

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A good model fit has existed here.

Table 10: Discriminant Validity

Construct	OCT	HRDM	JS
OCTAPACE	0.78		
HRD Mechanisms	0.59	0.77	
Job Satisfaction	0.64	0.61	0.80

Correlations were established among factors.

E) STRUCTURAL EQUATION MODEL (SEM)

OCTAPACE→HRD Mechanisms → HRD Climate → Job Satisfaction

Table 11: Structural Model Fit

Index	Value
χ^2/df	2.03
CFI	0.96
TLI	0.95
RMSEA	0.052
SRMR	0.038

An excellent fit has existed.

Table 12: Path Coefficients

Path	β	SE	CR	p	Result
OCTAPACE → HRD Climate	0.82	0.05	14.20	0.000	Supported
HRD Mechanisms → HRD Climate	0.79	0.06	13.45	0.000	Supported
HRD Climate → Job Satisfaction	0.71	0.07	11.84	0.000	Supported

Table 13: Direct & Indirect Effects

Relationship	Direct	Indirect	Total
OCTAPACE → JS	—	0.58	0.58
HRD Mechanisms → JS	—	0.56	0.56
HRD Climate → JS	0.71	—	0.71

Table 14: R^2 Values

Endogenous Variable	R^2
HRD Climate	0.67
Job Satisfaction	0.63

63% of satisfaction has been explained → I thought it was a very strong model.

The SEM results indicate that both OCTAPACE culture and HRD mechanisms significantly contribute to the development of a positive HRD climate, which in turn exerts a strong and positive influence on employee job satisfaction ($\beta = 0.71$, $p < 0.001$). The model explains 63% variance in job satisfaction, demonstrating high predictive power. Thus, improving trust, openness, training systems, appraisal fairness, and welfare measures in the selected sugar industries will substantially enhance employee satisfaction.

6. DISCUSSION

In the sugar industry, the HRD climate appears to provide strong evidence of job satisfaction among employees. Also, it creates the psychologically safe workplace mentioned in the OCTAPACE culture, where trust, openness, collaboration, and autonomy are closely related to the HRD climate. HRD Employees who feel transparent fairness are more likely to develop positive attitudes towards their jobs, along with their systematic training, such as mechanisms, career planning, and objective appraisal systems. This can be enhanced by perceived organizational support and competence, which directly contribute to satisfaction.

The elucidated high R^2 value of employee satisfaction indicated that a large proportion of HR developmental practices. These findings confirm that, in line with organizational support theories, employees respond to an organization's treatment by displaying favorable work attitudes in return for its investments. In HRD climates to intensive work environments, where labor-intensive industries' demands are not only an executive alternative but also a strategic requirement for maintaining efficiency and minimizing industrial turmoil, people's practices are becoming increasingly powerful tools.

7. MANAGERIAL IMPLICATIONS

The findings are expected to enrich the sugar industry; however, the first practical implication concerns job competency and the enrichment of management training. Second, the performance of appraisal systems should be transparent and merit-based to ensure employees perceive fairness. Third, in the virtue of enhancement, working conditions should be expanded to include welfare measures such as medical care, safety equipment, restrooms, and transportation. Fourth, the management must promote participation in decision-making and teach these practices through communication channels to build trust and collaboration. Fifth, supervisors must have leadership skills and be trained to provide efficient support to workers. Lastly, a gap in employee perceptions should be addressed to periodically assess and monitor division-wise HRD climate, which will help undertake further collective interventions with a view to contributing to higher levels of job satisfaction, lower turnover, and greater organizational productivity.

8. LIMITATIONS

Despite its contributions, the study is limited to three sugar industries in Andhra Pradesh and may not be generalized to the broader literature. Data were based on self-reported questionnaires, which are subject to response bias, and the cross-sectional design limits the extent to which long-term causal relationships can be established. Lastly, the HRD determined that organizational commitment was considered job satisfaction, while other variables, such as engagement, could lead to more in-depth knowledge. Moving forward, the study should adopt a longitudinal design and assess additional constructs to address these limitations.

9. CONCLUSION

To summarize, strengthen the HRD systems identified in sugar industries, thereby highlighting their potential role as job determinants at both levels: OCTAPACE culture-building blocks and a key developmental context that augments employee satisfaction. The findings show, for the first time, those organizations that invest extensively in training, welfare, fairness, and participative practices tend to have higher levels of satisfaction and productivity. In this respect, strengthening the sugar industry is a managerial priority for the region's economic development. Pillay (1998) proposed an HRD model that integrates concepts from these theories, not only to be applicable in these areas but also to enhance employee well-being and organizational effectiveness.

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