The Dual-Aspect of Human Capital in the Agro-Industrial Sector: A Comparative Synthesis of Engagement and Retrenchment Strategies at Doiwala Sugar Mill

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Abstract

In the contemporary agro-industrial landscape, organizations face the dual necessity of maximizing human potential while maintaining structural agility through strategic workforce rationalization. This review synthesizes two research papers centered on the Doiwala Sugar Mill (DSCL) in Uttarakhand, India. Both studies utilize the Best-worst Method (BWM) to prioritize decision-making criteria- one focusing on the drivers of Employee Engagement (EE) through the WeThrive 4C framework, and the other examining the determinants of Employee Retrenchment grounded in Resource spectrum, this paper identifies a "Capability- Stability Paradox." The results indicate that technical proficiency is the primary driver for engagement, whereas external economic and regulatory pressures dictate downsizing logic. This synthesis provides a holistic framework for sustainable labor management in traditional manufacturing environments.

Keywords: Best-Worst Method (BWM); Employee Engagement; Retrenchment; Agro-Industry; Multi-Criteria Decision Making (MCDM); Uttarakhand.

Introduction:

The agro-industrial sector forms the backbone of emerging economies, serving as a critical nexus between agrarian rural landscapes and urban industrial market demands. Within the Indian subcontinent, the sugar industry stands as the second-largest agro-based enterprise, surpassed only by textiles. It holds deep socio economic significance by supporting the livelihoods of millions of sugarcane farmers, agricultural laborers, and industrial workers. Far beyond acting as simple manufacturing units, sugar processing facilities- particularly legacy public and cooperative mills like the Doiwala Sugar Mill (DSCL) in the Uttarakhand region – Function as foundational social institutions. They anchor regional development, inject capital into rural ecosystem, and establish structural employment in geographically isolated domains.

However, the operating environment of these processing units is defined by intense structural volatility. Unlike standard manufacturing processes that benefit from consistent, year-round input streams and predictable labor needs, the sugar industry is fundamentally tied to the natural biological life cycles of sugarcane cultivation. This dependency forces an intese operational duality divided into primary phases: a high-intensity "crushing season" and an elongated, capital-draining "off-season".

The sugar industry in India represents a complex intersection of agrarian tradition and modern industrial demands. Mills like the DSCL are not merely production units but social institutions that support thousands of livelihoods in the Uttarakhand region. However, the operational reality of these mills is characterized by extreme seasonality and resource volatility. During the crushing season, the demand for a highly motivated, technically skilled workforce is paramount. Conversely, during periods of resource scarcity or economic downturn, management must navigate the ethically and operationally fraught process of retrenchment. During the lean months, the sudden halt in raw material supply shifts organizational priorities toward equipment maintenance, capital preservation, and fiscal survival. This sharp cyclical transition creates a severe management paradox, forcing leadership to continuously balance the need for high employee engagement against the harsh economic realities that can trigger workforce retrenchment.

This comparative review examines the research work that has systematically mapped these workforce dynamics. By employing the BWM, a sophisticated MCDM tool, their research provides a mathematically grounded ranking of what keeps EE and what factors lead to their separation from the organization. Understanding these two forces is essential for creating a resilient industrial workforce.

Theoretical Foundations:

The WeThrive 4C Framework of Engagement: The study on EE shifts the focus from traditional job satisfaction to a multi-dimensional psychological state. The WeThrive 4C framework categorizes engagement into:

- **Capability:** The perception of having the tools, skills, and knowledge to succeed.
- **Connection:** The sense of social belonging and team cohesion.
- **Confidence:** The mental resilience and psychological safety of the employee.
- **Cognitive:** The clarity of role and alignment with the mill's objectives.

This framework is particularly relevant to DSCL, where the technical nature of sugar production requires employees to feel both physically capable and mentally aligned with high- pressure seasonal goals.

Resource Dependence and Institutional Theories in Retrenchment:

The retrenchment study adopts a macro-organizational lens. Resource Dependence Theory (RDT) posits that DSCL's survival is contingent upon its ability to manage external dependencies, such as the supply of sugarcane and the cost of energy. When these resources are constrained, the organization is forced to adjust its internal labor structure.

Furthermore, Institutional Theory (IT) explains how DSCL, as a state-influenced entity, must comply with regulatory mandates and social expectations. Retrenchment in this context is not a purely economic decision but a balancing act between financial survival and the maintenance of the mill's social "license to operate."

Methodology:

The Best-Worst Method (BWM)

The choice of BWM as the primary analytical tool across both studies is a significant methodological contribution. Traditional MCDM methods, such as the Analytical Hierarchy Process (AHP), often suffer from high inconsistency when a large number of criteria are involved.

The BWM addresses this by requiring the decision-maker to identify only the "Best" (most important) and "Worst" (least important) criteria first. Pairwise comparisons are then made only between the Best/Worst and the remaining factors. This reduces the cognitive load on the experts and results in a more consistent and reliable weighting of factors. In both DSCL studies, the consistency ratios were significantly low, validating the reliability of the expert panel, which consisted of mill managers, technical heads, and academic specialists.

Case Study Analysis:

Doiwala Sugar Mill (DSCL):

DSCL serves as an ideal laboratory for this research due to its heritage status and its integration into the local economy of Uttarakhand. The mill faces a "triple threat" of challenges: aging infrastructure, volatile raw material supplies, and a workforce that is transitioning from traditional manual labor to automated processes.

The case study reveals that the mill's management operates under a "seasonal psychological contract." During the crushing season, the relationship with employees is one of high-intensity collaboration. During the off-season, the

relationship shifts toward maintenance and resource conservation. This duality makes the mill a unique environment where engagement and the threat of retrenchment coexist in a cyclical fashion.

Comparative Discussion of Findings:

The Dominance of Capability:

A profound finding across the synthesis is the role of individual capability. In the engagement study, "Skills" and "Knowledge" were identified as the highest-weighted drivers. Employees at DSCL are most engaged when they feel they have mastery over the complex chemical and mechanical processes involved in sugar production.

In a striking parallel, the retrenchment study highlights "Employee Performance" and "Versatility" as critical filters. This suggests that the same technical mastery that makes a worker feel engaged is also their primary safeguard against downsizing. For the organization, investing in training serves a dual purpose: it increases productivity through engagement and identifies the "core" workforce essential for organizational survival during lean periods.

External Pressures and Regulatory Constraints:

While engagement is largely driven by internal, personal factors, retrenchment is dictated by external forces. The research identifies "Cost Pressures" and "Regulatory Obligations" as the primary triggers for workforce reduction. At DSCL, the influence of the state government and regional agricultural policies means that management cannot act solely on profit-and-loss statements. They must navigate a complex web of labor laws and social responsibility, which often places a "floor" on how much the workforces can be reduced, regardless of economic efficiency.

The Connection-Confidence Nexus:

The engagement study identifies "Team Cooperation" and "Attention" as secondary but vital factors. In the dangerous environment of a sugar mill, where high-pressure steam and heavy machinery are ubiquitous, social connection is not just a "perk"- it is a safety requirement. This social fabric, however, is precisely what is precisely what is threatened by retrenchment. The synthesis suggests that when retrenchment occurs, it damages the "Connection" and "Confidence" of the survivors, potentially leading to a decline in engagement for the remaining workforce.

Qualitative Synthesis and Strategic Implications:

The synthesis of these two research streams leads to the proposal of an **Integrated Labor Lifecycle Model** for the agro-industrial sector.

- **Strategic Cross-Training:** Given that capability is the highest-ranked factor in engagement, management should prioritize multi-skilling. This not only empowers the employee but provides the mill with "Functional Flexibility," allowing them to reassign workers during off-seasons rather than resorting to retrenchment.

- **Transparent Decision-MCDM:** The use of BWM should move from a research tool to a management tool. By making the criteria for both rewards (engagement) and rationalization (retrenchment) transparent and mathematically grounded, DSCL can maintain a sense of fairness and psychological safety.

- **Green Retrenchment and Modernization:** The retrenchment drivers indicate that energy costs are a major burden. Strategic workforce reduction should be linked to technological modernization. As the mill

upgrades to more energy-efficient systems, the workforce should be transitioned through upskilling rather than mere displacement.

Conclusion:

The research conducted by the researcher and her supervisor provides vital roadmap for the survival of traditional industries in a modern economy. Through the application of the Best-Worst Method, they have stripped away the subjective biases often found in HR management, revealing the hard mathematical weights that drive organizational behavior at the DSCL.

The primary conclusion of this review is that engagement and retrenchment are not separate management functions but two sides of the same coin. The "Capability" of the workforce is the bridge between the two. An organization that focuses on building employee skills and knowledge creates a workforce that is more engaged, more productive, and more resilient to the inevitable economic shifts of the sugar industry. For Scopus-level scholarship, this research serves as a definite case study in how MCDM tools can be used to solve the deeply human problems of the industrial workplace.

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