

DIMENSION REDUCTION USING FACTOR ANALYSIS IN SPSS FOR EMPLOYEE ENGAGEMENT SURVEY IN A HEALTHCARE NETWORK

1. Background and Problem Statement

A large private healthcare network in the U.S. conducted a 25-item employee engagement survey across its administrative, nursing, and technical staff. Despite high response rates, the HR analytics team found the interpretation of the data difficult due to overlapping constructs. The leadership requested a concise set of dimensions that could summarize the underlying drivers of employee engagement to guide future policy design. The goal was to reduce redundancy and derive meaningful latent variables using factor analysis in SPSS.

2. Objectives

- To reduce the number of observed variables into fewer, interpretable underlying constructs using factor analysis
- To uncover the latent factors that explain the majority of variance in employee engagement scores
- To develop a structured and validated factor model for further organizational benchmarking
- To assist HR leaders in identifying actionable areas for employee engagement improvement

3. Methodology

3.1 Data Overview

- Dataset: 1,200 responses from full-time employees
- Instrument: 25-item Likert-scale survey (1 = Strongly Disagree to 5 = Strongly Agree)
- Sections covered: Communication, Leadership Trust, Recognition, Role Clarity, Work-Life Balance, Growth Opportunities

3.2 Factor Analysis Approach

- Tool: SPSS

- Initial Analysis: Kaiser-Meyer-Olkin (KMO) Test = 0.912; Bartlett's Test of Sphericity = $p < 0.001$
- Extraction Method: Principal Axis Factoring (PAF)
- Rotation Method: Varimax
- Factor Retention Criteria: Eigenvalues > 1 , scree plot inflection, and theoretical interpretability

4. Results

Factor Structure (6 retained factors):

1. **Leadership Trust** – Explained 24.3% of variance
 - Items: “I trust my supervisor,” “Leadership communicates transparently,” etc.
2. **Role Clarity and Autonomy** – 15.1% of variance
 - Items: “My responsibilities are well-defined,” “I have autonomy at work,” etc.
3. **Recognition and Feedback** – 11.7% of variance
 - Items: “My efforts are recognized,” “I receive regular feedback”
4. **Work-Life Balance** – 9.8% of variance
 - Items: “I am able to disconnect after work,” “My workload is manageable”
5. **Team Collaboration** – 8.4% of variance
 - Items: “My team collaborates well,” “I can rely on my colleagues”
6. **Growth and Development** – 6.9% of variance
 - Items: “I have access to learning opportunities,” “I see a future at the organization”

Model Fit and Reliability

- Total Variance Explained: 76.2%
- All communalities > 0.5
- Cronbach's alpha for each factor ranged from 0.81 to 0.89, indicating strong internal consistency

5. Interpretation and Insights

- **High-impact Areas:** Leadership trust and role clarity emerged as top predictors of engagement.
- **Overlapping Constructs:** Two items cross-loaded on both Leadership and Feedback dimensions, requiring content revision.
- **Redundant Items Identified:** 5 original items were recommended for removal due to low communalities and weak factor loadings.
- **Team-specific Differences:** Nurses scored lower on “Autonomy,” while technical staff scored lower on “Recognition,” suggesting differentiated action plans.

6. Recommendations

- Revise the employee engagement survey to a 6-factor, 18-item structure for annual roll-out
- Introduce leadership training focused on transparency and trust-building
- Design a pilot feedback and recognition framework for underperforming departments
- Conduct separate workshops on role clarity and growth pathways, especially in nursing teams

7. Future Work

- Apply Confirmatory Factor Analysis (CFA) in the next cycle to validate the refined structure
- Link factor scores to retention and absenteeism data to identify predictive patterns
- Benchmark factor scores against similar healthcare institutions using available SHRM or Gallup data

8. Stakeholder Relevance

Academic:

- Demonstrates real-world dimensionality reduction using factor analysis in HR analytics
- Suitable for courses in organizational behavior, statistical methods in psychology, or workforce analytics

Corporate:

- Empowers HR and organizational leaders with focused insights
- Simplifies annual engagement reporting and enhances action planning across large healthcare units

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