

Ahmedabad University

Addressing Seasonal Inventory Losses and Workforce Management at Spring Haven

Capstone Presentation

Research Problem and Introduction

Key Issues:

Inventory Damage During Monsoon: Powder absorbs moisture due to waterlogging, leading to 9-10% product loss.

Workforce Mismanagement: Daily wage workers lack fixed roles; frequent absenteeism, poor morale.

Root Causes:

- Ineffective storage systems.
- Lack of inventory tracking and rotation.
- No clear structure or training for workers.

Impact:

- Financial losses due to wastage.
- Reduced productivity and operational inefficiency.

Purpose

Goals:

- Minimize inventory damage through better forecasting and storage practices.
- Enhance worker productivity by streamlining roles and payment structures.

Approach:

- Combined principles of operations management, psychology, and finance.
- Applied EOQ, FIFO, and Exponential Smoothing for inventory planning.
- Introduced self-managed teams, job rotation, and fixed monthly wages.

Scope:

- Analysis of current systems and practices.
- Development of practical, implementable solutions.
- Long-term focus on sustainability and efficiency in small-scale operations.

Company Profile

- **Spring Haven**
  - **Location**: Jamnagar, Gujarat
  - **Founded** in 1971 by Vijayan Rajamanicka Nadar Pagalm and Poonkodi Viajayn Pagala.
  - **Location**: Jamnagar, Gujarat
  - **Specialization**: Production of chicory powder
  - **Production Capacity**: 2 tons/day
  - **Key places** for **sourcing** chicory root: Villages in Uttar Pradesh and Gujarat
  - **Key Markets**: Bangalore, Chikmagalur, Davanagere, Gauribidanur, Hassan, Madhugiri, Mumbai, Mysore, New Delhi, Sagar, Sakleshpur, Udupi, and VNR

Company Profile

- **Manufacturing Process**
  - **Cleaning:** Manual removal of impurities (70% yield).
  - **Cutting:** Roots divided into 3 parts (top/middle/bottom).
  - **Roasting:** Each part roasted separately (2 hours/batch).
  - **Grinding:** Blended and ground into fine powder.
  - **Packaging:** Stored in plastic bags.

Company Profile



Cleaning and Cutting







Cutting the roots into three parts(lowermost, Middle, Topmost)





Roasting





Final Packaging





Packaging



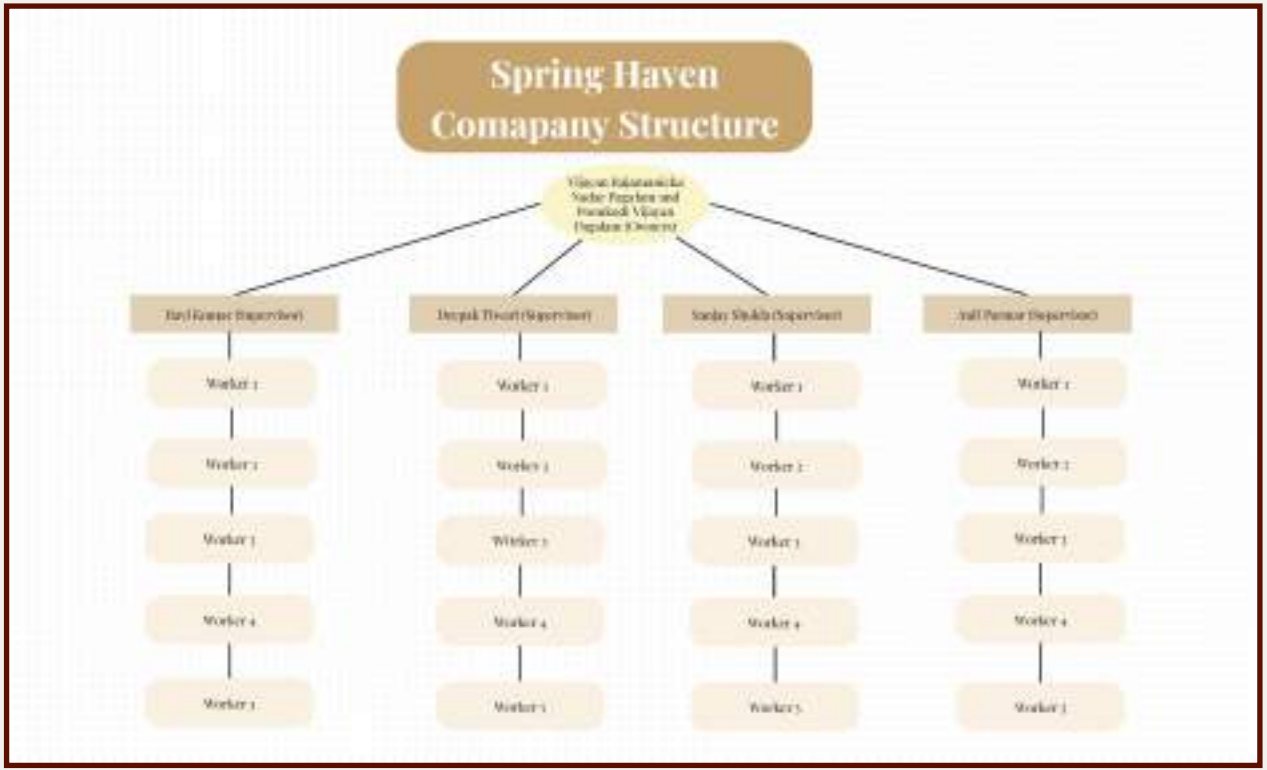
Grinding



Roasting

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Company Profile



Review of Literature

Operations Management:

Breaking the Trade-Off Between Efficiency and Service by Frances X. Frei

From Superstorms to Factory Fires: Managing Unpredictable Supply-Chain Disruptions by David Simchi-Levi, William Schmidt, and Yehua Wei

1. **HDPE Barrels for Weather Protection**
   Replacing plastic bags with HDPE barrels protects materials from rain, reducing delays and damage.

2. **Load-Bearing Plate for Faster Recovery**
   The plate reduces worker effort and speeds up material handling, lowering recovery time and productivity loss.

3. **Fix Small Risks with Smart Spending**
   Plastic bags are low-cost but high-risk; investing in better storage avoids bigger disruptions.

4. **Balance Efficiency and Variability**
   Tools like the load-bearing plate help manage labor inconsistency without hurting speed or quality.

Literature review:

The article “Self-Managing Team Performance: A Systematic Review of Multilevel Input Factors” by Magpili and Pazos (2018)

Research Methodology

- **Mixed-methods** study (qualitative + quantitative).
- Analyzed existing **team effectiveness frameworks**.
- Focus: Identified **input variables** affecting SMT performance at 3 levels:
    1. Individual
    2. Team
    3. Organizational

Key Findings

- **Capabilities are critical:**
    - Teamwork skills
    - Multi-skilling (enables job rotation)
    - Adaptive leadership
- Success requires **managing all 3 levels** of input factors

Literature review:

The article “Do salaries improve worker performance?” :

Study Design & Data

- **Sample:** 70 referees in top two English football divisions (20 in Tier 1, 50 in Tier 2)

Key Findings

1. **Immediate Performance Boost:**
    - Salaried referees issued **fewer cards**, indicating better game control.
2. **Long-Term Effects:**
    - Initial "competitive shock" faded as non-salaried referees improved to compete for salaried slots.
3. **Two Mechanisms:**
    - **Worker Sorting Effect:** Talented/ambitious referees stayed for salaried roles.
    - **Career Concerns Effect:** Referees performed better to retain/future salaries.

Literature Review

Research article “The Impact Study of the Role of Job Rotation System Effectiveness on Work Enthusiasm”

Study Overview

- **Sample:** 850 personnel (experts, employees, managers) in gas transmission operations.
- **Method:**
  - Researcher-made questionnaire (20 items) + Standard motivation questionnaire (17 items).
  - **5-point Likert scale** for responses.

Key Findings

1. **Positive Impact on Work Enthusiasm:**
   - Significant correlation between job rotation and employee motivation.
2. **Reduced Inefficiencies:**
   - Employees take ownership; no room for blame-shifting.
3. **Promotion-Linked Rotation:**
   - Further boosts performance and reassurance.

Literature Review

Key Financial Challenges in Small Businesses

- Poor inventory management → **cash flow problems** (stockouts vs. overstocking).
- High reliance on **short-term credit** (Peel et al., 2000).
- **Empirical finding:** Inventory mismanagement correlates with business failure (Kafeel et al.).

Literature Review

Inventory's Link to Profitability

- **Padachi (2006):** Positive relationship between working capital management & profitability.
- **Kwara State Study:** Firms with optimized inventory saw **higher profitability**.
- **Cost drivers:** Holding costs, spoilage (perishable goods)

Literature Review

Financial Benefits of FIFO (Perishable Goods)

- **Problem:** Chicory powder spoilage → revenue loss.
- **Solution:** FIFO ensures **older stock sold first**, reducing waste.
- **Impact:** Lower write-offs, improved gross margins.

Methodology

❖ **Research Design**

- **Mixed Methods Approach**
  - **Quantitative:** Inventory system analysis (FIFO, EOQ, Exponential Smoothing).
  - **Qualitative:** Workforce dynamics via interviews & observations.
  - **Goal:** Holistic solution for inventory waste & labor inefficiency.

❖ **Data Collection**

- **Primary Data:**
  - **Interviews:** 15 workers (of 20), 4 supervisors, and owner.
  - **Site Observations:** Handwritten notes + photos.
- **Secondary Data:**
  - Company records of past 3 years (e.g. production sheet, raw material purchase)

Methodology

❖ Inventory Management Techniques

- **FIFO (First-In-First-Out):**
  - Reduces spoilage of perishable chicory powder (12–24-month shelf life).
- **Exponential Smoothing:**
  - Forecasts demand during monsoons; minimizes waste.
- **EOQ (Economic Order Quantity):**
  - Optimizes order size to cut holding/ordering costs

❖ Workforce Insight

- **Interviews:** Unstructured questions on:
  - Task allocation, absenteeism, role clarity.
  - Worker/supervisor pain points (e.g., sudden task shifts).
- **Thematic Analysis:** Categorized responses to identify patterns.

Methodology

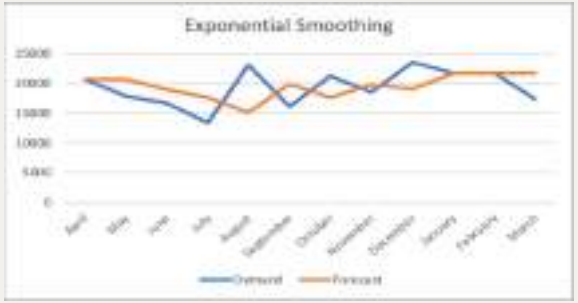
- **Questions** asked to **Workers**:
- “For how many months have you been working here?”
- “Do you come regularly to work here?”
- “If you could change one thing in any broader area of your working area, what would it be?”
- “How are tasks assigned to you every day?”
- “Do you perform the same task every day, or are they different from each other?”
- “Do you face any challenges when you are assigned any task unexpectedly?”

- **Questions** asked to **Supervisors**:
- “How frequently do you rotate the workers from one department to another?”
- “How much time does it take for the worker to adjust to working when they are shifted to a new department unexpectedly?”
- “Usually, how much time do you feel you have to engage with the workers when they are unexpectedly shifted from one department to another?”
- “Do workers come regularly to work, or is absenteeism a usual thing?”

Evaluation of Results and Findings

- FIFO inventory management
- Exponential Smoothing
- Trendline Analysis - Optimal predictive Toolkit when combined with Exponential Smoothing
- Economic Order Quantity
- Thematic Analysis from Qualitative Research - determines the size of ordered quantities
- Formation of Self Managed Teams
- Job Rotation

Exponential Smoothing



Trendline Analysis

Outward Sales Data

2021	2022	2023	Period	Average
23425.00	17075.00	21475.00	April	20658.3333
7400.00	19150.00	26925.00	May	17825
13425.00	20700.00	16025.00	June	16716.6667
5200.00	18450.00	16550.00	July	13400
17275.00	23300.00	28525.00	August	23033.3333
3500.00	22800.00	22125.00	September	16141.6667
12600.00	25975.00	25150.00	October	21241.6667
21725.00	12325.00	21875.00	November	18575
19250.00	24850.00	26350.00	December	23516.6667
16850.00	25550.00	22775.00	January	21725
17450.00	25550.00	22325.00	February	21775
15350.00	15625.00	21250.00	March	17408.3333

Economic Order Quantity

21-22	Inward
April	35075.00
May	
June	19250.00
July	6200.00
August	
September	
October	8050 KGS
November	9950 KGS
December	17350 KGS
January	23850 KGS
February	20700 KGS
March	28700 KGS
Total	60525

22-23	Inward
April	22000.00
May	12500.00
June	18200.00
July	15000.00
August	15200.00
September	21450.00
October	22450.00
November	32200.00
December	26750.00
January	30400.00
February	28075.00
March	24125.00
Total	268350

23-24	Inward
April	20500.00
May	11700.00
June	20875.00
July	8100.00
August	26000.00
September	18650.00
October	28200.00
November	20800.00
December	32800.00
January	29250.00
February	30100.00
March	22100.00
Total	269075

Outward Sales Data

Year 1	Year 2	Year 3	Period	Sales	Forecast
23425.00	17075.00	21475.00	April	20658.3333	20658.3333
7400.00	19150.00	26925.00	May	17825	20058.3333
13425.00	20700.00	16025.00	June	16716.6667	18958.3333
5200.00	18450.00	16550.00	July	13400	17613.3333
17275.00	23300.00	28525.00	August	23033.3333	19085.8333
3500.00	22800.00	22125.00	September	16141.6667	19854.1333
12600.00	25975.00	25150.00	October	21241.6667	17626.6533
21725.00	12325.00	21875.00	November	18575	19795.6613
19250.00	24850.00	26350.00	December	23516.6667	19063.2645
16850.00	25550.00	22775.00	January	21725	21735.3058
17450.00	25550.00	22325.00	February	21775	21729.1223
15350.00	15625.00	21250.00	March	17408.3333	21756.8489



Total	598850
Average	199616.6667
Ordering cost	600
Holding cost per unit	10
EOQ	4894.282378
	PER MONTH
EOQ	58731.38854
	PER YEAR
EOQ 21-22	2694.995362
EOQ 22-23	5674.680608
EOQ 23-24	5691.836259

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Interpretation of the themes

Key Themes from Worker Interviews

Thematic Analysis Findings

1. **Role Confusion**
   - Frequent department shifts → No role clarity.
   - Workers learn by copying peers (no formal training).

     Quote:

     "Yesterday I was cutting roots, today grinding… it's hard to adapt."
2. **Flexible Payment Issues**
   - Daily wages (₹800–900/day) → High absenteeism.
   - Workers demand fixed salaries + bonuses.

     Quote:

     "Why not pay us monthly like the firm next door?"

Interpretation of the themes

3. **Training Gaps**
    - Supervisors: Short Staffing forces ad-hoc task shifts.
    - Workers: No choice → Learn on the job → Chaos.

4. **Infrastructural Limitations**
    - **Waterlogging:** 9–10% spoilage due to storage racks.
    - **Inefficient Stacking:**
        - Bags stacked floor → rack (needs 4–5 workers).
        - No equipment → Manual ladder use → Slow/tiring.

Formation of Self managed teams

Team structure and responsibilities:

Team A: Responsible for cleaning and cutting

- Receives dried chicory roots from farmers
- Manual cleaning and cutting into three parts(top, middle and the lowermost)
- Composition: 4-5 workers + elected coordinator for quality checks

Team B:Roasting

- Roasts each root part separately in batches
- Composition: 4 workers + experienced heat monitor

Team C: grinding and Mixing:

- Grinds roasted parts for uniform powder consistency
- Composition: 2-3 workers + quality checker

Team D: Packaging and storage:

- Fills powder into bags and ensures proper stacking
- Composition: 3 workers(1 filler, 2 stackers) + supervisor

Fixed salary to Improve efficiency:

- Current issues with daily wages:

High absenteeism: no incentive for daily attendance

Low commitment: Workers see themselves as temporary labor

- Benefits of fixed salaries:

1. Reduces absenteeism and unauthorized substitutions
2. Boosts loyalty and retention
3. Improves accountability and productivity
4. Simplifies payroll and reduces conflict

Job Rotation in self managed teams

Benefits:

- Reduces skill gaps and absenteeism
- Enhances flexibility without role confusion
- Improves process understanding
- Combats boredom and boosts morale

Implementation plan:

- Structured rotation schedule: Rotate every 2-3 months
- Ensure logical skill progression
- Cross training process
- Avoiding pitfalls
- Performance tracking

The use of Barrels instead of Bags





Modified Version of the Storage Unit









Conclusion

- Resolved key issues: seasonal inventory failure & weak workforce structure
- Used FIFO, Exponential Smoothing & EOQ + interviews for practical solutions
- Identified gaps: no inventory systems, unclear roles, inconsistent wages
- Proposed structured storage, fixed payments, self-managed teams, job clarity
- Applied Ops Management, Human Capital Theory & Lean practices
- Recommend digital inventory tools & regular worker training
- Suggest strong supplier partnerships & KPI-based monitoring
- Promote sustainability, adaptive processes & continuous improvement

THANK YOU