ASCM CASE COMPETITION

In collaboration with Deloitte.

JUICE-PERFECT' MANUFACTURING STRATEGY AND OPERATIONS

Unplanned Downtime Reduction

Team Id : 2152743

Executive Summary

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Raw Material Procurement

→ **Pain Problems:**

- Separate teams in-charge of different operations and lack centralized coordination
- Improper tracking of materials inside the warehouse leading to misplacement of materials
- Since warehouse has limited capacity therefore due to misplacement and overproduction no space left for new material procurement.

→ **Solutions Proposed:**

- Concurrent Production model.
- Implementation of IoT (Internet of Things) and Automated Storage and Retrieval Systems.
- Implementation of a centralized team to plan out procurements of raw materials as per forecasted demand and division of the area of warehouse accordingly.

Florida

with 86.96% Yield is

Worst performing Plant

Unplanned Downtime

→ **Pain Problems:**

- Failure of predictive maintenance
- Inaccurate repair history
- Not enough raw material or packaging material in stock

Maintenance Delays

→ **Pain Problems:**

- Unavailability of spare parts
- Difference in the expertise of labor
- Labor Shortage

→ **Solution Proposed:**

- Forecasting of demand dependent safety stock of spare parts as few months are more crucial than other and customer retention rate will fall
- Internal workshop/sessions to bridge the gap in between expertise of labor
- Implementation of Enterprise Resource Planning (ERP) to forecast the need for labor according to the seasonality of demands

- **Maintenance delays will lead to unplanned downtime and unmet planned production**

Performance Overview

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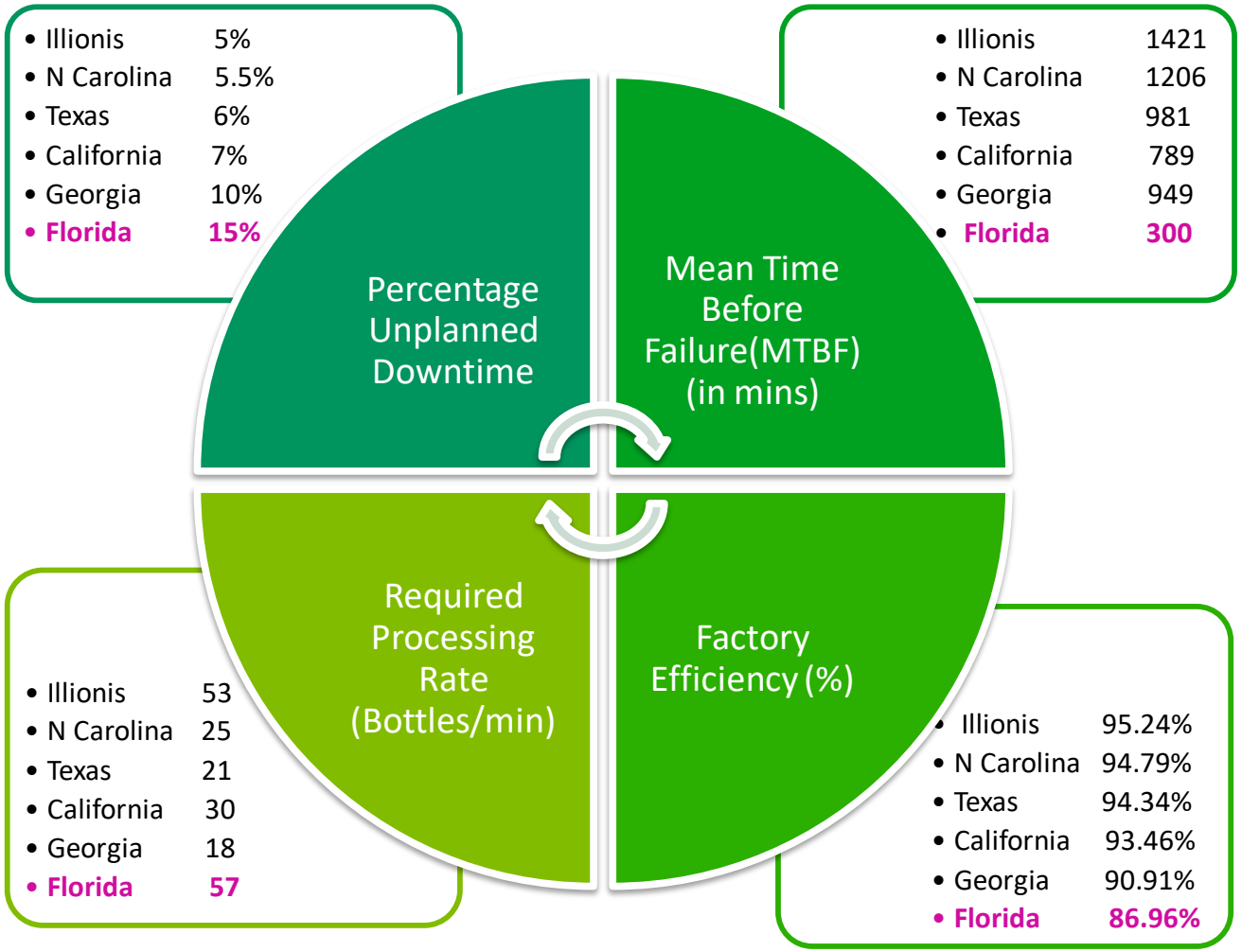

Performance Derived using following Formulae:

- Required Processing Rate of Bottles per minute =

$$\frac{Planned\ annual\ Poduction}{Processing\ runtime\ per\ day * Number\ of\ working\ days\ * 60 * M}$$

- M per day is
  Maximum Number of Simulatenous Operating production cycle
  $= \frac{Process\ Runtime\ per\ day}{8}$
- Process Runtime per day
  $= \frac{Total\ Annual\ Runtime + Total\ Planned\ \ Downtime}{Number\ of\ working\ days}$
- Factory Efficiency (%) = $\frac{Actual\ Production\ in\ same\ time}{Planned\ Annual\ Production}$
- Actual production
  = Total Annual Runtime * Processing Rate per bottle * M

- Number of working days is taken as 300 days.
- In a day one shift of 8 hours is assumed for all plants.

Florida is the worst Performing Plant!

Assumptions

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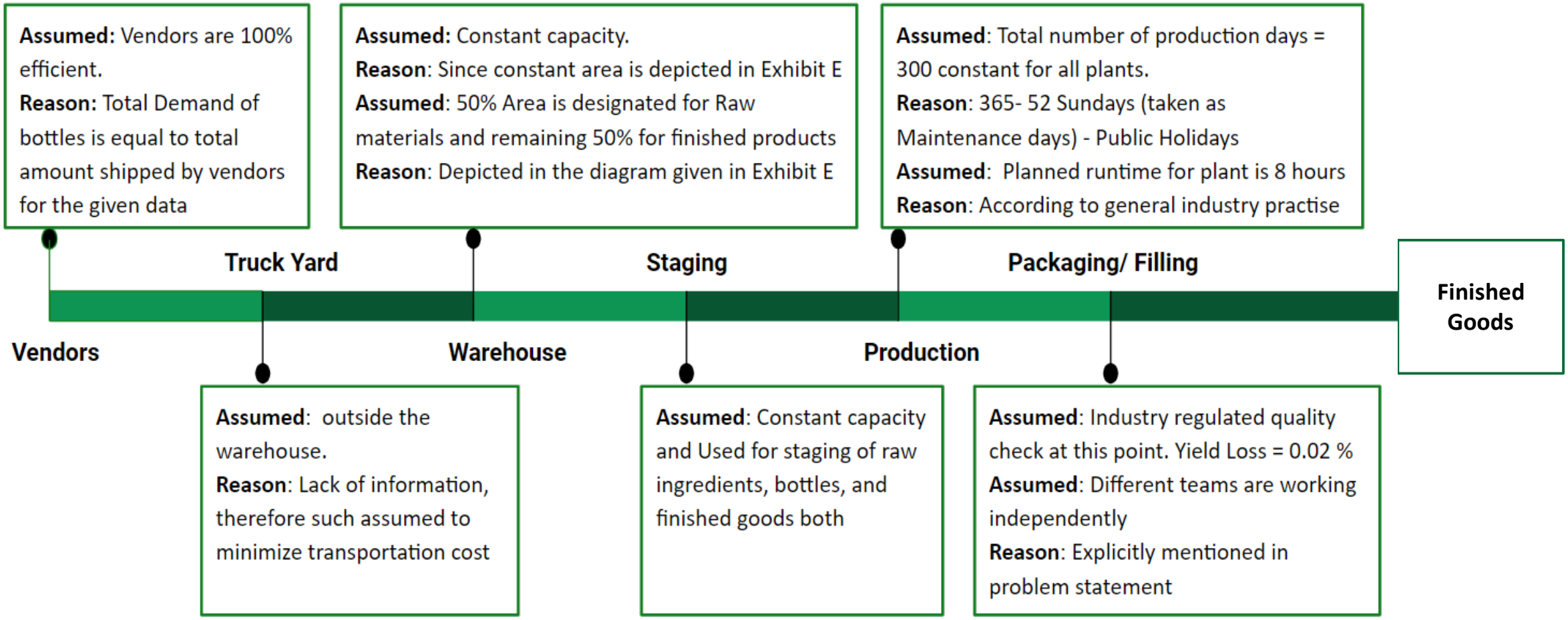

Opportunities for Improvement

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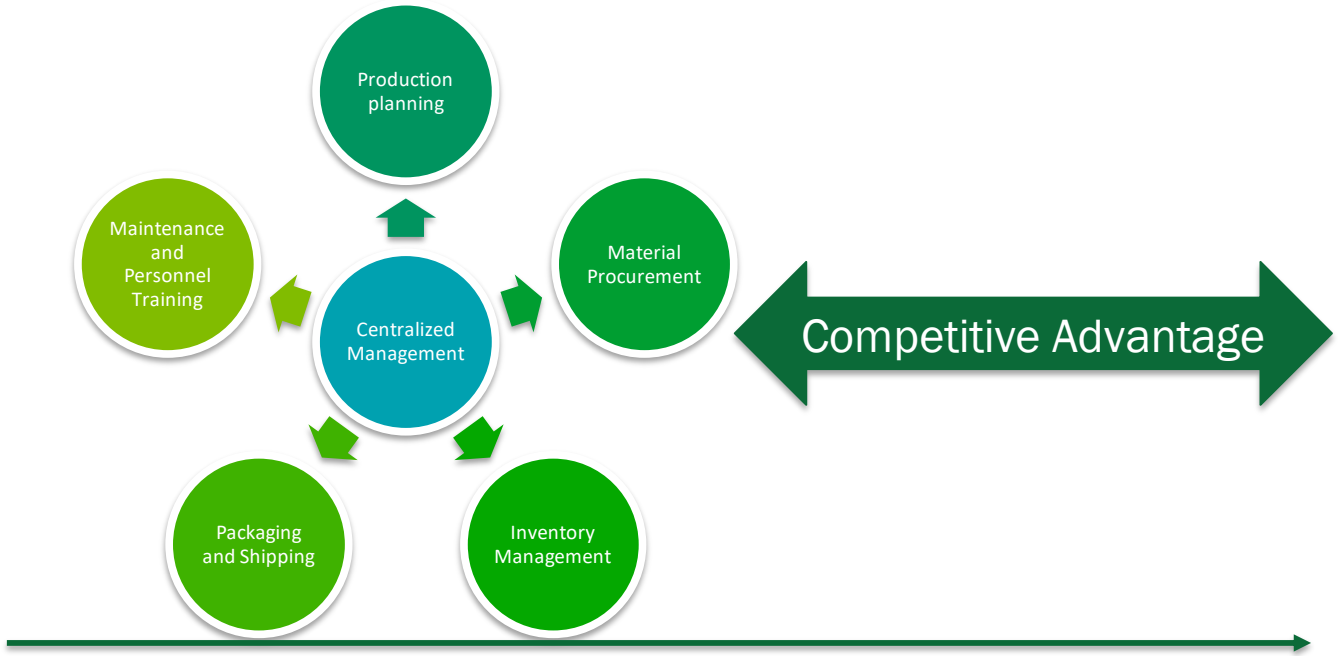
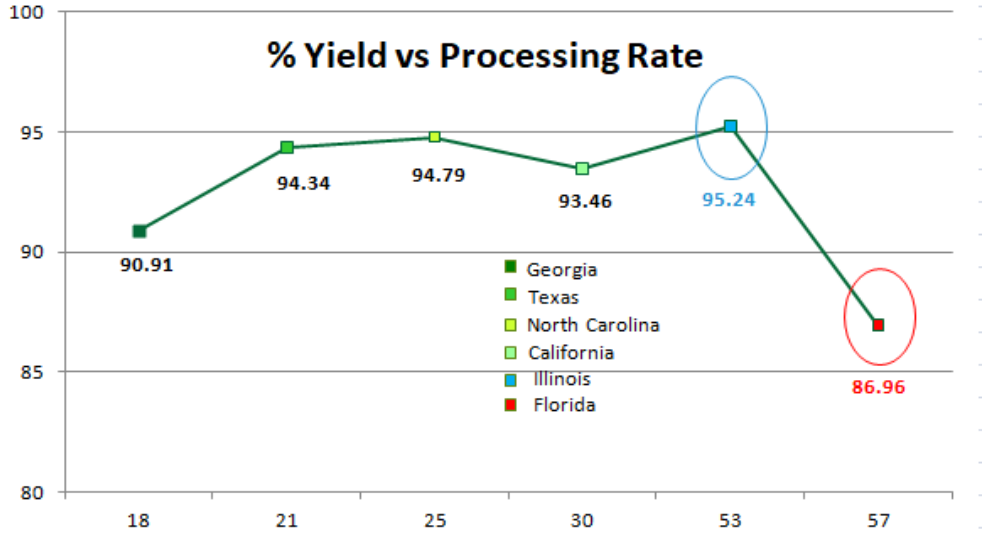
Presently : **Sequential Production Model**

Proposed: **Concurrent Production Model**



Time to market (even at time of high demands)

Optimum Production Rate:



For maximizing yield the production rate should be in the range: **30 bottles/min - 53 bottles / min**

Assuming: Similar type of machinery setup is used in all plants.

Raw Material Management

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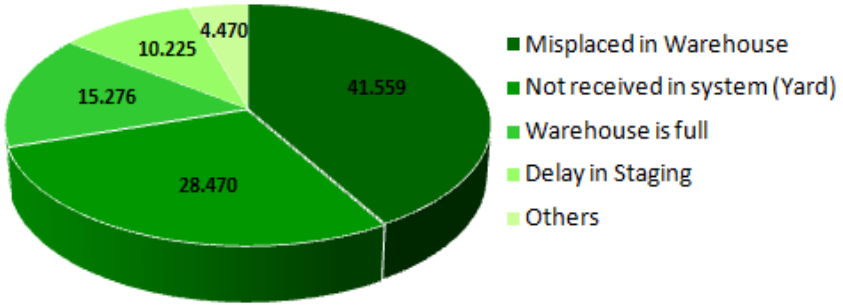
Problems Identified

Percentage of amount left in yard



Possible Reasons:

- Inadequate Material Storing and Retrieval System
- No real time tracking of materials inflow and outflow
- Non-optimal division of warehouse for storing of raw materials and finished goods.
- Lack of centralized network and inventory management system leading to improper coordination amongst teams.

Types of Bottles (Capacity in Ounces)

Solutions Proposed

Automated Storage and Retrieval System

- Affix some kind of label (bar code/ magnetic strip) to each material or unit load that uniquely identifies it.
- Within a given aisle each compartment has an alphanumeric code. Based upon the type of material the Storage/Retrieval machine is positioned.
- S/R machine should have horizontal, vertical and shuttle movement in between the carriage and storage compartment for storing and retrieving.

Implementation of Internet of Things (IoT)

Eliminates the need for manual documentation and introduces Enterprise Resource Planning (ERP) to facilitate cross-departmental visibility. Reduces expenditure and lack of analysis in organizations

Asset Care Planning

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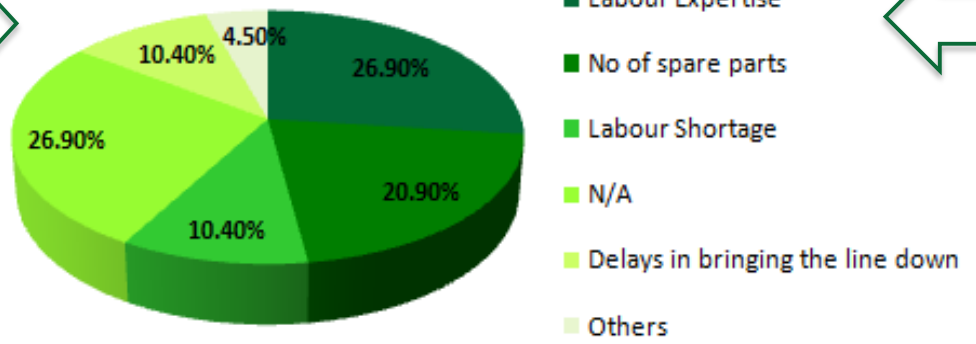
Labour Shortage

- Labour Planning software will track employee hours, create schedules and forecast staff needs so that labor shortage is avoided

Unavailability of spare parts

- Keeping a safety stock to ensure the availability of spare parts to cater to the damage during lead time
- As spare are staged in the storeroom two days before the execution, Instead of planning Maintenance activities before 14 days, it is more advisable to plan before 16 days to avoid last moment delays

Reasons of Delay



Labour Expertise

Type of Labour	Average Labour Efficiency	Max Labour Efficiency
Mechanical	1.07	9
Operator	1.17	8
Electrical	1.55	10

Workshops to increase foundational and technical skills as there is a skill gap between different labors

Unavailability of spare parts is the most crucial reason leading to unplanned downtime

Conclusion

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Assuming, Total planned production = Total Demand for the given time period

Total amount available = Bottles available in storage + (Total amount Shipped - Amount left in yard)

= 810000 + (114000 - 57605) = 866395 units

Service Level = Total Amount Available / Total Demand

Present Service Level = (866395 / 924000) * 100 = **93.76%**

Delay in staging, misplaced in warehouse and not received in system comprise nearly 80% of the case of unavailability of raw materials which can be addressed by IOT and ASRS system

Assuming 80% improvement of the above reasons by IOT and ASRS

Total amount available

= 810000 + (114000 - (2575 + 8800 + (5890 + 23940 + 16400) * 0.2)

Improved Service level = (903379 / 924000) * 100 = **97.76%**

Percentage Improvement = ((97.76 - 93.76) / 93.76) * 100 **= 4.2**%

Reasons of Delay	Delay Days	Improved Delay Days
Unavailability of spare parts	248	0.3*248 =74.4
Labour Shortage/ Expertise	128	0.5*128 =64
N/A and staging delay	200	0.6*200 =120
Others	81	81

Initial Production Loss due to Delay = 657 * 57 * 2 * 60 = **4,695,652 units**

Assuming our proposed methodology can bring about 70% improvement in unavailability of spare parts, 50% improvement in workforce management and 40% improvement in N/A and staging:

Improved Production Loss = 339.4 * 57 * 2 * 60 = **2,425,730 units**

Improvement in Net production = 4695652- 2425730 = **2,269,923 units**

Percentage Improvement = (2269923 / 4695652) * 100

= 48.34%

Taking into account all the proposed changes the plant will now be able to perform at par with the Industry standards (98% service level)

THANK YOU

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