



Process Optimization for SATS APS Inflight Catering Facility



IE3100R Systems Design Project
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1. Introduction

SATS Asia Pacific Star (APS) Pte. Ltd. is a subsidiary of SATS Ltd, founded specifically to serve low-cost budget carriers. Currently, SATS APS only serves local budget carriers based in Singapore: Scoot (TR) & Jetstar (3K).

2. Objective

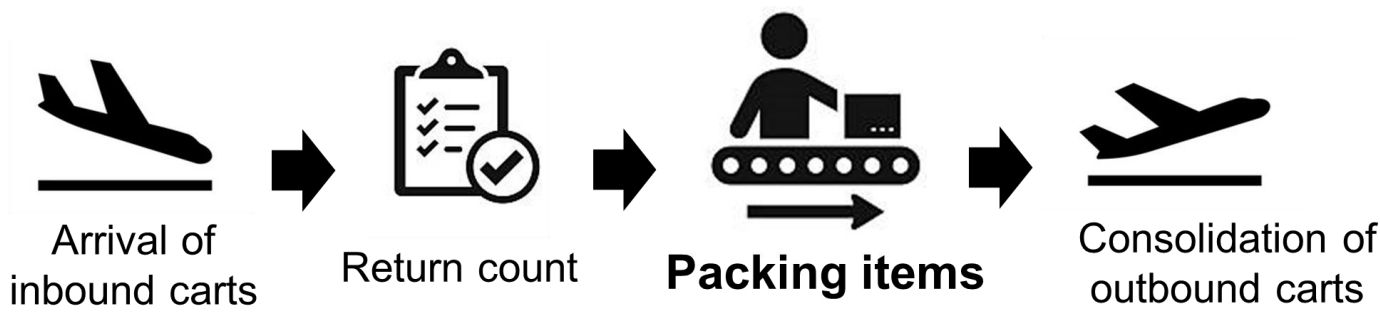
Aim: Optimize processes to increase scalability and meet growing demand.

Three identified areas with opportunities for optimizations are:

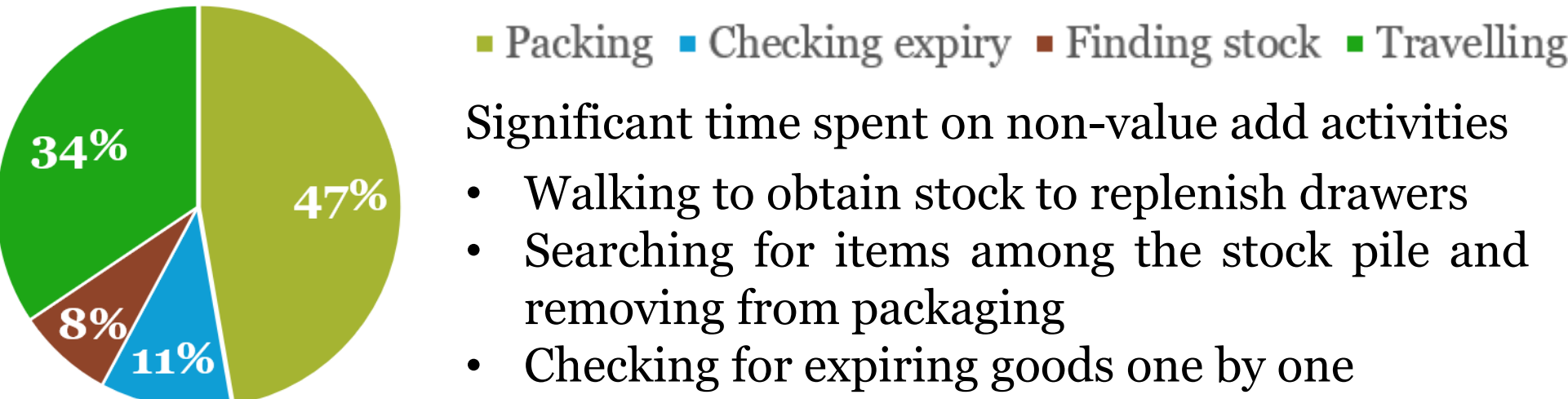
- Suboptimal packing process. Packers spend a significant proportion of time on non-value add (NVA) activities.
- Inadequate procedures to check for expiring products
- Lack of data collection and Key Performance Indicators (KPIs) on operations which makes it challenging to make data driven decisions

3. Data Collection & Analysis

The team manually observed and collected data on current operational procedures with the focus on the process of packing and replenishing items.



Breakdown of packers' activities and time taken for each action



4. FlexSim Model

FlexSim is a leading simulation modeling software that allows users to create accurate 3D representations of real-world systems. The team has developed a simulation model from scratch using the FlexSim software.



FlexSim 3D model that simulates the operations and workflow of packers

This digital twin mirrors the facility's operational processes with high fidelity. The two main rationale in building this simulation model are:

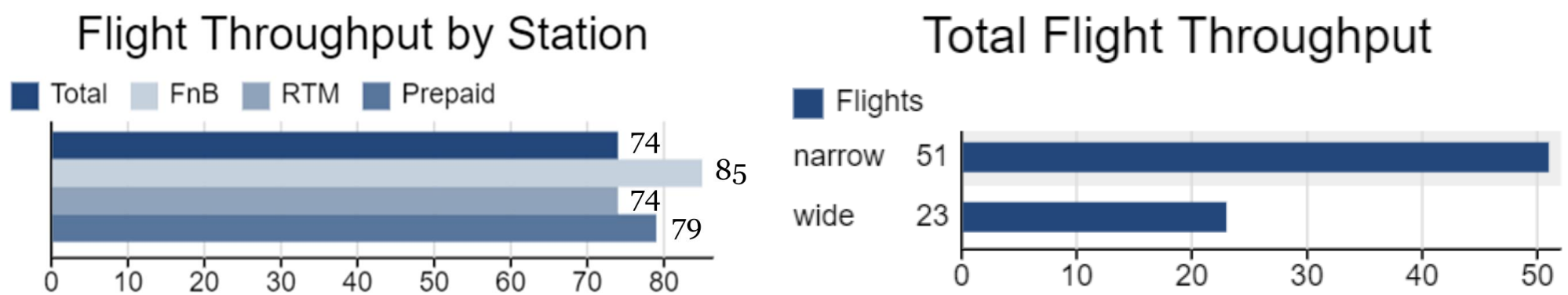
- Give stakeholders insights into current operations to identify potential bottlenecks, idle resources and evaluate changes in a risk-free setting.
- Simulate current operations to collect data of KPIs on a larger scale that would otherwise be impractical to carry out manually. This can be used for further quantitative optimizations and evaluations.

Output statistics from simulating one full day of operations (24hrs):

- Average time taken to pack carts (validated against actual time taken)

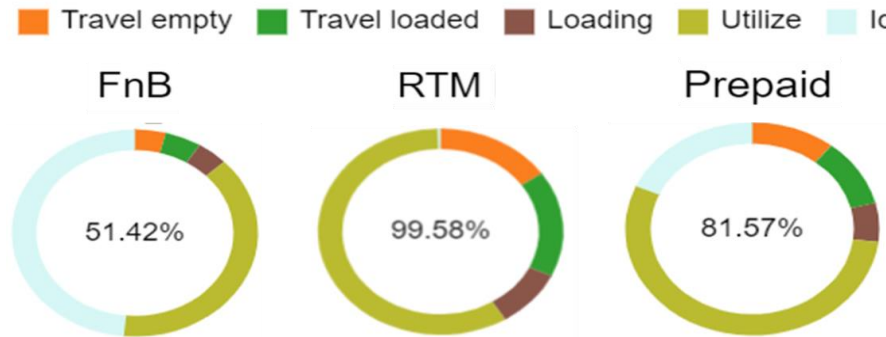
	Average time taken to pack a cart (mins)	
Cart Type	Simulation Output	Recorded Timings
F&B	8.7	11.1
RTM	15.1	16.3
Prepaid	23.8	21.5

- Flight throughput: RTM station is the bottleneck for flight throughput



3. Manpower Utilization

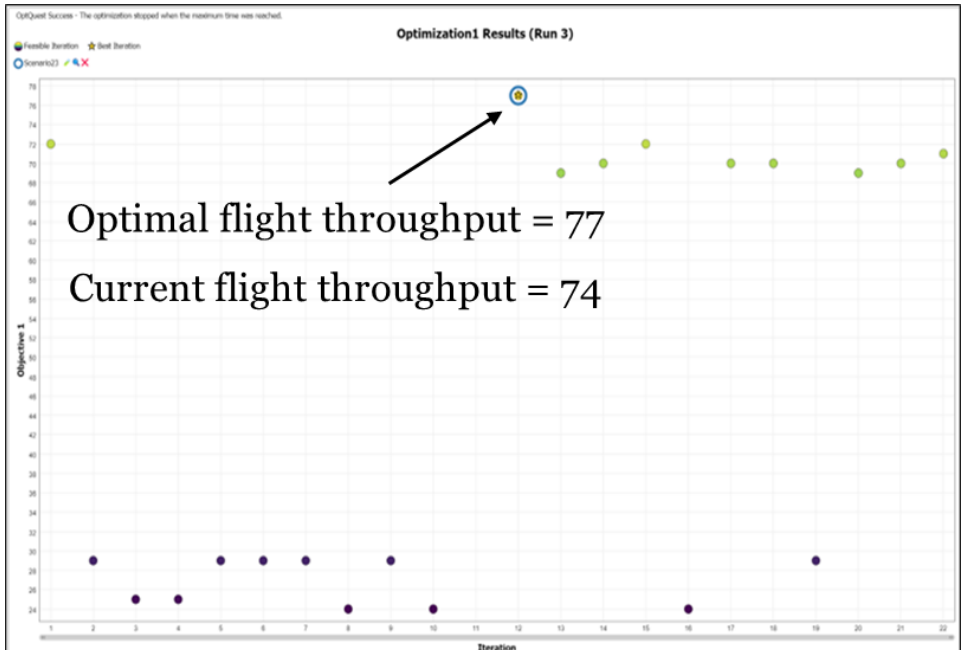
	FnB	RTM	Prepaid	Cart Pushers	Active Hours
08:00 - 16:00	12	1	4	2	7
16:00 - 20:00	4	1	2	2	4
20:00 - 08:00	1	1	2	2	11
Equivalent Manhours	111	22	58	44	
Equivalent Manpower Per Day	5	1	3	2	



- F&B Packers are underutilized
- RTM packers are overworked.
- Lack of RTM packers and too many F&B packers

Using an optimizer, a reallocation of 1 F&B packer to RTM resulted in a slight increase in total throughput from 74 to 77 flights.

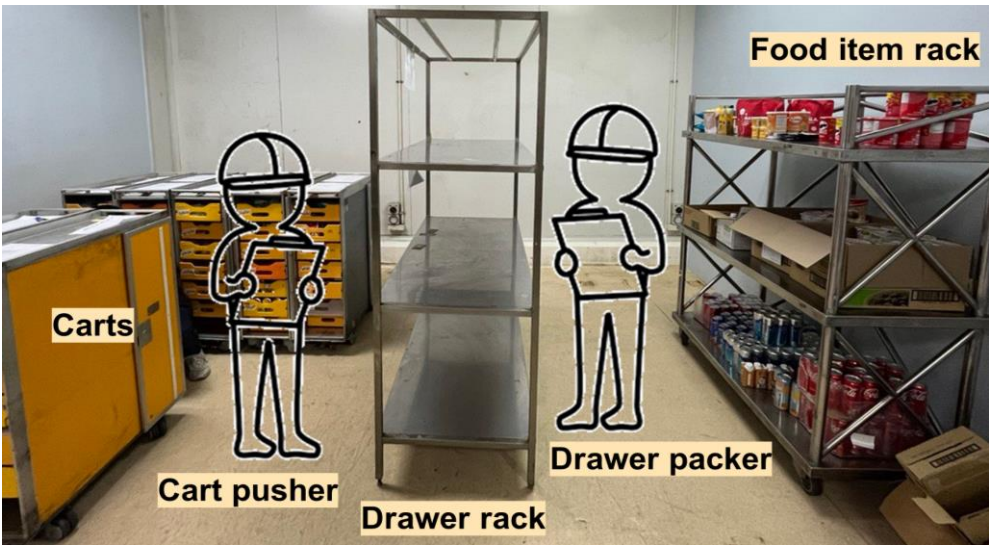
Name	Scenario23
Warmup Time	0
Stop Time	86400
Parameter	Value
FnB Packers	4
RTM Packers	2
Prepaid Packers	3



5. Proposed Methodology

We propose three novel solutions to enhance the efficiency of the packing process and improve the accuracy of locating expiring goods.

New layout and process aimed at enhancing efficiency



In this new layout, storage racks are used to both store food items and act as staging areas for packed drawers. They are positioned next to one another to eliminate any travelling time previously required to retrieve stocks.

Labelling of drawers with earliest expiry date

Drawers are labeled with the date of the earliest expiring item. Packers do not need to check drawers whose label date is still far, saving time checking.



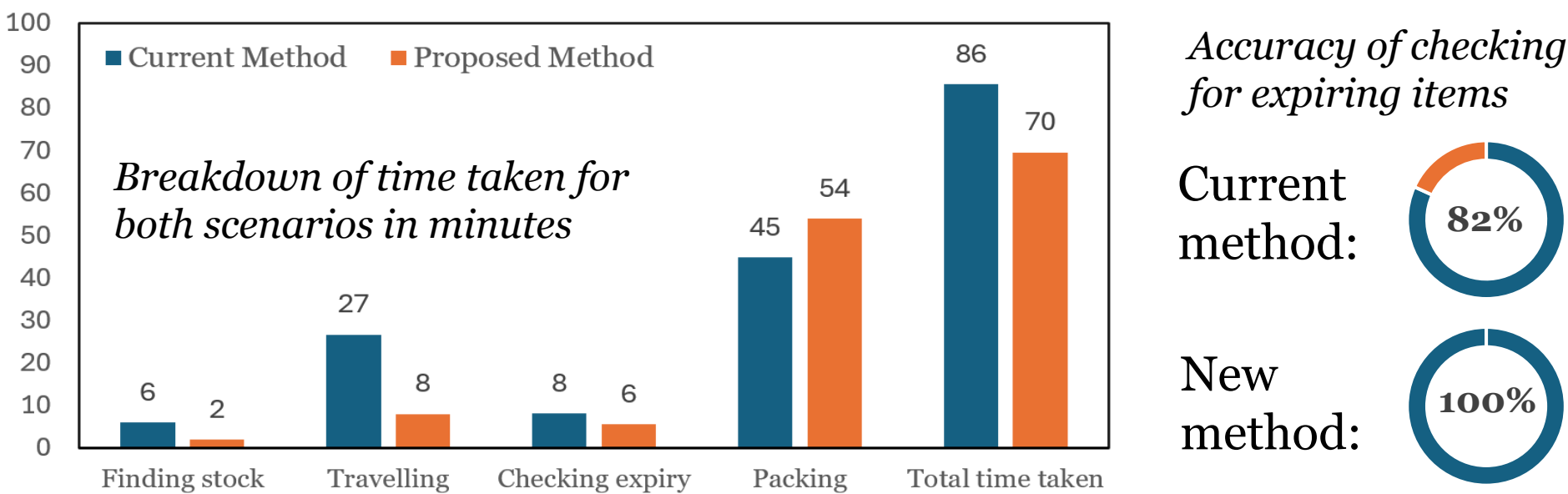
Traffic light implementation to arrange stocks in the issue store



Items arranged based on expiration dates, allows for an easier identification and prioritization of items. Studies have shown this decreases likelihood of expired items being used and reduces process times.

An experiment was conducted on site to compare these proposed methods against the current process as a control. In both scenarios, two packers packed seven carts and data was collected for both trials.

6. Results & Discussion



Accuracy of checking for expiring items

Current method: 82%

New method: 100%

From the experiment results, we observed the following improvements:

- 70% reduction in travelling time & finding stocks
- 18% more accurate identification of expiring items
- 19% more efficient packing with less manhours

7. Conclusion

- Identified key areas in SATS APS processes for further optimization.
- Backed up findings with data and observations collected manually, and insights generated from simulation.
- Proposed an approach, supported by literature, to increase the efficiency and accuracy of the packing process.
- Conducted an experiment on site to evaluate this new methodology against the status quo with promising results.
- Presented to the stakeholders who showed keen interest to take further steps to scale the idea for implementation.

Key Skillsets Acquired:

- FlexSim Simulation
- FlexScript
- SQL
- Process Optimization
- Discrete Event Simulation
- Project Management
- Operations Research
- Data Analytics & Visualization

