Introduction of a One Stop Acceptance Process for AFT 3, 4 and 5

Group Members: Lucas Tan, Liu Yulong, Kiran Krishnamchari, Yeo Eng Keat, Fu Xiangshan
Supervisors: Asst Prof Teo Kwong Meng, Asst Prof Ng Tsan Sheng Adam **Internal Supervisor:** Mr Pang Jiehao

Introduction

Singapore Airport Terminal Services (SATS) is the leading provider of integrated ground handling and airline catering services at Singapore Changi Airport. This project focused on the cargo acceptance processes at SATS Air Freight Terminal 3, 4, and 5.

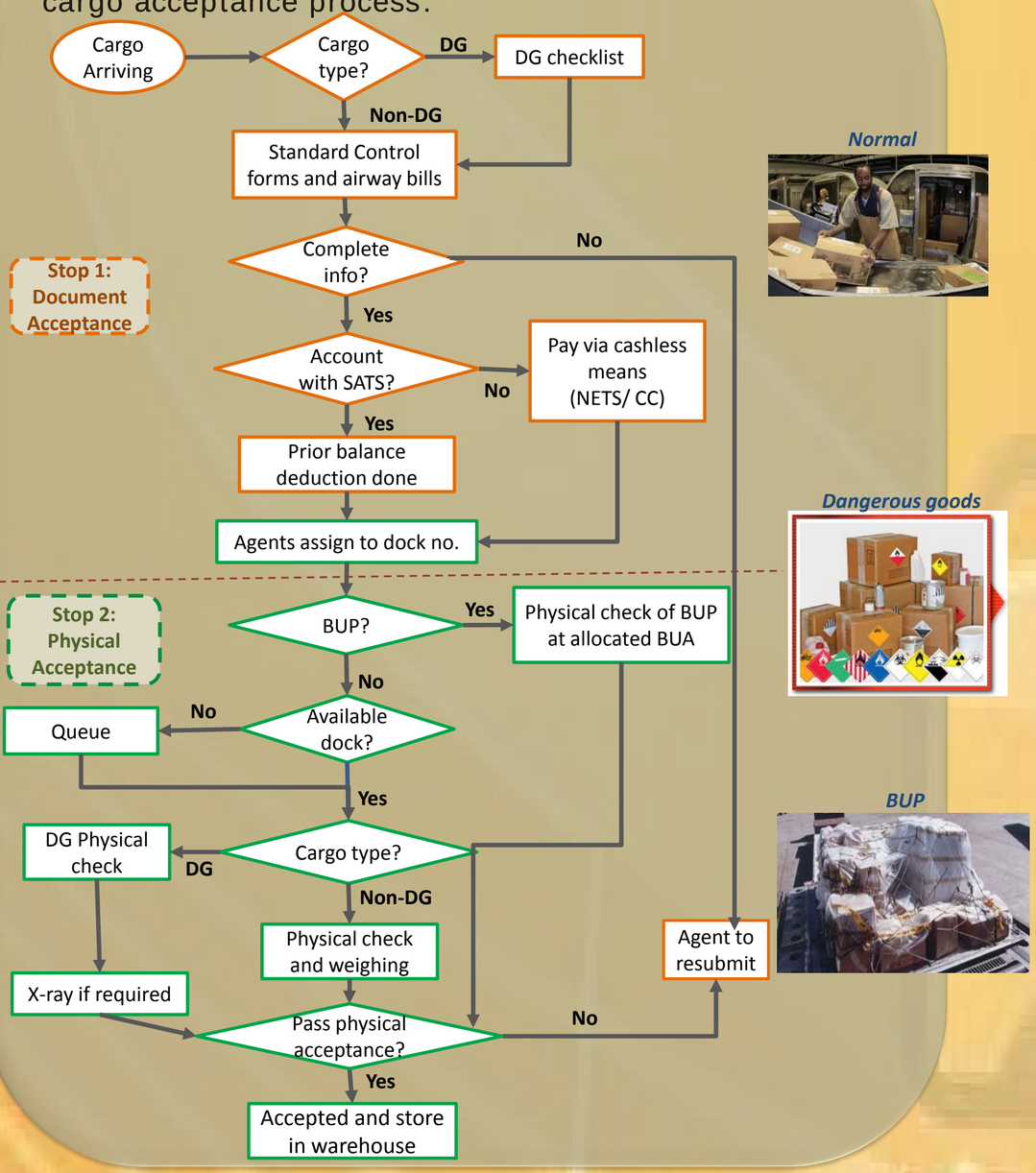
Objective

To investigate the most optimum implementation of a 1-stop cargo acceptance concept . The scope includes:

- Finding the ideal number of docking bay to be opened during peak/ non peak hour
- Re-engineering the new queuing system of the 1-stop acceptance process
- Stating qualitatively the facilities needed for 1-stop acceptance

Background

The following flowchart depicts the current cargo acceptance process:



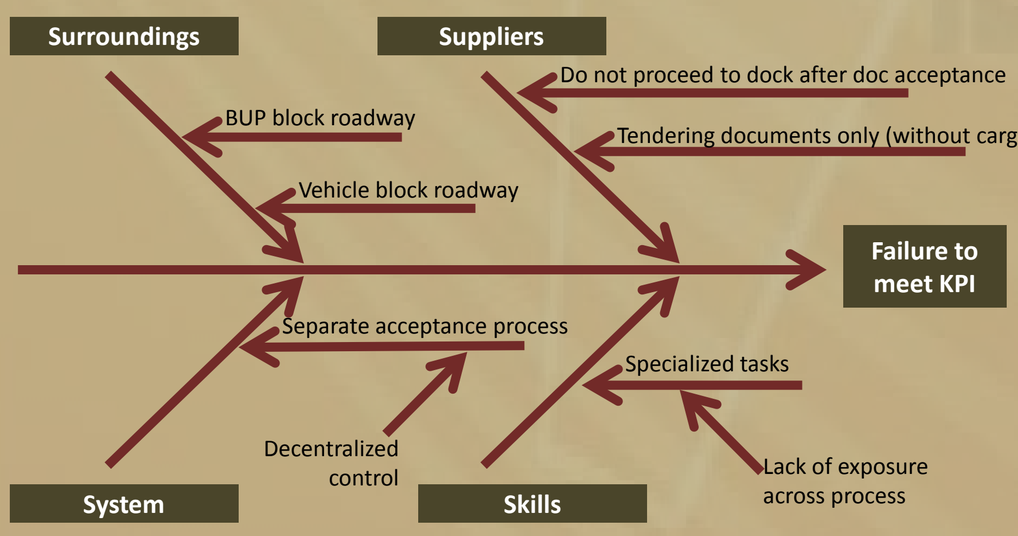
Normal

Dangerous goods

BUP

Analysis

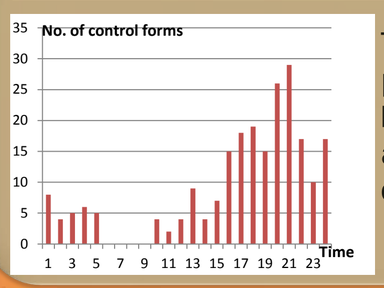
The Ishigawa diagram summaries the problems that SATS face with the current 2 stop acceptance process:



These problems contribute to time delay in cargo acceptance, which could amount to failure in meeting KPI standards. (90% cargo acceptance with 40 mins)

Data collection

Graph of arrival rate against time (hr) for AFT 3



Terminal 3 has the highest arrival rate during peak period.
Rationale for focusing on AFT 3 for our analysis would allow us to focus on the worst case scenario of traffic

- ❖Peak : 6pm-12am (λ= 3.2 min)
- ❖Non peak : 6am-12pm (λ= 35 min)

Conclusion

The necessary resources have to be made available for implementation are:

- ❖ Additional computer terminals and network system at docking bay
- ❖ Payment facilities
- ❖ Printing equipment
- ❖ An electronic ticketing equipment and queuing display board

The recommendations for the number of docks to be opened as part of 1 stop concept is as follows:

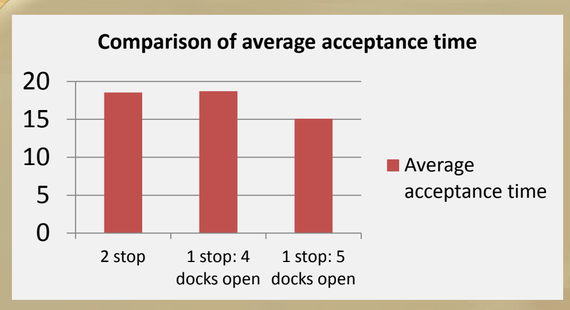
	Loose Cargo	BUP	Estimated CT
Peak	4 (3 dock + 1 platform)	1	15 mins
Non-peak	2 (1 dock + 1 platform)	1	8 mins

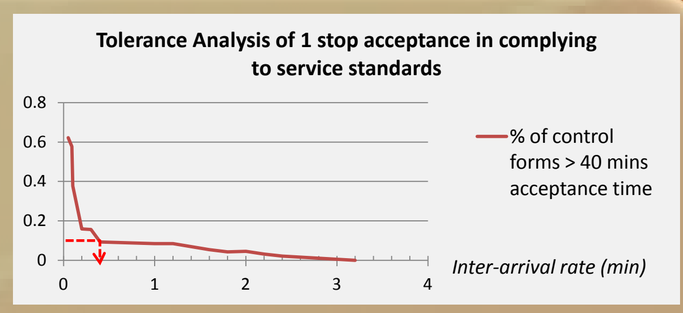
The is the optimal set up that balances the trade-off between :

- ➢ Reduction in traffic congestion
- ➢ Incremental cost in additional manpower hiring

The centralization of checkpoints in 1 stop will not only prevent any agent malpractices, it also leads to shorter acceptance timings during peak period. It is highly recommended for the concept to be implemented.

Results





- ✓ The number of trucks that can unloaded at the platform must be reduced from 3 to 1 to prevent congestion in 1 stop
- ✓ Opening of 1 stop: 5 service bays (4 docks + 1 bay) will save about 3 mins in overall acceptance time as compared to 2 stop acceptance
- ✓ Using 5 docks set-up, the I.A.T of cargos are systemically increased.
- ✓ 1 stop acceptance is able to withstand until I.A.T of e~(0.4 min), while still maintaining required service standards

Data Validation

Peak	Simulation	Observed
Mean	16.95	18.53
Variation	6.22	-
Observations	10	-
Hypothesized Mean Difference	0	
df	9	-
t Stat	2.002	
t Critical two-tail	2.262	

t-test is performed on the simulated and observed sample data
(top: peak, right:non peak)

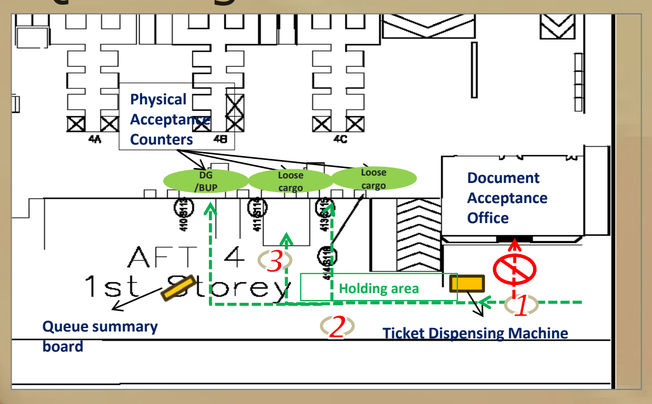
At 95% confidence level, we conclude that there is no significant difference between both sets of data.

Non Peak	Simulation	Observed
Mean	8.36	8.03
Variation	0.476	-
Observations	10	-
Hypothesized Mean Difference	0	
df	9	-
t Stat	1.53	
t Critical two-tail	2.262	

The simulation closely resembles the behaviour of the actual system.

Methodology

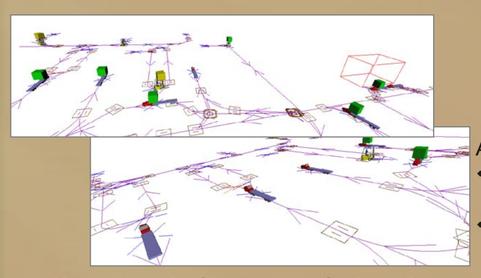
Queuing model

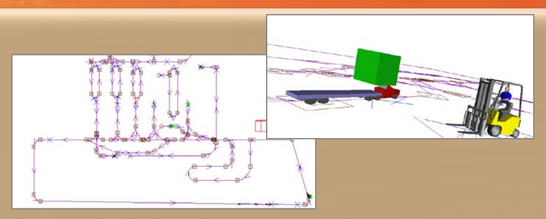


1. Agent drives lorry to the ticketing dispensing machine to collect queue no. based on type of cargo
2. Lorry will drive to the allocated docking bay based on queue no. displayed at the summary board.
3. At the docking bay, acceptance officer will perform both documentation and physical acceptance of the cargo

❑ The current document acceptance office will still be retained for purpose of back-end processing

AutoMod Simulation





Picture clockwise from bottom left: simulation run of 1 stop acceptance, simulation run of 2 stop acceptance, overview layout of a AFT, a forklift moving to transport the load from the agent,

AutoMod models were built for the purpose of:

- ❖ simulate the current 2 stop acceptance process
- ❖ re-engineer the new queuing model of 1 stop acceptance using the existing parameters.
- ❖ evaluate output affecting performance indicator
- ❖ pivot between traffic congestion and manpower constraints to find out the optimum number of bays to be opened.