

One-stop Stakeholder Management System

DENSO Corporation is a global automotive components manufacturer headquartered in Japan and ranks 2nd as the world's largest auto parts supplier. Due to the growing demand for auto parts, DENSO faces high levels of pressure in meeting clients' deliveries. DENSO would like to adopt new partnership and improve collaboration with existing partners while remaining lean in Logistics operations.



Requirements Gathering and Documentation

Problem Description

DENSO lacks database management for stakeholders in logistic. The process of analysing stakeholders' performances bottlenecks at the analysis phase.



Current Approach

DENSO drives its analysis on logistics operations through Microsoft Excel which produces errors and duplications, reducing its accuracy of analysis.



Key Objectives

1. Enable DENSO to effectively manage its stakeholders through data-driven insights via creation of web-based application
2. Empower DENSO to reduce logistics cost through greater visibility of logistics operations with overview of key metrics
3. Assist DENSO in leading and accelerating APAC's logistical knowledge and skills through prediction modelling

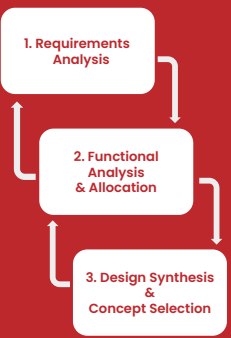
Skillsets Acquired

- Requirement Analysis
- AHP
- Project Management
- Human Factor
- Database Management
- System Thinking
- Software Engineering
- Front - end Development
- Modelling and Analysis



Methodologies

Systems Engineering Process



1. Requirements Analysis
 - Measure Stakeholders' performance
 - Understand shipment trends
 - Flag out deviations early and quickly
 - Scalable and user-friendly solution
2. Functional Analysis & Allocation
 - Decomposed high-level requirements into more specific, low-level requirements
 - Allocated requirements using MoSCoW Prioritisation

MoSCoW Prioritisation

Must Have	Should Have
Could Have	Won't Have time

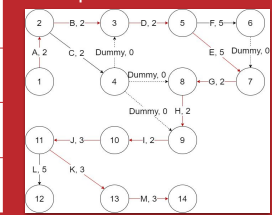
3. Design Synthesis & Concept Selection
 - Narrowed down to Excel VBA vs Web-based Application
 - Using AHP, we performed pairwise comparison to determine which proposed solution would generate the most benefit

Analytic Hierarchy Process (AHP)

	Ability to update data effectively	Data management	Dynamic update of visualisation	Activity log monitor (Access Control)	Scalability	Commonality	Search and Filter	Benefit
Weights	0.343	0.143	0.117	0.119	0.123	0.0689	0.0838	-
Web App	0.833	0.855	0.794	0.750	0.833	0.500	0.500	0.729
Excel VBA	0.166	0.144	0.205	0.250	0.166	0.500	0.500	0.186

Project Management

- Using Waterfall Methodology, we derived an activity list and scheduled these activities using critical path diagram to find the shortest time for project completion



System Design

Exploratory Data Analysis

Data Cleaning & Preprocessing

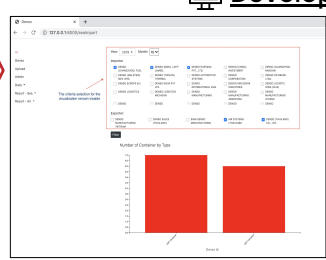
Using Python, the raw data was first cleaned to correct any forms of errors such as mismatched IATA codes and to remove duplicate entries to ensure analysed results remain accurate.



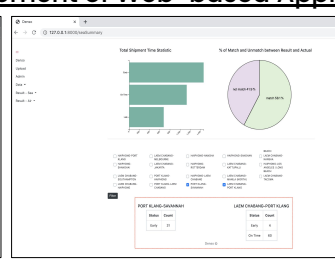
Scattered data were consolidated into one coherent dataset before preprocessing it. At preprocessing stage, data were standardised, harmonised and data noise were reduced.

Implementation

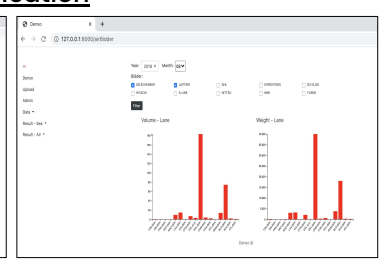
Development of Web-based Application



Importers' Performance on Sea freights based on types of containers used



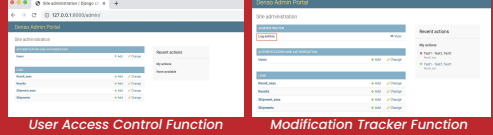
Bidders' Performance on Sea freights by comparing Shipment Time and percentage match between planned and actual shipment



Bidders' Performance on Air freights based on the total volume and weight transported

These visualisations will automatically update itself when new data is uploaded to show the latest performances of stakeholders. With the dynamic visualisations, DENSO will be able to reduce their downtime for analysis from a week to within a day. With the increased productivity and early identification of bidders who deviated from planned shipment time, DENSO will be able to communicate with them more effectively and improve collaboration and reduce logistics cost in the long run.

Value Propositions



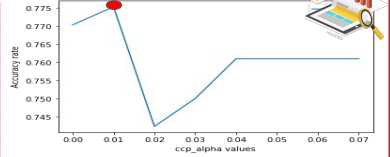
These functions will enhance data integrity of the system by preventing unauthorised modifications. The bottleneck of its current approach was also removed to help with turnaround time of analysis.

Limitations

- Speed of adoption of solution
- Maintenance of web app may be challenging to new users who lack domain knowledge
- A user guide was documented for easier transition

Recommendation: Prediction Models

ccp_alpha	Accuracy rate
0	0.770342
0.01	0.775287
0.02	0.74232
0.03	0.750012
0.04	0.761001
0.05	0.761001
0.06	0.761001
0.07	0.761001



Using Classification Analysis, predictive modelling proves to be possible with larger data sample which will enable DENSO to plan for buffer to optimise the process.

Testing & Evaluation

Future Deployment