IS455 – Data analytics in Asia

Final presentation

Prepared by team 1: Tung Lam, Zhebin, Yuquan, Yvonne, Jiayi

Insights from industrial visits

SCAN ME !

Key challenges

1. Difficulties in determining which products should be sold in each store
2. Costly & inefficient visits in some regions

Solution overview

1 How to identify which SKU should be sold at each store?

2 How to reduce cost through efficient visits?

Overview dashboard

- Offer high level insights into the sales performance of Osotspa products across various regions in Thailand
- Cater to senior executives

1

Sales performance dashboard

- Offer detail insights into the sales performance and purchasing pattern in each region
- Cater to sales department

1 2

Sales team dashboard

- Offer insights into the visit efficiency of each distribution center and individual salesman
- Cater to cash van team

2

Recommendation engine

- Machine learning model to recommend product bundles that can be cross sold in different region
- Cater to sales department

1

Overview dashboard

1 Key KPIs

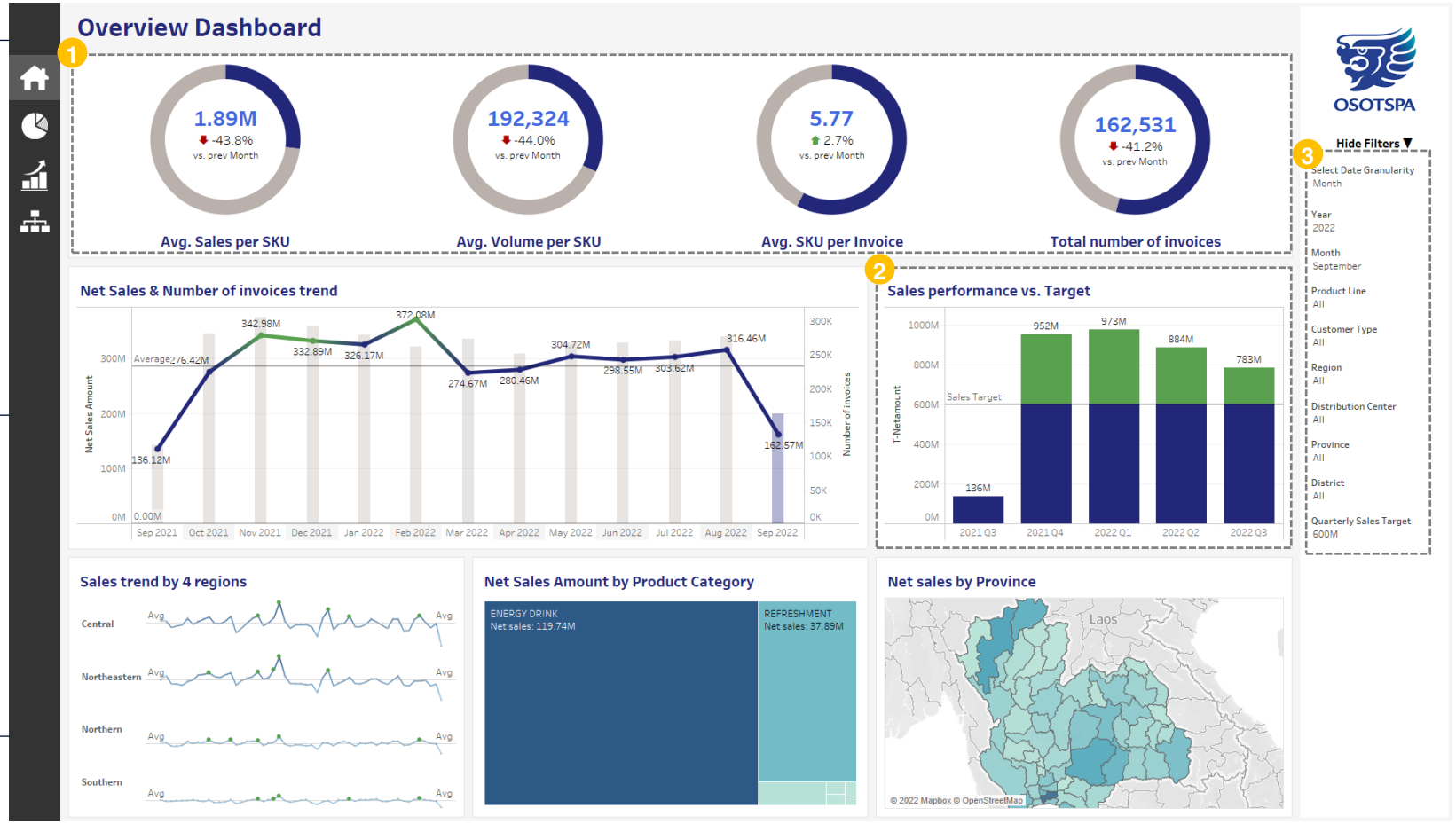
- Average sales per SKU
- Average volume per SKU
- Average SKU per invoice
- Total number of invoices

2 Target setting feature

- Management can set sales goal
- Instantly see how each quarter has achieved or missed the goal

3 Flexible filters & parameters

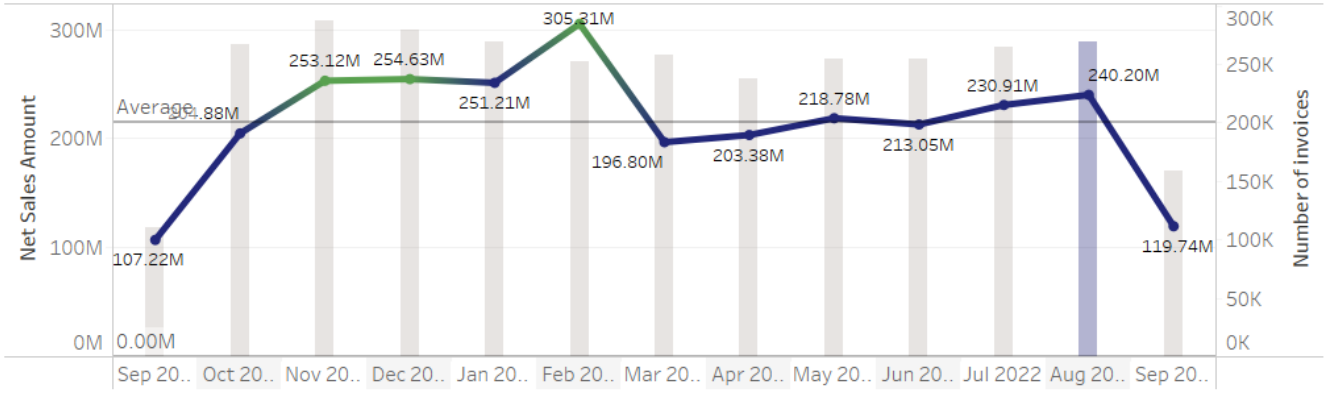
- Month or Quarter
- Product, Customer Types
- Location



Key insights

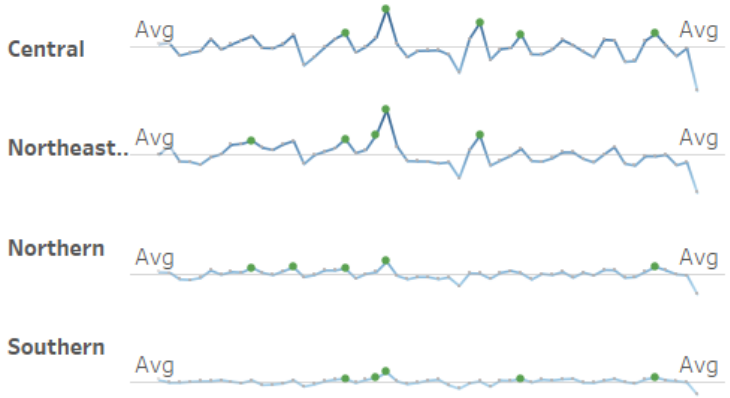
1 Seasonal pattern of energy drink sales

Net Sales & Number of invoices trend

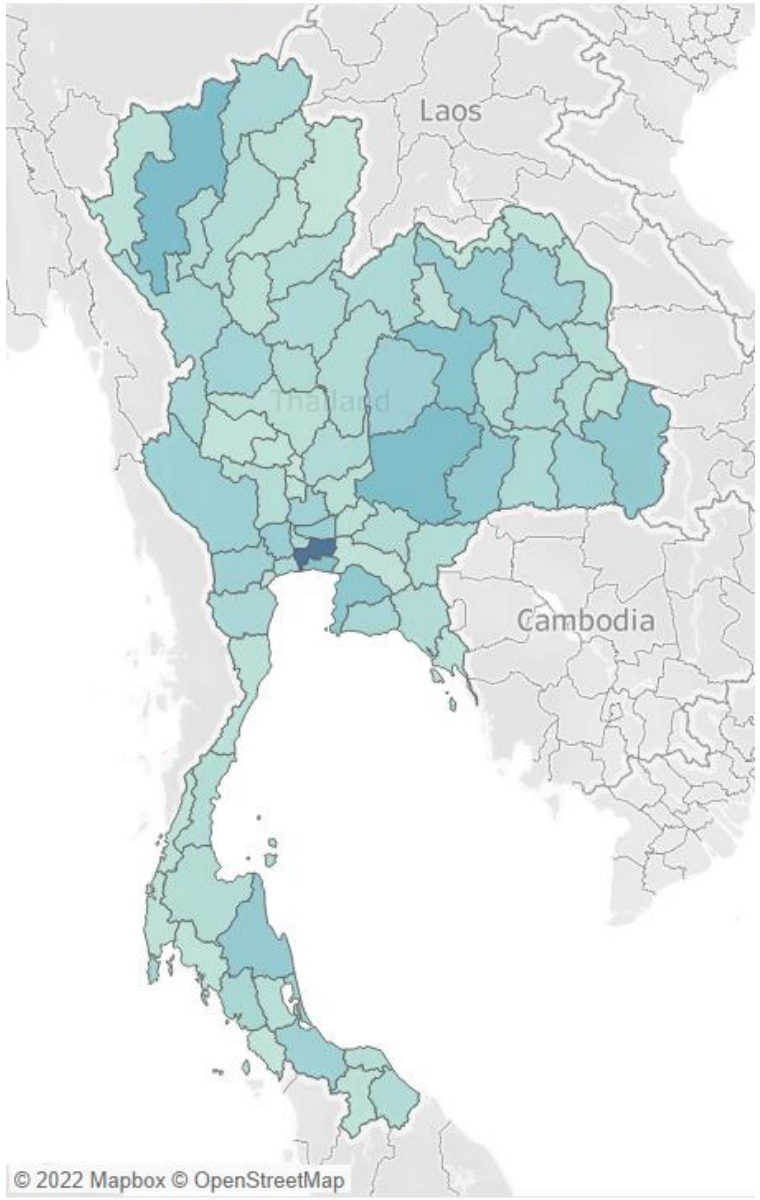


2 Regional sales performance

Sales trend by 4 regions

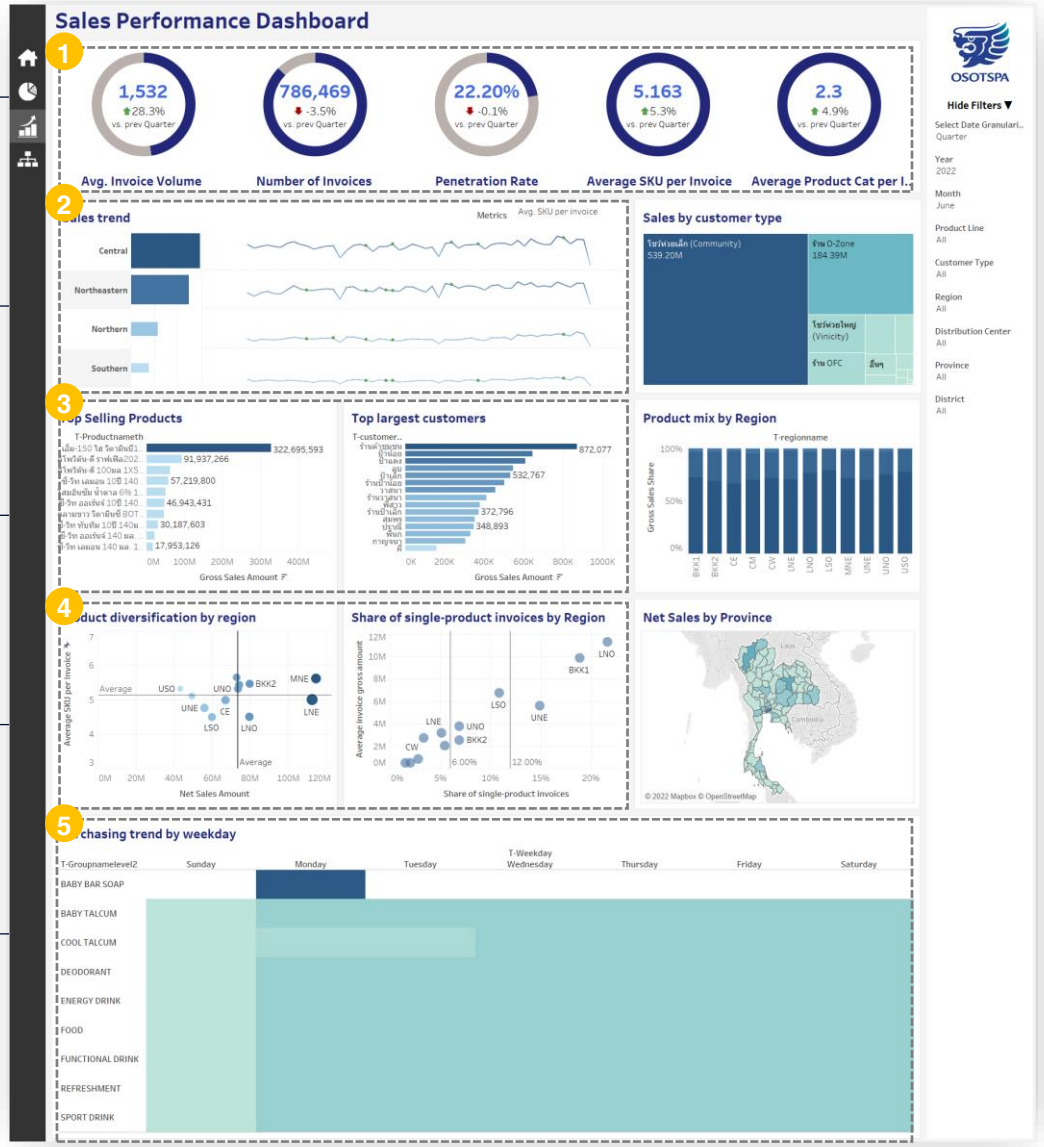


Net sales by Province



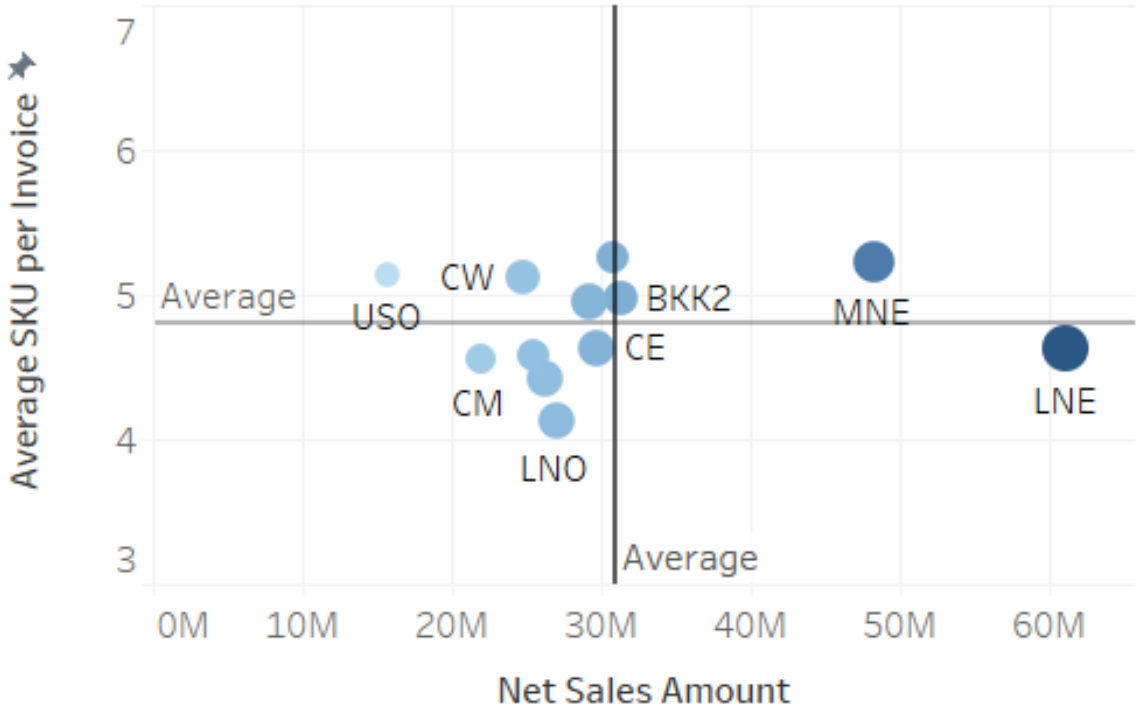
Sales performance dashboard

1. Key KPIs
2. Sales trend across 4 main regions
3. Top selling products & customers
4. Product diversification analysis
5. Purchasing pattern by weekday



Key insights

Product diversification by region



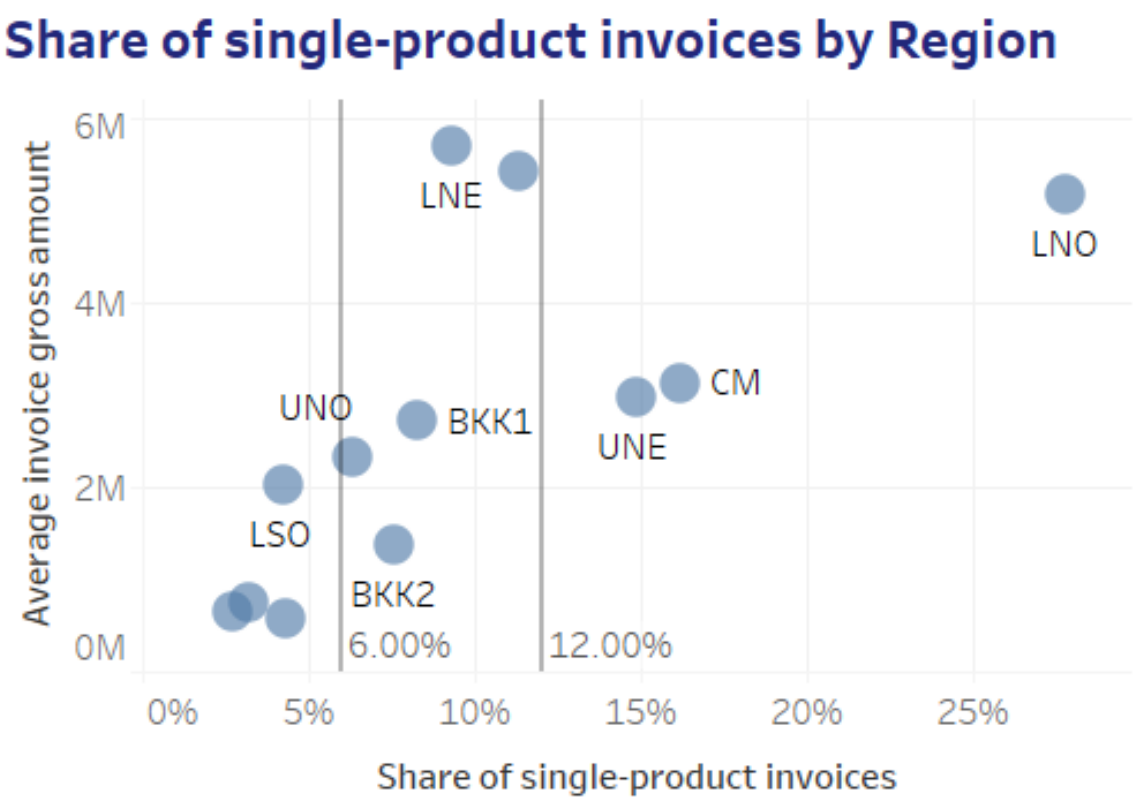
Findings

- CM, LNO, UNE, LSO are below average both in sales amount and product diversification
- Stores in LNO region are more incline to buying one single product in their invoice

Actions

- Strategically design marketing campaigns to target consumers in low sales & low product diversification regions.
- Schedule more visits to maintain relationships & cross-sell products generated from recommendation engine

Key insights



Findings

- CM, LNO, UNE, LSO are below average both in sales amount and product diversification
- Stores in LNO region are more likely to buy only one single product

Actions

- Strategically design marketing campaigns to target consumers in low sales & low product diversification regions.
- Schedule more visits to maintain relationships & cross-sell products generated from recommendation engine

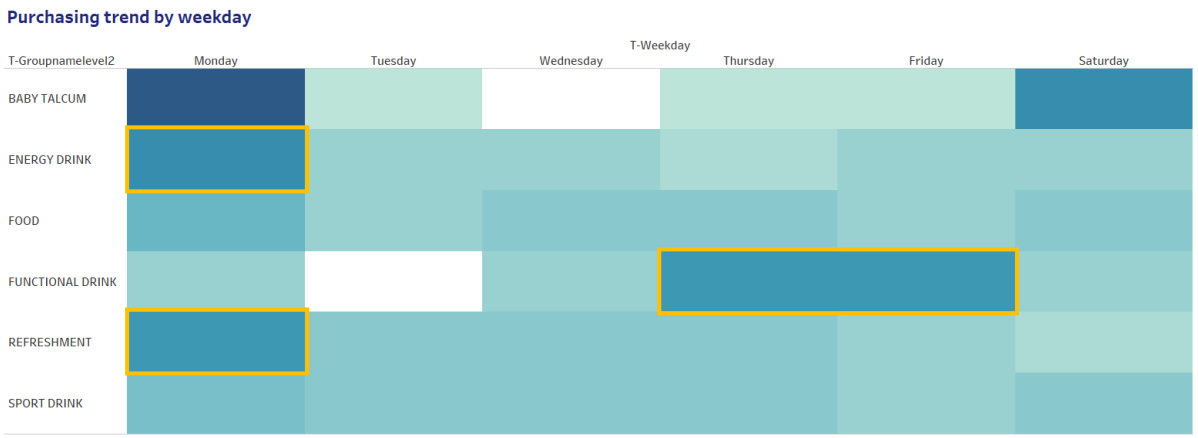
Key insights

Findings

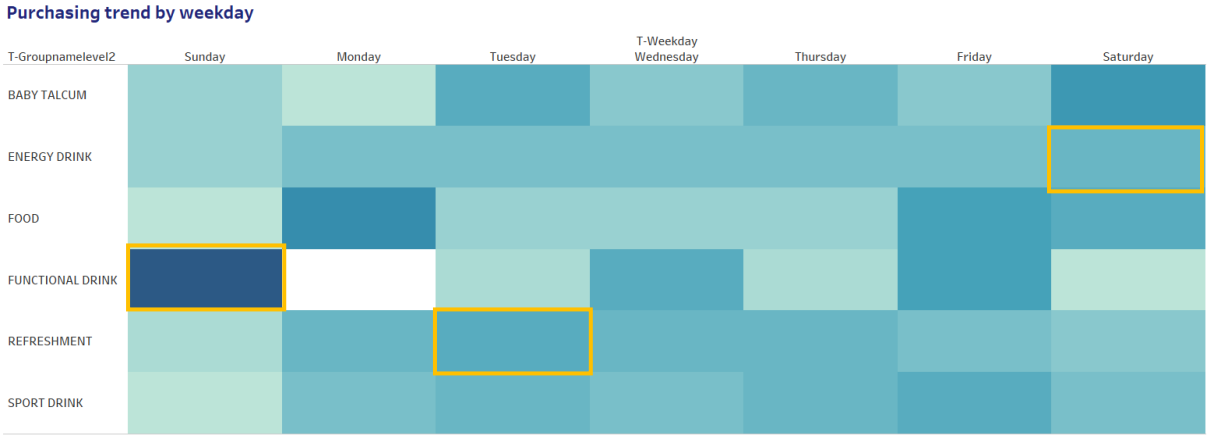
- Across different districts, mom-and-pop stores tend to restock different product on different weekday

Actions

- Strategically determine the quantity of each product type to load in cash vans



Purchasing pattern in Bangkok Yai



Purchasing pattern in Mae Hong Son

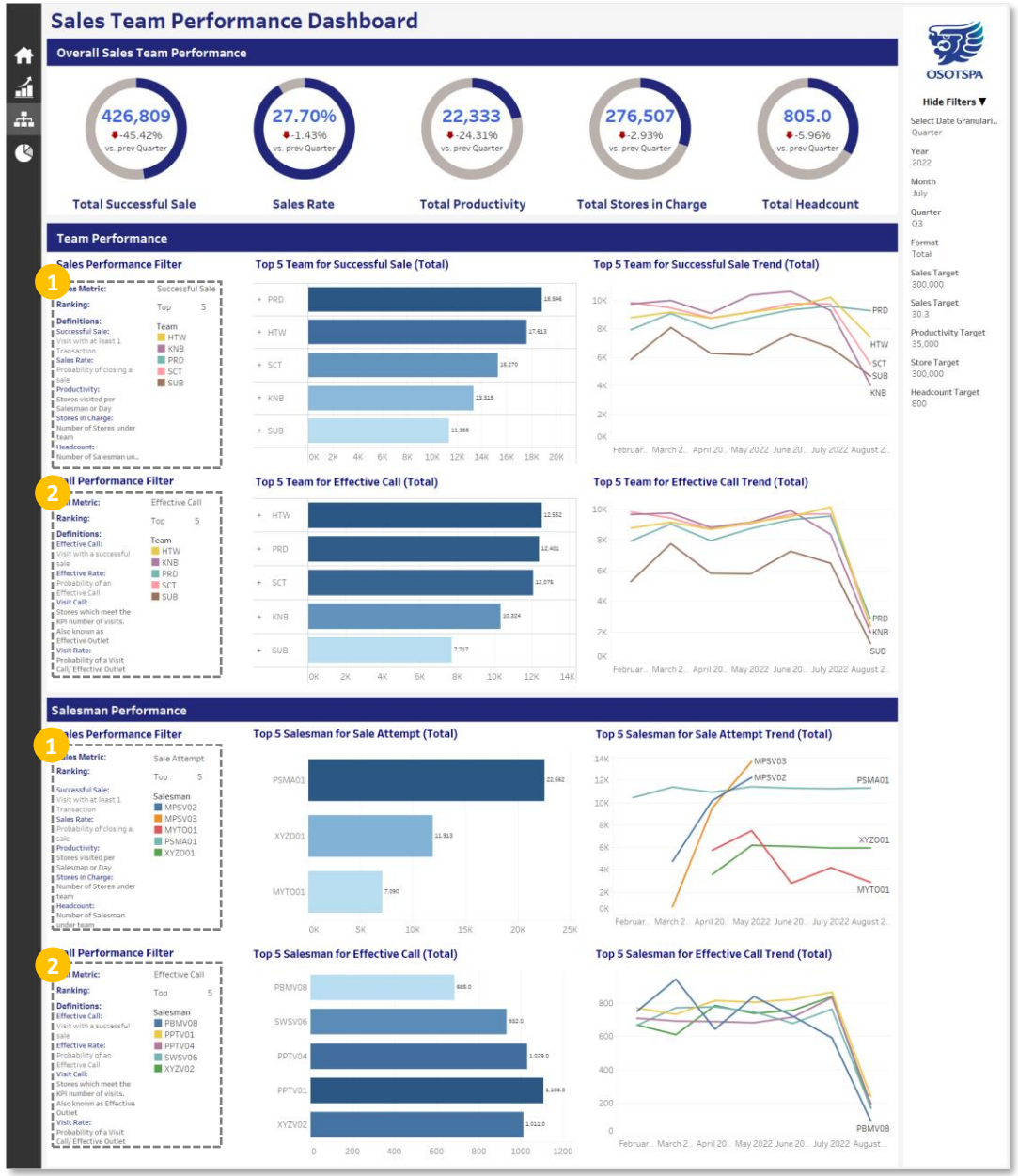
Sales team performance dashboard

1 Sales performance metrics

- **Successful Sale**: Visit with at least 1 transaction
- **Sales Rate**: Probability of closing a sale
- **Productivity**: Stores visited per Salesman or Day
- **Stores in Charge**: Number of Stores reached
- **Headcount**: Number of Salesman

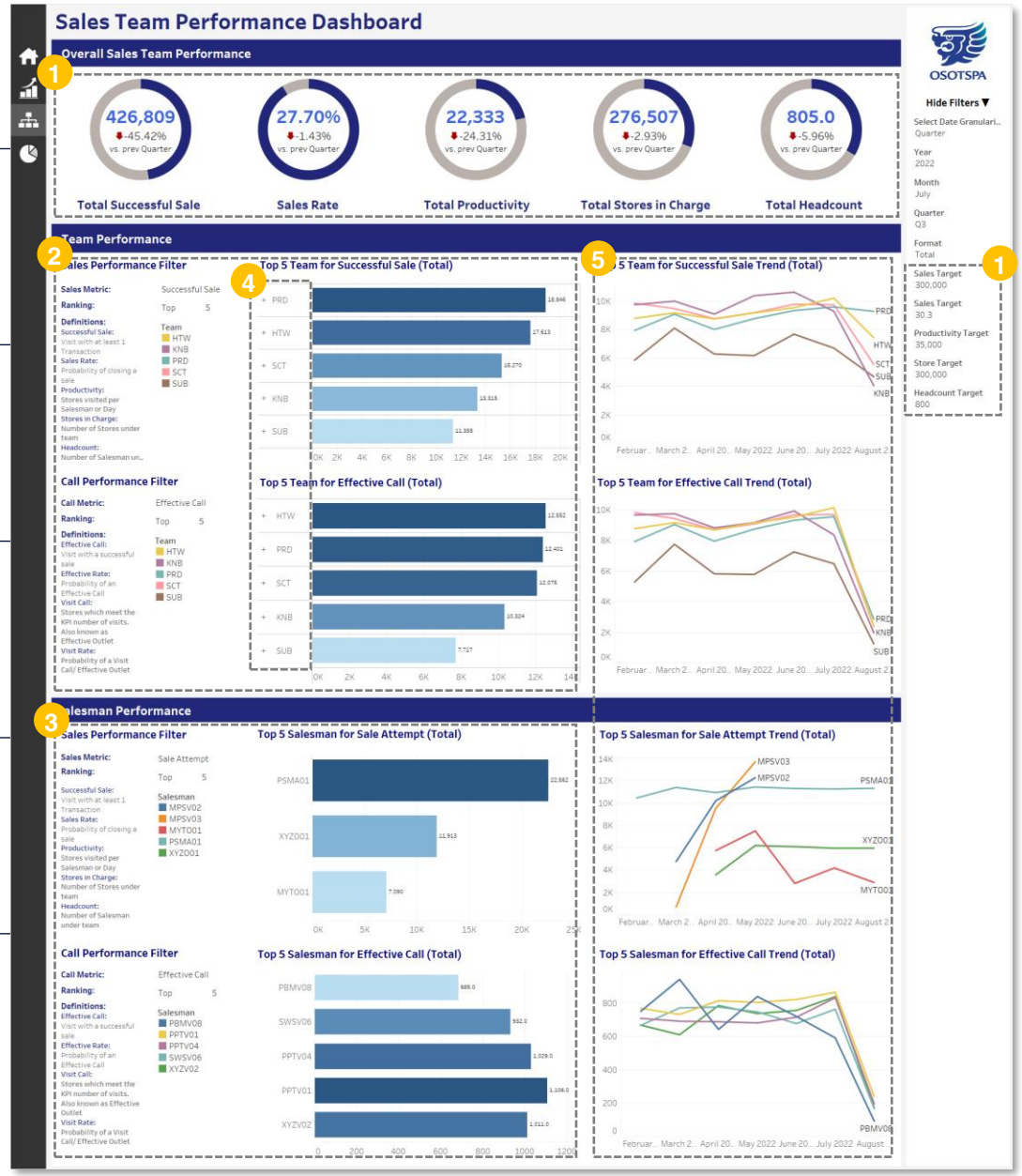
2 Call performance metrics

- **Effective Call**: Visit with a successful sale
- **Effective Rate**: Probability of an Effective Call
- **Visit Call**: Stores which meet the KPI number of visits (Effective Outlet)
- **Visit Rate**: Probability of a Visit Call/Effective Outlet



Sales team performance dashboard

1. Target Setting
2. Identify Top and Bottom Percentile Performing Teams
3. Identify Top and Bottom Percentile Performing Salesmen
4. Drill-down on team performance
5. View historical monthly performance



Key insights

1 Top Percentile Team for Each Metric

- Sales manager can share tips and strategies to other teams to achieve similar results

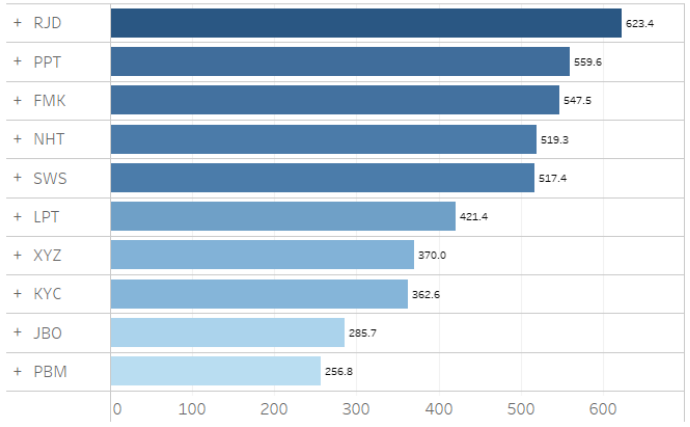
2 Low Sales Rate Salesmen/Team

- Learn better sales pitching technique
  - ➢ Prevent future redundant visits

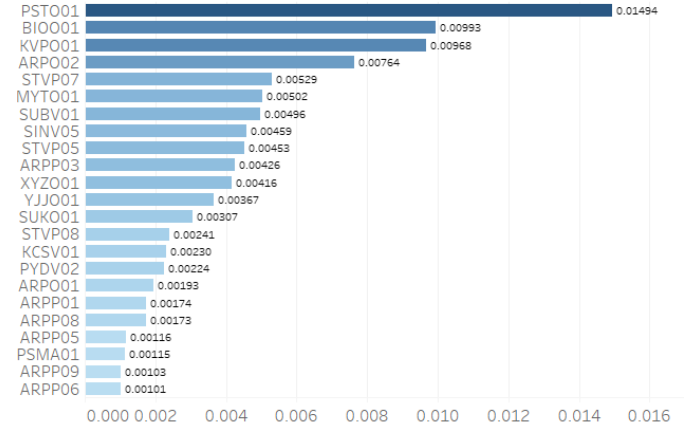
3 Low Productivity Salesmen

- Indicator for:
  - ➢ Unoptimised routes
  - ➢ Visit plan with rural stores

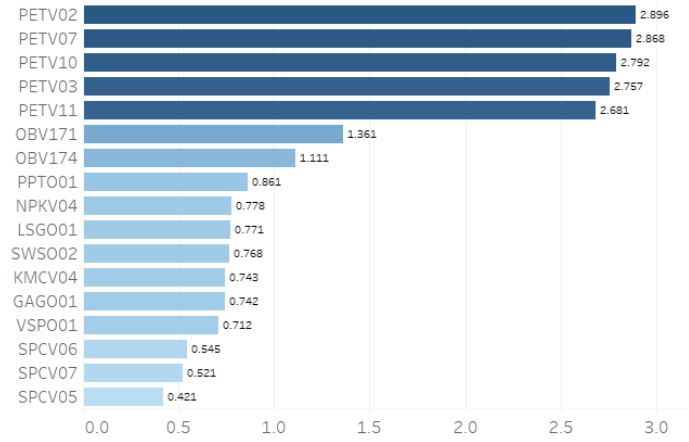
Top 10 Team for Successful Sale (Average)



Bottom 20 Salesman for Sales Rate (Average)

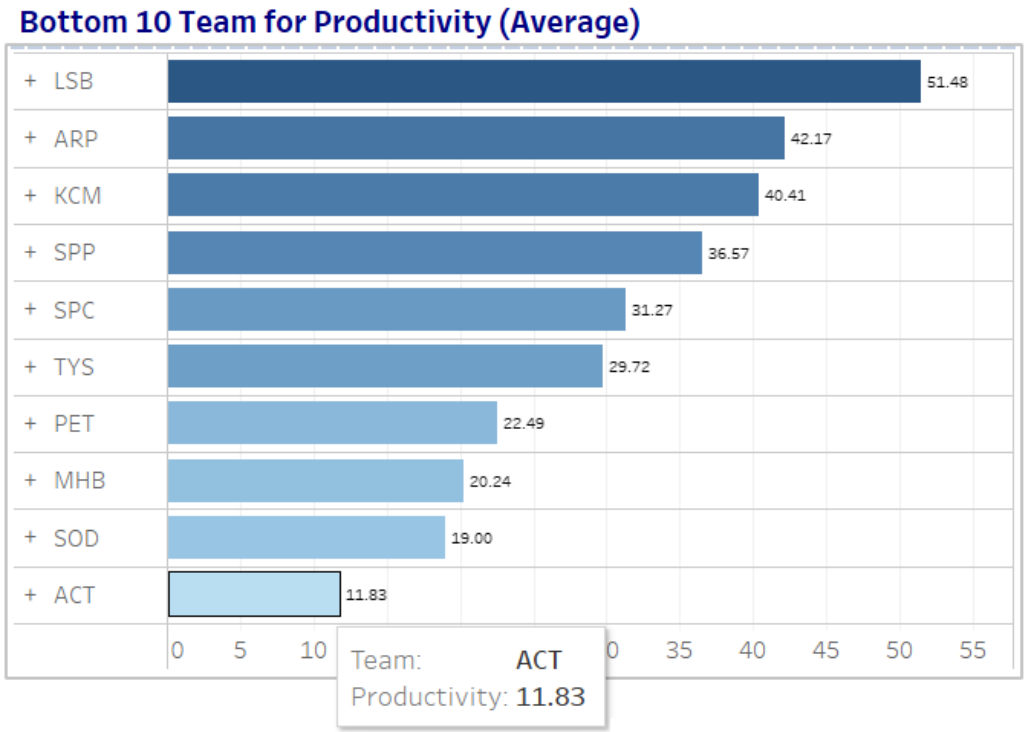


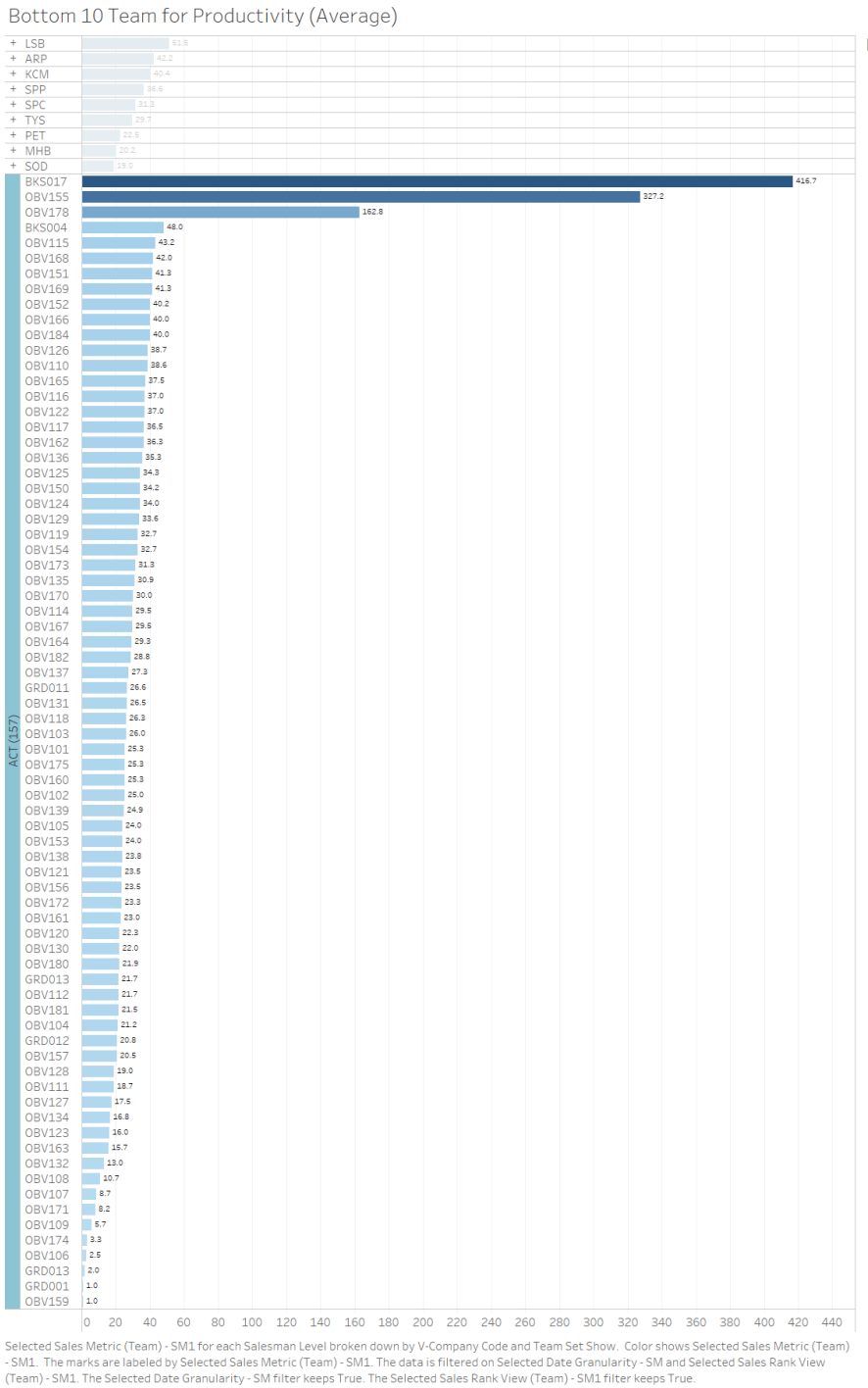
Bottom 20 Salesman for Productivity (Average)



Key insights

- ACT has the biggest team size, but they have the lowest productivity level.
- ACT salesmen performance is unevenly distributed.
- Top 3 performing salesmen by average productivity makes up 33% of the entire team's productivity as of Aug 22.
- ACT team can consider getting the top performing salesmen within their team to mentor new or poorer performing salesmen.





Selected Sales Metric (Team) - SM1 for each Salesman Level broken down by V-Company Code and Team Set Show. Color shows Selected Sales Metric (Team) - SM1. The marks are labeled by Selected Sales Metric (Team) - SM1. The data is filtered on Selected Date Granularity - SM and Selected Sales Rank View (Team) - SM1. The Selected Date Granularity - SM filter keeps True. The Selected Sales Rank View (Team) - SM1 filter keeps True.

Recommendation Engine

1 Problem Statement

- How to identify which SKU should be sold at each store?

2 Apriori Algorithm

- It detect the frequent individual items
- Expanding them to larger item sets

3 How Apriori Solves the problem?

- Enhance store interest in each province
- Identify the importance of itemsets
- Generate the frequent occurrences of an itemset.

Recommendation Engine

4 Outcome of Model

- Recommend cross-selling bundle with tendency to be brought by the store owners in each province

5 Why Apriori ?

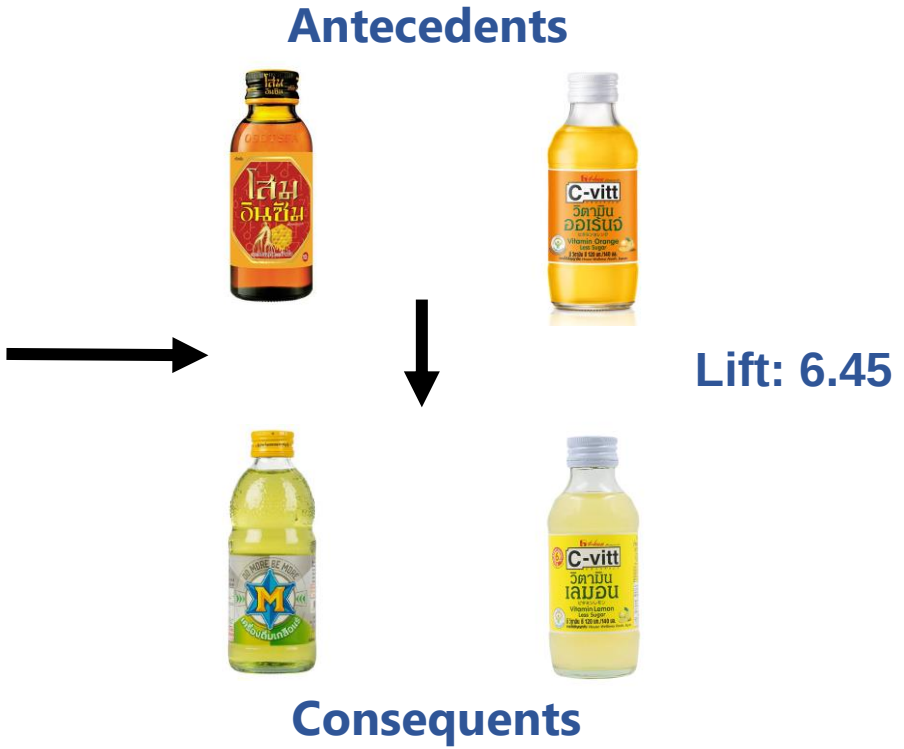
- It is efficient in studying of a client's basket while shopping.
- More accurate results compares to other methods

6 Key Evaluation Metrics

- The **Lift**
- Filter out recommended bundles with lift > 1

Phetchabun

Antecedents

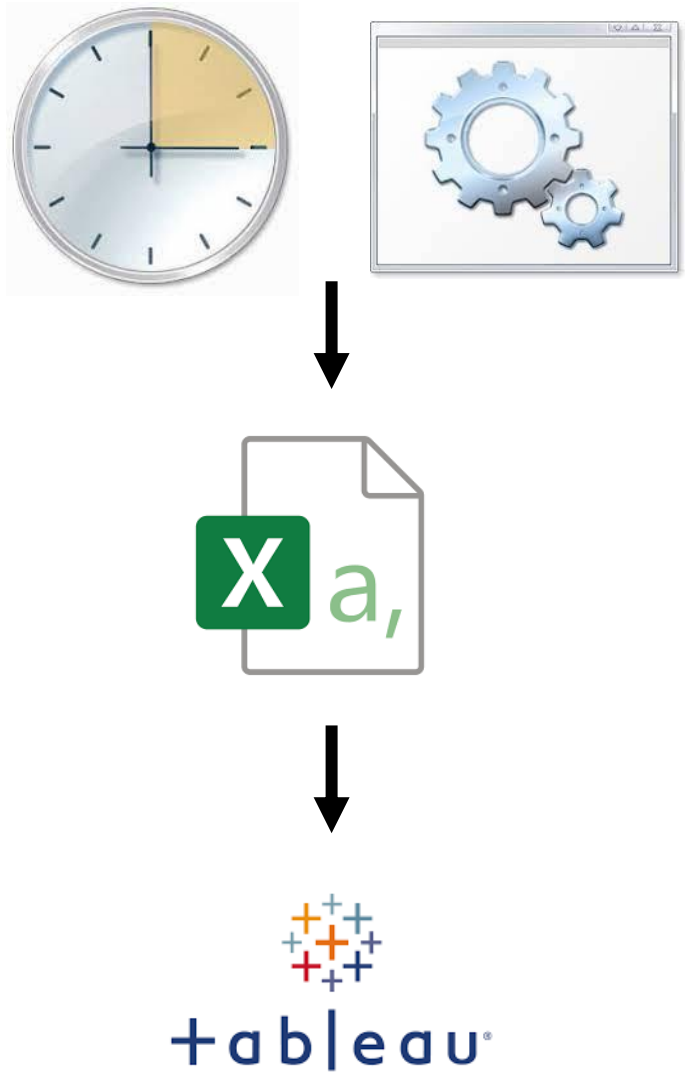


Lift: 6.45

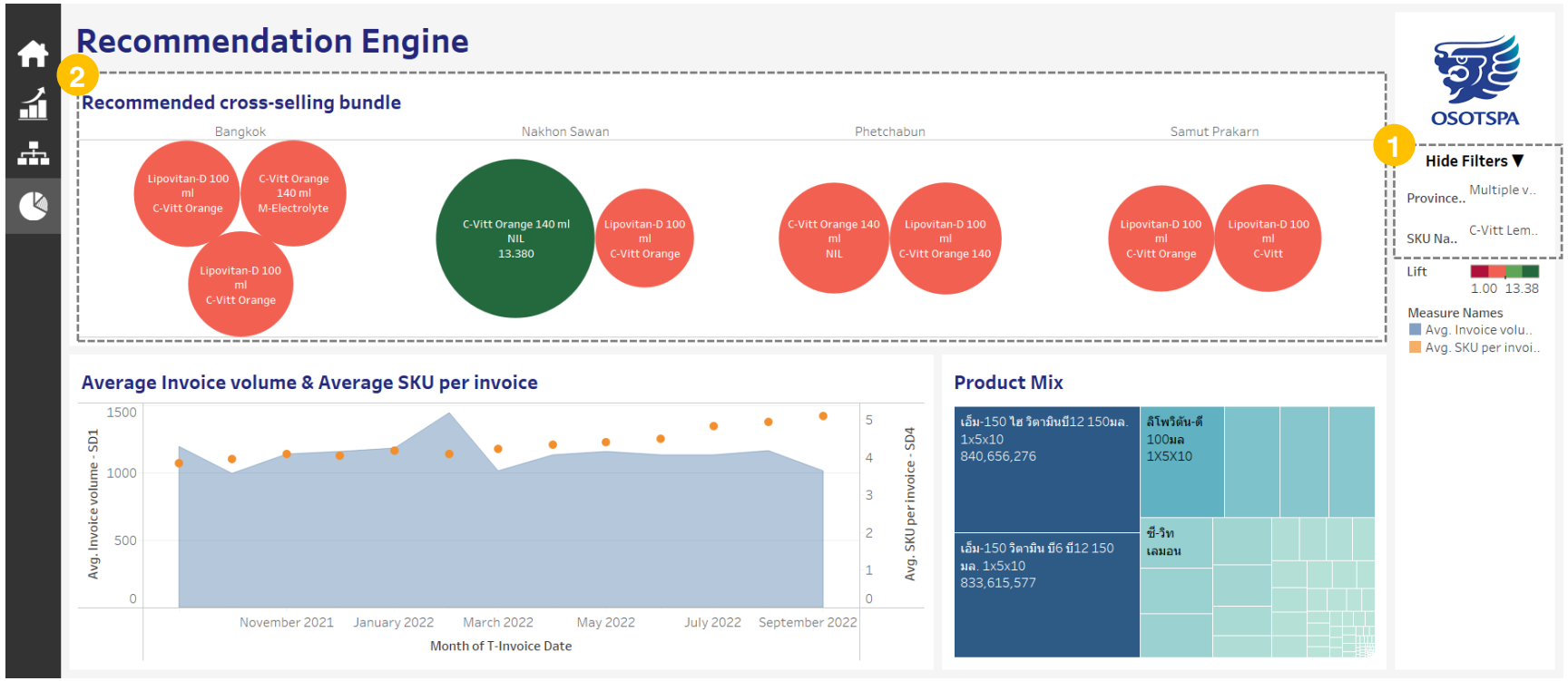
Consequents

Recommendation Engine

1. Apriori Algorithm
2. Scheduled batch file fed weekly with data
3. Recommend cross-selling bundle in a province
4. Filter out items with Lift > 1



Recommendation Engine



1 Inputs from users

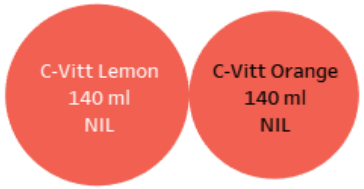
- Province name
- SKU name

2 Recommended cross-selling bundle

- Products recommended for cross selling
- Size and color represent lift of recommendation

Recommendation Engine

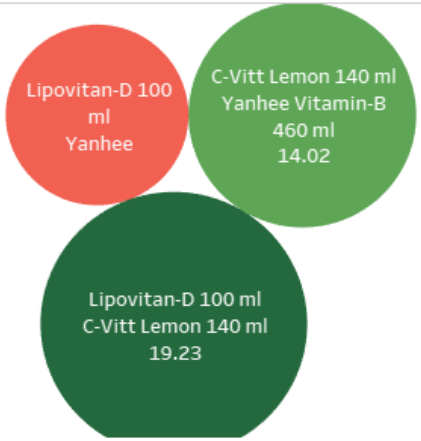
1 **Lop Buri**



SKU Name (Antecedent 1)

M-150 150 ml

2 **Nonthaburi**



3 **Phichit**

Findings

- Lipovitan-D and C-Vitt Lemon – Very Common
- C-Vitt Lemon and Yanhee Vitamin-B together with M-150 in Nonthaburi.

Actions

- Can give this sales strategy a go and bundle these products together to sell to stores in the province

Future recommendation

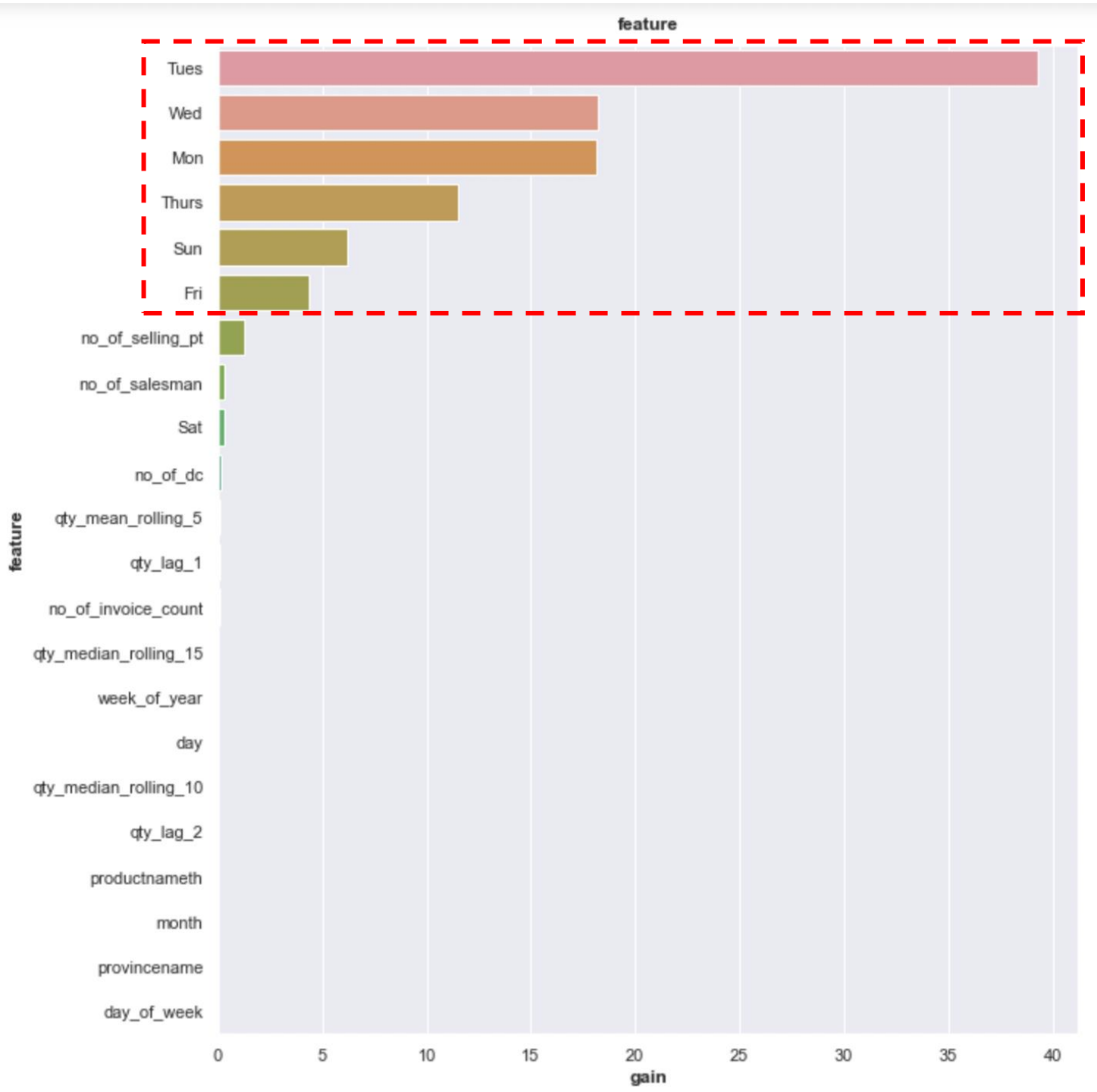
Province based Demand Forecasting Model

1. Anticipate demand
2. Sales teams to set goals to drive higher sales
3. Improve effective province base route scheduling

Important features

New features

1. Province-based product sold each week
2. Number of selling point
3. Number of salesman
4. Rolling mean quantity
5. Lagged quantity



Modelling approach

Model 1: LGBM

- Gradient boosting framework with tree-based learning algorithm
- Light and efficient
- Low memory usage

Model 2: Linear Regression + XGBoost

- Stacking model
- Linear regression to learn trend
- XGBoost to learn more complex relationships

Limitation

Requires longer period of data to increase the accuracy of the prediction.

Future recommendation

Province based Demand Forecasting Model

1. Anticipate demand
2. Sales teams to set goals to drive higher sales
3. Improve effective province base route scheduling

Suggestion on data collection

1 Shop Size

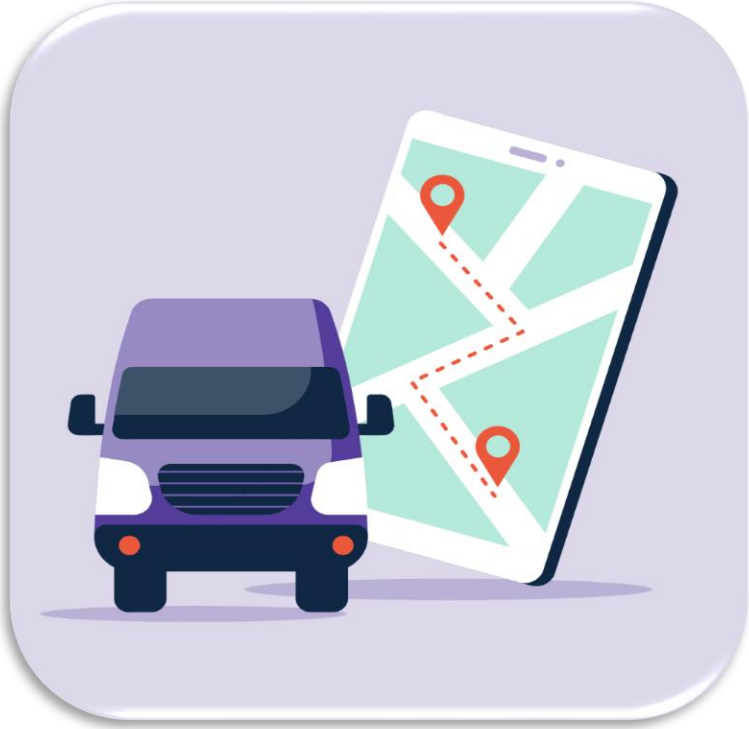
Better Granularity
Sales Volume/Store Size

2 Location Category

Better Granularity
Categorize as Urban/Rural

3 Date/Time of Visit

Route Planning / Route
Efficiency Calculation



Conclusion

1. How to identify which SKU should be sold at each store?
2. How to reduce cost through efficient visits?

SMU
SINGAPORE MANAGEMENT UNIVERSITY

OSOTSPA

Thank you!

Q&A