



SMU DSA x Maersk Case Competition

Team Data? Tada!

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Analysis of the Case

SCQA Framework

MAERSK

Situation

Maersk is an established global leader in logistics & transportation with an extensive network of container shipping, terminal operations and logistics services.

The firm moves 12 million containers every year via multiple transportation channels such as Ocean Transport, Inland Services, Cross Border Rail Transportation, Maersk Air Freight and Less-than-Container Load.

Complication

With a focus on **customer service and quality improvements**, Maersk has a focus point on one of their key business lines – **Maersk Air Freight**, that enables customers to fly goods with them quickly and efficiently across the globe.

Using insights from a fictional airline dataset, they aim to carry over insights to improve their air freight cargo business.

Question

- What are the key drivers to customer satisfaction and customer loyalty?
- How can we draw the similarities or differences between airline passengers and air freight cargo customers?
- What are some **creative recommendations** that can enable Maersk to improve its customer service that benchmark that of global leading companies like Tesla, Apple and Amazon?

The Dataset

Airline Passenger Satisfaction.csv

Consists of 23 labels – 19 numerical and 4 categorical variables

Category	Field Names
Passenger Demographics and Flight Information	Gender, Customer Type, Age, Type of Travel, Flight Distance
Customer Feedback (On a scale of 1 to 5)	Inflight Wi-fi Service, Departure/Arrival time convenient, Ease of Online booking, Gate Location, Food and Drink, Online Boarding, Seat Comfort, Inflight Entertainment, On-board Service, Leg Room Service, Baggage Handling, Check-in Service, In-flight Service, Cleanliness
Others	Departure Delay in Minutes, Arrival Delay in Minutes, Satisfaction, Satisfaction Score

Voice of Customer.csv

- Only feedback of dissatisfied customers (Satisfaction score <= 4) are recorded
- Records the customer ID, satisfaction score and reasons for dissatisfaction in their journeys



Model Analysis for Customer Satisfaction

Methodology

Customer Segmentation

- 1. Reduce Complexity of Dataset
- 2. Improve Market Understanding
- 3. Targeted Resource Allocation & Strategies

High Correlation Filter

- 1. Dimensionality Reduction
- 2. Improve Model Interpretability
- 3. Enhance Model Performance

Collinearity Analysis

- 1. Enhance Feature Importance
- 2. Clearer insight into feature impact
- 3. Avoid multicollinearity issues

Features Removed

Collinearity and Correlation Filter set at 0.1

Business Class	Eco Plus Class	Eco Class
Departure/Arrival Delay	Departure/Arrival Delay	Departure/Arrival Delay
Flight Length	Flight Length	Flight Length
Gender	Gender	Type of Travel
Age Group (Senior)	Age Group	Age Group
Gate Location	Gate Location	Gate Location
Departure/Arrival Time Convenient		





Model Analysis for Customer Satisfaction

Model Selection

Hyperparameter Tuning

Feature Importance of Final Models

Top 10 Features in each Class

Models Used

- Linear Regression
- Random Forest Regressor
- Gradient Boosting Regressor
- Support Vectors Regressor
- K-Neighbors Regressor
- LightGBM Regressor
- XGBoost Regressor

Evaluation Metrics

- Mean Squared Error
- Root Mean Squared Error
- R-Squared

Business Class	Eco Plus Class	Eco Class
XGBoost Regressor RMSE: 0.80914 R-Squared: 0.85253	LGBM Regressor RMSE: 0.80914 R-Squared:	XGBoost Regressor RMSE: 0.80914 R-Squared:
Online Boarding	Inflight Service	Inflight Wi-fi Service
Inflight Entertainment	Baggage Handling	Inflight Entertainment
Type of Travel	Inflight Wi-fi Service	Online Boarding
Inflight Wi-fi Service	Check-in Service	Ease of Online Booking
Customer Type	Seat Comfort	Food and Drink
Cleanliness	Departure/Arrival Time Convenient Departure/Arrival Time Con	
Check-In Service	On-Board Service Cleanliness	
Leg Room Service	Ease of Online Booking On-Board Service	
Ease of Online Booking	Online Boarding Inflight Service	
On-Board Service	Inflight Entertainment Seat Comfort	





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Check-In Service	On-Board Service Cleanliness		
Leg Room Service	Ease of Online Booking On-Board Service		
Ease of Online Booking	Online Boarding Inflight Service		
On-Board Service	Inflight Entertainment Seat Comfort		





Limitations of the Model

Satisfaction Score Model

Poor Generalisation

Feature Engineering Quality

Data Quality

Over-simplification of Features

Logistics handling is different from passenger moving; thus, the insights may not be directly applicable.

In-flight entertainment and services do not affect the delivery of logistics.

Binning of features can result in loss of granularity.

For example, an 8-year-old may have different characteristics from a 17-year-old, but both are classified in the same bin.

Satisfaction score is highly subjective due to the differences in expectations.

Scores given are relative to personal preferences.

Combination of certain features due to high correlation may oversimplify the impacts each feature has on customer satisfaction.





Model Analysis for Customer Loyalty

To determine what makes a customer loyal/disloyal, we have set our target variable to "Customer Type" whereby **0** represent disloyal and **1** represent loyal customer.

Logistic Regression

- This model is used for binary classification with the intention to determine the probability of the dataset belonging to one of the two classes.
- The model also allow us to determine coefficients of the dependent variables and provide insight into feature importance of important variables.

Random Forest

- This model can capture the **complex relationship** between the features and the target variable through each feature split.
- The terminal nodes generated at each feature selection split have helped to narrow down the influence of each feature and deduce on the more important features.

Evaluation Metrics

Classification report	Logistic Regression	Random Forest
Accuracy	0.901	0.987
Precision	0.929	0.981
Recall	0.951	0.949
F1-Score	0.940	0.965

Feature Importance

Logistic Regression	Coefficient	Random
Type of travel_personal	6.164	Type of t
Flight length_Long-Haul	4.351	Satisfacti
Satisfaction score	3.633	Cleanline
Inflight entertainment	2.757	Age grou
Online boarding	2.512	Inflight w

Random Forest	Coefficient
Type of travel_personal	0.189
Satisfaction score	0.086
Cleanliness	0.065
Age group_Young adult	0.065
Inflight wifi service	0.063



Model Analysis



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Limitations of the Model – Loyalty Prediction

Loyalty Prediction

Logistic Regression



1) Linearity Assumption

Customer Loyalty might be influenced by complex and non-linear interactions between some features.



2) Imbalanced Data

Bias towards majority class, leading to poorer predictions against minority class.

Random Forest



1) Possibility of Overfitting

Overfitting may still occur due to the high number of dependent variables.



2) Inability to extrapolate

Struggle to predict loyalty for customers with behaviors that significantly differ from those in the training data.



Model Analysis for Voices of Customer

Latent Dirichlet Allocation (LDA) Model

Voice of Customer.csv

Top 5 Key Topics

Time-Related

Service

Communication

Difficulties

Pricing

Exc	el '	VB/	۱ fo	r tc	pic
(ate	ego	risa	tio	n

Top 5 Key Topics	Number of comments		
Time-Related	284		
Service	205		
Communication	77		
Difficulties	53		
Pricing	6		

Limitations

Sentiment analysis is quite subjective and may not capture the nuances of customer feedback

Stemming, stop word removal, and other NLP techniques might oversimplify or misinterpret the actual sentiment of the feedback.





Business Model Canvas of Maersk

Key Partners

- Port authorities worldwide.
- Shipping alliances and partners.
- Customs and regulatory bodies.
- Technology providers for logistics and tracking.
- Suppliers for ships, containers, and equipment.

Key Activities

- Container shipping and cargo transport.
- Logistics and supply chain management.
- Digital solutions for tracking and customer service.

Key Resources

- Global network of terminals and ports located in key trade hubs.
- Fleet of container ships designed for every purpose
- Diverse team of professionals ranging from ship crews to logistics experts

Value Propositions

- To enable and facilitate global supply chains and provide opportunities for their customers to trade globally
- Maersk is engaged in exploration for production of oil and gas in many parts of the world

Customer Relationships

- Dedicated account managers for large clients.
- Self-service digital platforms for booking and tracking.

Channels

- Maersk's official website and digital platforms.
- Direct sales teams.
- Partner and third-party logistics providers.
- Physical offices in key cities and ports.

Customer Segments

- Geographic: Global reach with a strong presence in key trade routes, including Asia-Europe, Trans-Pacific, and Trans-Atlantic routes.
 Offices and operations in major cities and ports worldwide.
- Demographic: Large multinational corporations involved in extensive import and export activities. Small and medium-sized enterprises seeking reliable global shipping solutions.

Cost Structure

- Operational costs (fuel, maintenance of ships and equipment).
- Labor and staffing costs.
- Technology and IT infrastructure costs.
- · Port fees and regulatory charges.
- · Marketing and sales expenses.

Revenue Streams

- · Revenue from container shipping.
- Fees from terminal operations and port services.
- Logistics and supply chain management services.
- Digital solutions and software services.
- Long-term contracts and partnerships.



Maersk Business Model





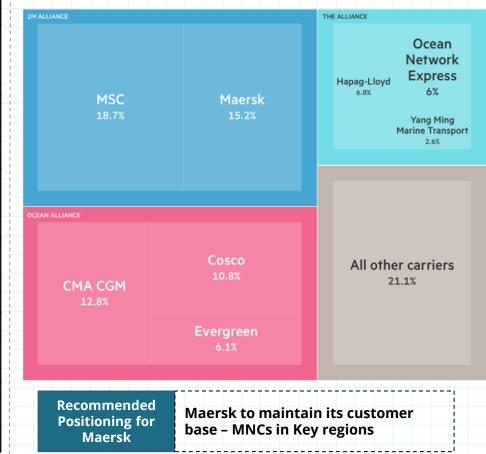
Business Model Canvas of Maersk

Competitor Analysis

Company	Key Products & Services	Innovation & Technology	Customer Base	Key Regions Served
Maersk	Advanced logistics solutions - Global terminal operations	Digital tracking platform "Maersk Flow" - Automated terminals	Multinational corporations - Retailers	Europe - North America - Asia
Mediterranean Shipping Company (MSC)	Integrated logistics - Eco-friendly terminal operations	"MSC e-business platform" for online bookings - Green tech vessels	Import/Export businesses - Manufacturers	Europe - Africa - South America
CMA CGM	Tailored logistics - Special cargo (e.g., refrigerated, oversized)	"CMA CGM+" suite of solutions - LNG powered ships	Agriculture producers - Automotive sector	Europe - Asia - North America
Hapag-Lloyd	Customized logistics solutions - Special cargo handling (e.g., dangerous goods)	"Quick Quotes" instant quotation tool - Eco-efficient fleet	E-commerce businesses - FMCG companies	Europe - Latin America - Asia
cosco	Comprehensive logistics - Major terminal operations in Asia	Smart port systems - Fleet modernization	Raw material suppliers - Electronics firms	Asia - Europe - Oceania
Evergreen Line	End-to-end logistics - Eco-friendly terminal services	"GreenX" digital platform - Sustainable ship designs	Textile industry - Tech companies	Asia - North America - Europo

Perceptual Map

Share of global container shipping capacity by company and alliance







Linking our Findings to Maersk

Insights Summary

Satisfaction Score

There were commonalities found among all classes such as online services & in-flight Wi-Fi, but different customer segments placed importance on different factors.

These insights show the need for personalization and segregated services.

Customer Loyalty

Passengers flying for "Personal" reasons often showed higher Customer Loyalty.

We believe that this is because personal travelers tend to have **a choice** in airline while business travelers might instead follow their companies' choice.



MAERSK

Voices of Customers

A prevalent cause of dissatisfaction came from time-related flight issues.

This can cause **time sensitivity issues,**. **productivity loss** or **frustration** due to the lack of information.



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MAERSK

Answer

- Our solution must enable safe & ethical data collection
 of customers to tailor services to customers on a
 personal or business level.
- A crucial element that Maersk needs to target is efficiency and transparency to the customers in their shipments.
- Recommendations have to be a fresh idea gained from external industries (like Tesla, Amazon, and Apple)



Recommendations

Model Analysis

Model Ar

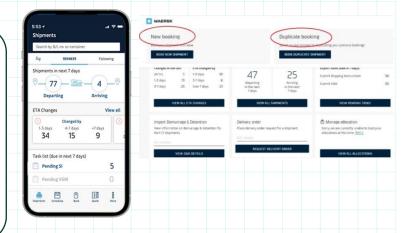
Gamify the Business on Multiple Levels

The Big Picture

Gamification is the implementation of game elements, design principles and mechanics in non-game context to engage & motivate individuals to achieve specific goals & tasks.

Maersk offers services to a range of stakeholders— MNCs, SMEs, Start-ups and even on a personal level. To improve customer service, Maersk will have to innovate different strategies, objectives & user journeys for each client segment.

As gamification on a B2B Level and in the Air Freight Industry is scarce, offering various tiers of incentives, goals & achievements for these different levels of businesses & clients can allow Maersk to widely differentiate themselves from competitors.



Segmentation

Multi-National Companies

Amazon, Disney, Microsoft etc.

Small-Medium Enterprises *Start-ups, local Stores etc.*

Personal Users *Freelancers, Solo practitioners etc.*

Considerations

Might not be receptive towards gamification; rewards/cost savings do not justify the extra time and effort spent.

More cost conscious due to lack of capital as compared to MNCs.

Small scale deliveries, may find it challenging to hit the targets for rewards consistently





Recommendations

oduction Mode

Maersk Business Mo

Additional Recommendations to Gamification

Complementary Services

As Maersk specializes mainly in shipping logistics & supplies, other variables or elements that affect a customer experience & service can be acquired with partnerships.

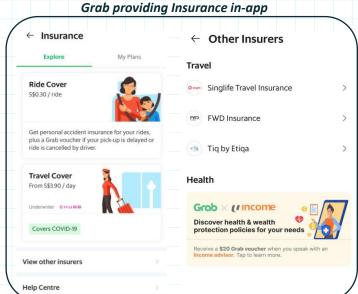
Examples of Services to Partner/Acquire

- 1. Supply Chain Consultation
- 2. Insurance Providers
- 3. Customs Brokerage
- 4. Warehousing & Storage

Customer Journey

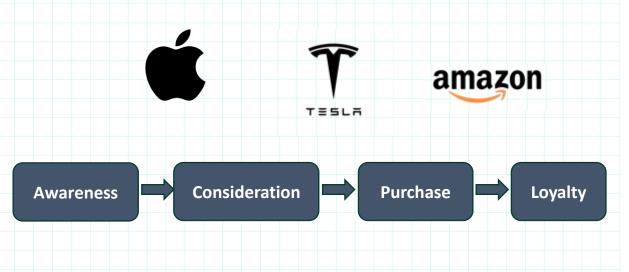
To complement gamification, a cost-effective method is to bring it across to customers as a journey.

This will create a dynamic shipping journey for clients of Maersk, whilst marketing the gamification initiative to the general public.





Amazon collaboration with Marsh



Recommendations

Examples of Gamification in Maersk

Multi-National Corporations

Objective

How

Foster Efficient Communication

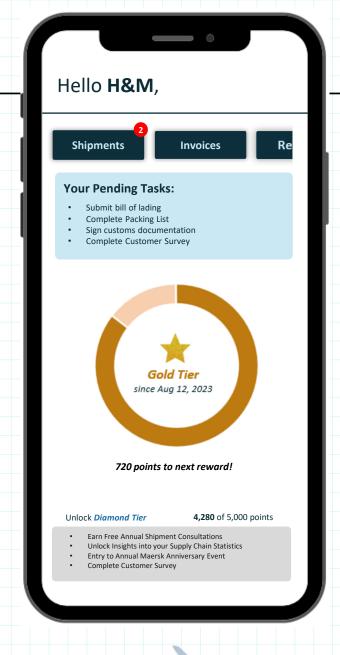
Implement gamified communication platform that rewards MNCs for timely responses, providing necessary documentation and proactive collaboration with Maersk's Team.

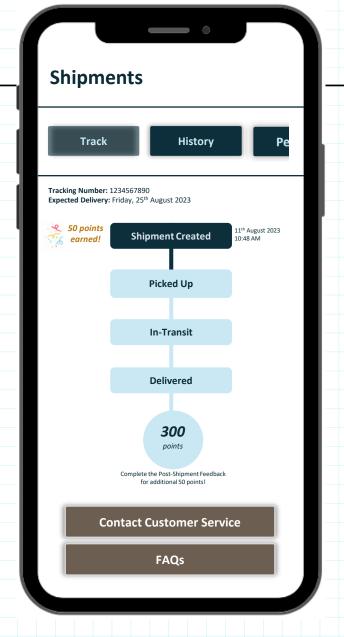
Promote Various Ways of Logistical Transport.

Offer **experience and points** when clients' logistical supplies include a certain mode of transport.

Promote Sustainability
Choices

Award extra points for choosing **ecofriendly shipping options**, providing information on carbon emission offset.







Examples of Gamification in Maersk

Small-Medium Enterprises

Personal Users

Objective

How

Objective

How

Example of Leaderboards in Apps

Example of Forums & Blogs in Apps

Enhance Cost Efficiency

Offer rewards for costeffective routes, consolidating shipments and minimizing delays.

Encourage Friendly Competition Implement a Leaderboard
System with careful datasharing and collection, to
publicly rank users based on
points earned.

Reward Loyal Partners

Create a **loyalty program** that rewards SMEs for consistent use of Maersk's services.

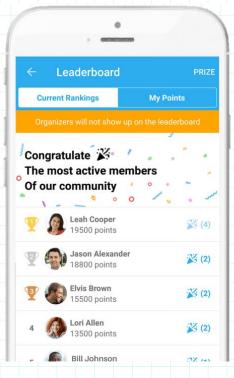
Promote Community Involvement

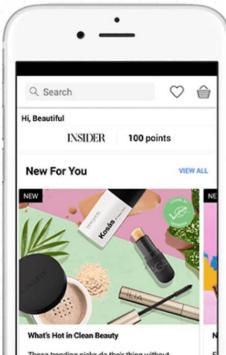
Introduce a sense of community between users for participating in forums, providing tips, sharing experiences.

Feedback Generation SMEs can earn points for sharing constructive, actionable feedback, participating in surveys or giving suggestions.

Service
Utilization and
Engagement

Encourage users to **explore & utilize services** like insurance providers and shipping cost calculators to earn badges.







Maersk Business Model

Value Proposition of Integrating Gamification

VALUE PROPOSITION

Data-Aware Dashboards for Clients to view Supply Line

Gamified Communication Interface between Clients

Data Collection of Clients to provide tailored services

Gain creators

Products & services

Tiering System to provide "progress" when using Maersk

Loyalty Programs for repeat Clients

Point & Reward System to Loyal Customers

with events or digital rewards

comprehensive guides on regulations

Gamify the usage of accessing complementary services

Incentivize Top Leaderboards among Loyal Clients

Basic reward & positive reinforcement to

Offer Interactive Training to educate clients with

facilitate document checks & submissions

Simplified views of various shipping options

Interactive Application/Web Interface that provide Communication Systems

Progress Bars of Shipments

Profiled Clients to understand

needs and concerns

Themed Gamification to build identity

Offer Tiers & Confidence System in Clients that rewards flexibility in contracts.

Map logistics networks that incentivizes communication between stakeholders

Award choices in entitlements for delays in Maersk's Shipment and offer a gamified feedback system.

Pain relievers

CUSTOMER SEGMENT



Tailored Services and Content

Sense of Fulfilment when using Maersk

Faster Shipment of Products

Ease of Access to Services

Better Visualization of Supply Chain

Generate Cost Savings

Reliable Time Sensitive Shipping

Customer jobs

Networking with Other Clients

Multiple Shipping Options

Discounts and Rewards with Maersk

Effective Communication with Stakeholders

Real-Time Tracking & Updates of Supplies

Pains

Guidance & Support with Shipment

Unhappiness in Shipment Delays

Concerns about Package Security

Safe Package Handling

Complex Logistics Management

Affordability

Difficult Regulatory Compliances

Inconsistency in Demand

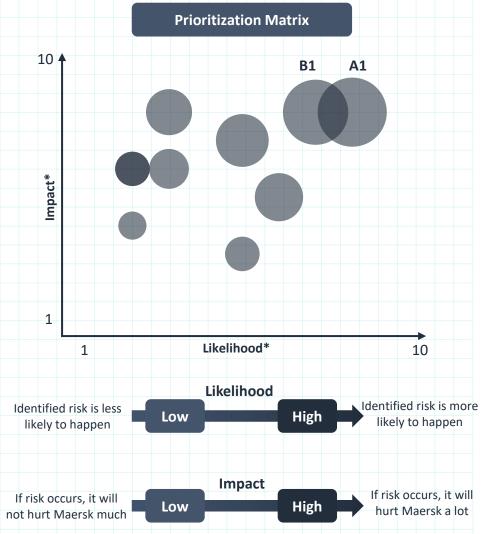
Complications in Documentation



Recommendations

Risk Mitigation

Solutions	Risk	Mitigation Plan	Code	L	1
Gamification in App and Web interface	Data Privacy & Security Concerns	Clearly communicate how user data will be used, obtained and adheres regulations	A1	9	8
	Low Onboarding Rates	Use data collected for specific customer segments to tailor the experience & rewards	A2	4	6
	Dependency on Rewards	Balance rewards and achievements with other intrinsic motivation factors	А3	7	5
	Misaligned Cultural Fit with Maersk	Simplify the gamification of the business, like Starbuck's Loyalty Program	A4	3	6
Integrating	Operational Complexity	Only incorporate services that Maersk's company infrastructure can handle	B1	8	8
	Regulatory & Compliance Issues	Research & understand regulatory landscape	B2	4	8
	Competitive Dynamics	Clearly demarcate the separation & independence of businesses	В3	3	4
Building Customer Ina Journey	Running out of Ideas	Look for references and benchmarking from competitors' social media accounts	C1	6	3
	Inaccurate Assumptions	Base customer journey on solid research and data-driven insights	C2	6	7
	Overcomplication of Journey	Keep the journey simple, intuitive, and aligned with customers' natural flow and preferences	СЗ	3	6





Model Analysis

Maersk Business Model

Introduction

