HackMTY 2025 – Pick & Pack of the Future
Pillar: *Smart Intelligence*

Consumption Prediction

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gategroup

Contents

Consumption Prediction

1. Understanding the Context

Within airline catering, the Pick & Pack process operates in two distinct ways depending on the type of onboard service. The first is **Retail**, also known as **Buy On Board**, where passengers purchase snacks, meals, or beverages during the flight. The second is the **standard Pick & Pack** service, which covers all pre-planned items provided free of charge to passengers as part of the inflight service.

For Buy On Board, airlines often work with specialized third-party companies that provide a complete management solution. These vendors deliver integrated software, scanners, and real-time stock tracking systems that allow the airline to monitor product sales, onboard inventory levels, and replenishment needs accurately. As a result, consumption data is available immediately after each flight, enabling precise control of stock movement and sales performance.

In contrast, the standard Pick & Pack process has very limited visibility over what passengers actually consume during a flight. Once the trolleys are prepared, loaded, and dispatched, there is no continuous feedback loop on what was used versus what returned. Consumption information becomes available only later, during periodic inventory checks or manual reconciliations. By that time, any opportunity to react or adjust production and loading levels has already passed.

This lack of real-time consumption insight makes it difficult to optimize provisioning and production. Many catering units rely on historical patterns or fixed loading ratios to estimate how much of each item should go on board. However, actual usage can vary significantly depending on route, time of day, passenger demographics, seasonality, and even crew preferences.

Without accurate, timely data, overproduction and waste are common outcomes. Products that were never opened or consumed may return unused and, in some cases, cannot be reused due to hygiene rules or expiry limitations. Meanwhile, other items may run short during service, impacting passenger satisfaction.

The ability to predict consumption in a more dynamic and data-driven way could transform how airline catering operations plan, pack, and manage inventory. By better understanding what passengers actually consume, catering units could reduce waste, improve accuracy, and enhance the overall passenger experience while supporting operational sustainability goals.

2. The Current Challenge

The main difficulty in predicting consumption lies in the limited visibility of what actually happens once the trolleys leave the catering facility and are loaded onto the aircraft. For **Retail (Buy On Board)** operations, airlines often have access to sales and stock data, but this information is not always captured in a consistent or automated way. In some cases, employees use handheld scanners to record product replenishment and returns, while in others, the process is still done manually using pen and paper. This manual recording limits data accuracy and slows down reporting, as the information must later be consolidated and verified before being shared with catering teams.

For **standard Pick & Pack**, the situation is even more complex. Once products are loaded for a flight, there is no reliable or real-time feedback about what was actually consumed. The only available data comes later, during periodic inventory counts or manual reconciliations. By the time this information is collected, it is often outdated and cannot be used to adjust ongoing production or loading levels.

As a result, catering units must rely on fixed provisioning rules or historical averages to decide how much of each product should go on board. These assumptions rarely reflect real consumption behavior, which varies by route, season, passenger mix, and even crew habits.

This lack of timely and standardized consumption data creates multiple operational challenges:

- **Overproduction and waste:** Large volumes of unused items return from flights and cannot be reused due to hygiene and safety rules.
- **Inconsistent passenger experience:** Some flights may run short on popular products while others return with excess stock.
- **Inefficient inventory planning:** Procurement and production teams work with outdated or incomplete information, leading to imbalance across the supply chain.
- **Limited data integration:** Even when data exists, it is often fragmented across manual reports, paper logs, or separate retail systems that do not connect with the main catering platform.

Both Retail and standard Pick & Pack processes face inefficiencies due to the absence of real-time, structured, and integrated consumption data. The challenge is not only to collect information more accurately but also to transform it into meaningful insights that can predict and guide future provisioning decisions.

A smarter, predictive approach could help bridge the gap between what is planned and what passengers actually consume, improving efficiency, reducing waste, and enhancing overall service quality across the entire catering operation.

3. Your Mission

Your challenge is to design an intelligent solution that helps airline catering teams better understand and predict what passengers will actually consume on board. The goal is to move from static provisioning rules and delayed manual reporting to a smarter, data-driven system that continuously learns from flight behavior and supports real-time or near real-time decision-making.

Today, standard Pick & Pack operations lack reliable data feedback. Retail (Buy On Board) systems provide some information, but it is often collected manually, fragmented, or delayed. Your task is to imagine how technology and analytics could transform this situation, enabling catering units to anticipate consumption patterns, adjust production and packing more accurately, and minimize waste without compromising service quality.

Your solution could explore any combination of digital intelligence, sensors, data analytics, or process design to predict and optimize consumption. Think of how different data sources could be connected, such as flight schedules, passenger counts, route profiles, time of day, or even weather conditions, to anticipate what will actually be used on board.

The ideal concept will help planners and production teams make smarter daily decisions, answering questions such as:

- How much of each item should be prepared for each flight?
- Which routes or times of day have lower or higher consumption rates?
- When and where does overloading or underloading occur most often?
- What trends can be detected to continuously improve provisioning accuracy?

In scope:

- Building a predictive model or algorithm that estimates consumption per product, route, or service type
- Designing a dashboard or visualization that highlights real-time consumption patterns and anomalies
- Proposing a method to collect or connect existing data sources from flights, returns, or inventory systems

- Developing solutions that monitor, automate, or digitalize the capture of consumption and replenishment data
- Exploring digital feedback loops that can inform production and packing decisions daily
- Suggesting process improvements that make data collection easier and more reliable for employees

Out of scope:

- Changing menu design, onboard service concepts, or airline commercial strategies
- Modifying passenger pricing, payment systems, or third-party retail contracts

You are not expected to design a complete enterprise solution. A focused prototype, concept, or model that clearly demonstrates how consumption prediction could work in a real catering environment is sufficient. The emphasis is on creativity, practicality, and measurable impact, showing how data and technology can make a complex process smarter, faster, and more sustainable.

4. Inspiration and Example Ideas

There are many possible ways to approach this challenge. The best ideas often combine technology, process understanding, and creativity to solve a real operational problem. Below are some examples to help you get inspired. You can use them as a starting point, adapt them, or come up with something completely different.

a. Predictive consumption dashboard

A digital dashboard that combines data from multiple sources, such as flight schedules, passenger loads, routes, and historical consumption. It could display trends, highlight anomalies, and predict how much of each item will likely be consumed on upcoming flights. The system could automatically adjust production and packing recommendations based on new data each day.

b. Automated consumption logging

A concept where smart sensors or scanners automatically detect what products are used or returned during loading and unloading. This could include smart trays, RFID-tagged trolleys, or scanning gates that track the movement of products without manual input. The collected data would feed directly into a central system for real-time visibility and prediction.

c. AI-based forecasting model

An algorithm that learns from past consumption patterns and external variables such as route type, season, or flight time. The model could continuously improve its accuracy, providing planners with suggested load quantities and expected usage rates.

d. Digital feedback app for crew or catering staff

A simple mobile or tablet interface where crew or catering employees quickly record what was used, returned, or missing. The data would be captured in a structured and consistent format, removing the need for manual paperwork or delayed reporting. Over time, this data would train the prediction model to become more precise.

e. Smart trolley or container tracking

An Internet of Things concept where trolleys or containers are equipped with sensors that record opening frequency, product movement, or remaining stock levels. This would provide an automatic record of onboard activity, reducing dependency on manual counting or post-flight estimation.

f. Integrated demand and production planning

A system that links flight consumption predictions directly with production schedules and procurement planning. For example, if data shows that certain items consistently return unused from specific routes, production levels could automatically adjust before the next cycle, preventing overproduction and waste.

A strong idea does not need to rely on complex technology. Even simple, well-designed digital tools that automate or simplify how consumption data is captured and used can make a major difference in accuracy, efficiency, and sustainability. The key is to focus on usability, practicality, and impact, showing how your solution would realistically help catering teams make faster, data-informed decisions while reducing waste and improving passenger satisfaction.

5. Supporting Mock Data

To help you design and test your ideas, you will receive a simplified dataset that simulates real consumption data from an airline catering environment. This dataset can be used to train models, visualize trends, or prototype dashboards and prediction tools that estimate what passengers are likely to consume on upcoming flights.

Each row in the dataset represents a product associated with a specific flight and its origin. It reflects the quantities prepared, returned, and consumed based on operational

records and specifications. The dataset is designed to give you enough structure to work with while keeping the scenario manageable and realistic.

Column	Description
Flight_ID	Unique identifier for each flight. Example: LX180, BA715, or AA204.
Origin	Location of the catering unit or flight departure, represented by the IATA code of the city. Example: ZRH, LHR, or JFK.
Date	Flight departure date in YYYY-MM-DD format.
Flight_Type	Indicates whether the flight is short-haul, medium-haul, or long-haul.
Service_Type	Defines if the flight includes Retail (Buy On Board) or standard Pick & Pack service.
Passenger_Count	Total number of passengers onboard.
Product_ID	Unique identifier for each product. Example: SNK001, DRK023, or MLK105.
Product_Name	Name of the item, for example Snack Box Economy or Sparkling Water 330ml.
Standard_Specification_Qty	Number of units per drawer or per flight according to the customer specification (the planned quantity).
Quantity_Returned	Number of units that returned unused after the flight.
Quantity_Consumed	Estimated number of units consumed, calculated as the difference between the Standard Specification Quantity and the Quantity Returned.
Unit_Cost	Cost of one unit of the product, useful for calculating waste impact or consumption value.
Crew_Feedback	Optional field where crew or catering staff can log remarks such as “ran out early,” “low demand,” or “drawer incomplete.”

This dataset allows you to simulate and explore how consumption varies under different operational conditions and origins. You can use it to create predictive models, visualize demand by route or destination, or generate automated recommendations for future load planning.

For example, you could design a dashboard that:

- Predicts expected consumption for upcoming flights based on historical data and passenger loads
- Identifies products with high return rates on specific origins or routes
- Highlights differences between planned versus actual usage to support waste reduction and cost optimization

Using the dataset is optional. You may also choose to develop a concept focused on real-time data capture, sensor-based monitoring, or automation of consumption logging. The goal is to demonstrate how data can be used to make catering operations more intelligent, predictive, and sustainable.

Remember that this mock data represents only a small portion of what a real catering operation manages daily. In reality, thousands of products are loaded, returned, and compared against specifications across multiple origins and catering units. Your solution should be designed with this complexity in mind while remaining practical and easy to use for teams working in fast-paced environments.

6. What Makes a Great Solution

Judges will evaluate your project based on several key dimensions that reflect both creativity and real-world applicability. Your idea does not need to be fully functional or perfect, but it should demonstrate clear thinking, innovation, and a strong understanding of the operational problem.

a. Innovation

How original and creative is your solution? Does it introduce a new way to capture, analyze, or predict consumption in the Pick & Pack process? Judges will value ideas that think beyond traditional methods and show clear improvement over current manual or static approaches.

b. Feasibility

Could your solution realistically work in an airline catering operation? Consider the environment: limited time, high workload, and strict safety requirements. A great solution will balance ambition with practicality, showing that it could be implemented without disrupting ongoing operations.

c. Efficiency

Does your idea make the process faster or reduce the amount of manual work required to capture and analyze consumption data? Solutions that simplify tasks, automate data input, or enable quicker decision-making will be rated highly.

d. Data Quality and Insight

How well does your solution improve the accuracy and usefulness of consumption data? The best ideas will not only collect data efficiently but also turn it into actionable insights that support smarter production and provisioning decisions.

e. Sustainability

How effectively does your solution help reduce waste or optimize resource use? Airline catering handles large quantities of shelf-stable products daily, and minimizing unnecessary disposal directly contributes to environmental and financial goals.

f. User Experience

Is your solution intuitive and practical for catering employees and planners? Remember that users operate in busy environments and have limited time. A clear, visual, and user-friendly interface that minimizes steps and training will make your concept stronger.

A great solution combines innovation, practicality, and measurable impact. It should clearly show how technology can help catering units better predict and manage consumption, improving both efficiency and sustainability across the operation. Even a simple concept that enhances data visibility or automates a single step can create significant value when scaled globally.

7. Real-World Impact

Imagine your solution being used in large airline catering facilities around the world. Every day, thousands of employees plan, pack, and dispatch meals and snacks for flights with different destinations, timings, and service models. Even a small improvement in how consumption is predicted and tracked could have a major impact on efficiency, waste reduction, and overall performance.

A successful system could allow catering teams to instantly see how much of each product is typically consumed on a specific route or flight type. Instead of relying on manual counts or delayed inventory results, planners could make decisions based on live data and predictive insights. The result would be more accurate provisioning, lower waste, and improved stock utilization across all catering units.

Automated or data-driven feedback loops could also help align production and packing with real passenger behavior. Products that consistently return unused could be reduced in future cycles, while high-demand items could be prioritized. Over time, this would create a continuous improvement loop, where every flight contributes to smarter forecasting and better resource planning.

The impact goes beyond operational efficiency. Better consumption prediction supports sustainability by minimizing food waste and optimizing supply chains. It also enhances passenger satisfaction by ensuring that popular items remain available, and service levels remain consistent across flights.

In addition, the same type of solution could be applied to other sectors that manage perishable or high-volume goods, such as rail catering, hospitals, event catering, or retail food logistics. The ability to anticipate consumption, automate data collection, and make informed decisions based on real usage patterns has global relevance and can drive measurable environmental and financial benefits.

By developing a creative and realistic approach to consumption prediction, you contribute directly to shaping the next generation of smart, sustainable catering operations. Your idea could inspire real pilots and future digital tools that make a measurable difference in how food and resources are planned, used, and saved around the world.

8. Tip for Participants

Do not worry if you have never worked inside an airline catering facility. You can think of this challenge as a large-scale demand forecasting problem that operates under extreme time pressure and tight operational constraints. The same principles apply to supermarkets, food logistics centers, or event catering, but in this case, accuracy, speed, and reliability must be achieved simultaneously.

Focus on understanding the core issue: how to ensure that every flight receives exactly what passengers are likely to consume, without overloading, wasting products, or running short of key items. Whether your solution relies on artificial intelligence, data analytics, sensors, automation, or process redesign, what matters most is how it improves the way people work and make decisions.

Try to visualize the environment in which your solution would operate. Employees work in cold rooms, packing zones, and assembly lines, often under strict time constraints. Planners must make rapid decisions based on limited information, while other teams manage returns, stock rotation, and flight schedules. Your solution should fit naturally into this workflow, making the process more efficient and intuitive.

Think creatively and look for ways to combine existing technologies or data sources to create new value. Sometimes, the most impactful ideas come from rethinking a simple step that everyone assumes must be manual. Even partial automation or predictive visibility can create a ripple effect across the entire operation, improving planning accuracy, reducing waste, and enhancing the overall service experience.

The key is to stay practical, user-focused, and imaginative. Your concept does not need to be complex or expensive to make a difference. A well-designed, data-driven idea that helps teams work smarter and anticipate real consumption needs can have a powerful and lasting impact on how catering operations function worldwide.