

Original Research Article

# Optimizing meal kit delivery: A system analysis of Hellofresh’s supply Chain

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**Abstract:** According to Miller and Kelekian (2015), meal kits are considered a transformative technology as they disrupt the traditional grocery supply chain, fundamentally changing how food is sourced, distributed, and consumed. This article analyzes HelloFresh, a leading representative of the meal kit industry, to demonstrate its efficiency and effectiveness. Through a data-driven approach, HelloFresh ensures operational efficiency while delivering high-quality, fresh meal kits to its customers.

**Keywords:** Supply chain; Meal kits; Supply Chain management; Operational efficiency

## 1. Introduction

HelloFresh is a meal kit delivery company founded in Germany in 2011, which expands to Australia in 2012. By the end of 2022, it was delivering meal kits to more than 8 million users worldwide, generating around €6 billion in revenue. HelloFresh’s strategies focus on affordability, freshness, taste and sustainability<sup>[1]</sup>, and this contributes to its global success by delivering the freshest food to customers in an efficient way while reducing waste.

## 2. System overview

### 2.1. System diagram

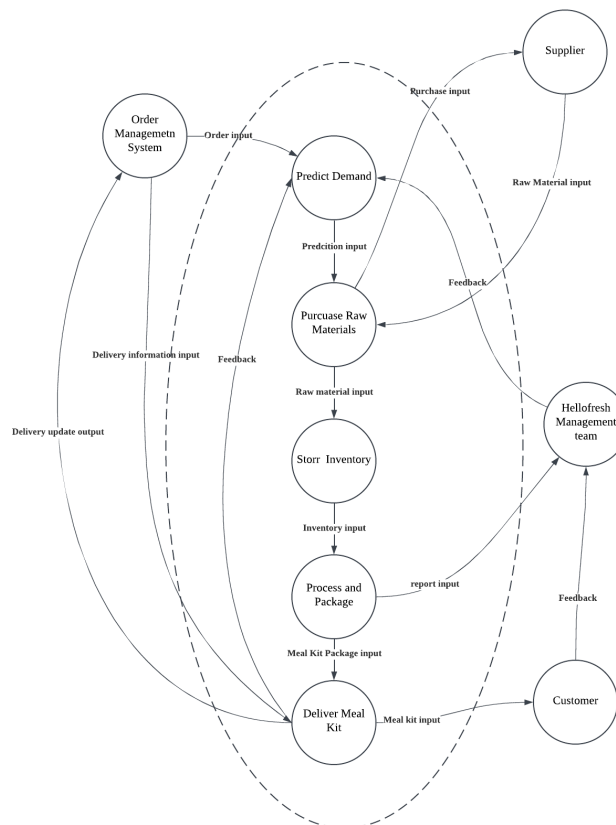


Figure 1. System diagram for Hellofresh’s supply Chain.

## **2.2. Scope**

### **2.2.1. Purpose**

Hellofresh's supply chain management system aims to provide hellofresh with an efficient supply chain to deliver high quality and freshly prepared food to customers quickly, while reducing costs and waste.

### **2.2.2. Scope for Hellofresh's supply Chain**

The scope of Hellofresh's supply chain management system encompasses the entire process, from receiving ingredients from farms and suppliers to delivering ready-to-cook meal kits to customers<sup>[2]</sup>. During this process, raw ingredients are stored and recorded in Hellofresh's warehouses, where they are prepared and portioned into meal kits according to specified recipes. The completed packages are then dispatched to subscribed customers using optimally planned delivery routes to ensure efficiency and timeliness.

The system does not include the growing of ingredients on farms, how customers use the packages after delivery, or subscription and payment management for customers.

### **2.2.3. Major functions**

To achieve the goal of delivering fresh meal kits efficiently, several key functions are integral to Hellofresh's supply chain management system:

#### **1. Predict Demand .**

The system forecasts raw material requirements for the upcoming week by analyzing current order demand and historical data<sup>[3]</sup>. Purchase Raw Materials

The system automatically generates purchase orders to ensure raw materials are delivered promptly and align with forecasted demand<sup>[4]</sup>.

#### **2. Store Inventory**

The system uses advanced automation to record and track purchased and consumed stocks in real time. It employs a first-expired, first-out (FEFO) approach<sup>[5]</sup> to prioritize freshness and minimize waste.

#### **3. Process and package ingredients**

Ingredients are prepared and portioned into ready-to-cook meal kits based on the specified recipes selected by customers.

#### **4. Delivery Meal Kits**

Meal kits are delivered to subscribed customers using optimized delivery routes to ensure efficiency and timely delivery<sup>[6]</sup>.

### **2.2.4. System environment**

HelloFresh's supply chain operates in a dynamic environment influenced by various internal and external factors. The system interacts with key entities such as the HelloFresh management team, suppliers, customers, and order management systems. Additionally, external conditions like the seasonal availability of ingredients from farms can impact the system's ability to procure specific items<sup>[7]</sup>, which can make it harder to get certain items.

### 2.2.5. Input and output

**Table 1. Input and output of Hellofresh’s Supply Chain system.**

Process	Input	Interaction	Output
<b>Predict Demand</b>	Customer orders, Historical data	System analyzes data to predict raw material needs	predicted demand, procurement schedule
<b>Purchase Raw Materials</b>	Predicted demand, procurement schedule	System generates purchase orders and sends them to suppliers.	Purchase orders
<b>Store Inventory</b>	Raw materials, Relevant stock data	System tracks stock levels in real time and ensure accuracy	real time inventory data
<b>Process and Package Ingredients</b>	Raw materials, Specified Recipes, Customer orders	Raw materials are portioned and packed into meal kits. The system updates the meal kit status and inventory data in real time.	Packaged meal kits, Quality assurance reports
<b>Delivery Meal Kits</b>	Packed meal kits, Delivery addresses	System plans the optimal delivery routes and updates customers on delivery status	Delivered meal kits, Delivery notifications

### 2.2.6. Interfaces

Hellofresh’s supply chain relies on several interfaces to enable communication and data exchange between internal components and the external environment.

**Customer Interface:** Customer orders are sent to the system, allowing it to forecast demand and plan production accordingly.

**Supplier Interface:** Interfaces with suppliers facilitate communication of procurement schedules, submission of purchase orders, and inventory updates.

**Production Interface:** The system integrates recipes and customer orders from the order management system to assist in processing and packaging meal kits.

**Delivery Interface:** Once meal kits are completed, they are dispatched to customers, and delivery status updates are provided through the system.

### 2.2.7. System boundaries

The boundaries of Hellofresh’s supply chain management system clearly separate the internal system components from the external environment and stakeholders. Inside the boundary, processes such as demand forecasting, procurement, inventory management, and production are fully managed by the system. Outside the boundary, the system communicates and collaborates closely with external entities, including customers, suppliers, and third-party logistics providers.

## 2.3. Components

Hellofresh’s supply chain management system consists of several interdependent modules that work together to ensure efficiency and minimize waste.

- **Module 1 - Predict Demand:**

The module receives order data from the order management systems and uses algorithms to predict raw material demands<sup>[8]</sup>. Based on the predicted data, it automatically generates procurement schedules. By accurately forecasting demand, this module helps reduce waste and ensures that only the required quantities of raw materials are procured.

- Module 2 - Purchase raw materials:

This module generates purchase orders based on the procurement schedules created by the demand forecasting module. The system sends these purchase orders to the relevant suppliers, who deliver the ordered raw materials to Hellofresh's warehouse. With well-planned schedules, the module ensures timely procurement and minimizes delays in the supply chain.

- Module 3 - Store Inventory: After warehouse staff inspect and approve the received raw materials, the accepted items are temporarily stored in the plant's warehouse. This module updates inventory data in real time based on the receipt of materials and highlights stock items nearing their expiration to ensure proper utilization and minimize waste.

- Module 4 - Process and Package ingredients: This module collects current orders from the order management system and generates a production schedule based on available stock and order requirements. Before delivery, quality inspectors check the packaging and contents to ensure they meet the required standards. The module records these checks and generates a quality assurance report to confirm quality and freshness.

- Module 5 - This module ensures the efficient and timely delivery of meal kits by generating optimal delivery routes and enabling real-time tracking of the delivery process. These enhance operational efficiency and the overall customer experience by keeping customers informed about their deliveries.

## 2.4. Interrelationships

The internal components of Hellofresh's supply chain collaborate closely to ensure efficiency and seamless operations. Accurate demand prediction leads to precise procurement schedules, reducing waste and preventing stockouts. Raw material purchase records are directly integrated into the inventory management system, saving time and improving efficiency. Additionally, real-time inventory tracking ensures that the production process has the necessary materials available, preventing disruptions in packaging meal kits.

## 3. Conclusion

Hellofresh's supply chain management system demonstrates exceptional efficiency through its seamless integration of modules and data-driven processes. The algorithm-driven demand forecasting ensures precise procurement schedules and timely purchasing, effectively reducing delays and waste. Meanwhile, optimize delivery routes and real-time tracking further enhance customer satisfaction by ensuring on-time deliveries. This comprehensive design makes Hellofresh's supply chain highly efficient, enabling the company to consistently provide high-quality food to its customers.

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