Northern Hammer*

Hardware Retailers

Sales analysis

Making the future more profitable again

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Codecademy
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Project Assignment 1 - Sales Dashboard

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*Fictional Company & Data
Any resemblance to actual persons, places, or events is purely coincidental.

Overview

Project

Approach

Data Exploration

Data Preparation

Exploratory Data Analysis

Key Insights

Project

Problem

Lack of clear, data-driven understanding of regional performance

Aim

Uncover trends and evaluate profitability

Purpose

Support strategic decision-making

Questions

Are there seasonal effects?

What are the top 10 selling products?

What are the most common sales channels?

Is there inconsistent revenue and profit performance across regions?

Approach

Leverage 4 years of sales data (2014-2017) to pinpoint growth levers and optimise strategy

Approach

Data Exploration

- Gather data files
- Explore data files to gain understanding of data content and structure
- Identify key variables for business questions

Data Preparation

- Integrate data files
- Handle missing data
- Feature scaling*
- Identify outliers*
- Transform data

Exploratory Data Analysis

- Describe data
- Univariate Analysis
- Multivariate Analysis*

Key Insights

- Identify key contributors with regard to research questions

*not included yet, added step by step when project enters multivariate analysis stage

Data Exploration

Sales Data

The data includes the sales data of Northern Hammer over a 4 year time period, from January 2014 until February 2018

Sales Records

The data includes a total of 64,104 Sales Records. Each record has a **sales date** which can be used for seasonal analysis.

Product Line

The sales are marked for the entire Northern Hammer product line, a total of 30 DIY and Home improvement products

MONTHS

50

ORDERS

64K+

PRODUCTS

30

Data Exploration

Customers

There have been 175 U.S. organisations as our customers

Country-wide

Customers located in 412 counties with 220 unique region codes over the **4 regions**: NorthEast, MidWest, South, West

Region

There are 10 **metrics for each region of the customer**: type, latitude and longitude, area code, population, households, median income, land and water area, and time zone.

COMPANIES

175

STATES

48

AREA DEMOGRAPHICS

10

Data Exploration

Distribution

The Northern Hammer products are distributed through three channels: Wholesale, Distributor, Export.

Delivery

The Northern Hammer products are distributed from our 4 NH warehouses.

Sales Metrics

Each order lists order quantity, order unit price, total order price, and unit cost price. These are key outcome metrics for our analysis.

CHANNELS

3

WAREHOUSES

4

KEY METRICS

4

Data Preparation

Handling Missing Data

The data is complete. No missing values are reported for the key variables.

For specific variables, some of the values may be considering to be missing based on impossible entries (e.g., 0 median income or population in specific regions).

When these variable would be used as predictors in multivariate analysis, this needs to be investigated based on domain knowledge. Missing data can be imputed*

Feature Scaling

There is significant skewness in specific region predictor variables. Before conducting a predictive analysis, feature scaling needs to be applied*

Outliers

There are outliers among specific predictor variables. Before conducting a predictive analysis, outlier correction needs to occur*

Transform Data

Cost is calculated based on unit cost * amount of units in the order

Profit is calculated by subtracting cost from total order price

Profit Margin by dividing total order price by cost * 100

Profit & **Profit Margin** quartile groups are calculated

Year, **Quarter** and **Month**, and their dummy variables were derived from date

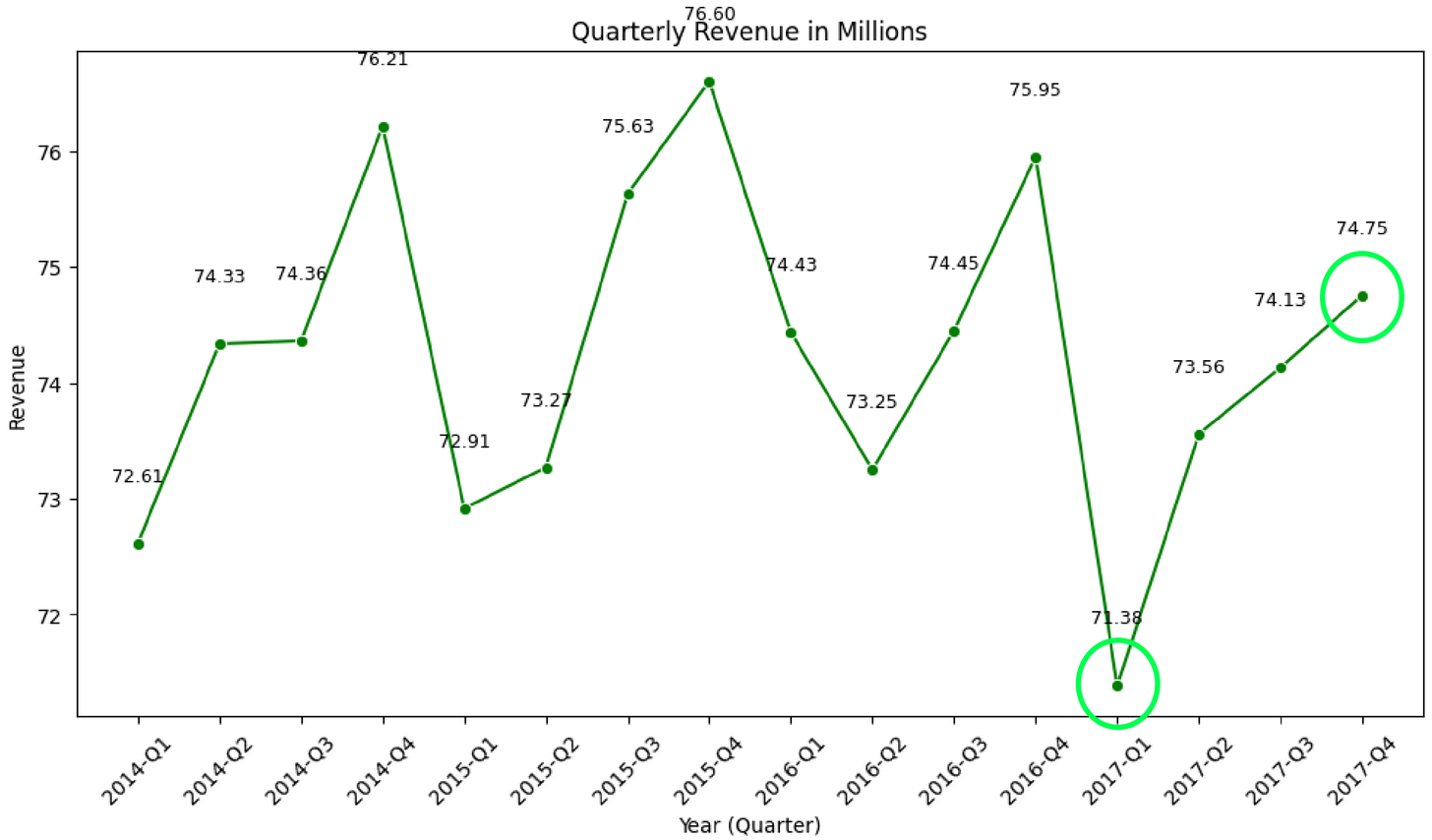
*not included yet, added step by step when project enters multivariate analysis stage

Exploratory Data Analysis

- Seasonal Sales, Revenue & Profit Analysis
- Top Selling Products
- Distribution Channels
- Regional Sale Differences

The Seasonal in Orders, Revenue, Profit

Revenue Per Quarter 2014-17



298M

REVENUE PER YEAR IN 2014-2016

293M

LOWER YEAR REVENUE IN 2017

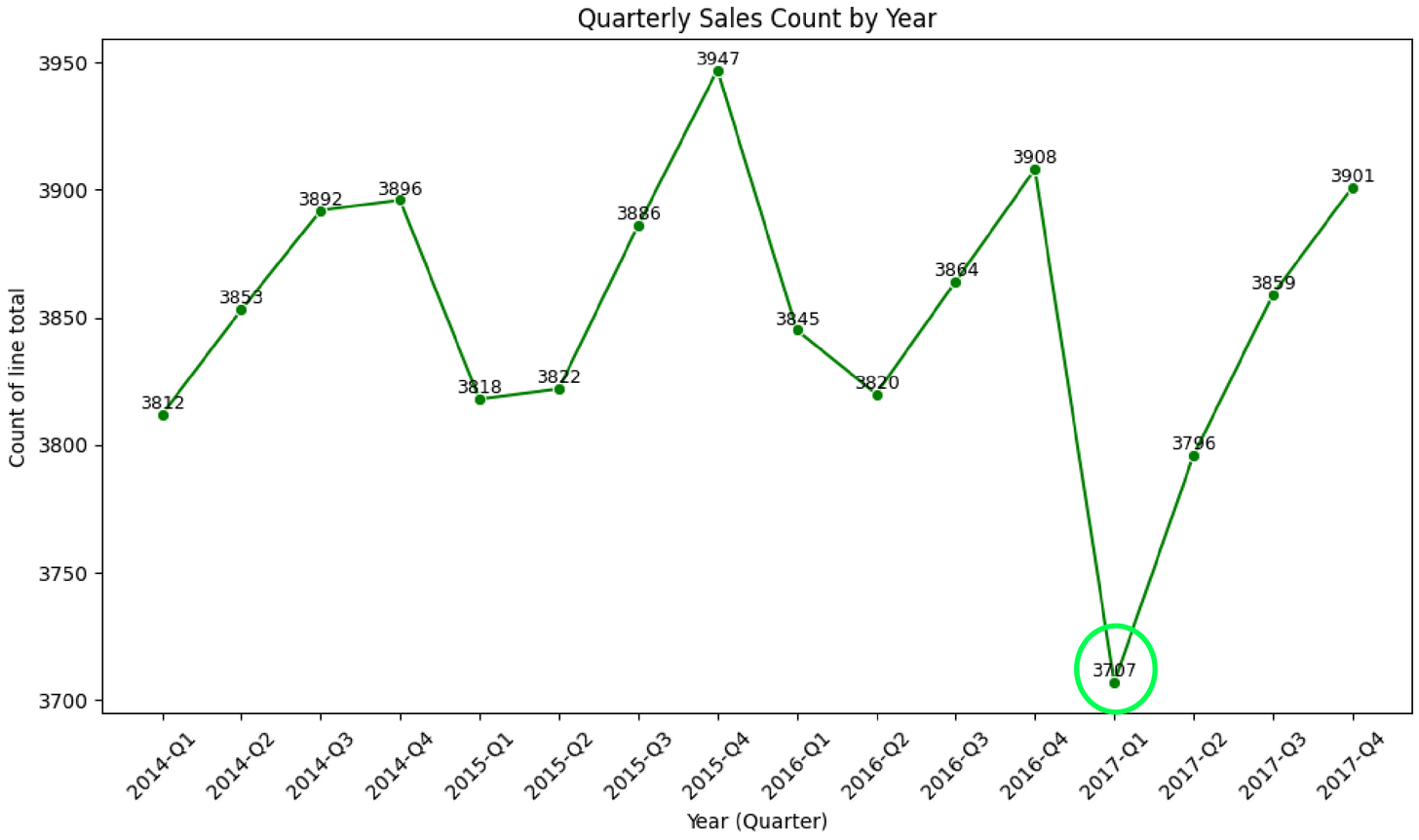
Q3 & Q4

YEARLY HIGH REVENUE QUARTERS

Q1 & Q4

LOWER REVENUES IN 2017

#Orders Per Quarter for 2014-17



15,5K

NUMBER OF ORDERS PER YEAR

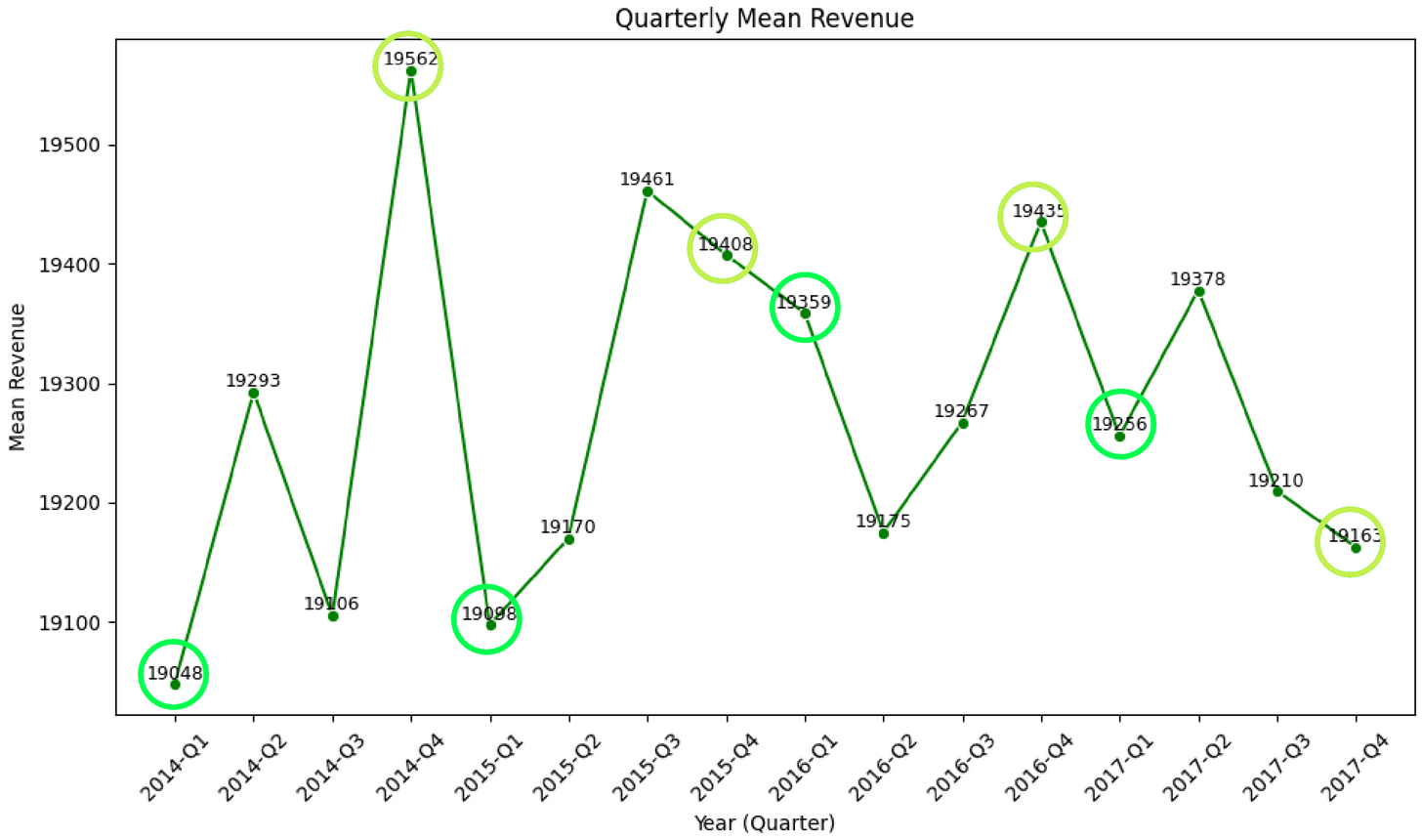
3,85K

NUMBER OF ORDERS PER QUARTER

Q1 vs Q4

LOWER NUMBER OF ORDERS IN Q1&Q2
DROP IN NUMBER OF ORDERS IN 17-Q1
Q4 STRONGEST NUMBER OF ORDERS

Mean Revenue/Order Per Quarter for 2014-17



19,3K

MEAN REVENUE PER ORDER PER YEAR

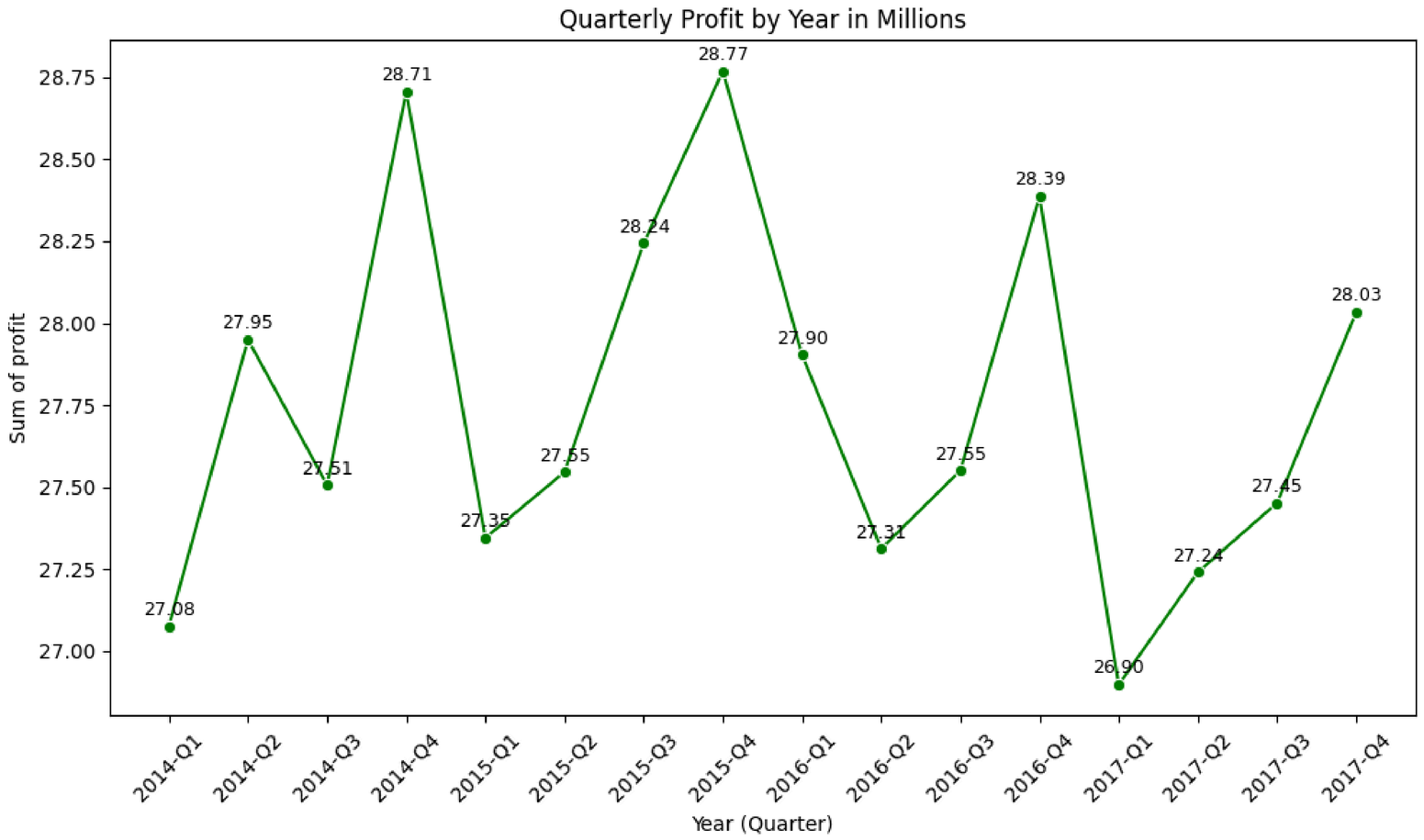
Q3-4 2017

17 DROP IN AVERAGE REVENUE/ORDER

Q1 2017

HIGHER REVENUE/ORDER VS. 14-15
LOWER REVENUE/ORDER VS. 16

Profit Per Quarter for 2014-17



1.6M

LESS PROFIT THAN AVERAGE YEAR

Key Insights

Yearly less revenue in Q1&2

Stronger Q3-4 Seasons

Revenue suffered in 2017

Realised $5M less revenue

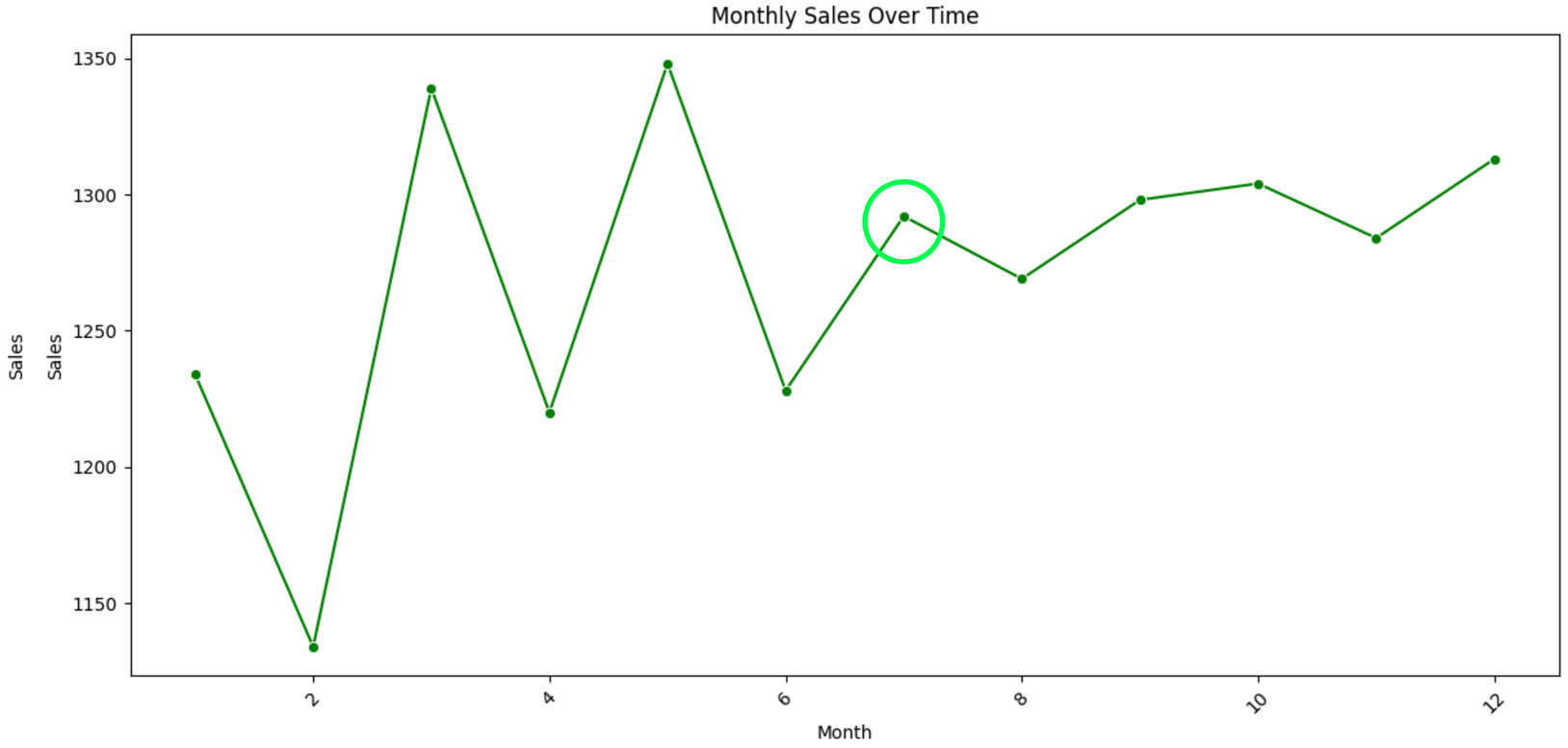
Lower Sales (Orders) in Q1 of 2017

Lowest in #orders in 4 years

Lower Revenue per Order in Q4 of 2017

Lower revenue realised per order in Q4 than other years

Total Orders per Month for 2014-17



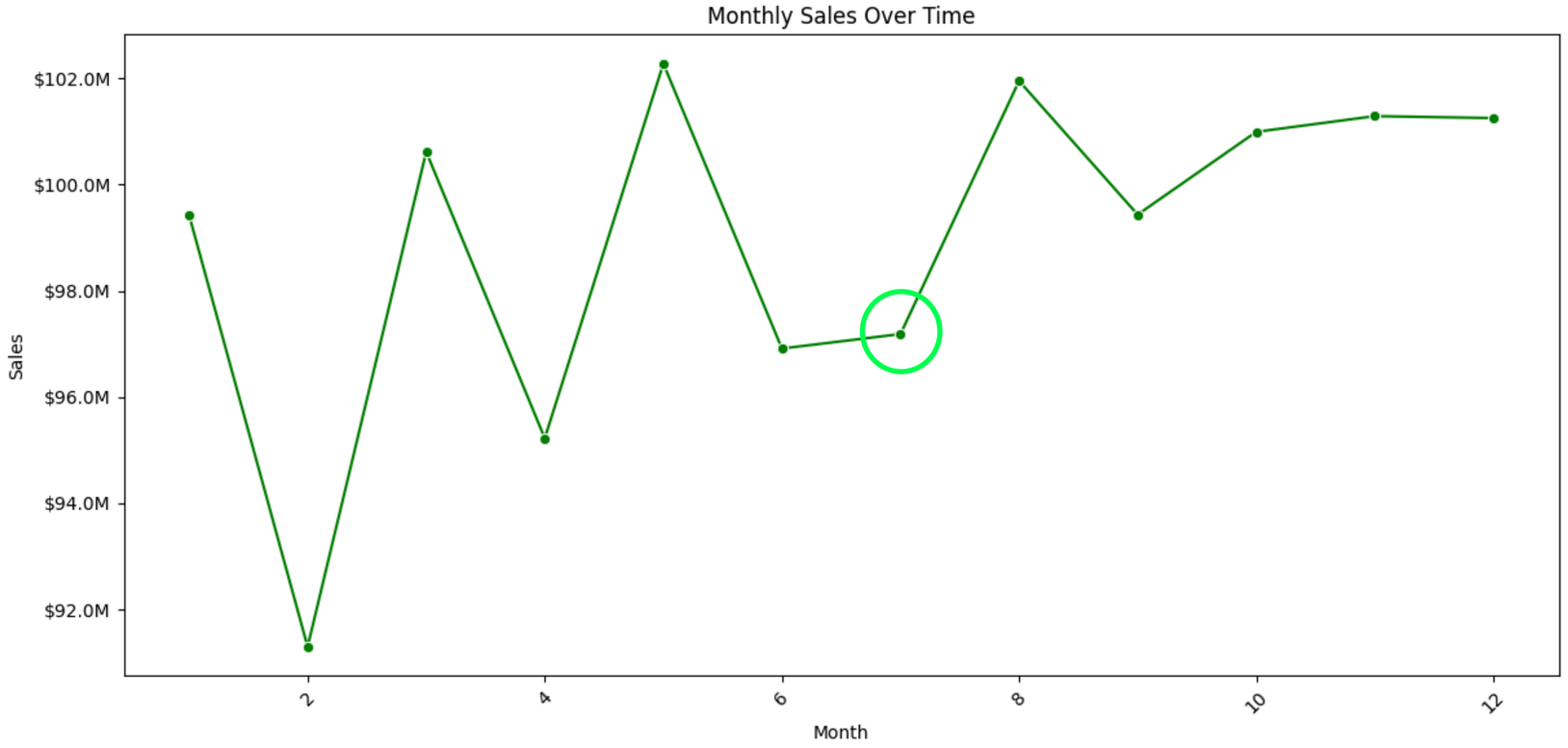
February

YEARLY LOWER ORDERS

Y1st half

TOP 4 LOWEST ORDERS MONTHS
ARE IN THE FIRST SEMESTER OF YEAR

Total Revenue per Month for 2014-17



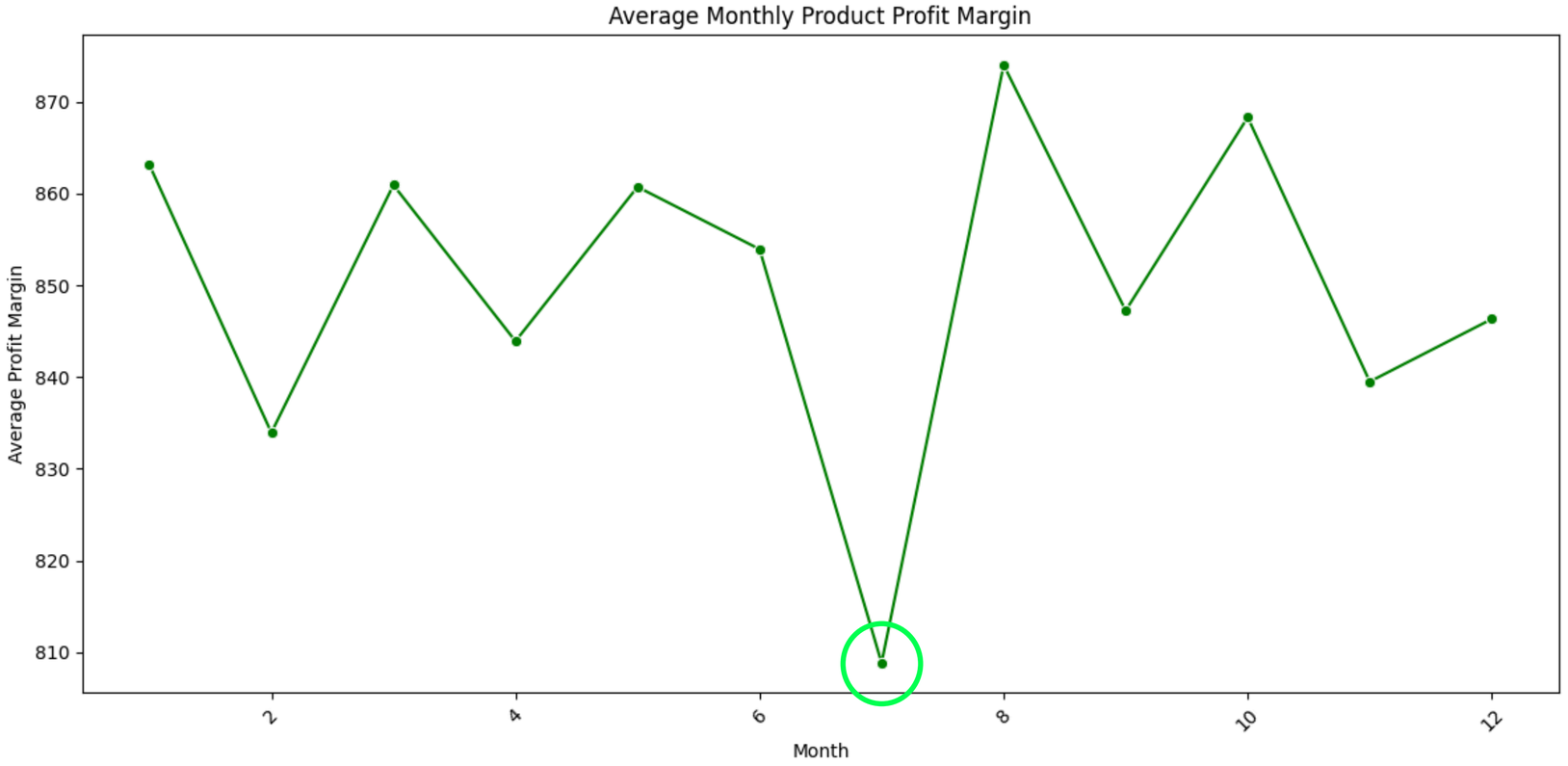
Orders

ORDER NUMBERS DRIVE REVENUE

Q4

STRONGEST QUARTER OF YEAR
RANK 3, 4 AND 5 IN #ORDERS

Average Monthly Profit Margin per Sold Unit for 2014-2017

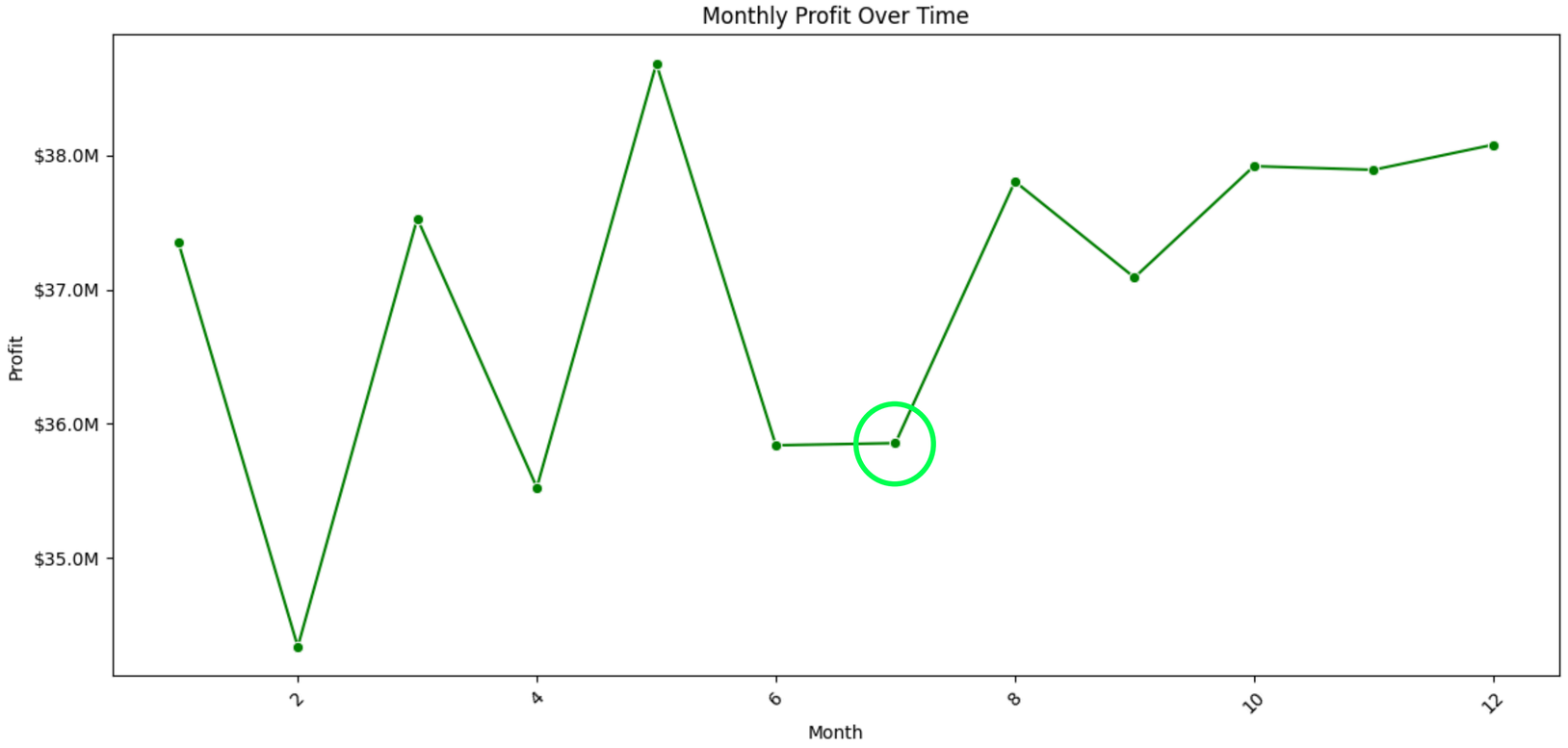


July

SIGNIFICANT LOWER
PROFIT MARGINS PER SOLD UNIT

DESPITE HIGHER NUMBER OF ORDERS
LOWER REVENUE AND PROFIT IN JULY

Total Profit per Month for 2014-17



Profit

STRONGLY FOLLOWS REVENUE

July

PROFIT AFFECTED
BY SIGNIFICANT LOWER
PROFIT MARGINS PER SOLD UNIT

Key Insights

Revenue highest in 2nd half of year

Strong Q4

Low Revenue in February

Also April is a lower revenue month

Profit follows revenue (sales)

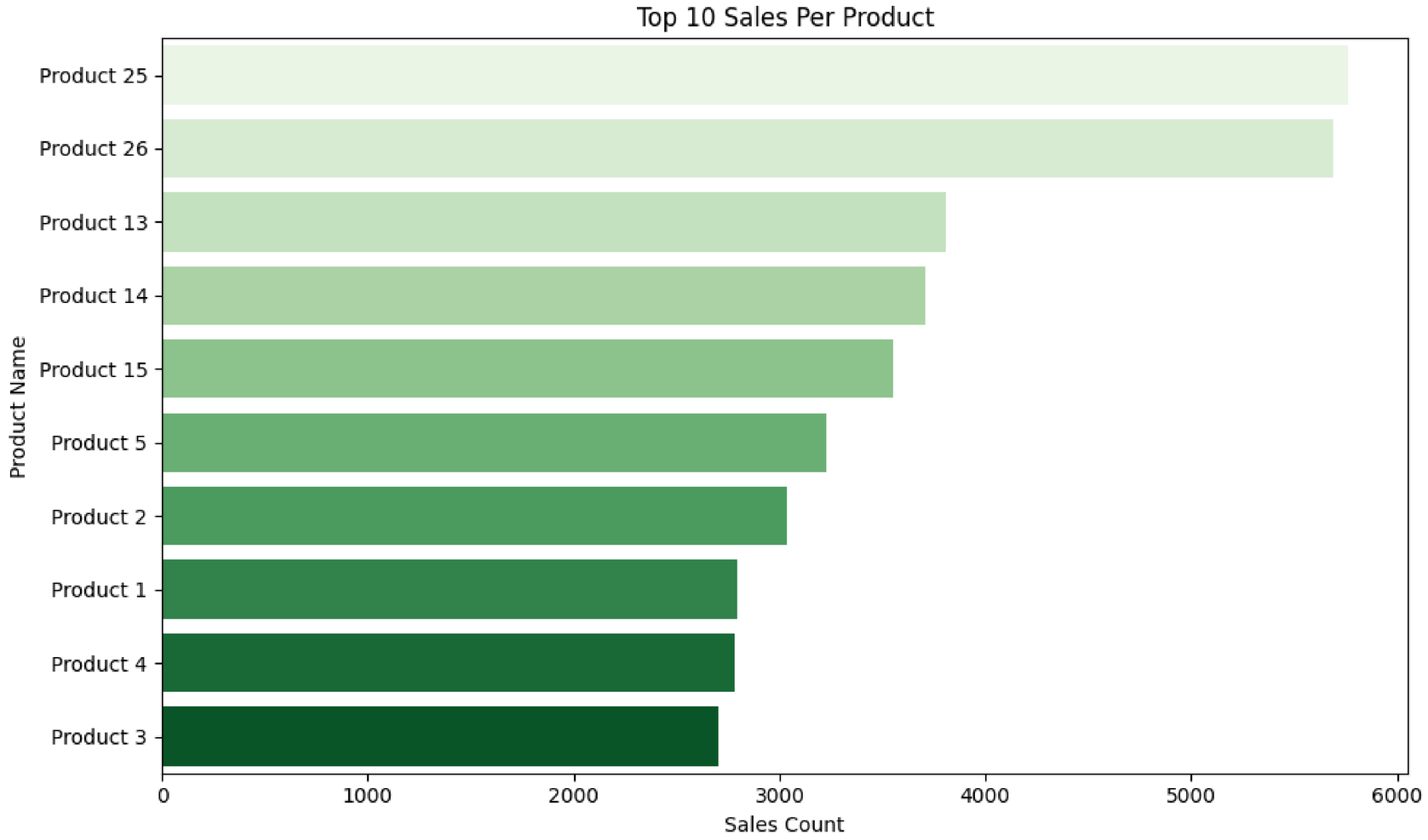
#Orders is driver of revenue and profit

Profit Margin per Sold Unit is Low in July

Lower revenue and profit in July

Top 10 Sold & Grossing Products

Total Orders per Product for 2014-17



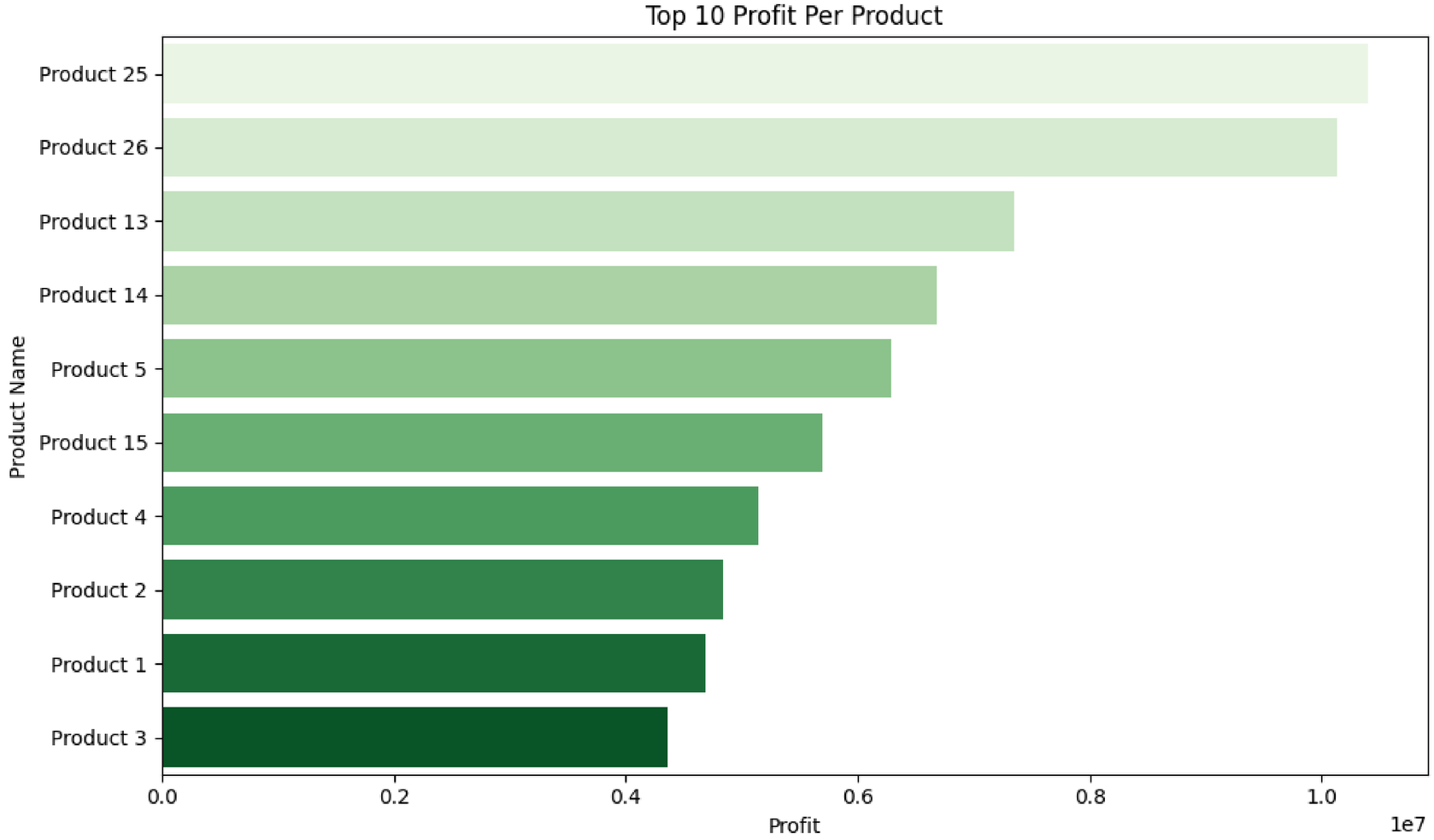
18.5%

PRODUCTS 25 AND 26 ARE
THE MOST ORDERED PRODUCTS.
THEY ACCOUNT FOR 18.5% OF ORDERS.

60%

TOP 10 ORDERED PRODUCTS
GENERATE 60% OF THE REVENUE

Total Profit per Product for 2014-17



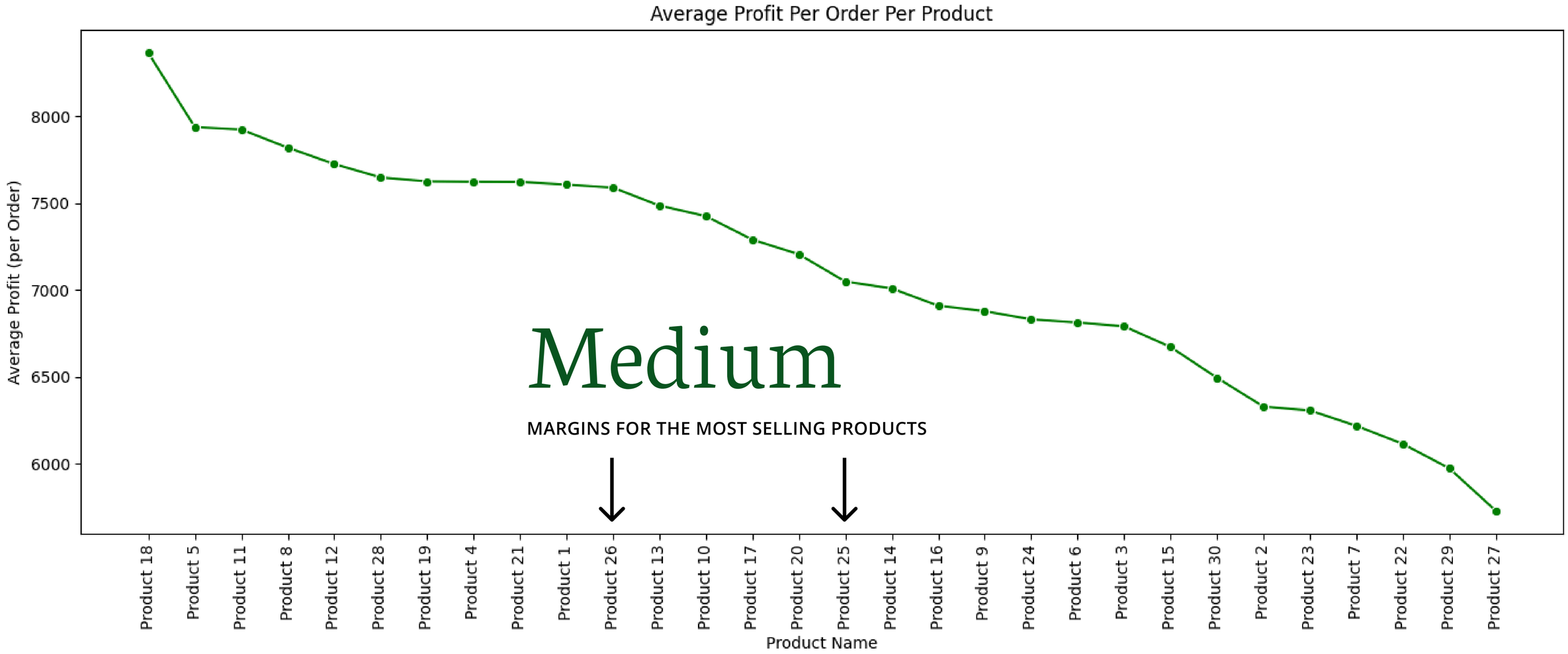
18.5%

PRODUCTS 25 AND 26 ARE THE MOST PROFIT GENERATING PRODUCTS. THEY ACCOUNT FOR 18.6% OF PROFIT

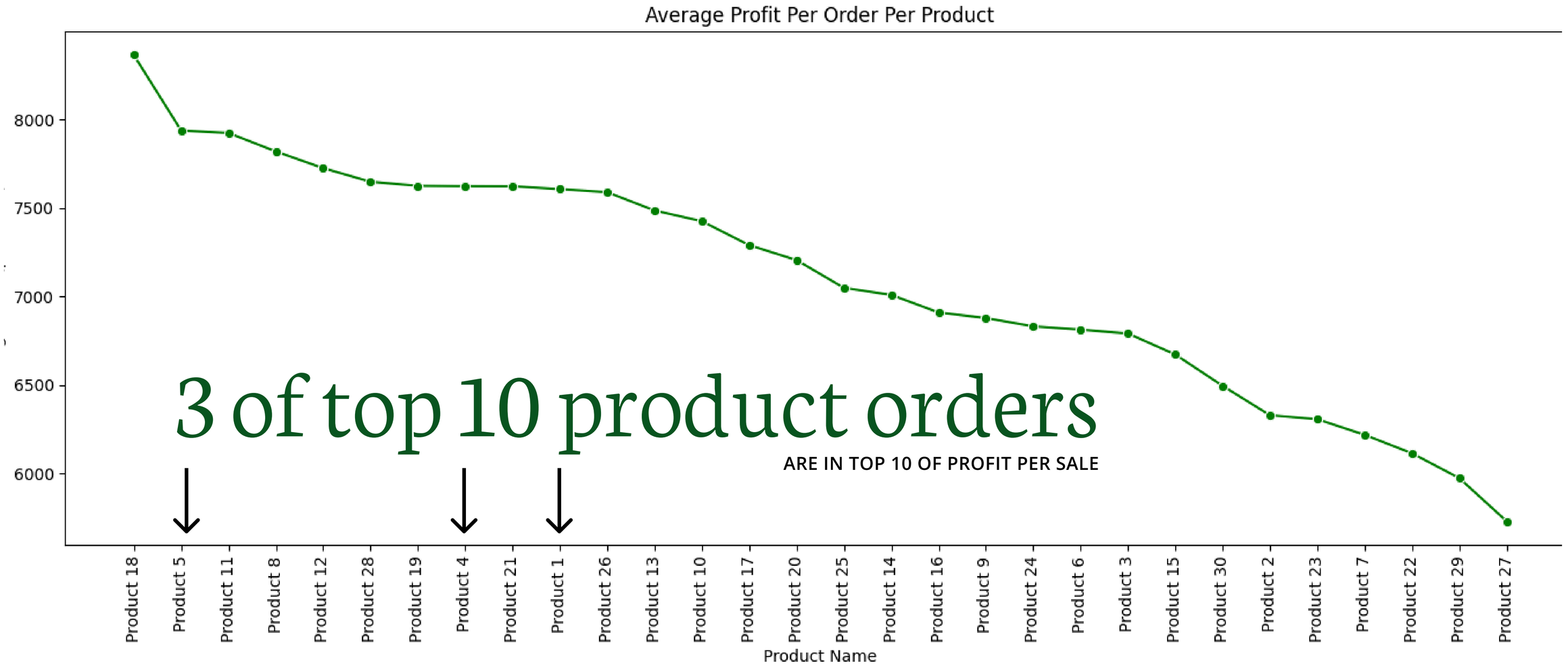
60%

TOP 10 ORDERED PRODUCTS GENERATE 60% OF THE PROFIT

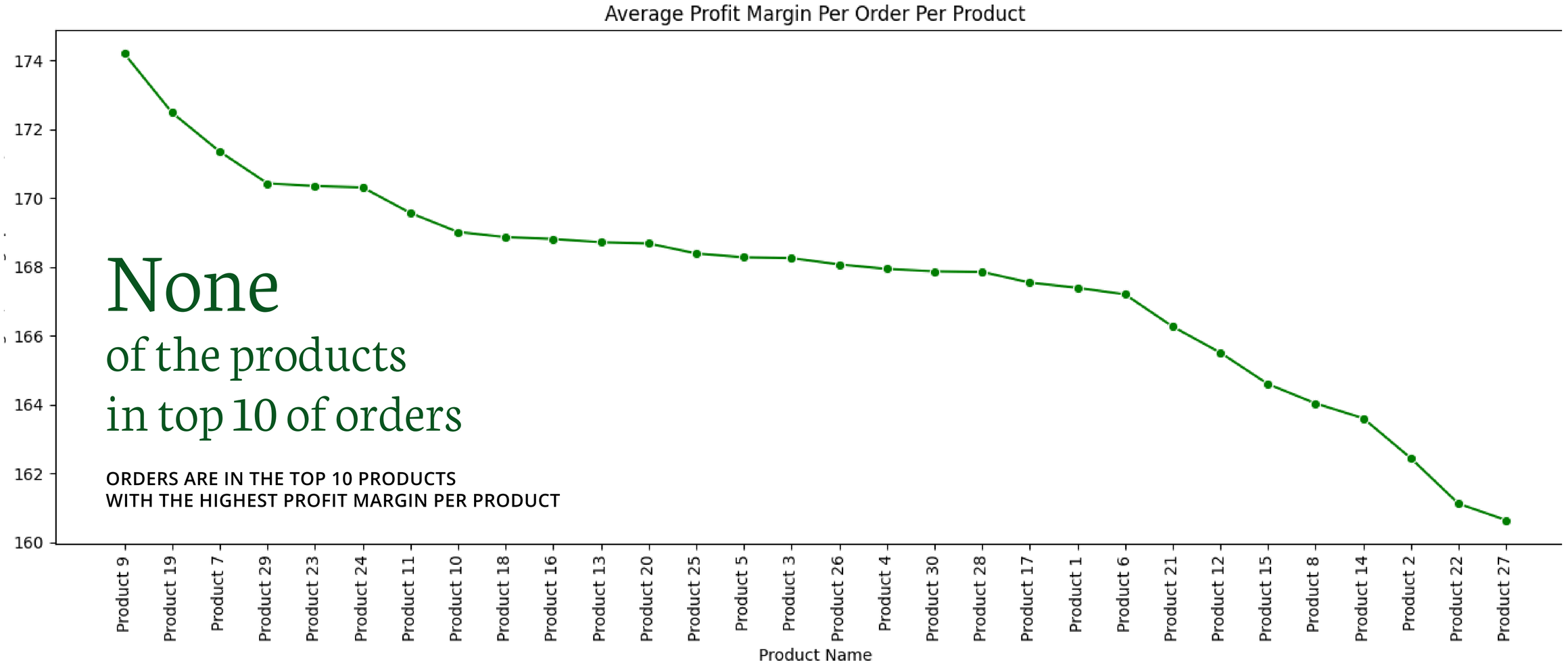
Average Profit per Product for 2014-17



Average Profit per Product for 2014-17



Average Profit Margin per Product for 2014-17



None

of the products
in top 10 of orders

ORDERS ARE IN THE TOP 10 PRODUCTS
WITH THE HIGHEST PROFIT MARGIN PER PRODUCT

Key Insights

Quantity of Orders drives Revenue and Profit

Revenue and Profit driving products

Top 2 → Products 25-26 → is responsible for 18%
Top 10 → is responsible for 60%

Most ordered product → not highest profit

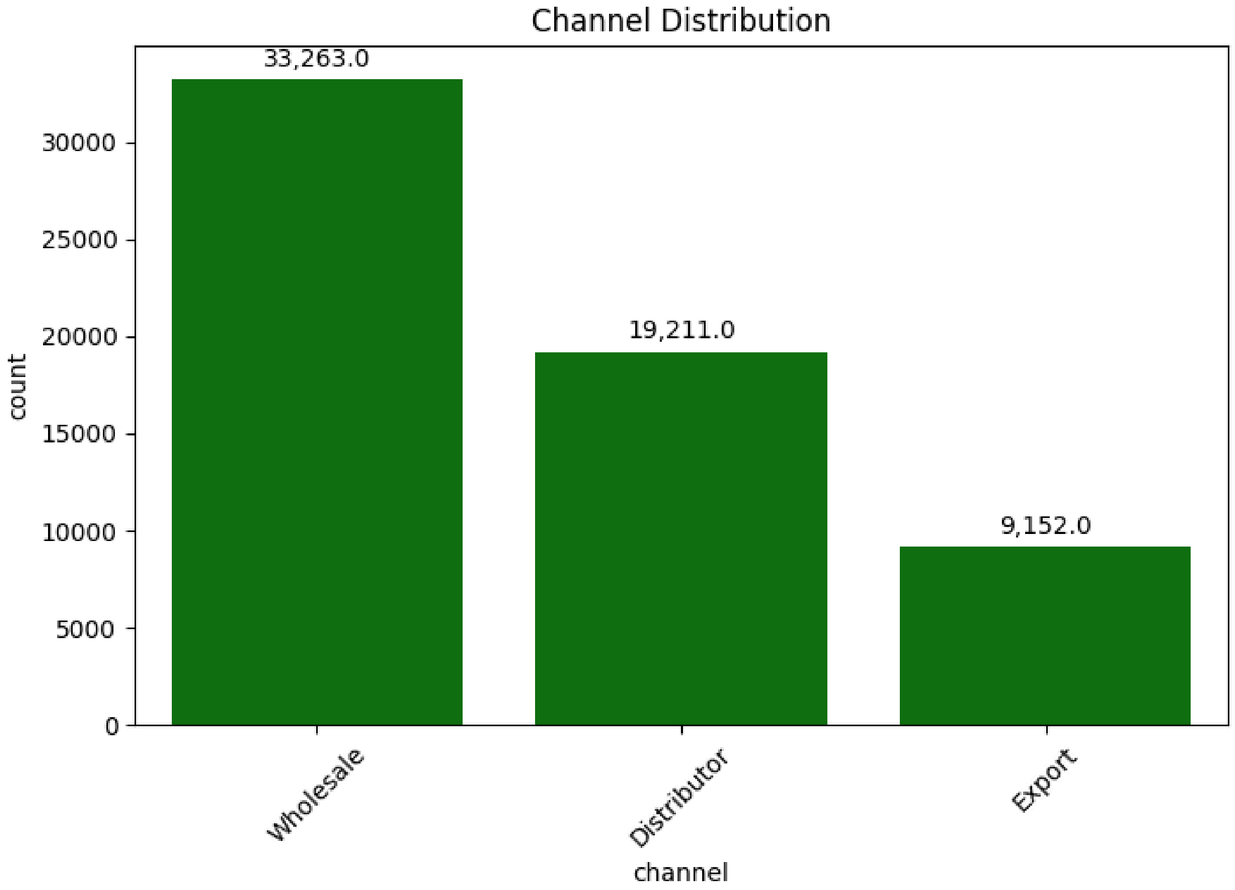
The majority of products that are ordered most often (top 10)
are not in the top 10 of average profit per sale.

Most ordered product → not highest margin

All products that are ordered most often (top 10)
are not in the top 10 of profit margin per sold unit.

Distribution Channels

Distribution Channels 2014-2017



54%

WHOLESALE

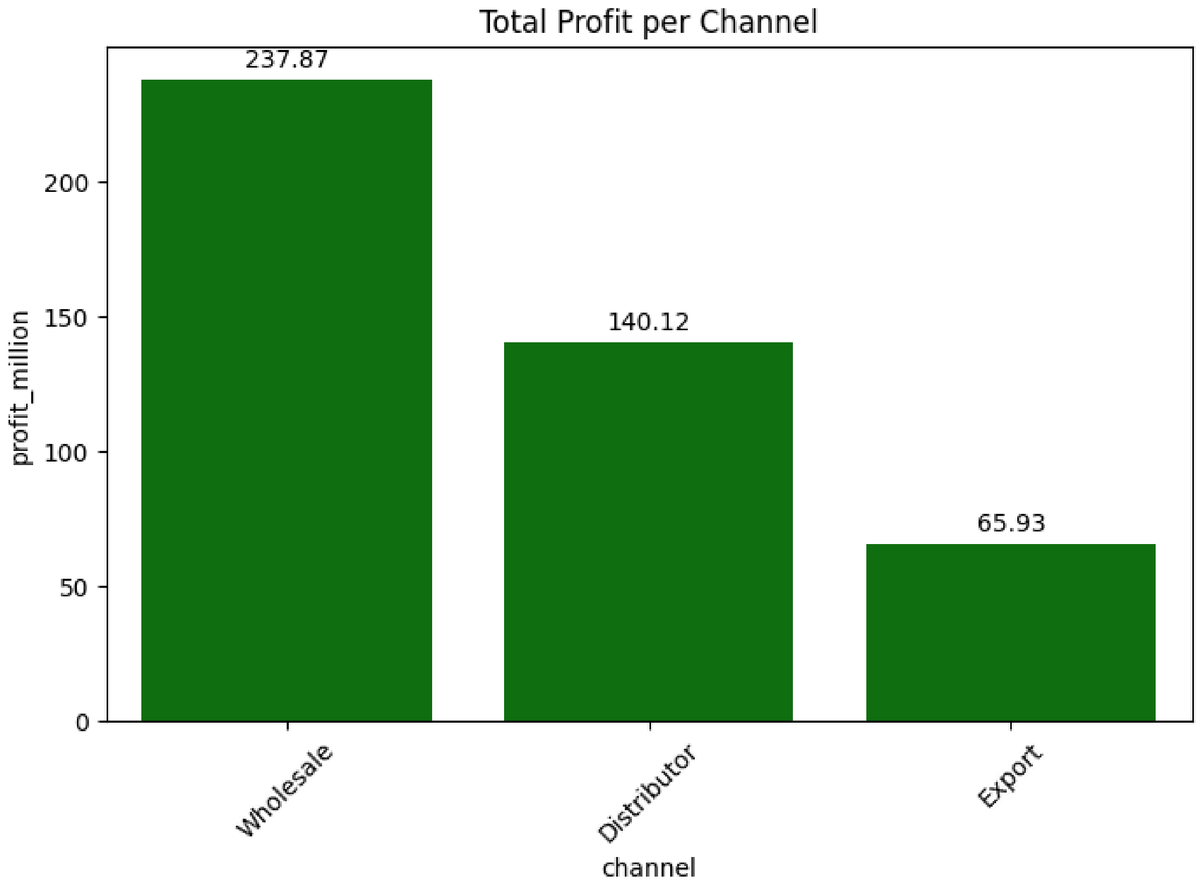
31%

DISTRIBUTOR

15%

EXPORT

Profit per Channel 2014-2017



54%

WHOLESALE

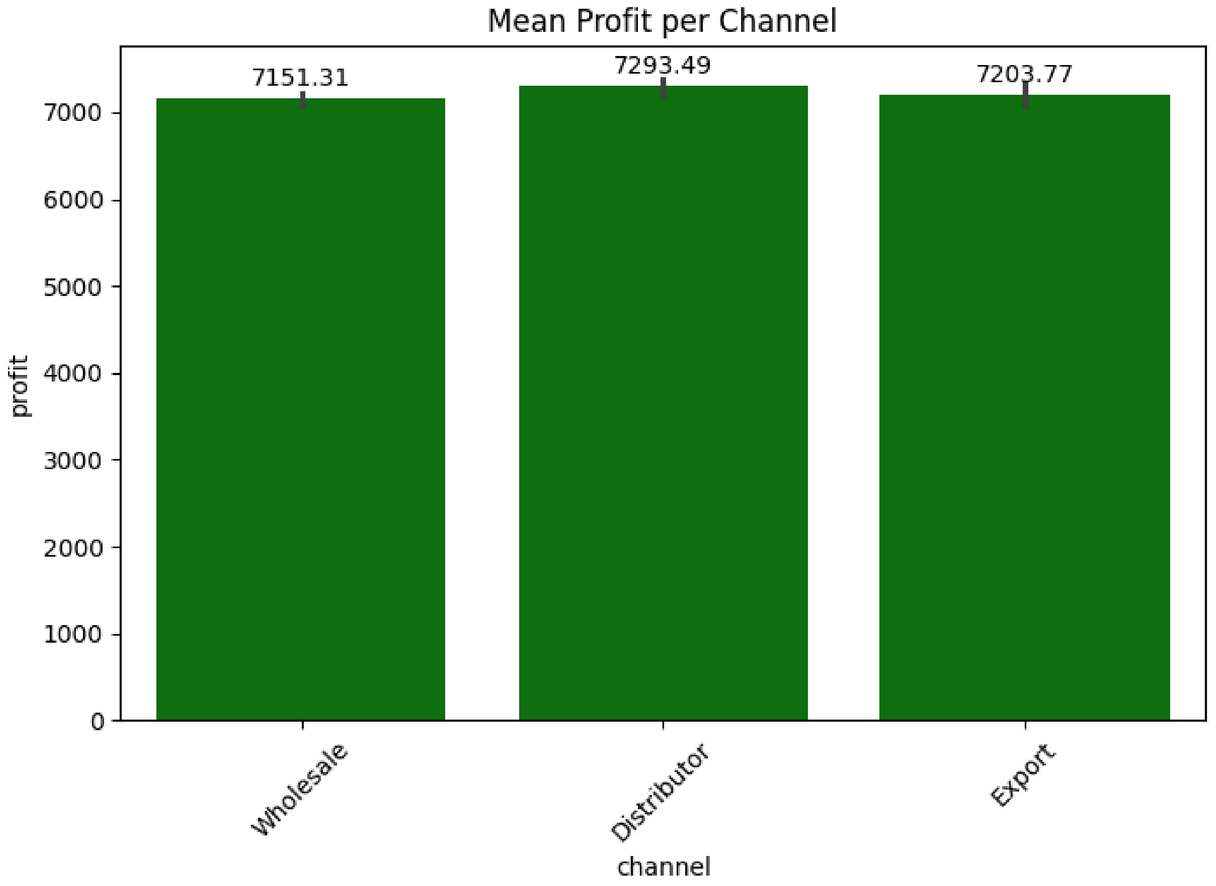
31%

DISTRIBUTOR

15%

EXPORT

Mean Order Profit per Channel 2014-2017



7,2K

MEAN PROFIT PER CHANNEL

Equal

MEAN PROFIT PER ORDER

Key Insights

Wholesale → 50%+ of all orders and profit

Outperforms other channels

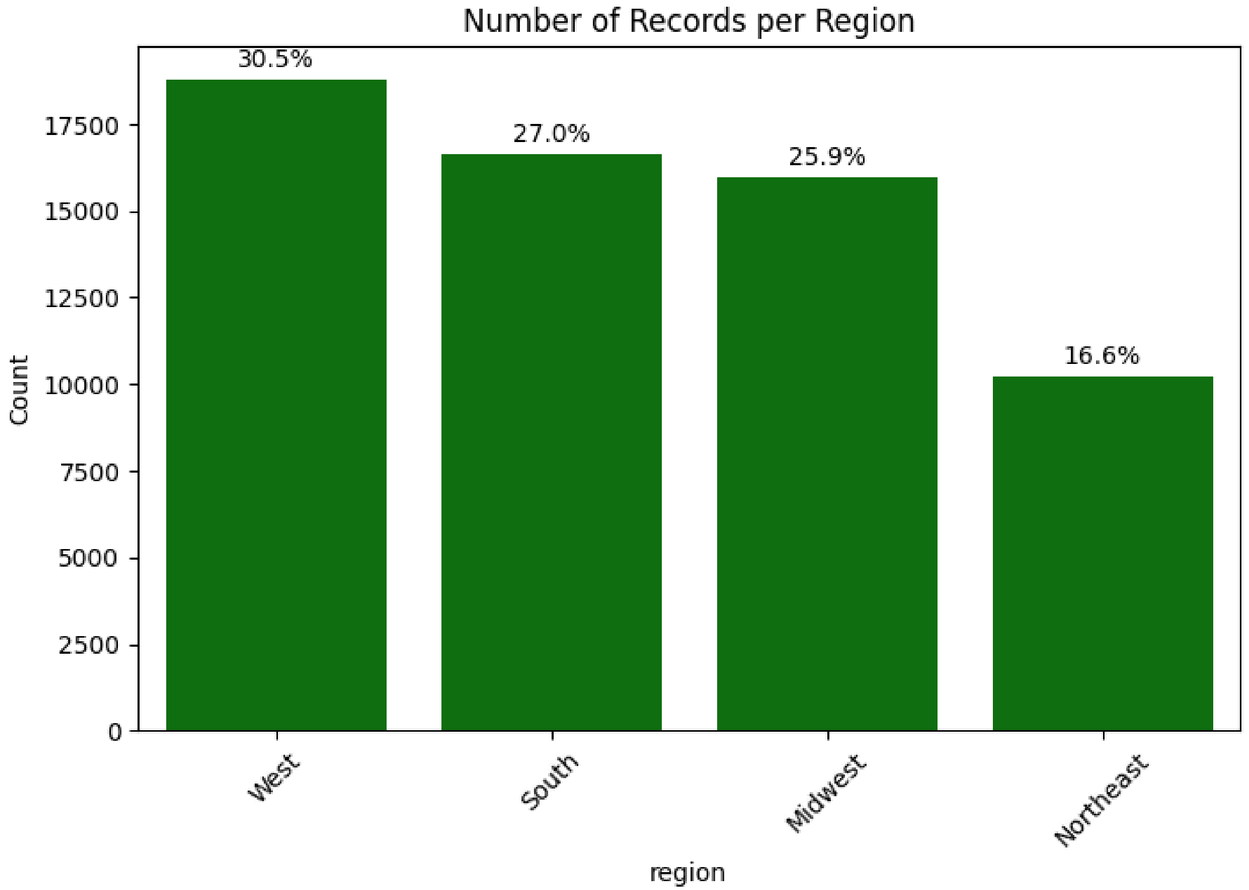
~ Double as much as Distributors
~ Triple as much as Export

Equal average profit per order

The average profit per order is equal for all channels

Regional Orders & Profits

Orders per Region 2014-2017



18,8K

MOST ORDERS IN THE WEST

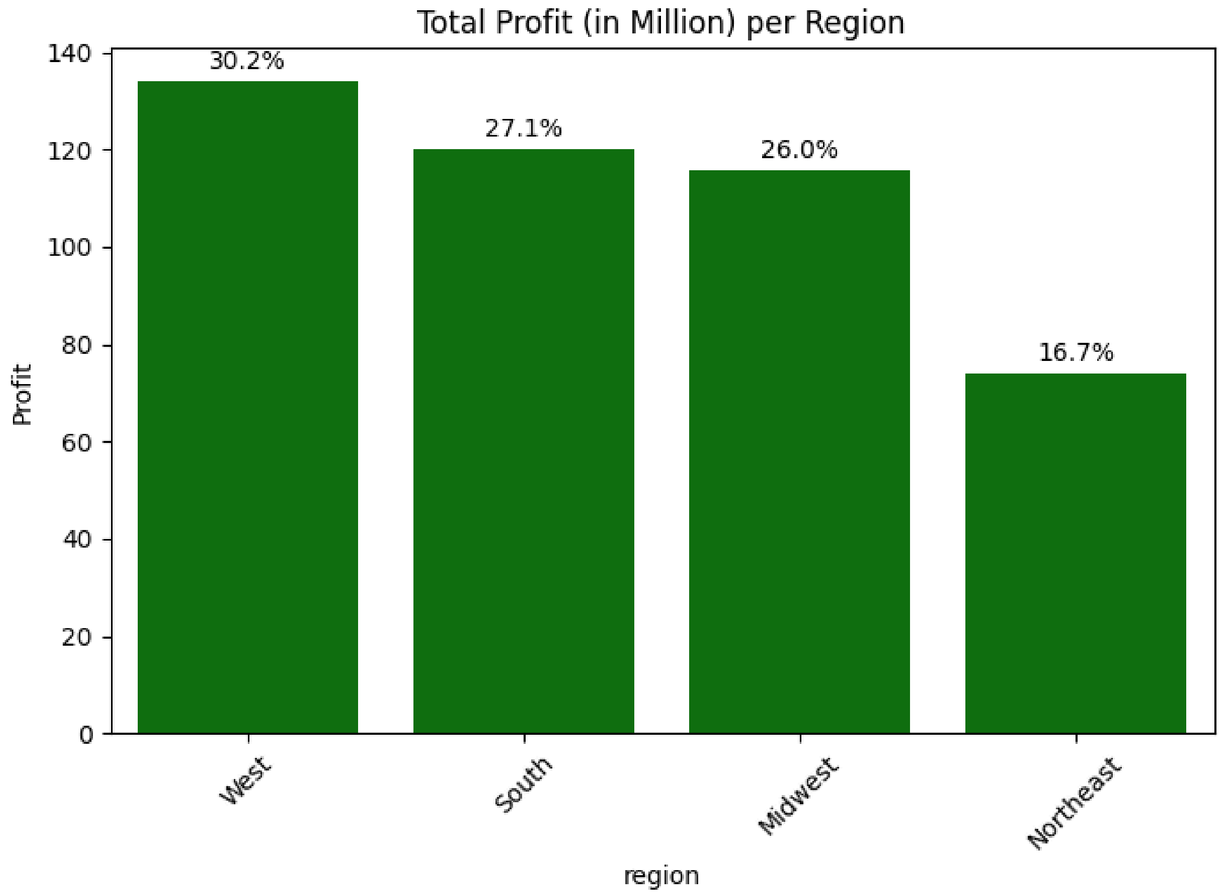
10,2K

LOWEST ORDERS IN THE NORTH EAST

~16,2K

SOUTH AND MIDWEST

Profit per Region 2014-2017



$134M

MOST PROFIT IN THE WEST

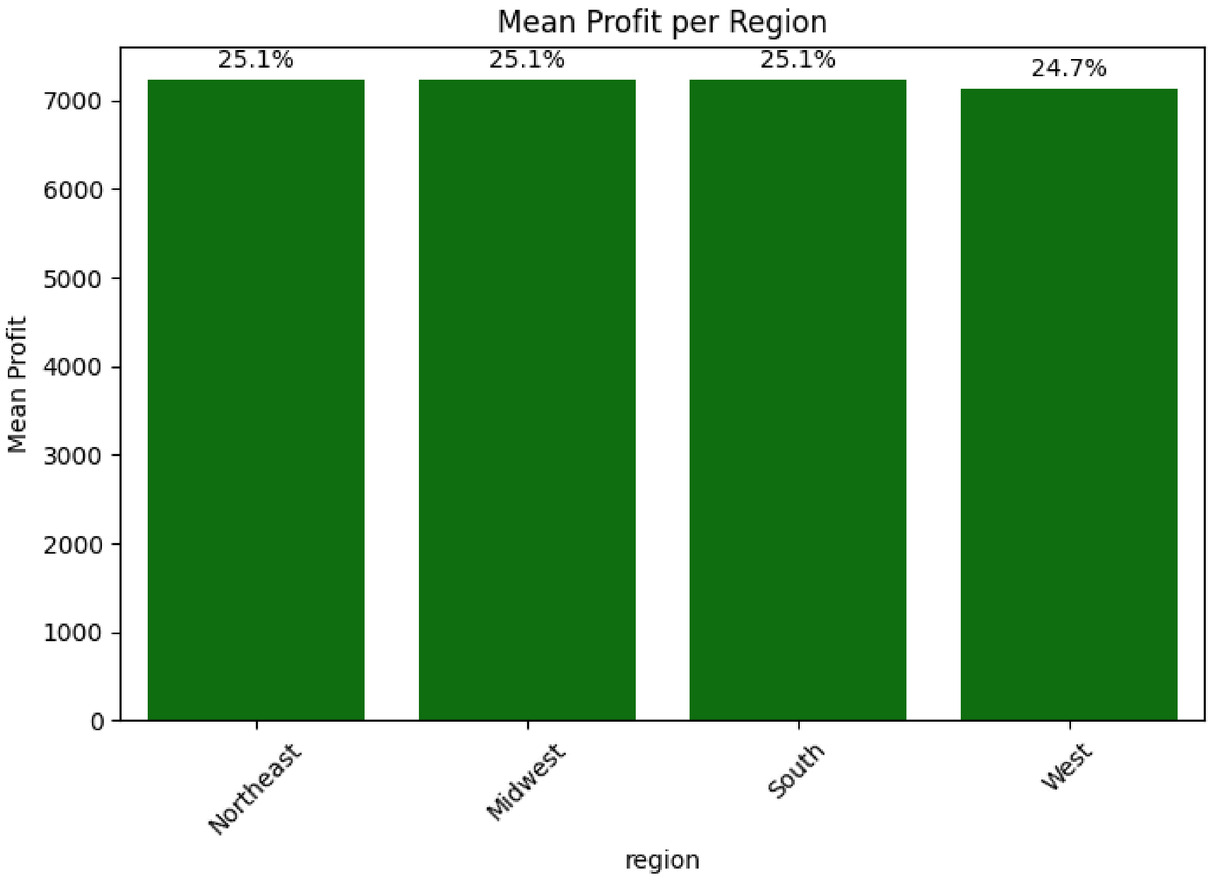
$74M

LOWEST PROFIT IN THE NORTH EAST

~$117M

SOUTH AND MIDWEST

Orders per Region 2014-2017



$134M

MOST PROFIT IN THE WEST

$74M

LOWEST PROFIT IN THE NORTH EAST

~$117M

SOUTH AND MIDWEST

Key Insights

West → Strongest sales region

30.5% of Orders & 29.5% of Profit

North East → Weakest sales region

16.6% of Orders & 16.8% of Profit

Equal average profit per order

The average profit per region is equal for all channels