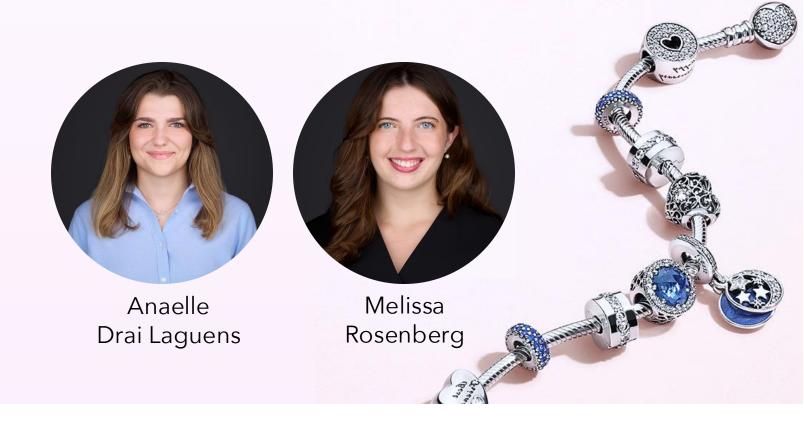


Unearthing the perfect gem: Optimizing staffing to boost retail performance

Faculty Advisor: Rahul Mazumder



Overview

Problem motivation



Pandora is a global leader in affordable luxury jewellery.

Sales patterns are highly seasonal, fluctuating by weekday & weekend and around key holidays, resulting in variable staffing needs



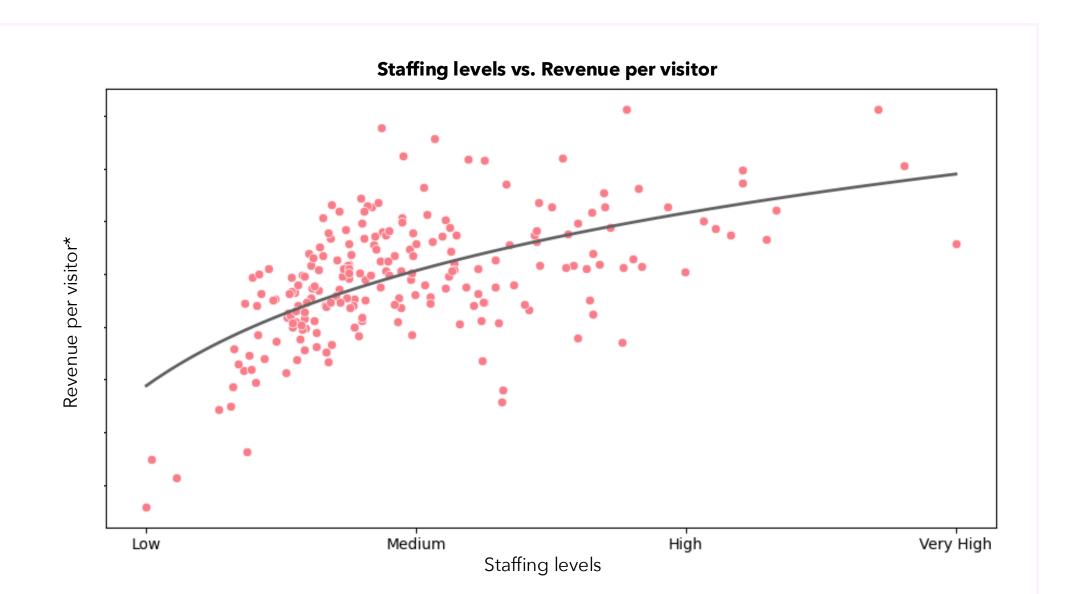
Operating over 2500 stores globally, staffing is both one of the largest cost drivers & a key commercial lever.

- Cost risk: Overstaffing during low-traffic periods inflates labor spend
- Growth lever: Understaffing during peak demand leaves revenue on the table



There is a trade-off between revenue gains and labor costs.

As staffing levels increase, revenue per visitor rises, but so does the cost to serve each customer. Finding the right balance is key to maximizing profit.





How can we optimize staffing levels to maximize revenue without overspending on labor?

Approach - Pilot on UK stores

Methodology

To optimize staffing, we must first understand its impact on sales. We therefore follow a two-step approach:





Model sales response function

Goal: Understand how staffing and traffic interact to drive sales

Determine profit-maximizing staffing levels

Goal: Optimize the trade-off between labor cost and sales uplift

Data



data

revenue,

Transaction

Orders, sales

basket value



data

Past labor

hours, wages,

min. staffing

Labor hour Time

metadata Promotions, day of week, cyclicity

Store traffic

data Daily visitor counts per store

四 **Store** metadata Store size,

location

design concept,

Step 1: Model

We formulate a typical Cobb-Douglas production function to model the dynamics of labour (L) and customer traffic (T) over retail sales, by store i & day t:

$$S_{it} = \alpha_i * T_{it}^{\beta_1, \beta_2: Learned coefficients}$$

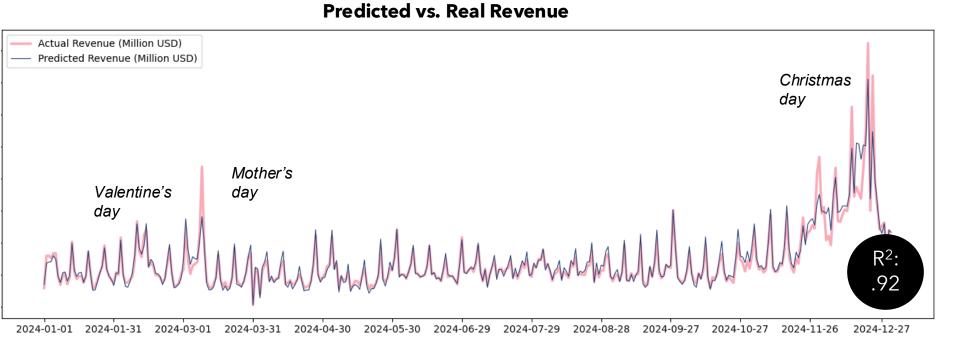
 S_{it} : Sales at store i per day t

 α_i : Store potential

 T_{it} : Traffic contribution

To run an OLS regression, we linearize by taking the logarithm and add controls:

$$\ln(S_{it}) = \beta_0 + \beta_1 \ln(T_{it}) + \beta_2 \frac{1}{T_{it}/L_{it}} + \text{Controls} + \epsilon_{it}$$



Our model works well as it captures seasonal trends, accounts for diminishing returns to staffing, and adjusts for store-specific potential.

Step 2: Optimize

Now that we understand how staffing affects sales, we can find the level that maximizes profit. We define profit as:

Profit = Revenue * Margin - Labor Cost

This allows us to hit the sweet spot where staffing drives the most value and avoid overstaffing that wastes budget.

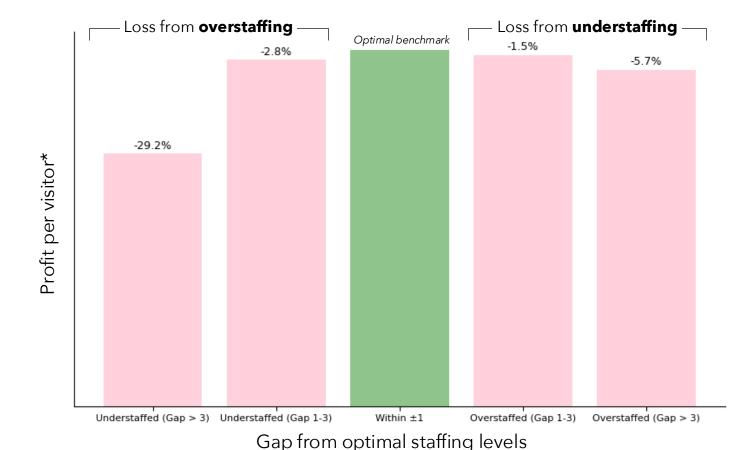
Profit for a given store on a given day **Optimal Profit** 32000 30000 26000 Understaffed: Lost profit Overstaffed: Lost profit due to lost sales due to excess labor costs 24000 22000 20000 18000 Staffing levels Very high Medium

Results

UK Pilot results

To validate our model, we compare historical profit per visitor between stores operating near their optimal staffing levels and those operating further away

Profit per Visitor vs Gap from Optimal Staffing (Quantiles)



Profit gain through realistic short-term changes

Business impact

Labor costs

by reducing overstaffing in low-traffic periods

Lost sales recovery by addressing understaffing

in peak demand

\$69M

Annual profit potential by scaling to other markets