B1_1

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Pricing strategy for Offline-to-Online(O2O)Dual-Channel Retailing: A Case Study of Dayuanzi

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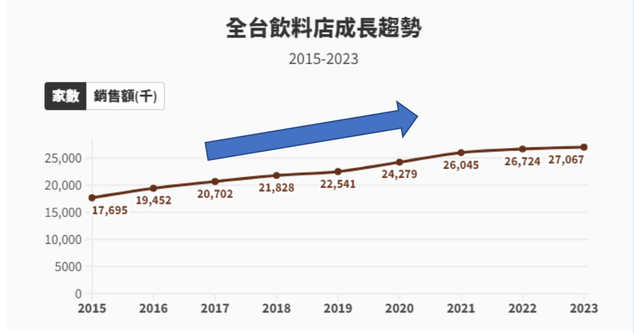
Introduction

Research Background

In Taiwan, using platforms more often. With growing drink stores, collaboration is common, but restaurants raise prices to cover fees.



Motivation

Dayuanzi, a local beverage chain store, struggles with lower sales due to higher prices than competitors like FIFTYLAN and Coco.

Only 47.1% of consumer buys in offline, and 27.9% online, underscoring the need for optimized pricing to boost sales and profits

Research purpose

1. To construct a mathematical model to determine optimal online and offline pricing strategies for store.
2. By analyzing profit functions and consumer demand, the study seeks to enhance Dayuanzi's competitive positioning and operational efficiency.

Research method

1. Mathematical Approach Market Setup

Includes a beverage store (Dayuanzi), a third-party delivery platform, and consumer.

2. Platform-Leading Model

The delivery platform sets a service fee, and the beverage store determines its online price P_n and offline price P_f.

3. Analysis Tools

Profit functions to model interactions between delivery platforms and beverage store. Partial derivatives to identify pricing strategies that maximize profits.

Mathematical model

Notation	Definitions	Notation	Definitions
p_n	The online food price.	f	The unit service fee charged by the platform to the restaurant.
p_f	The offline food price.	c	The unit production cost of the food.
d_n	The online demand.	π_R	The restaurant's profit.
d_f	The offline demand.	π_p	The platform's profit.
e	The advantage of the delivery service level.	β	The consumers' sensitivity to the price difference between two channels.
a	The potential consumer size.	r	The unit delivery fee charged by the platform to consumers.
θ	The online channel to the total consumer size.		

Online demand: $d_n = \theta a - P_f - r + e + \beta(p_f - p_n)$

Offline demand: $d_f = (1-\theta)a - p_f + \beta(p_n - p_f)$

Restaurant profit function: $\pi_R = P_f d_f + (p_n - f\ )d_n$

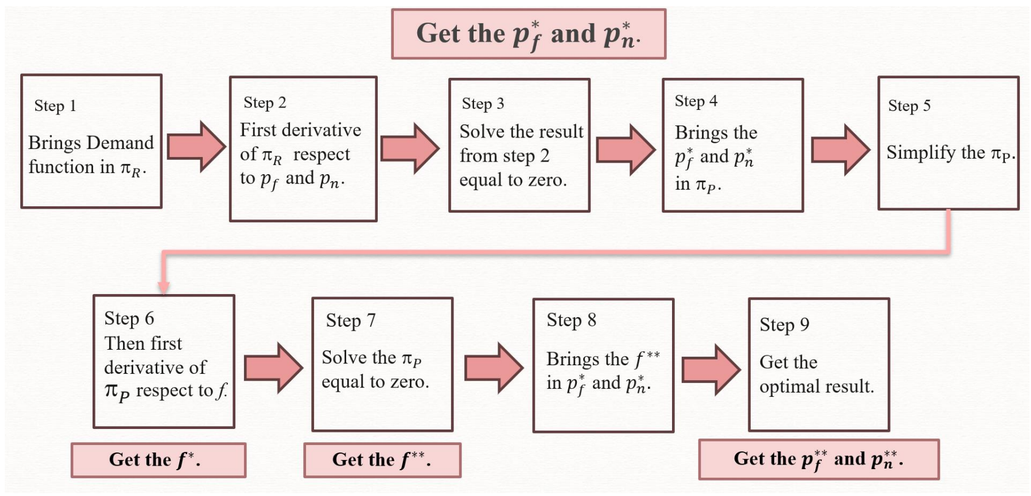
Platform profit function: $\pi_p = (f\ + r\ - c)d_n$

Optimal result:

$$p_n^{**} = \frac{(c + 3e - 4r + 2a\beta + 3c\beta + 6e\beta - 9r\beta + 2a\beta^2 + 2c\beta^2 + 2e\beta^2}{4 + 12\beta + 8\beta^2} + \frac{-4r\beta^2 - 2a\beta\theta - 2a\beta^2\theta + 3\theta a + 6\beta\theta a + 2\beta^2\theta\alpha}{4+12\beta+8\beta^2}$$

$$p_f^{**} = \frac{-a(1+\beta)(-1+\theta) + \beta(e - r + \theta a)}{2 + 4\beta}$$

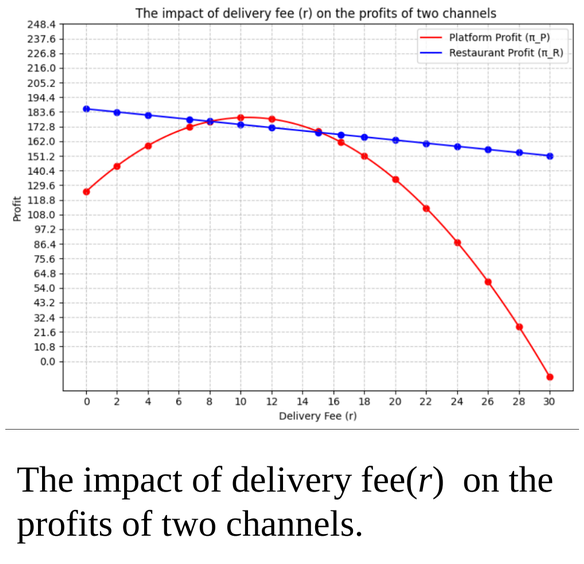
$$f^{**} = \frac{c + e - 2r + c\beta + c\beta - r\beta + \theta a}{2(1+\beta)}$$



Research result

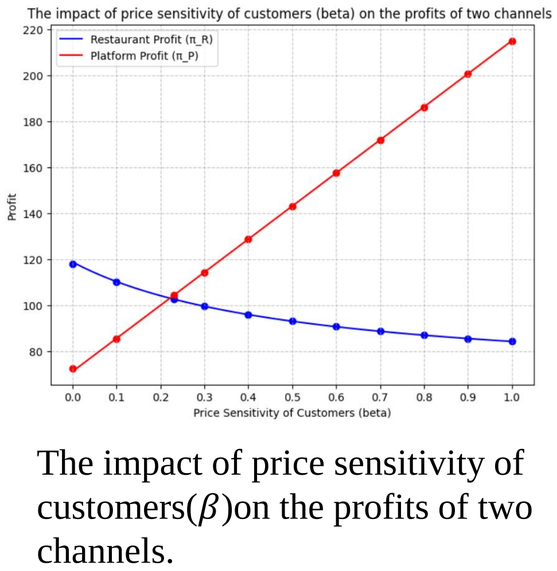
1. Sensitivity analysis

$r = 15$



The impact of delivery fee(r) on the profits of two channels.

$\beta = 0.23$



The impact of price sensitivity of customers(β)on the profits of two channels.

2. Multiple relationship

From the above discussion, the proposed model incorporates cost c and the delivery fee r as key parameters, enabling restaurants to implement differentiated pricing strategies and achieve profit maximization across varying product costs. Given that the delivery fee r is determined by the food delivery platform, restaurants are required to optimize their pricing strategies within the constraints set by the platform.

Conclusion

Through sensitive analysis, the suggested delivery fee r is \$15 to achieve the provides the optimal outcome. Also, when consumer's sensitivity to the price difference between dual channels as 0.23, indicate a state of balanced profit between the two channels.

This model demonstrates both practical utility and effectiveness in guiding restaurants in formulating pricing strategies on food delivery platforms.

Multiple relationship:

$$Pf\ \left(\frac{(7.3(-250000000000000.0c + 874484909232654.0r - 467579758324981.0)}{(575000000000000.0r - 1.2520525e{+}15)}\right) = Pn$$

Platform's highest profit range &Balance points

- **Delivery fee=10~12NTD** The platform achieves the highest profit
- **Delivery fee=8 or 15NTD** The profits of the platform and the restaurant tend to balance

Advantages of a higher delivery fee

- **Increase platform profit**: Boosts profit potential and market stability.
- **No harm to restaurant profit**: Does not negatively affect restaurant profits.
- **Reflects Service Value**: A higher delivery fee reflects the true value of the delivery service.

Choice of price sensitivity coefficient

- **Moderate price sensitivity**: Balances profits for the restaurant and platform, reduces demand loss from high prices.
- **Maintain restaurant orders**: Ensures the restaurant can consistently maintain order volume.