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Pricing Strategy Analysis Based on Dual Channel Supply Chain (DCSC) Model Concept

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Abstract

The rise of digitalization has driven companies to adopt the Dual Channel Supply Chain (DCSC) model to expand market reach and improve distribution efficiency. This study aims to evaluate pricing strategies based on the level of coordination between online, offline, and reseller channels to maximize company profit. The research develops a mathematical model that incorporates three demand functions (offline, online, and reseller) and a profit objective function. Model parameters including price elasticity, cross-channel sensitivity, unit cost, and customer preferences were obtained from historical data and structured questionnaires, then optimized using MATLAB. The validated model was applied to simulate four pricing scenarios reflecting different coordination levels among channels. Simulation results show that Scenario 2, integrating coordination among online, external reseller, and offline channels, yields the highest financial performance, generating a total profit of IDR 456,955,350. This collaborative approach outperforms other scenarios by enabling synchronized pricing and promotions and expanding market coverage without requiring additional investment in distribution infrastructure. Further sensitivity analysis confirms that Scenario 2 remains the most robust across variations in key parameters such as unit cost, channel preference, and maximum demand. Therefore, a coordinated pricing strategy within the DCSC framework can serve as an adaptive and competitive solution for companies operating in multi-channel environments.

Keywords: Dual Channel Supply Chain, Pricing Strategy, Channel Coordination.

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INTRODUCTION

The development of digitalization has prompted companies to adopt a Dual Channel Supply Chain (DCSC) strategy as an approach to expanding market reach and improving operational efficiency. The DCSC model integrates sales through online and offline channels, which allows companies to respond to market dynamics more adaptively, especially in the face of changing consumer preferences that now prioritize flexibility in transactions (Küster et al., 2016). Effective coordination in this system is crucial to achieving mutually beneficial performance between channels and optimizing overall profitability (Xu et al., 2022).

In Indonesia, the adoption of DCSC is supported by a significant growth in the number of internet users. According to data from the Indonesian Internet Service Providers Association ((APJII), 2024), around 79.5% of the population has become active internet users, which has a direct impact on the increase in digital transactions and the growth of e-commerce. This condition encourages the need for adaptive and competitive pricing strategies in various sales channels, especially online, offline, and resellers, to maintain business balance and maintain competitiveness in an increasingly complex market (Widodo and Januardi, 2020). The APJII survey (2024) also shows that 57.59% of respondents consider competitive prices to be the main strategy for increasing market share.

Theoretically, this research is grounded in channel coordination theory and pricing strategy in DCSC systems. Conflicts among channels, if not managed through proper coordination, have the potential to reduce overall supply chain performance. However, their work primarily focused on online-offline channels, without considering the growing role of reseller channels in today's digital landscape. Furthermore, much of the literature examines pricing decisions in isolation, whereas real-world practices involve simultaneous pricing decisions across all channels. This study addresses this gap by incorporating all three key actors online, offline, and reseller, into one unified pricing model. This integration follows the direction of more recent research that explores simultaneous coordination and pricing strategies to achieve global optimization (David & Adida, 2015; Zhang et al., 2021; Wang et al., 2021).

Several previous studies have shown the importance of a coordinated pricing strategy in the context of Dual Channel Supply Chain (DCSC). The integration of online and offline channels significantly impacts profitability and customer satisfaction, particularly when price consistency is maintained (Pasaribu et al., 2022). However, the implementation of asynchronous discount strategies between channels can lead to channel cannibalization i.e., a shift in demand from one channel to another resulting in unstable sales performance (Ranjan & Jha, 2019; Xia et al., 2022). Moreover, price competition among channels can lead to conflicts and inefficiencies, especially without proper mechanisms for coordination (Chandra et al., 2022; Li et al., 2021).

This study contributes to the DCSC literature through two main aspects. First, by including reseller channels as an integral part of the pricing analysis, this study provides a new perspective that was still limited in previous studies. Second, this study examines the simultaneous interaction between all three channels, which results in a deeper understanding of price coordination in a multi-channel environment. In addition to being relevant to digital transformation in Indonesia, the results of this study also offer practical implications for companies operating with similar distribution structures particularly in addressing price conflict and improving overall profitability within the DCSC framework (Widodo et al., 2021; Andriani & Tseng, 2023).

LITERATURE STUDY

Dual Channel Supply Chain (DCSC)

The inventory model in the supply chain is one of the applications of mathematical models that are commonly used in the field of industrial economics. The supply chain includes a series of processes that range from production to the sale of products to the end consumer. In its implementation, supply chains can be divided into two types, namely single channel supply chain (SCSC) and dual channel supply chain (DCSC) (Hidayati and Setiyowati, 2020). Dual Channel Supply chain is a distribution system that combines two sales channels, namely online channels and offline channels. In this model, suppliers can sell their products through both channels, which allows them to reach more consumers and improve distribution efficiency (Matsui, 2020). The structure of the dual channel supply chain is shown in Figure 1.

Dual-channel management involves cross-channel competition, pricing strategies, and supply chain coordination in a dual channel. Based on the research (Xu et al., 2023) The demand function in DCSC is assumed as:

Offline Demand Function

$D_s = (1-\rho)_s^{max} - \alpha_1 P_s + \beta_1 P_o$ .... (1)

Online Demand Function

$D_o = \rho d_s^{max} - \alpha_2 P_o + \beta_2 P_s$ .... (2).

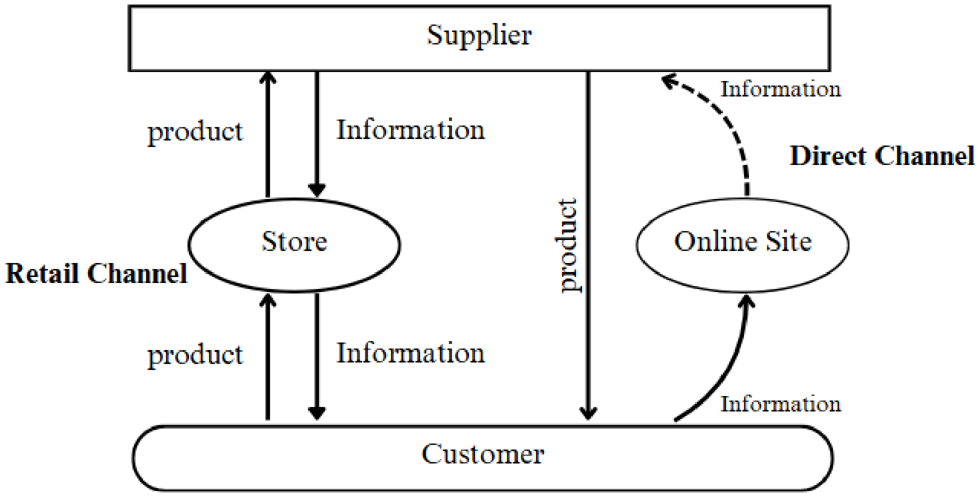


Figure 1. Dual Channel Supply Chain Structure

Pricing Strategies

The pricing strategy aims to set the optimal price by maximizing profits, maximizing the number of units sold, and others. To obtain maximum profits, maintain the company, achieve wide market coverage, quality leadership, overcome competition and carry out social responsibilities (Lubis et al., 2024). Profit is the difference of total revenue to total cost. The equation based on research (Pakaya et al., 2024) is as follows:

$$\pi = TR - TC \quad (3)$$

In the concept of DCSC (Dual Channel Supply Chain), the price of a product must be different in each sales channel, based on the customer's preference for that channel, which is influenced by the additional value that the customer receives when shopping offline (Raza and Govindaluri, 2019). This is due to the difference in customer perception of products purchased through online channels compared to offline channels (Yi et al., 2021). Pricing strategies that understand these differences are critical to maximizing the profit potential of both channels (Chen et al., 2012).

Online, Offline, and Reseller Channels

Online, offline, and reseller channels each play a critical role in the dual channel supply chain model, with distinct characteristics that must be carefully integrated. Online channels utilize internet-based platforms to deliver products or services to consumers, with value-based pricing that is highly influenced by dynamic customer preferences and evolving market trends (Chandra et al., 2022). However, one key challenge in managing online channels is ensuring balance with offline counterparts to avoid potential channel conflict (Sana, 2022). Meanwhile, offline channels offer direct, physical interaction between buyers and sellers, providing a tangible shopping experience that remains important despite the growth of e-commerce. These channels allow consumers to evaluate products firsthand an advantage that fosters trust and complements online information-seeking behaviors (Sastri Pitanatri et al., 2020). The integration of online and offline systems, when managed properly, can enhance customer loyalty, especially when pricing and promotion strategies are aligned across both platforms (Ma et al., 2023). Reseller channels, as third-party intermediaries, help expand market coverage and increase sales volume without requiring companies to invest directly in retail infrastructure. Cross-channel coordination involving resellers has been shown to improve customer retention in competitive markets. Nevertheless, to ensure pricing consistency and maintain service quality, strong coordination between manufacturers and resellers is essential (Bahri & Lahindah, 2022). A thorough understanding of each channel's function and consumer behavior is crucial in designing an integrated and effective distribution strategy (Suriansha, 2021).

The integration of DCSC structure, pricing strategies, and channel characteristics online, offline, and reseller provides a comprehensive foundation for understanding channel coordination issues. In this study, the demand and profit functions are modeled by incorporating pricing sensitivity and consumer preference across all three channels. By linking channel-specific behaviors (e.g., value perception, information access, and transaction habits) with price differentiation strategies, this research aims to simulate real-world channel interactions and optimize pricing scenarios. This synthesis forms the basis for the conceptual framework of the study.

As the conceptual foundation of this study, several theoretical propositions are formulated based on the literature review and the Dual Channel Supply Chain (DCSC) framework. First, it is proposed that coordinated pricing among online, offline, and reseller channels yields higher overall profit for the company compared to independent pricing strategies. Second, the inclusion of reseller channels in the pricing coordination process is expected to expand market reach and reduce potential price conflicts between distribution channels. Third, customer preferences toward each channel, represented by the parameters ρ and η, are assumed to significantly influence the performance of each pricing scenario. Consequently, sensitivity analysis becomes essential in evaluating the robustness of the pricing strategy under different market conditions. These propositions serve as the theoretical basis for developing the simulation and optimization model applied in this research.

RESEARCH METHODOLOGY

This research focuses on evaluating pricing strategies across three distribution channels: online (e-commerce via Shopee), offline (Factory Outlet), and reseller (Department Store). The research was conducted in October 2024 and involved both primary and secondary data collection. The primary data was collected through a structured questionnaire distributed online and offline to assess customer preferences in purchasing channels. The questionnaire illustrated a sample product (jeans) and asked respondents to score their preference levels when purchasing through offline, online, or reseller channels. Parameter η represents the customer's preference for the reseller channel relative to the offline channel. Using the same method as parameter ρ, 38 respondents from G-Jeans customers rated the reseller channel on a scale of 0 to 99, with offline fixed at 100. These scores were used to quantify η as part of the model input. Secondary data was obtained from historical sales and pricing reports provided by G-Jeans, including product prices (Ps, Po, Pr), demand volume (Ds, Do, Dr), and average unit cost (Cu). These were used to construct the demand functions and perform sensitivity analysis. Parameters α and β, representing self-price and cross-price elasticity across channels, were obtained through MATLAB optimization.

The research methodology consists of several steps. First, a mathematical model was developed based on Equations (1) and (2) to derive demand functions for offline (Ds), online (Do), and reseller (Dr) channels, as well as the gain (profit) function. The model includes parameters such as price elasticity, unit cost, maximum demand, and customer preference, obtained from G-Jeans historical data and surveys. The model was verified in MATLAB and validated using the Mean Absolute Percentage Deviation (MAPD) method. Once validated, four pricing scenarios were constructed based on different levels of channel coordination. The scenarios are as follows:

1. Scenario 0 (Existing Condition): All channels operate independently with uniform pricing, without considering customer channel preference.
2. Scenario 1: Coordination between the online and offline (Gab's Jeans Store) channels, enabling shared pricing strategies and customer fulfillment.
3. Scenario 2: Coordination between the online and reseller channels, requiring balanced pricing to maintain reseller competitiveness and consistency.
4. Scenario 3: All three channels operate independently with no coordination.

Numerical simulations using MATLAB's optimization tools were conducted to determine the most profitable scenario. Finally, a sensitivity analysis was carried out to evaluate the model's robustness under changes in key parameters.

RESULT AND DISCUSSION

Conceptual Model

The four scenarios to be analyzed include: (1) Scenario 0: the existing conditions, the three channels (online, offline, and reseller) operate independently without price differentiation, (2) Scenario 1: coordination between the company's online and offline channels, (3) Scenario 2: coordination between online channels and resellers as external parties, and (4) Scenario 3: no coordination between the three channels.

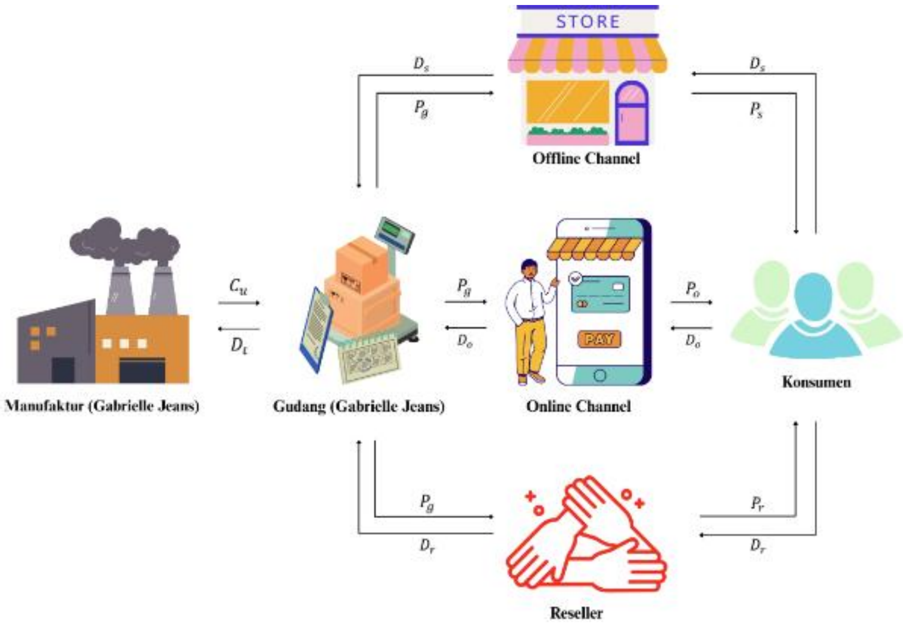


Figure 2. Dual Channel Supply Chain Model Flow

Model Development

The basic reference for model development in this study is offline and online function demand. Here are the request functions of each channel:

$D_s = (1-\rho\eta)d_s^{max} - \alpha_1 P_s + \beta_1 P_o + \beta_2 P_r$ .... (4)

$D_o = \rho d_s^{max} - \alpha_2 P_o + \beta_3 P_s + \beta_4 P_r$ .... (5)

$D_r = \eta d_s^{max} - \alpha_3 P_r + \beta_5 P_s + \beta_6 P_o$ .... (6)

Here are the profit functions of each scenario, based on Equations (4), (5), and (6):

The objective function (G_{so}) accommodates the coordination between the offline channels G-Jeans Store and the online, which is indicated by the sum of the profits of the offline channels and the profits of the online channels. The decision variables are P_s (price for offline channels G-Jeans Store) and P_o (price for online channels), will be derived from this objective function. Meanwhile G_{tot1} It shows the total profit for the entire G-Jeans supply chain system in Scenario 1.

$max\ G_{so}(P_s, P_o) = D_s(P_s - C_u) + D_o(P_o - C_u)$

$max\ G_{so}(P_s, P_o) = ((1-\rho\eta)d_s^{max} - \alpha_1 P_s + \beta_1 P_o + \beta_2 P_r)\ (P_s - C_u) +$
$(\rho d_s^{max} - \alpha_2 P_o + \beta_3 P_s + \beta_4 P_r)\ (P_o - C_u)$ .... (7)

$max\ G_r(P_r) = D_r(P_r - C_u)$

$max\ G_r(P_r) = (\eta d_s^{max} - \alpha_3 P_r + \beta_5 P_s + \beta_6 P_o) - (P_r - C_u)$ .... (8)

$max\ G_{tot1} = G_{so} + G_r$ .... (9

The objective function (G_{ro}) accommodates the coordination between the offline reseller and online channels, which is indicated by the sum of the profits of the offline channel and the profits of the online channels. The decision variables are P_r (price for offline channels – resellers) and P_o (prices for online channels), will be derived from this objective function. Meanwhile G_{tot2} It shows the total profit for the entire supply chain system in Scenario 2.

$max\ G_{ro}(P_r, P_o) = D_r(P_r - C_u) + D_o(P_o - C_u)$

$max\ G_{ro}(P_r, P_o) = (\eta d_s^{max} - \alpha_3 P_r + \beta_5 P_s + \beta_6 P_o)(P_r - C_u) +$
$(\rho d_s^{max} - \alpha_2 P_o + \beta_3 P_s + +\beta_4 P_r)(P_o - C_u)$ .... (10)

$max\ G_s(P_s) = D_s(P_s - C_u)$

$max\ G_s(P_s) = (1-\rho\eta)d_s^{max} - \alpha_1 P_s + \beta_1 P_o + \beta_2 P_r) - (P_r - C_u)$ .... (11)

$max\ G_{tot2} = G_{ro} + G_s$ .... (12)

The objective function below accommodates the number of products sold multiplied by the difference between the price and the cost of production, which is indicated by the profit result of each channel. Meanwhile G_{tot3} It shows the total profit for the entire G-Jeans supply chain system in Scenario 3.

$$max\ G_s(P_s) = D_s(P_s - C_u)$$
$$max\ G_s(P_s) = ((1-\rho\eta)d_s^{max} - \alpha_1 P_s + \beta_1 P_o + \beta_2 P_r)\ (P_s - C_u) \quad (13)$$
$$max\ G_o(P_o) = D_o(P_o - C_u)$$
$$max\ G_o(P_o) = (\rho d_s^{max} - \alpha_2 P_o + \beta_3 P_s + \beta_4 P_r)(P_o - C_u) \quad (14)$$
$$max\ G_r(P_r) = D_r(P_r - C_u)$$
$$max\ G_r(P_r) = (\eta d_s^{max} - \alpha_3 P_r + \beta_5 P_s + \beta_6 P_o) - (P_r - C_u) \quad (15)$$
$$max\ G_{tot3} = G_s + G_o + G_r \quad (16)$$

A number of constraints need to be incorporated into the model to ensure that the essential characteristics of the Dual Channel Supply Chain (DCSC) system can be accurately represented:

1. $P_s, P_o, P_r \geq C_u$ Offline, online, and reseller prices must be greater than or equal to the cost of the production unit.
2. $P_s \geq \frac{P_o}{\rho}$ The offline price must be greater than or equal to the online price after calibrating by a factor of
3. $P_s \geq \frac{P_r}{\eta}$, Sales opportunities through resellers are available after P_s reaching the threshold value.
4. $D_s, D_o, D_r \geq 0$ Requests across all channels must have a non-negative value.
5. $P_r \geq 0{,}8P_s$ The price difference between the selling price of the product to the direct consumer (P_s) and the price for the reseller (P_r) should not be more than 20%.

Parameter Collection

The system parameters needed in this study include ρ, η, α_1, α_2, α_3, β_1, β_2, β_3, β_4, β_5, β_6, dmax, and Cu. Parameters ρ (ratio of customer acceptance to online versus offline products) and η (ratio of customer acceptance to reseller products compared to offline) were obtained through a survey of consumer preferences towards the purchase channel of G-Jeans products. The values of $_1$, α_2, and α_3 represent the coefficients of self-price elasticity on each offline, online, and reseller channel, calculated based on the sensitivity of demand to historical price changes on each channel. The α value is obtained from the test in MATLAB, which results in the optimal value of the solution. Meanwhile, β_1 to β_6 are the cross-sensitivity parameters, which indicate how much price changes on one channel affect demand on another. These β coefficient values were obtained through modeling and simulation using MATLAB. The dmax parameter, which is the maximum number of requests on the offline channel when the minimum price is applied, is determined based on historical sales data. Finally, the Cu or product unit cost is determined based on the average production cost report issued by the company for one product unit, which is IDR 200,000. The recapitulation of the parameter values used in this study is shown in the table below.

Table 1. Value of the Parameter

No.	Parameter	Value
1	ρ	0,61
2	η	0,74
3	α_1	0,0002
4	α_2	0,001
5	α_3	0,001
6	β_1	0,0001
7	β_2	0,0001
8	β_3	0,0003
9	β_4	0,00006
10	β_5	0,00002
11	β_6	0,0005
12	d_s^{max}	1038 (pcs)
13	C_u	Rp200.000

Function Validation

The evaluation of the accuracy of the model was carried out using the Mean Absolute Percentage Deviation (MAPD) measure to determine the magnitude of the percentage of error in the calculation results. The validation termination criteria are determined when the MAPD value reaches a number of less than or equal to 5% (Puisa et al., 2023).

$$MAPD = \frac{\sum|D_t - F_t|}{\sum D_t} \quad \text{(17)}$$

$$MAPD = \frac{598 - 541}{598} x\ 100 = 2{,}87\ \%$$

Based on the calculation above, it can be stated that the function Ds is valid. This is shown by the MAPD (Mean Absolute Percentage Deviation) value obtained at 2.87%, which is below the tolerance threshold of 5% (Mokhtar et al., 2024).

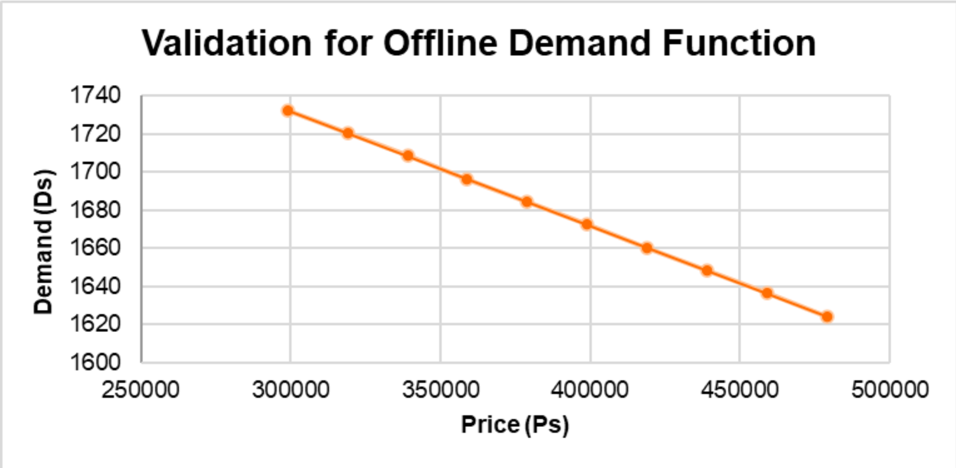


Figure 3. Validation for Offline Demand Function

The test is also carried out by observing the behavior of the demand function to price changes. It is seen that when the price increases, the amount of demand decreases consistently. The same goes for other channel request functions.

Validation of the gain function is carried out by testing the system's response to changes in certain parameters, in this case the Cu (cost per unit) parameter. The goal is to ascertain whether the developed model can represent the behavior of real systems logically and consistently.

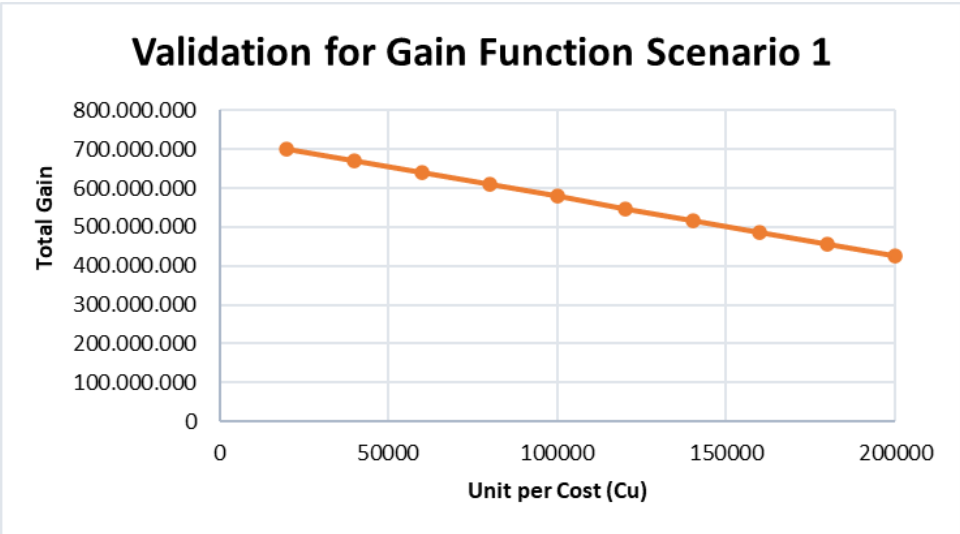


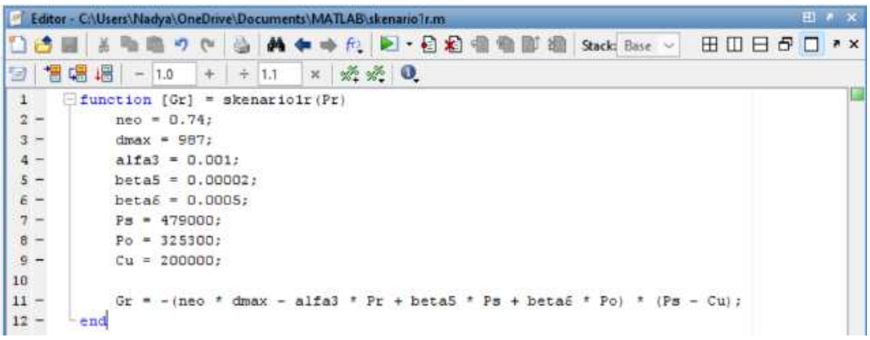
Figure 4. Validation for Gain Function Scenario

Cu varies from lowest to highest, and its effect on total gains is observed. In theory, when there is no change in the selling price, the lower the cost per unit, the higher the profit produced. Conversely, if the cost per unit increases, then profits will tend to decrease.

Model Verification

Model verification is performed to ensure that the MATLAB program or script has been written correctly and according to the logic of the mathematical model it was designed. At this stage, verification is carried out by running the program and paying attention to whether the objective function and the parameters used are defined through the script (m.file) can be executed without errors and whether the calculation logic is in accordance with the formula that has been set. Here are the results of the verification test:

Figure 5.
Verification for G_r Scenario 1

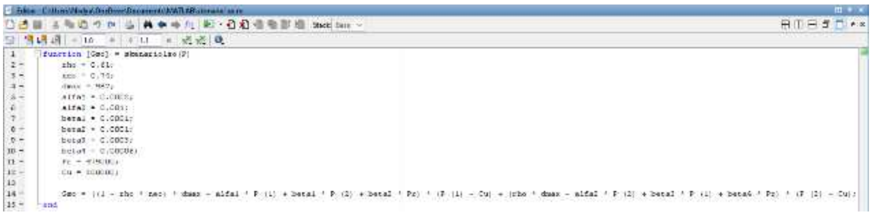


```
function [Gr] = skenario1r(Pr)
    neo = 0.74;
    dmax = 987;
    alfa3 = 0.001;
    beta5 = 0.00002;
    beta6 = 0.0005;
    Ps = 479000;
    Po = 325300;
    Cu = 200000;

    Gr = -(neo * dmax - alfa3 * Pr + beta5 * Ps + beta6 * Po) * (Ps - Cu);
end
```

Figure 6.

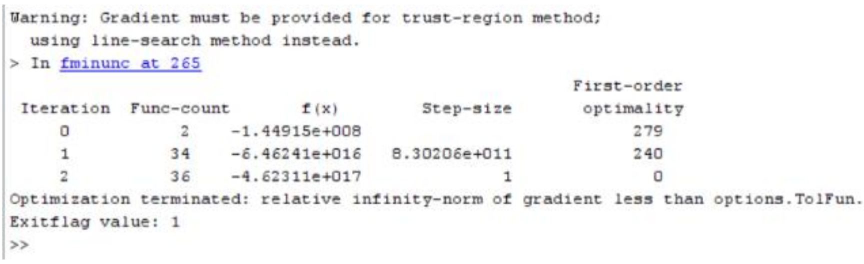
Verification for G_{so} Scenario 1



Figures 5 and 6 show the success of the first indication which is marked by the display of an indicator (*green status indicator*) on the upper right side of the MATLAB editor software indicating the absence of syntax errors.

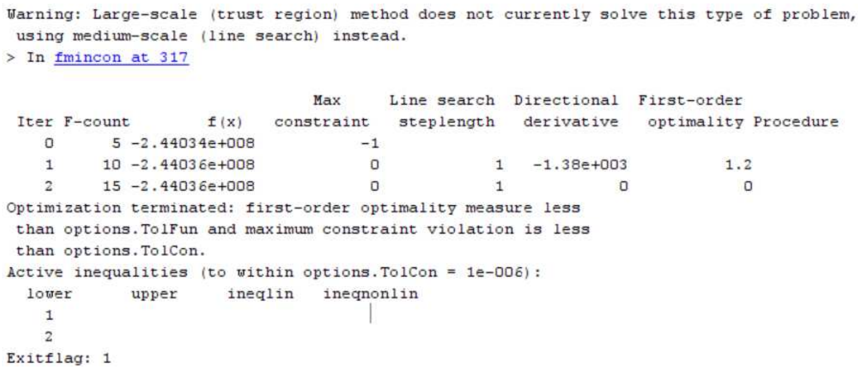
Verification is continued with the second indication, namely when the function is executed using fmincon synchronization in the *command window*, it produces an exitflag value value = 1, shown in figures 7 and 8:

Figure 7.
Exitflag Value of G_r Scenario 1



```
Warning: Gradient must be provided for trust-region method;
  using line-search method instead.
> In fminunc at 265
                                                      First-order
 Iteration  Func-count       f(x)        Step-size      optimality
     0           2     -1.44915e+008                        279
     1          34     -6.46241e+016  8.30206e+011          240
     2          36     -4.62311e+017            1             0
Optimization terminated: relative infinity-norm of gradient less than options.TolFun.
Exitflag value: 1
>>
```

Figure 8.
Exitflag Value of G_{so} Scenario 1



```
Warning: Large-scale (trust region) method does not currently solve this type of problem,
 using medium-scale (line search) instead.
> In fmincon at 317

                                 Max     Line search  Directional  First-order
 Iter F-count        f(x)   constraint   steplength   derivative   optimality Procedure
    0      5 -2.44034e+008           -1
    1     10 -2.44036e+008            0            1    -1.38e+003          1.2
    2     15 -2.44036e+008            0            1            0            0
Optimization terminated: first-order optimality measure less
 than options.TolFun and maximum constraint violation is less
 than options.TolCon.
Active inequalities (to within options.TolCon = 1e-006):
  lower      upper     ineqlin   ineqnonlin
    1
    2
Exitflag: 1
```

Numerical Experiment

In scenario 1, numerical experiments are performed for offline-online channels and reseller channels. The reseller channel is the first channel to be evaluated assuming that Ps and Po have a fixed value of IDR 479,000, which is the current price. This numerical experiment is performed on reseller channels with the following limitations

Table 2. Constraint for Scenario 1 (Reseller)

No.	A		B	Note
1	$-P_r$	$\leq$	$-C_u$	Price Lower Bound
2	$-\beta_2 P_r$	$\leq$	$(1-\rho\eta)d_s^{max} - \alpha_1 P_s + \beta_1 P_o$	
3	$-\beta_4 P_r$	$\leq$	$\rho d_s^{max} - \alpha_2 P_o + \beta_3 P_s$	Positive Demand
4	$\alpha_3 P_r$	$\leq$	$\eta d_s^{max} + \beta_5 P_s + \beta_6 P_o$	
5	$-P_r$	$\leq$	$-0{,}8P_s$	Reseller Pricing Policy
6	P_r	$\leq$	P_s	Price Leadership

Numerical experiments on reseller channels are carried out taking into account several constraints that are relevant to real conditions. Table 2. summarizes the constraints used in the optimal price search process for the reseller channel, taking into account the price down, reseller pricing policies, demand must be positive, and price leadership. The results of this experiment obtained the optimal price for the reseller channel of IDR 479,000.

Once the optimal price for the reseller channel was obtained, the experiment continued to evaluate the optimal price on the online and offline channels simultaneously. This evaluation is carried out using one objective function, while still using the results of previous experiments as a reference. In this case, the price on the Pr reseller channel is considered fixed and used as an input parameter in the next experiment.

Table 3. Constraint for Scenario 1 (Offline - Online)

No.	A		B	Note
1	$-P_s$	$\leq$	$-C_u$	Price Lower Bound
2	$-P_o$	$\leq$	$-C_u$	
3	$-P_s + \frac{P_o}{\rho}$	$\leq$	0	Demand Interaction
4	$-P_s$	$\leq$	$-\frac{P_r}{\eta}$	
5	$\alpha_1 P_s - \beta_1 P_o$	$\leq$	$(1-\rho\eta)d_s^{max} + \beta_2 P_r$	
6	$\alpha_2 P_o - \beta_3 P_s$	$\leq$	$\rho d_s^{max} + \beta_4 P_r$	Positive Demand
7	$-\beta_5 P_s - \beta_6 P_o$	$\leq$	$\eta d_s^{max} - \alpha_3 P_r$	
8	$0{,}8P_s$	$\leq$	P_r	Reseller Pricing Policy
9	$-P_s + P_o$	$\leq$	0	Price Leadership
10	$-P_s$	$\leq$	$-P_r$	

Table 3. Summarizes the constraints used in determining the optimal price for online and offline channels. These limitations include price lower-caps, demand interactions between channels, requests must be positive, reseller pricing policies, and price leadership. The experiment was carried out with several iterations of the α and β parameters until an optimal value was found that resulted in maximum profit. Based on the results of the experiment, the optimal price for the Ps online channel was IDR 598,750 and for the offline Po channel of IDR 365,237. This value is the best combination based on the market structure and price interaction between distribution channels. After evaluating each scenario, then the results of the numerical experiment above will be summarized in the table below.

Table 4. Comparison of Numerical Experiment Results

	Scenario 0	Scenario 1	Scenario 2	Scenario 3
Ps	Rp479.000,00	Rp598.750,00	Rp497.000,00	Rp479.000,00
Po	Rp479.000,00	Rp365.237,00	Rp365.237,00	Rp335.300,00
Pr	Rp479.000,00	Rp479.000,00	Rp598.750,00	Rp383.200,00
Ds	541	506	542	518
Do	296	445	416	433
Dr	520	446	324	524
Gs	Rp151.069.628	-	Rp151.236.665	Rp144.387.578
Go	Rp151.069.628	-	-	Rp70.020.212
Gr	Rp151.069.628	Rp141.213.590	-	Rp94.809.334
Gso	-	Rp285.457.452	-	-
Gro	-		Rp305.718.685	-
Gtot	Rp453.208.883	Rp426.671.042	Rp456.955.350	Rp309.217.125

Table 4. Displays the results of numerical experiments for each scenario. Based on these results, there was a significant difference in total profit between the tested scenarios. This difference is mainly due to price variations in each scenario, which are the output of the optimization process performed using the MATLAB software. From these results, it can be concluded that Scenario 2 provides the best financial performance for the company. However, these decisions are dynamic and may change in the future, especially if there are changes to the parameters used in the model. These potential changes will be further analyzed through sensitivity analysis, which will evaluate how much influence parameter variation has on the results obtained.

Sensitivity Analysis

Sensitivity analysis is performed to identify which parameters have the most effect on total profit. The purpose of this analysis is to understand how changes to a parameter can affect total profits, which can ultimately lead companies to change decisions regarding the selection of the best scenario. This analysis process is carried out by changing one parameter individually, while the other parameters are kept constant. With this approach, it can be seen how much influence each parameter has on the final result of the model. The parameters to be evaluated are the parameters dmax, Cu, ρ, and η.

Table 5. Sensitivity Analysis of Parameter dmax

dmax	Gtot0	Gtot1	Gtot2	Gtot3	Best Scenario
50	Rp22.958.910,00	Rp0,00	Rp23.627.829,73	Rp2.079.300,00	2
150	Rp68.876.730,00	Rp39.589.788,57	Rp69.874.096,55	Rp34.858.150,00	2
250	Rp114.794.550,00	Rp85.836.055,39	Rp116.120.363,37	Rp67.637.000,00	2
350	Rp160.712.370,00	Rp132.082.322,21	Rp162.366.630,19	Rp100.415.850,00	2
450	Rp206.630.190,00	Rp178.328.589,03	Rp208.612.897,01	Rp133.194.700,00	2
550	Rp252.548.010,00	Rp224.574.855,85	Rp254.859.163,83	Rp165.973.550,00	2
650	Rp298.465.830,00	Rp270.821.122,67	Rp301.105.430,65	Rp198.752.400,00	2
750	Rp344.383.650,00	Rp317.067.389,49	Rp347.351.697,47	Rp231.531.250,00	2
850	Rp390.301.470,00	Rp363.313.656,31	Rp393.597.964,29	Rp264.310.100,00	2
987	Rp453.208.883,40	Rp426.671.041,86	Rp456.955.349,83	Rp309.217.124,50	2
1050	Rp482.137.110,00	Rp455.806.189,95	Rp486.090.497,93	Rp329.867.800,00	2
1150	Rp528.054.930,00	Rp502.052.456,77	Rp532.336.764,75	Rp362.646.650,00	2
1250	Rp573.972.750,00	Rp548.298.723,59	Rp578.583.031,57	Rp395.425.500,00	2
1350	Rp619.890.570,00	Rp594.544.990,41	Rp624.829.298,39	Rp428.204.350,00	2

Table 6. Sensitivity Analysis of Parameter Cu

Cu	Gtot0	Gtot1	Gtot2	Gtot3	Best Scenario
20000	Rp745.601.711,40	Rp699.987.667,86	Rp749.671.475,83	Rp588.676.952,50	2
40000	Rp713.113.619,40	Rp669.619.153,86	Rp717.147.461,83	Rp557.625.860,50	2
60000	Rp680.625.527,40	Rp639.250.639,86	Rp684.623.447,83	Rp526.574.768,50	2
80000	Rp648.137.435,40	Rp608.882.125,86	Rp652.099.433,83	Rp495.523.676,50	2
100000	Rp615.649.343,40	Rp578.513.611,86	Rp619.575.419,83	Rp464.472.584,50	2
120000	Rp583.161.251,40	Rp548.145.097,86	Rp587.051.405,83	Rp433.421.492,50	2
140000	Rp550.673.159,40	Rp517.776.583,86	Rp554.527.391,83	Rp402.370.400,50	2
160000	Rp518.185.067,40	Rp487.408.069,86	Rp522.003.377,83	Rp371.319.308,50	2
180000	Rp485.696.975,40	Rp457.039.555,86	Rp489.479.363,83	Rp340.268.216,50	2
200000	Rp453.208.883,40	Rp426.671.041,86	Rp456.955.349,83	Rp309.217.124,50	2
220000	Rp420.720.791,40	Rp411.833.783,05	Rp446.117.951,80	Rp307.222.803,72	2
240000	Rp388.232.699,40	Rp395.737.318,18	Rp430.327.861,18	Rp308.942.427,58	2
260000	Rp355.744.607,40	Rp380.594.011,27	Rp416.113.478,02	Rp311.487.130,90	2
280000	Rp323.256.515,40	Rp0,00	Rp404.510.016,10	Rp322.672.754,02	2

Table 7. Sensitivity Analysis of Parameter ρ

ρ	Gtot0	Gtot1	Gtot2	Gtot3	Best Scenario
0,10	Rp764.986.194,00	Rp922.237.198,00	Rp1.064.829.898,00	Rp510.363.008,56	2
0,20	Rp703.853.388,00	Rp757.718.189,50	Rp837.404.658,25	Rp468.521.729,50	2
0,30	Rp642.720.582,00	Rp637.245.859,84	Rp684.481.669,12	Rp426.680.450,44	2
0,40	Rp581.587.776,00	Rp559.947.513,60	Rp598.920.825,60	Rp384.839.171,38	2
0,50	Rp520.454.970,00	Rp487.126.710,00	Rp518.868.078,75	Rp342.997.892,32	0
0,61	Rp453.208.883,40	Rp426.671.041,86	Rp456.955.349,83	Rp309.217.124,50	2
0,70	Rp398.189.358,00	Rp376.916.965,00	Rp407.587.933,75	Rp284.331.704,80	2
0,80	Rp337.056.552,00	Rp320.933.866,50	Rp352.107.785,25	Rp248.041.749,67	2
0,90	Rp275.923.746,00	Rp267.207.217,00	Rp299.279.260,75	Rp211.243.327,36	2
1,00	Rp214.790.940,00	Rp205.485.637,50	Rp237.952.856,25	Rp168.736.600,00	2

Table 8. Sensitivity Analysis of Parameter η

η	Gtot0	Gtot1	Gtot2	Gtot3	Best Scenario
0,10	Rp775.725.741,00	Rp1.207.391.105,70	Rp1.385.208.875,70	Rp509.664.703,90	2
0,20	Rp725.332.482,00	Rp924.751.525,60	Rp1.009.930.429,60	Rp475.790.258,87	2
0,30	Rp674.939.223,00	Rp779.621.813,46	Rp845.233.352,46	Rp441.915.813,84	2
0,40	Rp624.545.964,00	Rp684.597.740,98	Rp739.834.153,54	Rp408.041.368,81	2
0,50	Rp574.152.705,00	Rp592.593.185,25	Rp637.138.310,32	Rp374.166.923,78	2
0,60	Rp523.759.446,00	Rp517.384.732,90	Rp554.127.934,15	Rp340.292.478,75	2
0,74	Rp453.208.883,40	Rp426.671.041,86	Rp456.955.349,83	Rp309.217.124,50	2
0,80	Rp422.972.928,00	Rp388.139.727,40	Rp413.203.610,53	Rp296.240.862,45	0
0,90	Rp372.579.669,00	Rp330.815.563,00	Rp352.628.263,00	Rp272.382.523,20	0
1,00	Rp322.186.410,00	Rp282.710.170,00	Rp304.522.870,00	Rp242.049.906,00	0

Furthermore, an evaluation will be carried out on two parameters at once, namely ρ and η, with the aim of understanding how the interaction between the two parameters affects the total profit obtained. The analysis was carried out using MATLAB software by utilizing meshgrid syntax to produce a three-dimensional mapping. The scenarios analyzed specifically are Scenario 0 and Scenario 2, as they both result in almost the same total profit value.

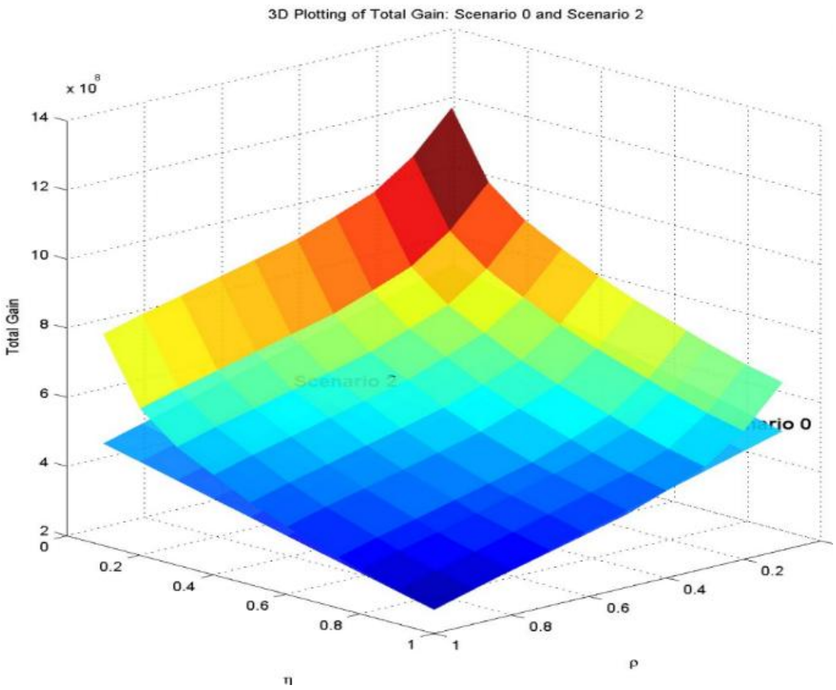


Figure 9. Sensitivity Analysis of Parameter ρ dan η

Based on Figure 9. which shows the 3D mapping of the gain function in each scenario, the x-axis represents the ρ value, the y-axis for the η value, and the z-axis of the total gain scenario. From the graph, it can be seen that the interaction between the ρ parameter and produces a different profit pattern in each scenario. Specifically, Scenario 0 gives the maximum advantage when the value ρ is in the high range, i.e. between 0.8 to 1. Conversely, when the value of ρ is in the range between 0.1 and 0.8, the maximum profit is actually generated by Scenario 2. This study shows that decisions on the best pricing scenario are strongly influenced by dynamic customer preferences towards distribution channels. Therefore, companies like G-Jeans need to actively monitor changes in consumer behavior over time. This sensitivity analysis can be a strategic guide for the relevant companies in evaluating and adjusting the pricing strategy used when there is a change in channel preferences in the market.

Among all alternatives, Scenario 2 which coordinates pricing among online, offline, and reseller channels (e.g., department stores) produces the best financial outcome. This strategy allows firms to scale up distribution via third parties without large infrastructure investment while maintaining brand consistency and price harmony across channels. For this synergy to succeed, companies must ensure coordination mechanisms are in place and incentives are distributed fairly among channel partners.

These findings hold practical relevance for other industries with multi-channel distribution systems, such as electronics, cosmetics, consumer goods, and fashion retail. In such sectors, channel conflicts, pricing inconsistency, and shifting consumer preferences are common challenges. Implementing a coordinated pricing framework as modeled here can help businesses improve profitability while enhancing customer experience.

From an academic standpoint, this research contributes to the dual channel supply chain literature by introducing a simulation-based evaluation of multiple coordination scenarios under consumer preference variability. It extends traditional DCSC models by incorporating resellers into the pricing coordination mechanism and by analyzing how scenario robustness shifts across a multidimensional parameter space (ρ, η, Cu, and dmax). This approach offers a replicable framework for analyzing channel strategy resilience in other product or service contexts.

CONCLUSION

This study has successfully evaluated the financial performance of G-Jeans company through simulation of four distribution channel-based pricing scenarios, namely online, offline, and reseller channels. The results of the analysis show that the level of coordination between distribution channels has a significant influence on the total profits obtained by the company. Among the four scenarios analyzed, Scenario 2, which reflects the collaboration between online-reseller channels, and offline resulted in the highest total profit of IDR 456,955,350, so it is recommended as the most optimal pricing strategy. A collaborative approach between channels has been proven to improve efficiency and responsiveness to market demand, even under conditions of variation in channel preference parameters (ρ and η).

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