*Proceedings of the International Conference on Industrial Engineering and Operations Management*

Publisher: IEOM Society International, USA DOI: 10.46254/AN15.20250154
Published: February 18, 2025

# Impact of Simultaneous and Sequential decision-making on the Supply Chain Operation under Encroachment and Reselling: A Game-theoretic Analysis

**Arnab Adhikari**
Assistant Professor, Quantitative Methods & Operations Management Area
Indian Institute of Management Kozhikode
IIMK Campus P.O., Kozhikode, Kerala 673570, India
arnaba@iimk.ac.in

## Abstract

Manufacturer's encroachment and retailer's reselling strategies are prevalent in the contemporary global supply chain operations. In this backdrop, the simultaneous or sequential decision-making of the supply chain members can play an instrumental role in their pricing decisions and profitability. This issue motivates us to develop a game-theoretic model for a dyadic supply chain comprising one manufacturer and one retailer, where the manufacturer adopts an encroachment strategy, i.e., selling product through its direct channel apart from the other retailer's outlet and the retailer follows a reselling strategy, i.e., setting a markup over the manufacturer's wholesale price of the product and selling it to the market. Here, we consider the quantity competition between the manufacturer and the retailer. Using a game-theoretic approach, we investigate how the supply chain members' simultaneous and sequential decision-making impact the optimal supply chain members' quantity decisions and profitability, along with the consumer surplus. The comparative analyses signify that sequential decision-making leads to higher supply chain members' profits and consumer surplus than simultaneous decision-making.

## Keywords
Game theory, Encroachment, Simultaneous decision-making, sequential decision-making.

## 1. Introduction
### 1.1 Background and motivation
In the last two decades, e-commerce platforms such as Amazon, Flipkart, etc., have transformed the supply chain operations. Many of the product manufacturers, who earlier used to sell their products through their own channels, are currently selling their products through these e-commerce platforms. The e-commerce-platforms follow reselling and agency strategies for collaborating with these manufacturers. Also, the manufacturers often sell their products through other retail outlets. Reselling strategies can be defined as setting a markup over the product's wholesale price set by the manufacturer and selling it to the market. The e-commerce platform charges a fraction of manufacturer's revenue as a commission under the agency model. Further, there are several examples of organizations selling their products through both their own outlets and other retailers' outlets. For instance, electronic tech giants such as Apple, Dell, etc., deliver their products to customers through their own channels and others' outlets (Huang et al., 2018). This operation can be defined as the manufacturer's encroachment. In this context, as the manufacturer engages in either price or quantity competitions with the retailer or e-commerce platform, the timing of their decision becomes crucial, i.e., whether they should devise their pricing or quantity decision simultaneously with the retailer or e-tailer or they should take first mover's or late entrant's advantage through sequential decision-making. In the context of the digital goods market, the simultaneous move of Amazon Prime and Netflix in the Indian market and their sequential decision-making in Germany signify this phenomenon (Adhikari et al., 2022)

### 1.2 Research questions and contribution statements

Our exploration of relevant literature on manufacturer's encroachment indicates that the scholars focus on different issues such as information sharing (Zhao et al., 2024), demand forecasting (Zhang et al., 2022), outsourcing strategies (Amirnequiee et al., 2024), and so on. However, simultaneous and sequential moves of the supply chain members in the presence of manufacturer's encroachment have been ignored. It motivates us to address the following research question.

- *RQ: How do the simultaneous and sequential decisions impact the supply chain members' pricing decisions and profitability in the presence of manufacturer's encroachment and retailer's reselling strategies?*

The contributions of this article are as follows:

Here, we propose a game-theoretic model for a two-level supply chain consisting of one manufacturer and one retailer, where the manufacturer sells the product through the retailer as well as direct channel, and the retailer follows a reselling strategy, i.e., set a retail price by considering a profit margin on the manufacturer's wholesale price. Here, the manufacturer and the retailer engage in a quantity competition. Now, we consider the supply chain members' simultaneous and sequential decision-making and determine the optimal solutions of supply chain members' prices, quantity, and profits, along with the consumer surplus. The comparative analyses indicate that sequential decision-making results in a higher profitability of the supply chain members and consumer surplus compared to simultaneous decision-making.

The article is organized as follows. Section 2 presents a summarized literature review. Section 3 demonstrates the proposed mathematical model. Section 4 describes the solution methodology and solutions. Section 5 explains the results and insights obtained from the comparative analyses. Section 6 concludes the article by discussing the contributions and future research avenues.

## 2. Literature Review

The scholarly works relevant to our work can be classified in two categories: manufacturer's encroachment and simultaneous and sequential decision-making in supply chain.

### 2.1. Scholarly works on manufacturer's encroachment

There are substantial research works on the manufacturer's encroachment in the supply chain. Huang et al. (2018) develop a game-theoretic model to demonstrate the information sharing effect on chain members' decisions in the presence of manufacturer's encroachment. Ha et al. (2022) and Gong et al. (2024) extend their work and discuss the effect of retailer's information sharing on the manufacturer's encroachment strategy and retailer's selling format selection, i.e., reselling or agency. Zhao et al. (2024) propose a game-theoretic model to demonstrate information sharing strategies under manufacturer's encroachment and signaling effect. Yu et al. (2024) investigate whether an e-tailer should follow the store brand (SB) encroachment and information sharing strategies. Liu et al. (2021) examine the effect of the manufacturer's encroachment strategy on the supply chain decisions under the downstream competition. For a supply chain comprising an e-tailer and a manufacturer, Zhang et al. (2022) devise a retailer's demand forecasting strategy in the presence of upstream member's encroachment. Tang et al. (2023) explore the manufacturer's different encroachment strategies for both e-tailer's and manufacturer's channel leaderships. Amirnequiee et al. (2024) investigate the manufacturer's outsourcing strategies using a two-period game-theoretic model in the presence of the manufacturer's encroachment for a two-level manufacturer-retailer supply chain.

### 2.2. Scholarly works on simultaneous and sequential decision-making in supply chain

Simultaneous and sequential decision-making in supply chain has received significant scholarly attention. Wang (2006) develop a game-theoretical model for the supply chain with complimentary products under demand uncertainties considering the simultaneous and sequential moves. Gnanlet and Gilland (2009) explore the effect of simultaneous and sequential decisions to attain optimal resource flexibility in healthcare. Ni and Li (2012) develop a game-theoretic model to depict the impact of simultaneous and sequential moves on corporate social responsibility (CSR) decisions for a two-level supply chain. Niu et al. (2015) investigate the appropriate decision-making, i.e., simultaneous or sequential, for a supply chain with an original equipment manufacturer (OEM) and an original design manufacturer (ODM). Li et al. (2016) examine the impact of simultaneous and sequential moves for a dyadic supply chain under upstream competition and random yield. Chen et al. (2018) study how channel leadership and simultaneous as well as sequential decisions influence the supply chain members' pricing decisions and profitability in the presence of customer returns. Adhikari et al. (2022) propose a game-theoretic model to compare the uniform and spatially differentiated pricing strategies considering simultaneous and sequential moves.

In summary, our exploration of the literature indicates that simultaneous and sequential decisions under supplier encroachment of a supply chain have not been paid enough attention. In this article, we address this research gap.

## 3. Mathematical Model

In this section, we describe our proposed model for a dyadic supply chain comprising one manufacturer and one retailer. Here, the manufacturer sells the product through the retailer as well as its direct channel. Before providing the detailed description of the model, we first present the notations of the supply chain members, scenarios, decisions, parameters, and decision variables used throughout this paper for model formulation in Table 1.

Table 1. Description and notations of the supply chain members, decision-making scenarios, parameters, and decision variables

| Description | Notations |
|---|---|
| Manufacturer | $M$ |
| Retailer | $R$ |
| Simultaneous decision-making | $SIM$ |
| Sequential decision-making | $SEQ$ |
| Manufacturer's direct channel selling cost/ unit | $k$ |
| Manufacturer's total fixed production cost | $F$ |
| Manufacturer's wholesale price/ unit for the decision-making $a,\ a \in \{SIM, SEQ\}$. | $(w_M)_a$ |
| Manufacturer's retail price/ unit for the decision-making $a,\ a \in \{SIM, SEQ\}$, selling through the direct channel | $(p_M)_a$ |
| Manufacturer's quantity sold for the decision-making $a,\ a \in \{SIM, SEQ\}$, through the direct channel | $(q_M)_a$ |
| Retailer's retail price/ unit for the decision-making $a,\ a \in \{SIM, SEQ\}$. | $(p_R)_a$ |
| Retailer's quantity sold for the decision-making $a,\ a \in \{SIM, SEQ\}$. | $(q_R)_a$ |
| Manufacturer's profit function for the decision-making $a,\ a \in \{SIM, SEQ\}$. | $(\pi_M)_a$ |
| Retailer's profit function for the decision-making $a,\ a \in \{SIM, SEQ\}$. | $(\pi_R)_a$ |

Here, we consider following assumptions for our model formulation to facilitate the simplified representation of the results without loss generalizability,

- *Assumption 1.* Manufacturer incurs a negligible per-unit production cost, i.e., zero.
- *Assumption 2.* Market potential is scaled to one. Similarly, the consumer's price sensitiveness is same for both the products sold by manufacturer and retailer and scaled to one.
- *Assumption 3.* The retailer experiences a linear demand function characterized by $(p_R)_a = \left(1 - (q_R)_a - (q_M)_a\right),\ a \in \{SIM, SEQ\}$. Similarly, the manufacturer's direct channel experiences a linear demand expressed as $(p_M)_a = \left(1 - (q_M)_a - (q_R)_a\right),\ a \in \{SIM, SEQ\}$.

As mentioned earlier, the manufacturer sells the product through the retailer as well as its direct channel. It indicates the presence of manufacturer encroachment. For the decision-making $a,\ a \in \{SIM, SEQ\}$, the retailer procures the quantity of the product $(q_R)_a$ from the manufacturer at wholesale price $(w_M)_a$ and sells it to the market at retail price $(p_R)_a$. It signifies that the retailer follows a reselling model. Now, the manufacturer, apart from selling $(q_R)_a$ units of product to the retailer, sells $(q_M)_a$ units of product to the consumers through its direct channel. Here, $(p_R)_a = \left(1-(q_R)_a-(q_M)_a\right)$, $(p_M)_a = \left(1-(q_M)_a-(q_R)_a\right)$, $a \in \{SIM, SEQ\}$. The manufacturer incurs direct channel selling cost $k$ per unit of product, $0<k<1$. Here, the manufacturer engages with the retailer in quantity competition through its direct channel. Figure 1 depicts the mechanism of the proposed model. In case of sequential decision, the retailer and the manufacturer works as a leader and follower, respectively. Now, the profit functions of the retailer and manufacturer can be expressed as follows:

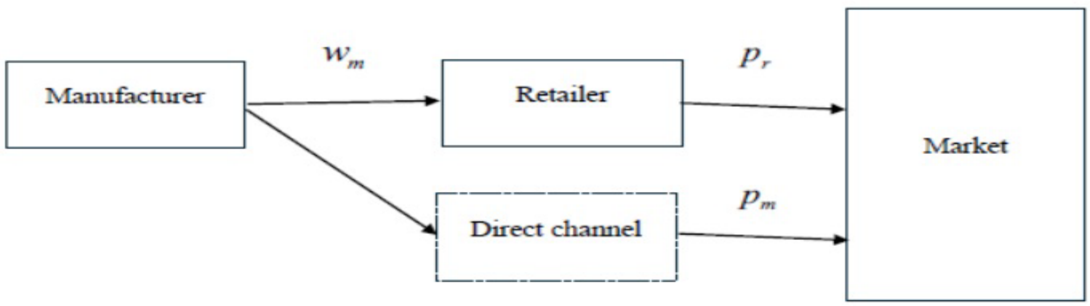



Figure 1. Mechanism of the supply chain

$$\underset{(q_R)_a}{Max}\ (\pi_R)_a = \left((p_R)_a-(w_M)_a\right)(q_R)_a. \tag{1}$$

$$\underset{(w_M)_a,(q_M)_a}{Max}\ (\pi_M)_a = \left((w_M)_a(q_R)_a+\left((p_M)_a-k\right)(q_M)_a-F\right). \tag{2}$$

Now, the consumer surplus ent for the decision-making $a$, $a \in \{SIM, SEQ\}$, can be expressed as follows

$$(CS)_a = \int_0^{\left((q_R)_a+(q_M)_a\right)} \left(\left((q_R)_a+(q_M)_a\right)-q\right)dq = \frac{\left((q_R)_a+(q_M)_a\right)^2}{2}. \tag{3}$$

## 4. Solution methodology and Results

In this section, we adopt a simultaneous solution of the equations and backward induction-based approach in the proposed methodology. we present the detailed description of the solution methodology employed to obtain the optimal value of the decision variables as follows.

### 4.1. Simultaneous decision-making

We first differentiate $(\pi_R)_{SIM}$ with $(q_R)_{SIM}$ and $(\pi_M)_{SIM}$ with $(q_M)_{SIM}$. We find that $(\pi_R)_{SIM}$ and $(\pi_M)_{SIM}$ is concave in $(q_R)_{SIM}$ and $(q_M)_{SIM}$, respectively. From simultaneously solving the first order conditions, i.e., $\frac{\partial(\pi_R)_{SIM}}{\partial(q_R)_{SIM}}=0$ and $\frac{\partial(\pi_M)_{SIM}}{\partial(q_M)_{SIM}}=0$, we determine the value of $(q_R)_{SIM}$ and $(q_M)_{SIM}$ in terms of $(w_M)_{SIM}$. Now using the values of $(q_R)_{SIM}$ and $(q_M)_{SIM}$, we rewrite $(\pi_M)_{SIM}$ and differentiate it with $(w_M)_{SIM}$. We find that $(\pi_M)_{SIM}$ is concave in $(w_M)_{SIM}$. From the first order condition, i.e., $\frac{\partial(\pi_M)_{SIM}}{\partial(w_M)_{SIM}}=0$, we determine the optimal value of $(w_M)_{SIM}$. Finally, using optimal value of $(w_M)_{SIM}$, we determine the optimal values of $(q_R)_{SIM}$, $(q_M)_{SIM}$, $(p_M)_{SIM}$, $(p_R)_{SIM}$, $(\pi_M)_{SIM}$, $(\pi_R)_{SIM}$, and $(CS)_{SIM}$.

### 4.2. Sequential decision-making

We first differentiate $(\pi_M)_{SEQ}$ with $(q_M)_{SEQ}$. We find that $(\pi_M)_{SEQ}$ is concave in $(q_M)_{SEQ}$. From the first order condition, $\frac{\partial(\pi_M)_{SEQ}}{\partial(q_M)_{SEQ}}=0$, we determine the value of $(q_M)_{SEQ}$ in terms of $(w_M)_{SEQ}$ and $(q_R)_{SEQ}$. Then, we rewrite $(\pi_R)_{SEQ}$ and differentiate it with $(q_R)_{SEQ}$. We find that $(\pi_R)_{SEQ}$ is concave in $(q_R)_{SEQ}$. From the first order condition, $\frac{\partial(\pi_R)_{SEQ}}{\partial(q_R)_{SEQ}}=0$, we determine the value of $(q_R)_{SEQ}$ in terms of $(w_M)_{SEQ}$. Also, using the value of $(q_R)_{SEQ}$ expressed in terms of $(w_M)_{SEQ}$, we rewrite the $(q_M)_{SEQ}$ in terms of $(w_M)_{SEQ}$. Next, using this values of $(q_R)_{SEQ}$ and $(q_M)_{SEQ}$ in $(\pi_M)_{SEQ}$, we rewrite the $(\pi_M)_{SEQ}$ and differentiate it with $(w_M)_{SEQ}$. We find that $(\pi_M)_{SEQ}$ is concave in $(w_M)_{SEQ}$. From the first order condition, i.e., $\frac{\partial(\pi_M)_{SEQ}}{\partial(w_M)_{SEQ}}=0$, we determine the optimal value of $(w_M)_{SEQ}$. Finally, using optimal value of $(w_M)_{SEQ}$, we determine the optimal values of $(q_R)_{SEQ}$, $(q_M)_{SEQ}$, $(p_M)_{SEQ}$, $(p_R)_{SEQ}$, $(\pi_M)_{SEQ}$, $(\pi_R)_{SEQ}$, and $(CS)_{SEQ}$.

Now, the optimal values of the decision variables, supply chain members' profits, and consumer surplus for the above-mentioned scenarios are presented in Table 2.

Table 2. optimal values of the decision variables, supply chain members' profits, and consumer surplus under simultaneous decision-making and sequential decision-making scenarios.

| **Decision Variables** | **Expressions** | |
|---|---|---|
| | **Simultaneous decision-making** | **Sequential decision-making** |
| Manufacturer's wholesale price/ unit | $(w_M)_{SIM} = \left(\frac{5-k}{10}\right).$ | $(w_M)_{SEQ} = \left(\frac{3-k}{6}\right).$ |
| Manufacturer's quantity sold | $(q_M)_{SIM} = \left(\frac{5-7k}{10}\right).$ | $(q_M)_{SEQ} = \left(\frac{3-5k}{6}\right).$ |
| retail price/unit | $(p_M)_{SIM} = (p_R)_{SIM} = \left(\frac{5+3k}{10}\right).$ | $(p_M)_{SEQ} = (p_R)_{SEQ} = \left(\frac{3+k}{10}\right).$ |
| Retailer's quantity sold | $(q_R)_{SIM} = \left(\frac{2k}{5}\right).$ | $(q_R)_{SEQ} = \left(\frac{2k}{3}\right).$ |
| Manufacturer's profit | $(\pi_M)_{SIM} = \left(\frac{5-10k+9k^2}{20} - F\right).$ | $(\pi_M)_{SEQ} = \left(\frac{3-6k+7k^2}{8} - F\right).$ |
| Retailer's profit | $(\pi_R)_{SIM} = \frac{4k^2}{25}.$ | $(\pi_R)_{SEQ} = \frac{2k^2}{9}.$ |
| Consumer surplus | $(CS)_{SIM} = \frac{(5-3k)^2}{200}.$ | $(CS)_{SEQ} = \frac{(3-k)^2}{72}.$ |

## 5. Comparative analyses and Discussion

In this section, we explain the results obtained from the comparative analyses of the decision variables, supply chain members' profits, and consumer surplus between the simultaneous decision-making and sequential decision-making scenarios, as follows.

### 5.1. Comparative analyses

- **Pricing comparison**

(a) $(w_M)_{SIM} > (w_M)_{SEQ}$.

(b) $(p_M)_{SIM} = (p_R)_{SIM} > (p_M)_{SEQ} = (p_R)_{SEQ}$.

**Proof:**

(a) $(w_M)_{SIM} - (w_M)_{SEQ} = \frac{k}{15} > 0.$ Hence, $(w_M)_{SIM} > (w_M)_{SEQ}$.

(b) $(p_M)_{SIM} - (p_M)_{SEQ} = (p_R)_{SIM} - (p_R)_{SEQ} = \frac{2k}{15} > 0.$ Hence, $(p_M)_{SIM} = (p_R)_{SIM} > (p_M)_{SEQ} = (p_R)_{SEQ}$

Q.E.D

- **Quantity comparison**

(a) $(q_M)_{SIM} > (q_M)_{SEQ}$.

(b) $(q_R)_{SEQ} > (q_R)_{SIM}$.

**Proof:**

(a) $(q_M)_{SIM} - (q_M)_{SEQ} = \frac{2k}{15} > 0.$ Hence, $(q_M)_{SIM} > (q_M)_{SEQ}$.

(b) $\left(q_R\right)_{SEQ} - \left(q_R\right)_{SIM} = \dfrac{2k}{15} > 0$. Hence, $\left(q_R\right)_{SEQ} > \left(q_R\right)_{SIM}$ .

Q.E.D

- **Profitability comparison**

(a) $(\pi_M)_{SEQ} > (\pi_M)_{SIM}$ .

(b) $(\pi_R)_{SEQ} > (\pi_R)_{SIM}$

**Proof:**

(a) $(\pi_M)_{SEQ} - (\pi_M)_{SIM} = \dfrac{\left(5-10k+7k^2\right)}{40} > 0.$ Hence, $(\pi_M)_{SEQ} > (\pi_M)_{SIM}$

(b) $(\pi_R)_{SEQ} - (\pi_R)_{SIM} = \dfrac{14k^2}{225} > 0.$ Hence, $(\pi_R)_{SEQ} > (\pi_R)_{SIM}$

Q.E.D

- **Consumer surplus comparison**

$(CS)_{SEQ} > (CS)_{SIM}$ .

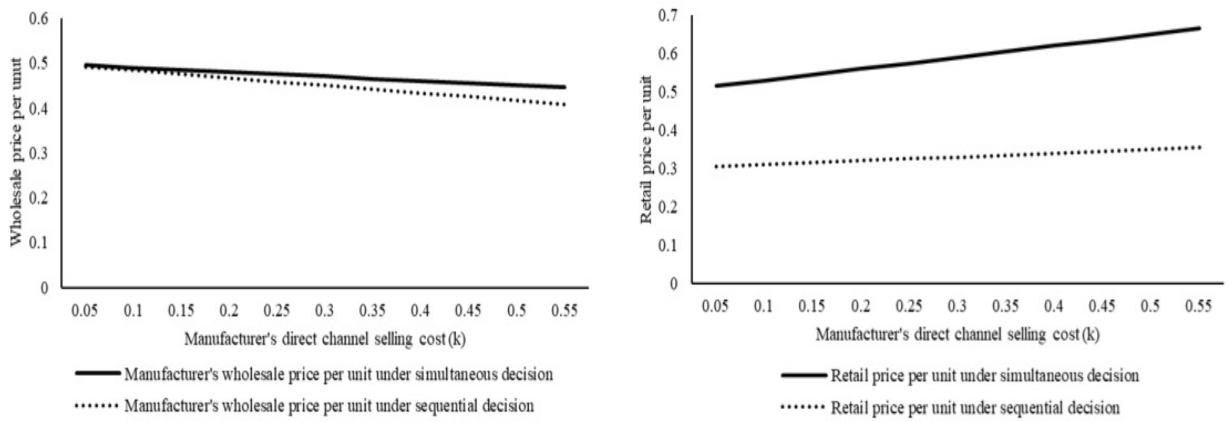
**Proof:**

$(CS)_{SEQ} - (CS)_{SIM} = \dfrac{4k\left(30-14k\right)}{8} > 0.$ Hence, $(CS)_{SEQ} > (CS)_{SIM}$ .

Q.E.D

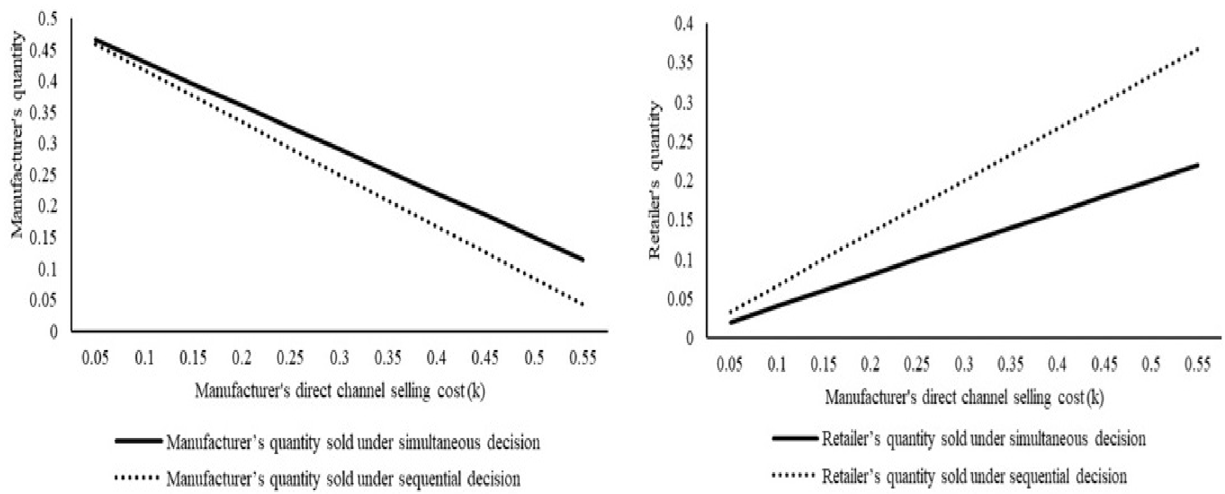
## 5.2. Discussion

The manufacturer's wholesale price remains lower in simultaneous decision-making than in sequential decision-making. As a result, the retail price set by the retailer or the manufacturer is less in simultaneous setting than sequential one. We observe that the manufacturer's quantity is also higher in case of simultaneous setting. As the manufacturer works as a follower in the sequential decision-making, eventually, its quantity depends on the quantity selected by the leader, i.e., the retailer. As a result, simultaneous decision-making yields a higher quantity for the manufacturer compared to sequential decision-making. On the other hand, channel leadership in the sequential game yields a higher order quantity for the retailer under sequential decision-making. The lower price and higher quantity ensure a higher retailer's profit level. Though the manufacturer's profit from the direct channel remains higher in the simultaneous than the sequential decision-making, its profit from selling the product through the retailer exceeds the reduction effect, and its total profit remains higher in the sequential decision-making. Finally, the consumer surplus remains higher in sequential decision-making than in simultaneous decision-making due to the lower price and higher quantity. Visual depictions of insights obtained from the supply chain members' price, quantity, profit, and consumer surplus comparisons are presented in Figures 2, 3, 4, and 5, respectively.



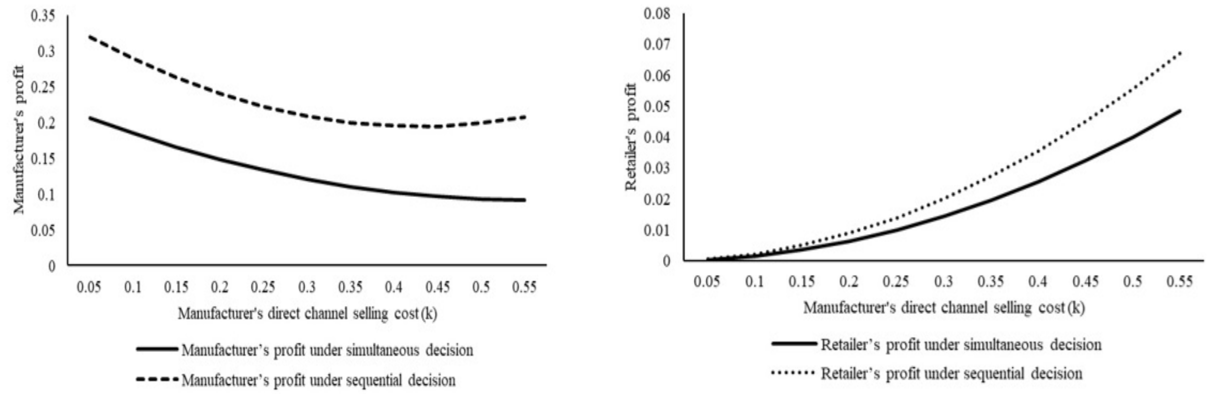

(a) Manufacturer's wholesale price under simultaneous and sequential decisions (b) Retail price wholesale price under simultaneous and sequential decisions

Figure 2. Pricing comparison




(a) Manufacturer's quantity under simultaneous and sequential decisions (b) Retailer's quantity under simultaneous and sequential decisions

Figure 3. Quantity comparison




(a) Manufacturer's profit under simultaneous and sequential decisions

(b) Retailer's profit under simultaneous and sequential decisions

Figure 4. Profitability comparison

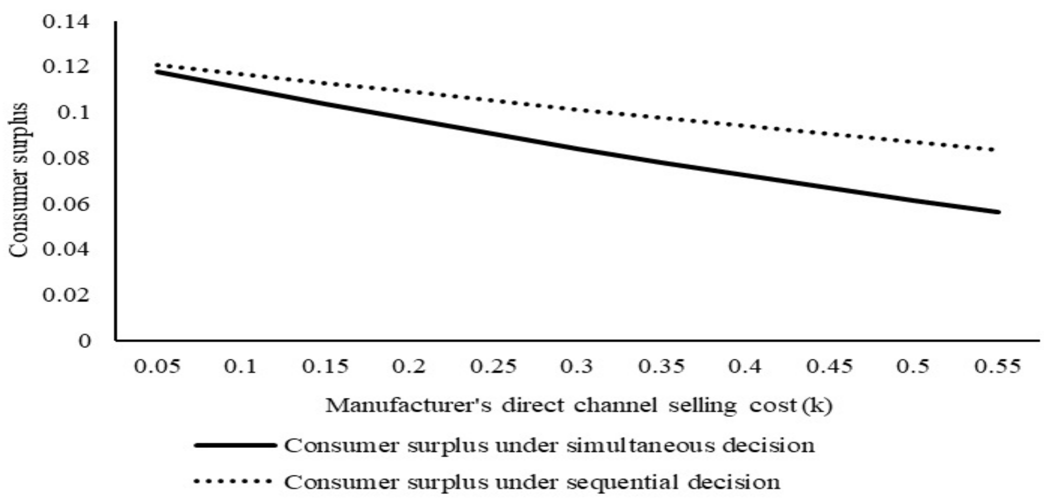



Figure 5. Consumer surplus comparison

## 6. Conclusion

In the contemporary global supply chain operations, manufacturer encroachment become prevalent. In this backdrop, the simultaneous or sequential decision-making of the supply chain members can add more complexity. Motivated by this issue, here we develop a game-theoretic model for a dyadic supply chain comprising one manufacturer and one retailer, where the manufacturer sells the product through the retailer as well as direct channel. Here, the manufacturer is involved in a quantity competition with the retailer. We consider the supply chain members' simultaneous and sequential decision-making and compute the optimal solutions of supply chain members' prices, quantity, and profits, along with the consumer surplus. Our comparative studies reveal that sequential decision-making yields more profitability for the supply chain members and consumer surplus than simultaneous decision-making. From the perspective of future research avenues, the same modeling framework can be extended to retailer's agency strategy. Also, considering demand uncertainty, information asymmetry, supply chain members' fairness concerns, etc., in model formulation can bring forth practical implications.

## References

Adhikari, A., Sharma, M., Basu, S. and Jha, A.K., Uniform or spatially differentiated? Pricing Strategies for Information Goods under simultaneous and sequential decision-making in multi-market context. *Journal of Retailing and Consumer Services*, vol.. 64, p.102832, 2022.

Amirnequiee, S., Pun, H. and Naoum-Sawaya, J., Navigating supplier encroachment: Game-theoretic insights for outsourcing strategies. *European Journal of Operational Research*, vol. 319, no. 2, pp.557-572, 2024.

Chen, J., Chen, B. and Li, W., Who should be pricing leader in the presence of customer returns?. *European Journal of Operational Research*, vol. 265, no. 2, pp.735-747, 2018.

Gnanlet, A. and Gilland, W.G., Sequential and simultaneous decision making for optimizing health care resource flexibilities. *Decision Sciences*, vol. 40, no. 2, pp.295-326, 2009.

Gong, C., Ignatius, J., Song, H., Chai, J. and Day, S.J., The Impact of Platform's Information Sharing on Manufacturer Encroachment and Selling Format Decision. *European Journal of Operational Research*, vol. 317, no. 1, pp.141-155, 2024.

Ha, A.Y., Luo, H. and Shang, W., Supplier encroachment, information sharing, and channel structure in online retail platforms. *Production and Operations Management*, vol. 31, no. 3, pp.1235-1251, 2022.

Huang, S., Guan, X. and Chen, Y.J., Retailer information sharing with supplier encroachment. *Production and Operations Management*, vol 27, no. 6, pp.1133-1147, 2018.

Li, G., Guan, X. and Mukhopadhyay, S.K., The impact of decision timing on the suppliers' interactions: Simultaneous moves versus sequential moves. *Journal of the Operational Research Society*, vol. 67, no. 2, pp.248-258, 2016.

Liu, B., Guan, X. and Wang, Y., Supplier encroachment with multiple retailers. *Production and Operations Management*, vol. 30, no. 10, pp.3523-3539, 2021.

Ni, D. and Li, K.W., A game-theoretic analysis of social responsibility conduct in two-echelon supply chains. *International Journal of Production Economics*, vol. 138, no. 2, pp.303-313, 2012.

Niu, B., Wang, Y. and Guo, P., Equilibrium pricing sequence in a co-opetitive supply chain with the ODM as a downstream rival of its OEM. *Omega*, vol. 57, pp.249-270, 2015.

Tang, Y., Sethi, S.P. and Wang, Y., Games of supplier encroachment channel selection and e-tailer's information sharing. *Production and Operations Management*, vol. 32, no. 11, pp.3650-3664, 2023.

Wang, Y., Joint pricing-production decisions in supply chains of complementary products with uncertain demand. *Operations Research*, Vol. 54, no. 6, pp.1110-1127, 2006.

Yu, D., Luo, C., Xu, J. and Ng, C.T., To share or not to share: Strategic information sharing with store brand encroachment in platform markets. *Transportation Research Part E: Logistics and Transportation Review*, vol. *189*, p.103632, 2024.

Zhang, S., Wei, L. and Zhang, J., Demand forecast sharing for a dominant retailer with supplier encroachment and quality decisions. *European Journal of Operational Research*, vol. 301, no.1, pp.39-50, 2022.

Zhao, Y., Zhou, H. and Wang, J., Information acquisition and sharing strategies of supply chain with supplier encroachment considering signaling effect. *Annals of Operations Research*, vol. 336, no. 3, pp.1835-1869, 2024.

## Biography

**Arnab Adhikari** is an Assistant Professor in Quantitative Methods and Operations Management area of Indian Institute of Management Kozhikode. He holds a BTech in Electrnics and Communication engineering from National Institute of Technology Durgapur and Ph.D. in operations management from Indian institute of Management Calcutta. His research articles have appeared in the several reputed international journals such as European Journal of Operational Research, Decision Sciences, International Journal of Operations & Production Management, Transportation Research Part E; Logistics and Transportation Review, Information & Management, Industrial Marketing Management, International Journal of Production Research, Annals of Operations Research, Journal of Retailing and Consumer Services, Journal of Enterprise Information Management, Informs Transactions on Education, etc. His research interest includes economic modelling in operations management, supply contracts and coordination strategy design, event studies, etc.