Price Change Strategies for an eCommerce Platform and Marketplace

Vikas Gupta

Direct/Architect Data Engineering/Data Science

LinkedIn -https://www.linkedin.com/in/vikas-gupta-a2200812/

Founder –
https://www.vayanitutors.com&&http://apsubjectjelp.com

ABSTRACT: Setting product prices is a comprehensive way for businesses to define their service quality & performance of the business. Unfortunately, price decisions are plagued with unpredictability. The interconnection of retail and consumer characteristics makes quantifying the efficacy of a pricing strategy on retailers tricky. When rival price tactics can have the ability to affect the customer, consumers and competitors' complexity rises and behavior. The research examines the influence of cost tactics or methods on merchants by agent simulations. The pricing concept methods are studied are interlinked with the promotion of the price. This explains the frequency and tentativeness of the promotions and the stage of the price drop. We can have two standard framework variants specify the agents i.e., consumers and retailers. The merchants utilize decent cost price technique homogeneity agents or alternative cost pricing policies (heterogeneous agents), whereas a customer has special and different purchasing preferences and optimistic utility rating scales. An operative product advertising market represents items that are pickup consistently for day-to-day needs, for example, foodstuff, fashion items, books and tech products and toiletries, etc. Mainly this paper study defines the report for the graphic illustration purpose. These reveal that each merchant and consumer have constrained method drives for the transpiring outcomes, and each product pricing method approach has a distinct effect on merchants in terms of market share. The research study defines the new predictive influence and distinctive effects of product cost pricing methods on retailers.

Keywords: Competition, Promotion, Pricing strategy, Simulation with agents.

1. INTRODUCTION

Retailers play a vital role in supply chains. They act as a middleman between consumers and manufacturers or suppliers. Retailers supply the products from manufacturers or suppliers and reach the consumer's demand. Retailers have a direct connection with supply chains and end consumers. The satisfaction of consumers depends on business decisions, so the retailer's best business decisions give the profitability to the supply chains, i.e. Most of the supply chains' profit and loss will be handled by Retailers One o0f the best strategic considerations are pricing which is made by retailers. It is a procedure taken by the organizations to position the value of the product and their exchange services. The best pricing plan strategy gives the result in a positive way i.e., better pricing provides better

sales growth and profit in the market. However, when we examine and making the pricing there is a lot of consideration factors that we have to face and understand, including retailers, competitors and consumer' behavior. Customer Manners and interests are influenced by their own priority & preferences. i.e., how much quantity, where and when to purchase and how many and their need and priority. Each customer has their own unique priorities and interests. Some of the preferences are influenced by socio-economic (socio-demographics), interactions and personality. For example, Personality factors focus on distance, quality, and sensitivity to the price whereas socioeconomic factors are about income and age-related factors. Retailers will explain the information related to the product and offer it atthebest business price. Most of the consumers are attracted by the products on advertizing and price offerings, which may be limited. But these better promotion strategies will influence and attract the buyers to make their minds to buy the products easily without delay. So this strategy gives the marketing success. The Pricing and promotion approach is the customer-attracting method where it gives the wages to merchants and affects or attracts the customer to make decisions to buy a product. This pricing method is impermanent, but it affects and attracts more customers. The best approach method gives the success of the market. The success depends on the frequency of the promotions and pricing reductions on the product and customer Interest rate. The study provides that customer behavior is a key role to influence making purchasing product decisions that are the reason the price promotion study gives marketing success to merchants Pricing strategy approach has been the topic for so many research studies. Each researcher explained in his different observation and considerations, MR know, Lee introduced the mathematical model which represents effects on competitors because of price strategies paying attention. Krishna, Koala and Hall (2012) performed a study that explains dynamic changes of prices in the brand of goods. Discount of prices led to effects on profit have been examined by Mr. Raghubir(2005). Binkley's research study says about the consumer behaviors differences in additional cost, and it defines the impacts. However, all the model mathematical strategies did not accept the interactions between retailers and customers. The aim of this research is to use for evaluating the techniques of price promotion methods on retailers and the impact by using simulations of agent based. It's because of the behavior of the customers and the rivalry between stores, the techniques of simulations are suggested for the complex dynamic interactions of Owings. These suggestions are given by Fasnacht and E1,2014), Mr. Fasnacht and EI,explained the profits and sales and appropriate responses are refer for evaluating the customer emergent behavior and retailers' performance and the profit. The main items like food, groceries, toiletries are being considered as the functional daily product in the market. This paper represents the results of several preliminaries of models on agent basis, and the approach towards understanding the methods and effects of pricing the retailers are novel. The following is the organized version of this paper: each part explains different concepts in step-by-step manner i.e. At first is the model design concepts with include computer and conceptual model. The next part defines and explains about effects of a price promotion of the product strategy towards retailers and the experiment with explanations. Finally, conclusion of the paper.

2.   DESIGN OF A MODEL

The model created in this study is detailed in this section. Robinson (2014) proposes a

modeling framework that addresses the conceptual model elements like: inputs or experimental factors, model contents, assumptions, model simplifications and outputs or responses. Meanwhile, the model's scope and level of detail are described in the 10th IC on OSCM, Vietnam, 2019 main features of the agent-based modeling approach are accounted by Robertson and Caldart (2010) and North and Macal (2008). The model's contents include the environment, the agent, the behavioral rules and the interaction. This model simulates two types of agents: customers and merchants. Consumer's decision-making is influenced by agents' distance from where they are situated in an environment. The consumers are dispersed and dynamically around the surroundings, but the shops are situated relatively near to one another. Various economic theories are built on agent's behavior, including the consumer price reference theory for the theory of consumer behavior, the price promotion theory and the gain and loss component. Two merchants are represented, and their price decisions can be configured to be either heterogeneous or homogeneous. Pricing decisions made by retailers are influenced by price promotion, which is characterized by the frequency and amount of price decrease. The pricing technique employs a cost-plus strategy, whereas price promotion lowers the desired profit. The promotion approach is divided into three levels: low-deep, moderate-deep and high-shallow (Sivakumar, 1999). The high-shallow approach represents a high frequency and shallow price decrease, with the price cut being about 30% with 50% of occurrences. The moderate method represents the moderate frequency and moderate amount of a price decrease, which offers a price reduction of around 50% in 30% of the possibilities. The low-deep approach stands for low frequency and deep price drop, which means a 90 percent price cut in 20% of the chance of occurrences. When they are set to be homogeneous, it indicates that both shops use the same price promotion approach. Otherwise, when merchants are heterogeneous, it indicates that the shops use different pricing techniques. Meanwhile, each customer agent is defined by their purchasing habits. distance, Price, budget, gain and loss tolerance, are among the choices. Because each consumer assigns a distinct weight to each sort of desire, the customers are predisposed to be diverse. Some consumer agents, for example, maybe very price sensitive, whilst others may have distinct characteristics. normal distribution technique can be followed by each consumer that has different budgets. This rule creates a distinct degree of demand for each customer, i.e. different quantities of goods lists can be created by each consumer. Agents' interactions are depicted below. The retailer was chosen by the consumer based on their preferences. For example, if a consumer agent believes that price is the most sensitive factor compared to retailer distance, it must evaluate the difference between the desired price and the lowest price given by the shop. If the disparity is still within the store's loss tolerance, the consumer will choose the merchant with the lower price. Otherwise, the buyer will not buy from any shop. When a buyer agrees to buy from one of the two merchants, the next choice is deciding how many products to purchase. This decision is based on the consumer's budget. Algorithms1depicts a basic chart that depicts the consumer's autonomy. The price approach employed is given as the retailer's behavior. The consumer's purchasing behavior is influenced by the model's primary input or experimental element of marketing strategy. In this study, the simulation's emerging outcome is assessed by three indicators: the retailer's profit, market share and total sales. The time unit is weekly, and there are 99 replications with a simulation period of 50 weeks. Net Logo was utilized in this work, and Figure 1 shows the computer representation of the simulation agent-based model. As the foundation for model validation, we compare the

resultant emergent behavior to the outcome of hotel ling's model (Hotel ling, 1930). It is demonstrated that when both shops exhibit homogenous competitive behavior, the emerging results follow Hotel ling's rule.

Algorithms1. Consumer agents

Begin

For Each customer

set a pricing preference = β_1

specify the preferred distance = $\beta2$

set the gain in preference = $\beta3$

set loss of preference = $\beta4$

Begin the purchasing process

Set a budget based on a random-normal distribution (99,30)

start retailer 1 x1 [price]

start retailer 2 x2 [price]

set y1 [distance] from the first retailer

set y2 [distance] from the second retailer

Calculate each retailer's gain and loss consumers.

Set retailer 1 gain to max (reference price – x1,0)

Set the loss for retailer 1 to be max(x1- reference price,0)

Set retailer 2 gain to max (reference price – x2,0)

Set retailer 2 loss to max (x2- reference price,0)

Calculate each retailer's price normalization

z1= x1/ x1+ x2

z2= x2/ x1+ x2

Calculate each retailer's distance normalization.

u1= y1/ y1+ y2

u2= y2/ y1+ y2

Calculate each retailer's gain normalization.

u_{g1}= g1/ g1+ g2

u_{g2}= g2/ g1+ g2

Calculate the loss normalization from each retailer

Y_{l1}= l1/ l1+ l2

Y_{l2}= l2/ l1+ l2

Calculate the score for each retailer.

Set the score for Retailer 1 to β_1*z1 + β_2*u1 - β_3* u_{g1} + β_1* Y_{l1}.

Set the score of Retailer 2 to β_1*z2 + β_2*u1 - β_3* u_{g1} + β_4* Y_{l2}.

If Retailer 1's score is higher than Retailer 2's,

Pick Retailer 1

Else

pick Retailer 2

Purchase a product at a retailer with a quantity equal to your budget / the price of the merchant you've chosen. Remove yourself from the store.
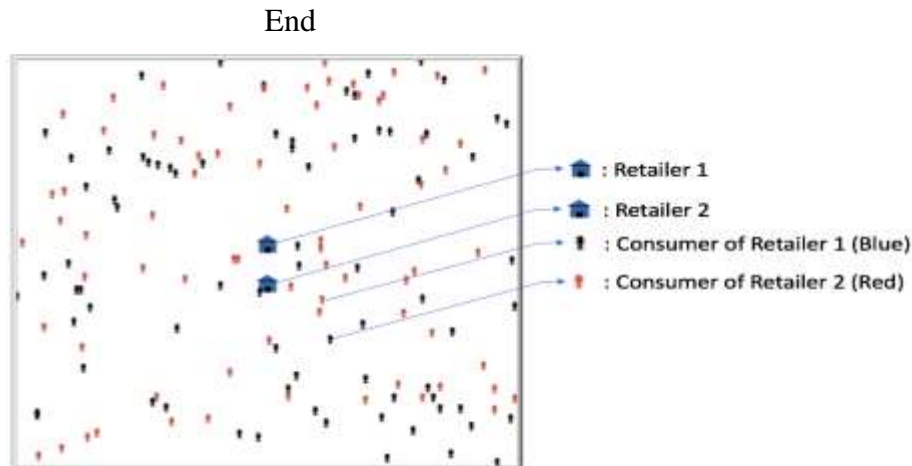Accelerate the purchase process.

End

Figure 1. Shows the simulation's computer representation.

3 . EXPERIMENTATION AND EARLY RESULTS

This study offers preliminary results for a model that analyzes the influence of price promotion techniques on retailers just in a few tests. The design is as follows: The experiment is carried out,we did 6 scenarios in this investigation. The price promotion technique may be used by resellers in all circumstances. Two stores have been using a high shallow approach in scenario 1 (p 1). Scenario 2 (p2) reveals the intermediary strategy being adopted by merchants. Everything in scenario 3 (p3) demonstrates that a low-depth circulation approach. Scenario 4 (p4) indicates a medium-distance strategy for retailers and a high shallow strategy for the second Scenario 4 (p4) approach. Scenario 5 (p5) demonstrates that the merchant uses the high shallow technique while the other way uses low depth. Scenario 6(p6) illustrates the medium-scales approach of a store and a low-depth approach of another retailer. The results of each scenario are summarized in Table 1. Table 1 provides the following. A strategy between the two stores is described in Scenario (p2). Scenario 3 (p3) demonstrates the low-deep tactics of two distributors. The 4th (p4) scenario indicates an intermediate dealer's approach while the other reflects a plan with minimal costs. Scenario 5 (p5) depicts a dealer employing a low-equilibrium approach and a second way. Scenario 6 (p6) is finally an intermediate method, and the other approaches are inferior. The outcomes of each of the following scenarios are presented in Table 1.

Table 1. Simulation scenarios

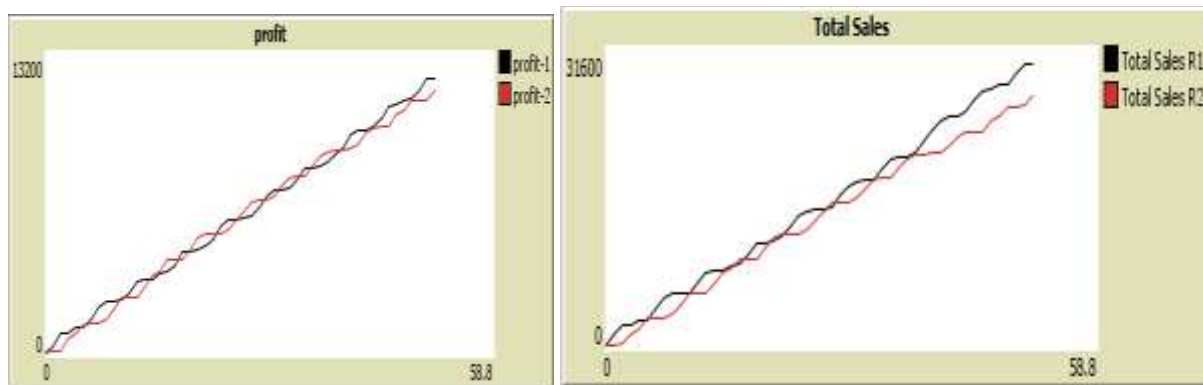| Scenario of pricing	Description
P1	high-shallow vs. high-shallow
P2	moderate vs. moderate
P3	low-deep vs. low-deep
	moderate vs. high-shallow
P4	high-shallow vs. low-deep
P5	moderate vs. low-deep
P6	

Figure 2: A single simulation result with scenario 4 - p4: accumulating profits and accumulating sales.

The first three situations (p1p3) are all homogenous dealers, since retailers take the same approach. The outcomes of the scenario demonstrate that there is little profit difference between the two retailers. For big sales, the same urgency applies. The explanation for the 'little profit-sales disparity across shops may be because of a similar price promotion technique employed by retailers. There are many other possibilities (p4-p6). For p4 strategies, the results of the simulation processes indicate the alternation of the dominating earnings and sales of each strategy. An example of such an event is shown in Figure 3. However, the major goal of the other is to achieve good profit and total sales when the simulation time extends to more than 52 weeks. The result reveals a smoother, higher profit and sales strategy than a lower one (very low floor) in Scenario 5 or p5, as shown by a higher strategy. Finally, the findings of scenario 6 or p6 (medium vs. low depth) demonstrate that no plan is in place to steadily achieve profits and income during the simulation process. A summary of retailers' revenues is given in Tables 1 and 2. From Table 1, retailer 1 can use the high shallow strategy to find out that retailer 2 achieved the highest profits in scenario 5 (p5) applied. Low deep approach. Conversely, scenario 2 (p2) has the lowest revenue for retailer 1. In this scenario, both retailers typically use the strategy. Table 2, on the other hand, shows that Retailer 2's maximum profit was achieved in Scenario 1 (p1), where both retailers apply the high shallow strategy. Retailer 2's lowest revenue is experienced in Scenario 5 (p5). In Scenario 1, Scenario 3 (p1p3) has a similar strategy for both retailers, so the difference in results does not appear to be significant, so the results of p1p3 may be ignored for analysis. Therefore, we can conclude that Scenario 5 (p5) in Tables 2 and 3 provides a significant difference in the profits of the two retailers

Table 2: Retailer 1 profit summary

Profit	Retailer 1.					
	P1	P2	P3	P4	p5	P6
Mean	$12.901,1		**$12.036,5**		$12.665,1	$13.014,2	**$16.153,1**
Median	$12.440,5						
Minimum	$13.901,1		$13.901,1		$13.901,1	$13.901,1	$15.901,1
Maximum	$12.901,1						
	$12.410,6		$12.410,6		$13.410,6	$13.410,6	$15.410,6
	$12.410,6						
	$13.123,4		$12.214,4		$13.214,4	$13.214,4	$14.214,4
	$13.214,4						

Table 3: Retailer 2 Profit Summary

Profit	Retailer 2.					
	P1	P2	P3	P4	p5	P6
Mean	$12.709,1		**$12.036,5**		$12.678,1	$13.123,2	**$16.098,1**
Median	$12.234,5						
Minimum	$13.234,1		$13.897,1		$13.890,1	$13.345,1	$15.876,1
Maximum	$12.098,1						
	$12.567,6		$12.345,6		$13.567,6	$13.890,6	$15.456,6
	$12.567,6						
	$13.456,4		$12.123,4		$13.567,4	$13.123,4	$14.123,4
	$13.876,4						

Table 4 provides an overview of total sales for each scenario. This table shows the significant changes in sales in Scenario 5 (p5). In this scenario, we offer the highest-selling retailer 1 and the lowest-selling retailer 2. This conclusion is consistent with the profit analysis, but comparing Table 4 with Tables 2 and 3 does not mean that more profits are always observed. For example, Handler 2 has the highest profits in Scenario 1 (p1), but in Scenario 6, retailer 2 (p6) has higher sales.

Table 4:shows the sales figures for retailers 1 and 2.

Total Sales	Retailer 1.						Retailer 2.					
	P1	p2	p3	p4	p5	p6	P1	p2	p3	p4	p5	p6
Mean	28	29	29	30	36	29	28	29	30	27	24	30
Median	28	29	29	30	36	29	28	29	29	27	24	30
Minimum	27	28	28	29	35	28	27	28	28	26	23	29

Maximum	28	29	29	30	36	29		29	30	30	27	24	30

This kind of price promotion strategy affects customer demand, especially for the quantity or number of products purchased. If the two stores are not promoting their products, the overall consumer demand is about 52,000. When price promotion techniques are used in the market, demand increases. Scenario 1 (p1, p2) Scenario 4 (p4) Scenario 5 (p6) requires approximately 55,000 units (57,000 units, 57,000 units, 57,000 units, 57,000 units, 58,000 units, 58,000 units).) and scenario 6 (p6). Each scenario shows that demand is increasing at a rate of 4.9% in p1, 8.7% in p2, p3, and p4, and 8.6% in p5 and p6. The result here is increased demand creation in Scenario 5 (p5) and Scenario 6 (p6). An analysis of market share between the two is shown in Table 5. In this table, the most noticeable difference from the previous situation can be seen in Scenario 5. In these situations, market share dominates the retailer, with 1 using a very shallow strategy (61.80%), while retailer 2 uses a low-level approach (40.20% share). To do.

Table 5:shows the market share that has resulted.

	Market Share					
	P1	*p2*	*p3*	*p4*	*p5*	*p6*
Retailer 1	51.16%	51.23%	51.34%	54.25%	61.23%	50.12%
Retailer 2	50.23%	50.45%	50.65%	51.23%	41.45%	51.43%

Because actors in this model are limited reasons. Although customer agents are changing their behavior over time, they are unaware of consumer activity in the retail future. Consumers also can't predict when businesses will use their promotions, so their choices are updated with every simulation. Also, sellers do not have sufficient knowledge of when to use competitors' pricing and promotion methods

Conclusion

The main motive of this research is to provide an agent modeling concept for evaluating the influence of product pricing approaches on consumers and retailers for operative the in-service product market. This research is analyzed the pricing methods and focused price promotions. Three conditional methods are assessed: Moderate strategy, High –Sallow strategy and low deep strategy. Some financial hypotheses are Considered in the Model or experimental construction methods, namely the price reference method defines the inconsistent loss and gain for buyers, the method explains that the customer behavior depends on price, place and distance, loss and gain and advertisement of the product thesis. These theses are demonstrated the simulation method which explains the data related to the study of the product price and advertising strategies to the merchants. The introductory report shows that some of the effects of the circumstances affect the price promotions. The High –shallow theory is discovered to be a better approach that has a consequential report effect on the profit of retailers, market share and Sales. However, in this situation only occurs when the other competitors adopt a low strategy. This appearance causes the agents' behaviors to emerge and conditional limited rationality. Thesis defines about integrate market entanglement that provides heterogeneous agents. It gives a new way to determine the effects of pricing methods on consumers while considering different features of customers. However, the contrasting agents build the investigation hard to trace which consumer choices are sensitive to product price advertisement strategies. Another way of direction also needs to think about for the upcoming research study is a restricted number of restoring retailers. We can find different emergent reports by competing with different competitors or retailers.

REFERENCES

[1]Bell, R. (2015). Determining Where Variable to of Shop: Fixed and Costs Shopping. Journal of

Marketing Research, 35(3), 352–369.

[2]Binkley, J. K. (2003). Consumer Price Awareness in Food Shopping: The Case of Quantity

Surcharge. Journal of Retailing, 79(1), 27–35.

[3]Breugelmans, E., & Campo, K. (2016). Cross-Channel Effects of Price Promotions: An Empirical

Analysis of the Multi-Channel Grocery Retail Sector. Journal of Retailing, 92(3), 333–351.

[4]Fassnacht, M., & Husseini, S.E. (2013). EDLP versus Hi–Lo pricing strategies in retailing—a

state of the art article, (83), 259–289. Journal of Business Economics, 83(3), 259-289.

[5]Hall, J. M., Kopalle, P. K., & Krishna, A. (2010). Retailer Dynamic Pricing and Ordering

Decisions: Category Management versus Brand-by-Brand Approaches. Journal of Retailing,

86(2), 172–183.

[6]Hitsch, G. J., Hortacsu, A., & Lin, X. (2017). Prices and promotions in us retail markets: Evidence

from big data. Chicago Booth Research Paper, No. 17-18.

[7]Hotelling, H. (1929). Stability in Competition. The Economic Journal, 39(153), 41–57.

Kwon, O., Im, G. P., & Lee, K. C. (2007). MACE-SCM: A multi-agent and case-based reasoning

collaboration mechanism for supply chain management under supply and demand

uncertainties. Expert Systems with Applications, 33(3), 690–705.

[8]North M J &Macal C M. (2007). Managing Business Complexity: Discovering Strategic Solutions

with Agent-Based Modeling and Simulation. New York: Oxford University Press.

[9]Raghubir, P. (2004). Coupons in context: discounting prices or decreasing profits ?. Journal of

Retailing, 80(1), 1–12.

[10]Robertson D.A. &Caldart A.A. (2009). The Dynamics of Strategy: Mastering Strategic

Landscapes of the Firm. New York: Oxford University Press.

[11]Robinson S. (2014). Simulation: The Practice of Model Development and Use (2nd ed.). Palgrave

Macmillan.

[12]Sivakumar, K. (1996). Tradeoff Between Frequency And Depth of Price Promotions: Implications

For High- And Low- Priced Brands. Journal of Marketing, 4(1), 1–8.

[13]Tadellis, S. (2013). Game Theory. Princeton University Press.

[14]Zentes, J., &Morschett, D. (2007). Strategic Retail Management. Wilhelm & Adam, Heusenstamm.

[15]Zhang, T., & Zhang, D. (2007). Agent-based Simulation of Consumer Purchase Decision-Making

and the decoy effect ☆. Journal of Business, 60, 912–922