



A SURVEY PAPER ON DYNAMIC PRICING MODEL FOR FREIGHT TRANSPORTATION SERVICES

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Abstract: With fast-growing advancements in E-commerce and product-centric organizations, data science and analytics are the backbones of firms. This study aims to understand and describe the pricing strategy model for freight transportation goods. The goal of price optimization is to help companies reach their profit estimations. By listing down parameters that affect conventional pricing strategies, we can provide a comparative analysis that can help maximize revenue. By providing valuable insights via visualizations, presentations and advanced analyses, dynamic pricing models will make it possible to understand the holistic approach to business efforts and actively study the impact of various parameters.

Index Terms - Dynamic Pricing, Freight Transportation Services, E-commerce

I. INTRODUCTION

Transportation of goods and logistics is an extremely fast-paced business with rapidly changing needs. Companies must provide the best price for their services to increase business revenue and expand their market presence while maintaining their profit margins. Growing globalization and industrial demands are actively changing the dynamic of the market. In the freight transport industry, choosing the right prices for transport requests to maximize their profits is the carrier's pricing decision solely based on his pricing parameter. However, these numbers are subject to change keeping in mind that a lot more parameters affect the ability of the company to reach their profit goals. To remain competitive, companies must be able to adjust their pricing quickly according to changes in supply and demand for their services. While traditional dynamic pricing algorithms use historical data to estimate the best prices, they are unable to adjust their numbers actively. With the help of modern dynamic pricing algorithms, we can leverage a lot more data, as well as Artificial Intelligence and Machine Learning capabilities to predict market trends and optimize prices accordingly. Dynamic pricing is referred to as surge pricing, demand pricing or time-based pricing. It is a strategy that enables companies to set flexible prices according to algorithms that take into consideration a multitude of parameters such as competitor pricing, supply and demand, crude oil prices, foreign exchange and other external factors.

Firms can apply new information technologies (NITs), using both quantitative and qualitative approaches to develop an understanding of customer sentiments, predict market patterns and drive revenue generation. Specific ways catering to different organization types – whether they are small businesses, large enterprises or specialized agencies, can increase profitability and drive market success. The determination of the proper price remains a complex task that requires an organization's knowledge not only about its operation expenditures but also about its possibilities to foresee product demand and their value concerning a consumer [1].

Advantages of Dynamic Pricing Models:-

1. Increased Profits: Dynamic pricing is designed to increase the revenues or profits of firms by adjusting prices in response to changes in the marginal value of capacity [2].
2. Increased Flexibility and Control Over Pricing: Rapid market fluctuations can be kept in control by adjusting parameters and their influence on the price.
3. Dynamic Pricing can be Tailored to Specific Customers or Markets: Combining previous historical consumer data with various other weighted parameters can help identify and navigate markets.
4. Better Cross-selling and Up-selling: Identifying important sales parameters like popular products, high demand products, key value categories and key value items.
5. Pricing and Consumers' Surplus: Better allocation of services and efforts behind company overall investment.

II. DYNAMIC PRICING MODEL

2.1 Pricing Strategy

Adjusting the prices is called a pricing strategy. A pricing strategy has a goal to establish an optimum price with current profit maximization of the number of units sold, etc. [3]. It refers to the methodologies and processes businesses use to set prices for their services and products. Businesses can use a variety of pricing strategies to determine the best one equipped to produce profitable margins. Pricing strategies can take advantage of using previous data to quantify and control factors such as time, customer preferences, market competition, etc.

2.2 Common Pricing Strategies

Pricing strategies help any company navigate markets and understand whether their service is well, over or underpriced. Mispricing services or products may result in forgoing much needed revenue and result in a downward curve in the company's growth. Common pricing strategies may help in building a foundation for a company to put a well-suited price on the spectrum of available services. These strategies may then be inter-connected and established deeper to provide a well-rounded system.

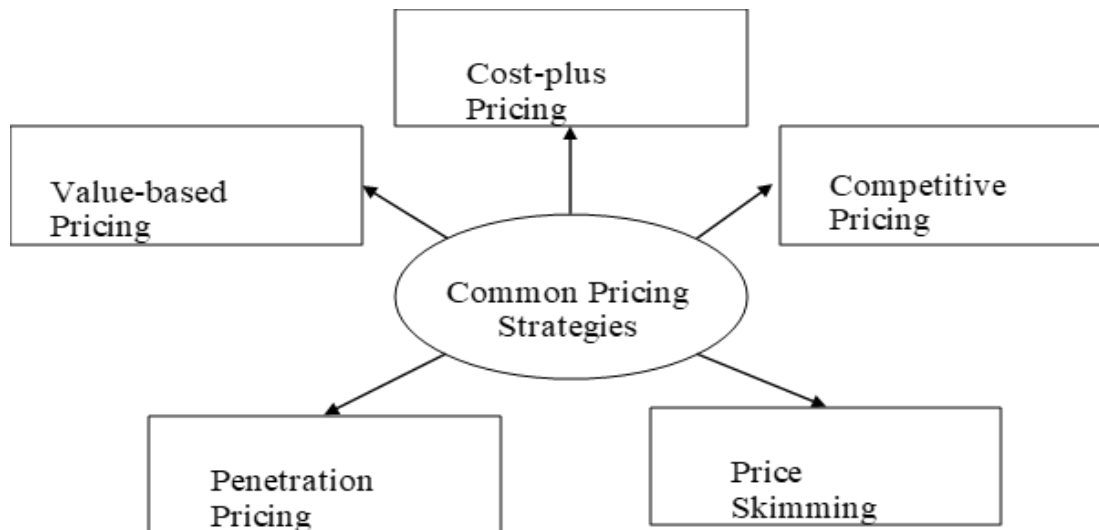


Fig 2.2.1: Common Pricing Strategies

Cost-plus Pricing: Cost-plus pricing, also known as markup pricing, is where a fixed, pre-decided percentage is added on top of the cost price to produce the selling price of the product or service. The factors affecting the implementation of this strategy include competition intensity, company size and industry [4]. These external factors are secondary to the internal factors of the individual business focusing intensely on production costs or internal costs to provide the end service. However, cost-plus pricing does not seem to take into consideration every factor that affects the spectrum of pricing for the product or service. The primitive nature of the strategy does not take multiple factors into consideration [5]. But overall, this system is simple to use, can justify prices correctly, and provides a consistent rate of return.

Competitive Pricing: Competitive pricing is the setting of pricing relative to the competitors in the market [6-7]. The process of strategically setting price points for services or goods based on market competitor pricing, rather than basing them solely on business costs and profit margins. This pricing method is commonly used in businesses selling the same service or products while there may be the presence of unique attributes. When services reach an equilibrium, excessive substitutes can be produced in the market, to which prices must respond to keep the market fresh for consumers. Categorizing competitors and defining data parameters are heavily relied on while implementing such a strategy.

Price Skimming: Price Skimming strategy is one of the popular systems deployed for both services and products. It is known for charging a high price once the product or service hits the target market and then gradually lowering it down [8]. As a new product is introduced onto the market, it is sold at a very high price and then gradually reduced when competitors start introducing a similar product. Skim pricing is also the opposite of penetration pricing. The objective is to skim off consumers who are willing to pay more for the newly launched product or service [9]. When the demand from the consumers starts decreasing, the price is then lowered, which also wards off high prices from competitors.

Penetration Pricing: Penetration pricing is the opposite of price skimming. It is a pricing strategy which involves offering a new service or product at a low initial price to gain the consumers' attention and sway market decisions. The goal is to aggressively get customers in the door with low prices and gain market share. Moreover, the strategy includes choosing the price point to set the cost underneath the product, an incentive to the customers, guaranteeing bigger market coverage and a stronger base [10]. The goal of this strategy is to incentivize the audience to switch to the brand due to the lower costs of the product or service in the market.

Value-based Pricing: This type of strategy primarily relies on the consumer or market response to the value of a product or service. Businesses deploying such a system for pricing believe that the estimated value of price on the product is justified and one that the consumers are willing to pay. The company then tries to earn the differentiated worth of its products when compared to other similar products in the market. Value to the customer is the overall satisfaction that the client gets from the acquisition of the product or service [11].

2.3 Pricing Model Strategy for Freight Transportation Services

The unique nature of the goods industry makes it difficult to estimate an accurate demand curve that's required to apply conventional revenue maximization pricing strategies. Multiple parameters affect the pricing strategies for these services, and the comparison between those factors allows us to produce a clean analysis to operate on competitor pricing strategy. The goal is to determine the most optimal price for the company to stay ahead of competition, and to maximize the long-term profit.

Parameters influencing the pricing strategy can be but not limited to the following:

1. Weight of the package
2. Dimensions of the package
3. Distance to Delivery location
4. Fuel fluctuations
5. Delivery Speed
6. Type of Delivery Location
7. Weather conditions
8. Shipping Insurance
9. Customs and Duties
10. Multiple orders
11. Seasonality Changes and Public Holidays

III. FREIGHT TRANSPORTATION SERVICES

3.1 Freight Transportation

Freight transportation is a primary component of all supply-chain and logistic systems. The cost of moving commodities between cities and countries is borne directly by the stakeholders (shippers, carriers, and consignees) as well as other members of society who may not directly benefit from it [12]. Rail is a common and cost-effective method of freight transportation. Although this method is known to be less reliable than others, it costs much less which makes the price of the service go down [13]. This plays as another parameter influencing the dynamic prices of these services and thus, mode of transport directly affects the price that the consumer pays.

The importance and impact of freight transportation is amplified by the recent boom in E-commerce, the new online-to-offline (O2O) or omnichannel business retailing strategy [13]. The start of the services in the market were first primitive in nature which then slowly advanced to incorporate various options to boost competitiveness. Logistic service providers devote adequate resources to provide consumers with a wide variety of categories displaying options on time, delivery type and speed. To optimize transport operations, the Freight Transportation Procurement Service mechanism is employed. It widely increases the efficiency and effectiveness of freight transportation operations.

3.2 Freight Service Strategies

The freight transportation companies should ideally be able to increase their profit margins while remaining competitive in the market with well-adjusted prices for their services. The freight goods shipping service industry is very dynamic. The various consumers' needs explain the volatile nature of this industry. Global Corporations, small businesses, E-Commerce Companies, as well as individual consumers all have a need to ship packages or documents to other businesses or individuals; however, the nature of these services will vary.

It depends on:

1. Extent of rivalry between established firms
2. Bargaining power of buyers
3. Bargaining power of suppliers
4. Threat of substitute products

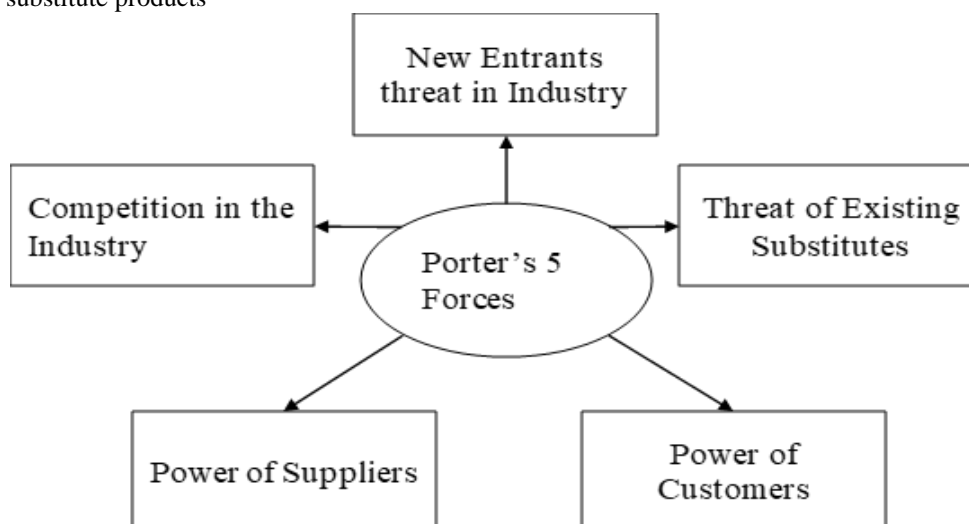


Fig 3.2.1: Porter's 5 Forces

3.3 Basics of Freight Transportation

Logistics: Logistics is characterized by thinking in processes, value chains, and networks. It includes parameters such as performance, quality, value, and cost [15].

Trucking and Transportation: This is the method to transport goods from one place to another and depends on factors such as the origin location, destination location, shipping method and delivery time required.

Distribution and Warehousing: Warehouses are often designed and operated by third party logistic companies (3PL) with tight margins [16]. The 3PL also handles where the product is on every step of the way between the product's original warehouse to finally being issued to its consumer.

Intermodal Trucking and Drayage: This is one of the key factors in any mode of transportation issued by a service providing company. If the shipment were to arrive in a particular destination by ocean, flight or rail transportation, it still needs to go to the intermediate warehouse or destination via trucks.

IV. CONCLUSION

In this paper, we discussed the freight transportation system and the impact of dynamic pricing models on the systems deployed in the market. We saw the various characteristics of pricing strategies and their correlation to different parameters affecting the price of the service. We further discussed the advantages of using dynamic pricing models and strategies to increase business returns, boost revenue generation and operate efficiently. We then discussed sales, marketing and their integration model to increase customer lifetime value. These various aspects all contributed to fragments of the freight transportation system which is the core of all logistics and supply chain systems globally.

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