



The Cost Of Immunity: Analyzing The Serum Institute Of India's Pricing Strategies During Covid-19

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Abstract: As the global effort to combat the COVID-19 pandemic shifts into the post-emergency phase, vaccine pricing remains a topic of significant discussion. While many countries have made substantial progress in vaccinating their populations, the price of COVID-19 vaccines continues to fluctuate, driven by factors such as manufacturer negotiations, distribution costs, and local government policies. This report deals with the issues surrounding COVID-19 vaccine pricing, examining the unequal access in costs between low, middle, and high-income countries, the influence of pharmaceutical manufacturers, and the potential future trends in vaccine pricing as the global market stabilizes. It highlights the importance of continued international cooperation to ensure equitable access to vaccines, particularly for underserved populations.

I. INTRODUCTION

Serum Institute of India and Its Impact on the Global Vaccine Industry

The Serum Institute of India (SII), recognized as one of the largest vaccine manufacturers globally, has played a crucial role in combating the COVID-19 pandemic. By 2019, SII was already producing over 1.5 billion vaccine doses annually, showcasing its robust production capacity. When the COVID-19 outbreak was declared a global pandemic on March 11, 2020, SII quickly joined the global race to develop a vaccine. Just two weeks prior, Adar Poonawalla, the CEO of SII, announced a partnership with AstraZeneca, a leading British-Swiss pharmaceutical company. This agreement enabled SII to begin manufacturing the Oxford-AstraZeneca vaccine, one of the most promising vaccine candidates at the time. Production started in August 2020, and by December of the same year, the vaccine—branded as COVISHIELD—was ready for distribution in India, pending regulatory approval. Priced at \$13 per dose, COVISHIELD required two doses per individual, resulting in a total cost of \$26 per person. This price was notably higher than SII's usual vaccine pricing. For instance, the measles vaccine produced by SII cost only 50 cents per dose compared to \$15 charged by Western pharmaceutical companies. The higher price of COVISHIELD was attributed to SII's \$100 million investment in a new facility capable of producing a billion vaccine doses annually. Furthermore, the company took the risk of manufacturing 200 million doses ahead of regulatory approval to ensure timely distribution.

In 2020, as the COVID-19 pandemic gripped the world, India, home to the Serum Institute of India (SII), found itself confronting a major health crisis. SII joined forces with AstraZeneca to produce and distribute COVISHIELD, a recombinant adenovirus-based vaccine originally developed by the University of Oxford. With an impressive annual production capacity exceeding 1 billion doses, SII played a pivotal role in ensuring vaccine access not just for India but also for other developing nations.

Serum Institute's Contribution to Vaccine Production

SII's involvement in the COVID-19 vaccine journey began with its collaboration with the University of Oxford and AstraZeneca to mass-produce the vaccine. Branded as COVISHIELD, the vaccine shared the same formula as AstraZeneca's but was specifically targeted for affordable distribution in low- and middle-income countries, including India. The institute's capacity to manufacture vaccines on such a massive scale established it as a cornerstone of the global vaccine distribution network. Within India, the government secured a deal with SII to procure large quantities of the vaccine to meet the needs of its vast population. SII committed to offering these doses at subsidized rates, a move crucial for accelerating the country's ambitious vaccination campaign aimed at immunizing over a billion people within a limited timeframe.

Pricing and Market Segmentation

The pricing strategy for the COVISHIELD vaccine became a contentious issue due to its implications on affordability and the Serum Institute of India's (SII) financial sustainability. Initially, SII announced that it would sell the vaccine to the Indian government at a subsidized rate of approximately ₹150 per dose (around \$2). However, private hospitals in India were charged ₹600 per dose (around \$7.50), and international pricing varied based on market demand and agreements with foreign governments. This differential pricing, aimed at balancing accessibility with revenue generation, sparked criticism. Many argued that the higher price for private buyers could deepen existing healthcare disparities, especially during a public health crisis. The decision to implement a tiered pricing model was driven by SII's goal to ensure broad access while covering production and operational costs. For the global market, the pricing strategy reflected regional agreements and market dynamics, which added complexity to the issue. This approach highlighted the challenge of balancing equitable vaccine distribution with financial considerations in a pandemic scenario.

Competitive Pricing

The COVID-19 vaccine market was shaped by diverse pricing strategies from major pharmaceutical companies. For instance, Pfizer priced its vaccine at \$19.50 per dose, while Moderna initially set its price higher at \$32–\$37 per dose, offering discounts for bulk purchases. The Russian government, in contrast, adopted a strategy of providing vaccines at lower costs to promote widespread access. These varied pricing models underscore the complexities of competitive pricing in a global health emergency, where cost, availability, and accessibility play critical roles.

The COVISHIELD pricing case underscores the delicate balance pharmaceutical companies must strike between ensuring affordability and maintaining operational viability. It also provides key insights for policymakers and global health organizations on addressing equity and access challenges in future public health crises.

Theoretical frameworks on pricing strategies: Price Skimming, Penetration Pricing and Ethical Pricing in Healthcare

In the healthcare sector, particularly in the context of pharmaceutical pricing, price skimming, penetration pricing, and ethical pricing are essential strategies. These approaches have an impact on market accessibility, customer behavior, and ethical concerns around cost of drugs. Finding a balance between patient access and profitability requires an understanding of their effects.

Setting a high initial price for a new product and gradually lowering it over time is known as price skimming. This strategy is frequently used for innovative treatments with little early competition, allowing companies to quickly recoup their R&D costs (Spann et al., 2015). Price skimming has been shown to enhance consumers' evaluations of quality and individuality (Ali & Anwar, 2021).

Penetration pricing offers a low starting price to lure customers and develop market share. Specifically, in markets where buyers are cost-conscious, this tactic can increase access to essential pharmaceuticals (Spann et al., 2015). According to studies, penetration pricing has a substantial impact on what consumers buy, lowering the overall cost of medicine (Ali & Anwar, 2021).

Sustainable pricing in healthcare emphasizes the moral responsibility of pharmaceutical corporations to prevent prices from causing vulnerable individuals to go bankrupt (Hughes, 2020). Because high costs can prohibit people from receiving necessary treatments, firms must strike a balance between paying back expenses and maintaining ethical standards (Parker-Lue et al., 2015).

While these pricing strategies may improve market dynamics and customer access, they also raise ethical concerns. To keep profit reasons from jeopardizing patient care and access to critical drugs, medical stakeholders must interact on a frequent basis (Haider, 2023).

A key component of the marketing plan is the price strategy. Setting prices for goods and services is essential to running a business. An organization's whole advertising strategy should be taken into consideration when reviewing its pricing policy. Pricing strategy should always be used in conjunction with other marketing strategies, even if it has an impact on sales and purchase volume. An effective pricing plan will benefit both product sales and the company's market position.

The penetration strategy aims to increase revenue and market share at a reduced price per unit, speed up short-term growth, and quickly reach the mass market at a reasonable price. In order to swiftly capture territory, establish a stable market position, and discourage low-margin competitors, a penetration strategy calls for providing commodities at discounted prices. Depending on the competition and product type, penetration prices may progressively increase. This aids the business in achieving success and progressively increasing profits.

To capitalize on consumer novelty, the skimming strategy requires a somewhat expensive stage of new product launch (high unit rates and low sales volumes). As the market opens up and/or competitors rise, the retail price of items gradually falls (e.g., iPhone X, tablets, TVs, laptops). Additionally, it creates adaptive markets for new products. A levy approach may affect product turnover and promote competitiveness while also increasing short-term earnings and collecting investments as quickly as possible.

A key component of the promotional strategy that has a significant impact on how a firm operates is pricing policy. Different pricing strategies are used depending on the state of the market. Companies must base their pricing decisions on the features of their products and their marketing objectives.

In light of the ethical quandaries pertaining to resource distribution, fair access, and financial incentives during unforeseen costs, ethical pricing in healthcare during the COVID-19 pandemic has been extensively studied. In 2022, Emaki and Folayan proposed a theoretical framework that prioritizes humanitarian situations, promotes equity, and addresses the costs of essential medical services like ventilators and personal protective equipment (PPE). The study emphasizes how morally necessary it is to balance cost and usability, particularly in areas with scarce resources. Ling et al. (2020) highlighted the conflicts between profit and the public interest in their examination of pricing strategies during the epidemic. They presented a conceptual framework for ethical pricing and called for legislative oversight to prevent exploitation under unpredictable and fearful times. De Panfilis and Perin (2021) made the case for healthcare pricing structures that respect justice and dignity through the use of moral standards of care. Their strategies prioritize those who are most at risk, especially when resources are limited. Kalaitzidis (2021) offered a moral evaluation of the cost and accessibility of the COVID-19 vaccine, emphasizing moral tactics like distributing the vaccine fairly throughout the world and focusing on high-risk populations. The paper criticizes vaccination pricing driven by profit while urging international cooperation. Emanuel and Persad (2023) developed a shared ethical framework to guide pricing and resource use during a pandemic. During the pandemic, Azimi et al. (2024) examined ethical care concepts and the effects of pricing sequences on fair provision of healthcare. They support laws that preserve those with little to no income. The consequences of pricing and alterations in medical systems on durability was studied by Lohela-Karlsson et al. in 2021. According to the study, superior health care results throughout emergencies are associated with moral pricing. Schaefer et al. (2020) criticized theoretical models that fail to properly deal with healthcare economic interests while exploring the ethical issues of pricing during the pandemic.

Pricing Pioneering Products

Setting the price for breakthrough items is one of the most fundamental and challenging marketing concerns. The vast majority of unique things fail in the perspective of customers, highlighting the difficulty of properly pricing them. A product that incorporates an important development is referred to as a pioneer. Unlike products that are simply new to the firm, fresh goods go through several aggressive stages in their life process. Different stages may have different pricing policies. Your domain of pricing discretionary contracts will be affected as new rival commodities reach the market and as their innovations reduce the difference in uniqueness between your new items and their alternatives. Throughout the cycle, production and distribution costs, as well as those related to valuing and promoting pliability, rise at regular intervals. Price policy adjustments may be necessary as a result of these developments. Technical competence is demonstrated by a

slower rate of product production, more brand homogeneity and reliability, and improvements in procedures and brand experience. Consumer acceptance of the core service paradigm, universal agreement that the vast majority of manufacturers' products would function effectively, and sufficient competence and information to allow customers to adequately evaluate brands are all signs of market maturation. Rising stability in shareholdings and pricing patterns indicates rivalry maturation.

MONOPOLY PRICING: An offering's price may be considered exploitative if it is genuinely innovative. However, certain aspects of the new commodity's economic environment change the monopoly price. The dominant position of the recently released product is programmable, sporadic, and restricted. Customers have options that directly compete with one another, and the product itself is vulnerable to deterioration from copying and obsolescence.

STRATEGY CHOICES: When deciding on a new goods price, there are two important options: (i) pricing skimming and (2) permeation intermediate pricing. Specific products are a major advance above traditional methods for providing assistance or meeting a demand. During the early stages of market development, a strategy of high rates combined with big advertising dollars (and, eventually, lower prices) has frequently worked well for such products. I call that a "glancing pricing policy." Its success can be attributed to four major factors: Consumer demand may not be as responsive to retail prices in the early phases of an item's development as it will be once it matures and competition emerges. A good has comparatively few competitors in its early stages, which results in a low level of cross-elasticity of need.

Customers are particularly sensitive to promotions for things that cost more per unit because they are hesitant to value the services provided by the product.

One effective way to divide the market into segments with varying price elasticity of demand is to introduce a new product at a high price. The market's elite, which is comparatively price-insensitive, is skimmed by the initial high price. Price reductions that follow target increasingly elastic market segments. The methodical succession serves as an example of this pricing technique. Using a skimming method appears to be safer. When dealing with unclear demand elasticity, a high beginning price serves as a "refusal" price during the investigation stage. It is difficult to predict how much cost savings would be attainable as the market expands and product design progresses due to increasing production efficiency caused by creative approaches. High pricing typically results in more sales during the early stages of market expansion than low beginning costs. You can gain access to higher-volume market segments by skimming pricing.

Penetrating price: Despite its many benefits, a price-cutting approach does not always solve your new product's problems. High initial prices may optimize the introduction of profits, but they may also impede sales to many of those who must be reached in order to establish a large market. The other alternative is to enter the mainstream market early by offering low prices as an entry point. I refer to it as penetration pricing. In certain cases, this method is most likely preferred. First, during the early stages of launch, a product's sales volume is very sensitive to price. Price has a significant impact on the product's sales percentage, especially in the early stages of launch. Significant cost savings could come from both manufacturing and distribution. Third, shortly after introduction, your product will certainly face fierce competition. In the absence of an 'elite' market, consumers are unlikely to shell out more money for the newest and finest. At any point in a product's life cycle, a penetration pricing strategy can be created. It is advised, therefore, that you assess the pricing strategy before to launching the new product. When selecting whether to employ penetration or skimming pricing for your new product launch, you must consider how quickly and easily competitors can produce substitutes. Given that large multi-product companies are orientated to mass markets, a policy of low starting costs makes sense for items with a clear large market potential. If you set your beginning price low enough, your formidable competitor may not consider it is worthwhile to make significant expenditures or reduce their profit margins.

Strategies of Pricing

Cost plus pricing: Cost-plus pricing, which is already appealing because of its purported financial rigor, calls for pricing that generates respectable returns over costs that have been properly allocated. However, because it ignores the dynamic interplay between price, volume, and spending, it frequently produces inadequate results. Anticipated selling quantities are used to distribute fixed expenses, but this assumption ignores how volume is determined by valuation and vice versa. This might result in a "death spiral," where price increases

reduce sales and raise unit costs, or underpricing when sales volume exceeds projections. Cost-plus pricing sometimes leads to undervaluing in strong markets and overpricing in poor markets, which runs contradictory to good strategic pricing strategies. Pricing is an inadequate approach to manage upfront expenses because price determines sales volume, making estimating expenses prior to pricing insurmountable. Value-oriented pricing ought to direct selections instead, bringing predicted prices and expenses into line before commitments are made. The above approach guarantees profitability despite escaping the driven by costs price cycle.

Customer driven pricing: Since cost-based pricing has had an adverse impact on earnings, enterprises are ditching it and giving price autonomy to product or sales executives instead. Whereas this is conceptually consistent with pricing that is value-based, using it improperly for immediate profit may erode long-term profitability and implied value. By accentuating a product's value over the willingness of customers to pay, price optimization seeks to capture value rather than solely increase sales. Buyer-seller connections may be deteriorated since savvy purchasers could deceive sellers about genuine value with the aim to obtain monetary rewards. Ignorant consumers frequently undervalued new products. Appreciating the probable value for customers who are pleased, spreading knowledge about it, and refraining from using inexpensive prices as substitutes for excellent marketing initiatives are all necessary for efficient pricing. Early consumers' trials and effective value interactions, rather than initially inexpensive prices, are how creative items are accepted.

Share driven pricing: It is illogical to let pricing be decided by the market circumstances and to focus entirely on gaining shares in the market. Reduced prices might boost sales fast, but they are not a robust fiscal approach because competitors can immediately match them, which leads to permanently lowered margins. Long-term, less expensive alternatives comprise sustainable techniques like distribution improvement, promotion, and differentiating your product. For maximum long-term profitability, charging must maintain a balance both market share and profitability. As illustrated by notable companies like Godiva, Apple, and Snap-on, who prosper by preserving their significant amounts positioning versus competing on price, there are circumstances when keeping prices elevated and lowering market share are more beneficial.

Tactics of Pricing

The pricing tactics argument emphasizes on feasible techniques that business enterprises may use that maximize profitability while aligning prices to segmentation of customers and perceived values. Segmented pricing is an essential technique that adjusts ranks for different customer categories according to their unique value assessments. Based on time pricing, in which prices change according to time of day, such as peak versus not busy rates, and price fencing, which outlaw negotiate between segments (e.g., based on location or purchase quantity), are two means for achieving this. Bundling and unbundling is another tactical tactic. While unbundling produces goods or services separately to fulfil a range of consumer needs or lower upfront expenses, bundling combines plenty products or services to increase their perceived value, such as software suites. Performance-based pricing connects the expenditure of the good or service to tangible results, ensuring that the price mirrors the real value provided to the consumer. Finally, psychological variables emphasize the significance of how customers feel, as demonstrated by psychological economics findings. Businesses must take into account how impartiality and the impression of value affect decision-making since factors like the fairness effect and transaction utility have a big impact on how consumers behave.

Pricing Analysis-Quantitative and Qualitative

Introduction

The Serum Institute of India (SII) stands as a global leader in vaccine production, with a legacy of making vaccines affordable for low- and middle-income countries. The COVID-19 pandemic posed unprecedented challenges and opportunities, compelling SII to develop, manufacture, and distribute vaccines at an accelerated pace. The critical decision to price Covishield at \$13 per dose represents a balancing act between affordability, cost recovery, and competitive positioning. This report delves into the financial, strategic, and ethical dimensions of SII's pricing strategy, exploring its implications for the global vaccine landscape and SII's long-term sustainability.

1. Pricing Rationale Analysis

The Serum Institute of India (SII), as the world's largest vaccine manufacturer, set an initial price of \$13 per dose for its COVID-19 vaccine, Covishield, a decision influenced by several key financial and strategic

factors. This section explores the economic and operational rationale behind this pricing decision, including its high investment costs, comparative analysis with competitors, and potential returns.

1.1. Investment and Fixed Costs

- **High Initial Investment:** SII invested \$100 million to build a new production facility to increase production capacity to one billion doses annually. This substantial capital expenditure (Capex) reflects a long-term commitment to meet global demand and achieve economies of scale. Unlike its other vaccines, which typically require smaller infrastructure investments, Covishield's production warranted significant upfront costs due to the urgency and scale of COVID-19
- **Pre-Approval Production and Risk:** SII began manufacturing 200 million doses before Covishield's regulatory approval, shouldering the financial risk to expedite global availability once approval was granted. These moves incurred substantial operational expenses (OpEx), exceeding \$100 million. Given the unpredictable nature of the pandemic, SII's financial strategy needed to account for the risk of potential losses if the vaccine faced regulatory or efficacy challenges.

1.2. Comparative Analysis with Competitors

- **Benchmarking Against Western Companies:** Compared to Western vaccine manufacturers like Pfizer, which priced its vaccine at \$19.50 per dose, SII's \$13 price positioned Covishield as a mid-tier option in the global market. This pricing considered affordability for middle-income countries while remaining competitive against high-cost Western vaccines.
- **Pricing Context in the Vaccine Market:** The price of \$13 per dose, though higher than SII's usual vaccines, was justified by the pressing need for COVID-19 treatments and the high costs associated with rapid scale-up and stringent quality requirements. For instance, even routine COVID-19 tests in certain countries cost more than \$20, and Remdesivir, an antiviral drug, was priced at over \$3,100 per treatment course. This comparison emphasized the accessibility of Covishield at \$13 in a market where other treatments were considerably higher.

1.3. Fixed vs. Variable Costs Breakdown

- **Fixed Costs:** Besides Capex for the production facility, fixed costs for Covishield include investments in long-term assets such as cold-chain storage and automated systems that enhance efficiency. These expenses are critical for maintaining high production volumes with consistent quality standards, a necessity given the scale and speed of demand during a pandemic.
- **Variable Costs:** Operating costs such as labor, quality control, raw materials, and logistics directly impact the per-dose cost. Given SII's commitment to produce high-quality vaccines, the need for thorough testing, labour-intensive oversight, and temperature-controlled distribution added to Covishield's variable costs. These expenses exceeded \$100 million, making the \$13 price essential for achieving financial viability in the short term.

1.4. NPV Calculations and Financial Implications

What Are We Trying to Do with NPV?

The NPV calculation helps us answer: "Is it worth spending this money now if we expect to make money from it in the future?"

- If NPV is +ve: the project is a good idea and could make a profit.
- If NPV is -ve: the project may lose money and might not be worth it.
- The Steps to Calculate NPV
- Let's go with the steps one by one:
- Start with the Money SII Spent Upfront (Initial Investment): Initial Investment (Year 0): SII had to spend money to get started.

SII spent \$100 million to build a factory that can make 1 billion vaccine doses each year.

SII also spent another \$100 million to produce some vaccines before they even had approval to sell them

Total Initial Investment: \$100 million + \$100 million = \$200 million. (Capex)

• This \$200 million is money spent upfront (in Year 0), so we'll count it as a negative amount because its money going out.

• Calculate the Money SII Expects to Make Each Year (Revenue)

• Revenue Per Year:

SII plans to sell each vaccine dose for \$13.

They can make 1 billion doses per year with the new factory.

Total revenue per year = \$13 per dose * 1 billion doses = \$13 billion per year.

• Operating Costs (OpEx) and Net Cash Flow: With a 40% profit margin, 60% of the revenue would go toward operating costs.

Annual Operating Costs: 60% of \$13 billion = \$7.8 billion

Annual Net Cash Flow (Profit): Revenue - Operating Costs = \$13b - \$7.8b = \$5.2b.

Discount Rate and Initial Investment:

- Discount Rate: 8% (We have taken it as industry standard).
- Initial Investment (Capex): \$200 million.

Factors Influencing the \$13 Price:

• The Big Investment: SII sunk a cool \$100 million into a new factory to churn out a billion doses of COVID-19 vaccines a year. Gotta recoup that investment, right?

The Risk: They didn't wait for the green light from regulators. SII rolled the dice and started pumping out 200 million doses, coughing up over \$100 million in operating costs. All to ensure the vaccine hit the market on time.

• Another factor was the landscape of competing vaccine prices. Pfizer's price, for instance, was set at \$19.50 per dose for the U.S. government, and treatments like Remdesivir cost significantly more, creating a pricing benchmark for COVID-19 treatments. On the other hand, Johnson & Johnson offered a not-for-profit price of \$10 per dose, and Russia was preparing to enter the market with mass-distributed vaccines. These diverse price points represented varying corporate strategies, with each entity navigating the thin line between accessibility and revenue generation. SII's \$13 positioned Covishield between higher-priced competitors and more affordable alternatives, a strategic midpoint in response to competitive pressures.

• SII's pricing also reflected an understanding of economies of scale. Producing doses at high volumes generally lowers per-unit costs, allowing for potential price reductions over time. SII recognized that, as production ramped up, cost efficiencies would naturally follow, aligning with the institute's longer-term vision of achieving profitability without compromising affordability.

• While this price was higher than SII's usual vaccine pricing, the extraordinary nature of the pandemic, combined with unique production costs, justified a departure from its typical price strategy. In sum, SII's pricing approach for Covishield was shaped by a complex web of economic decisions involving upfront investments, competitive pricing landscapes, risk management, and global market dynamics. It underscores a strategic positioning aimed at securing long-term sustainability while responding to the immediate demands of a global health crisis.

Break-Even Analysis: Calculating the break-even point for Covishield at each price level is crucial to understanding the minimum number of doses needed to cover both fixed and variable costs. At \$13, the break-even period is shorter, but it may limit market reach in low-income regions, while a lower price could extend the break-even timeline yet increase accessibility.

2. Competitive Pricing Strategy

Comparison:	
Vaccine Manufacturer	Price per Dose (USD)
Covishield (SII)	\$13
Pfizer-BioNTech	\$19
Moderna	\$25
Sputnik V	\$10
Johnson & Johnson	\$10

As the vaccine market evolved rapidly, competitive pricing pressures intensified. This section explores SII's strategic response to competitors, focusing on scenario simulations, market positioning, and financial impacts.

2.1. Market Dynamics and Competitive Positioning

- **Impact of Competitor Pricing Announcements:** SII faced direct competitive pressure following announcements from J&J, which priced its vaccine at a not-for-profit \$10 per dose, and Russia's low-cost vaccine initiative. These developments prompted SII to consider a price adjustment to maintain competitiveness, especially in price-sensitive markets.
- **Comparative Positioning in the Global Market:** While Western companies like Pfizer aimed for high-income markets, SII targeted middle- and low-income countries. The \$13 price balanced financial returns and accessibility, especially when compared to high-income nations that could pay more for Western vaccines. However, maintaining this price risked limiting adoption among lower-income buyers if competitors continued to offer vaccines at reduced prices.

2.2. Pricing Model Simulations

Using scenario analysis tools like Excel, SII can evaluate three main pricing models to determine their impact on revenue, profit margins, and market share:

- **Scenario 1: Maintaining the \$13 Price:** This model keeps profit margins higher, supporting SII's investment recovery and financial stability. However, it risks losing market share to lower-priced competitors, particularly in emerging markets that are budget-sensitive.
- **Scenario 2: Reducing Price to \$10:** Matching J&J's price could enhance SII's appeal, particularly in middle-income markets. The price reduction would likely increase demand and improve market share, potentially compensating for reduced per-dose revenue through higher volumes.
- **Scenario 3: Further Reducing Price to \$8:** At \$8 per dose, SII could capture extensive market share across low-income and emerging economies, positioning itself as a low-cost provider. However, this price may not fully cover fixed and variable costs initially, unless supplemented by partnerships or subsidies.

2.3. Financial and Demand Implications

- **Revenue Projections and Profit Margins:** Simulate each pricing scenario's revenue and profit implications. For instance, at \$10, SII may capture a significant portion of the middle-income market while sustaining an acceptable margin. Conversely, a \$13 price maximizes revenue per dose but risks slower adoption in price-sensitive regions.
- **Elasticity of Demand:** Conduct demand elasticity analysis across segments to evaluate how changes in price impact demand. This analysis can reveal the most price-sensitive regions where lower pricing could significantly increase vaccine uptake, particularly in middle-income and low-income countries where demand elasticity is higher.

3. Market Segmentation and Differential Pricing

SII's pricing strategy is influenced by variations in global income levels, which affect purchasing power and demand elasticity. This section discusses how SII can tailor pricing for different income segments, enhancing accessibility while sustaining profitability.

3.1 Income-Based Market Segmentation

SII can maximize its impact and financial sustainability by tailoring pricing strategies to align with the economic realities of different income segments. Using Gross National Income (GNI) as a benchmark, SII can categorize markets as high-income, middle-income (upper and lower), and low-income, adjusting prices to balance accessibility and profitability.

High-Income Markets

- **Characteristics:**
 - GNI: Average exceeds \$45,000 per capita.
 - Significant healthcare budgets and low-price sensitivity.
 - Strong focus on rapid vaccination coverage and premium-quality vaccines.
- **Pricing Strategy:**
 - Price Range: \$15–\$20 per dose.
 - High-income countries can absorb higher prices without significant impact on demand due to prioritization of speed and reliability.
 - Examples: United States, European Union nations, and Japan.
- **Strategic Rationale:**
 - Generate premium revenue to subsidize lower pricing in resource-constrained markets.
 - Reinforce SII's global reputation for quality and reliability in high-demand regions.

Upper-Middle-Income and Lower-Middle-Income Countries

- **Characteristics:**
 - GNI: Between \$1,036 and \$12,535 per capita.
 - Collectively home to 5.6 billion people, representing a critical segment for global vaccination efforts.
 - Limited healthcare budgets with reliance on government-funded vaccination programs.
- **Pricing Strategy:**
 - Price Range: \$8–\$12 per dose.
 - Offer tiered pricing based on specific countries' purchasing power and ability to finance public health initiatives.
 - Examples: China, Brazil, South Africa (upper-middle-income) and India, Nigeria, Indonesia (lower-middle-income).
- **Strategic Rationale:**
 - Moderate pricing reflects constrained healthcare budgets while maintaining SII's competitiveness.
 - Volume-driven revenue in these densely populated regions strengthens SII's market share.

Low-Income Markets

- **Characteristics:**
 - GNI: Below \$1,035 per capita.
 - Heavy reliance on international aid and donor support for vaccine procurement.
 - Limited ability to pay, necessitating significant price subsidies or donations.
- **Pricing Strategy:**
 - Price Range: \$4–\$8 per dose.
 - Leverage partnerships with GAVI, WHO, and CEPI to subsidize costs and ensure affordable distribution.
 - Examples: Ethiopia, Afghanistan, and Democratic Republic of the Congo.
- **Strategic Rationale:**
 - Aligns with SII's mission to provide affordable vaccines to underserved populations.
 - Fosters goodwill and collaboration with international organizations and governments, securing long-term procurement contracts.

3.2. Elasticity of Demand Analysis

- **High Elasticity in Price-Sensitive Regions:** Middle- and low-income countries display highly elastic demand, meaning that reductions in price could lead to significant increases in vaccine adoption. This elasticity analysis highlights the potential for differential pricing to expand market reach in low-GNI regions, where accessibility is closely linked to price sensitivity.
- **Market Penetration vs. Profit Maximization:** By adopting differential pricing, SII could achieve deeper penetration in price-sensitive regions while maximizing profits in high-income countries. For example, offering \$13 in high-income markets and \$10 in middle-income markets would balance revenue potential with accessibility.

4. Long-Term Strategy Post-Pandemic

The post-pandemic landscape will require a shift in SII's strategy to address stabilized demand, evolving competition, and potential shifts in consumer expectations for COVID-19 vaccines.

4.1. Transition to Endemic Demand

- **Endemic Phase Demand Characteristics:** As COVID-19 becomes endemic, annual or booster shots will sustain demand, albeit at a reduced level compared to the pandemic peak. SII will need to forecast long-term demand for maintenance doses in various regions, as the urgency for mass immunization lessens.
- **Supply-Demand Modelling:** Using supply-demand models, SII can predict steady revenue from repeat demand in high-income regions and assess the feasibility of seasonal vaccine cycles. This approach helps SII align production capacity with the expected reduction in global demand.

4.2. Value-Based vs. Broad Access Pricing

- **Value-Based Pricing Model:** Adopting a value-based pricing model post-pandemic would allow SII to set higher prices in high-income regions while offering lower-cost access in emerging markets. This model balances profitability with accessibility, sustaining revenue in regions with high purchasing power while maintaining affordability where budgets are limited.
- **Broad Access in Emerging Markets:** Continuing to provide accessible pricing in middle- and low-income regions remains critical for SII to sustain its global market leadership and reputation. This strategy ensures:
 1. **Affordability and Accessibility:**
 - Offering lower pricing tiers for middle- and low-income countries allows SII to address disparities in healthcare budgets and purchasing power.
 - Ensures widespread vaccine availability in regions most dependent on affordable solutions.
 2. **Strengthened Relationships with Key Stakeholders:**
 - Maintaining accessible pricing fosters long-term partnerships with governments, health ministries, and international organizations like GAVI and WHO.
 - Builds trust and goodwill, positioning SII as a preferred supplier for future vaccination campaigns.
 3. **Alignment with SII's Mission:**
 - Upholds SII's commitment to global health equity by ensuring vaccines reach underserved populations.
 - Demonstrates corporate social responsibility, reinforcing SII's brand as a global leader in affordable vaccines.
 4. **Strategic Benefits:**
 - Enhances SII's global footprint and market presence, particularly in emerging markets where long-term vaccine demand is expected to grow.
 - Supports bulk procurement opportunities, ensuring consistent revenue streams and operational efficiency.

By prioritizing accessible pricing in these markets, SII can maintain its legacy of affordable healthcare while securing a competitive edge in a rapidly evolving global vaccine landscape.

4.3. Competitive Landscape and Adaptation

- **Adaptation to New Competitors:** As new vaccine manufacturers enter the market, SII must prepare for intensified competition. Price adjustments and differential strategies will help SII maintain its market share while leveraging its high-volume production advantage.

5. Global vs. Differential Pricing Strategy

Choosing between a single global price or a differential pricing strategy has significant implications for SII's market share, accessibility, and profitability. This section explores the pros and cons of each approach and provides a recommendation based on market dynamics.

5.1. Global Pricing Model

- **Advantages:** A single global price simplifies logistics and administration, ensuring consistency in brand perception and simplifying compliance across international markets. This model supports equity and aligns with SII's commitment to affordable healthcare.

- **Drawbacks:** A single price may alienate both high-income and low-income markets. High-income countries could pay a higher price, while low-income countries may struggle with affordability. This model risks reducing SII's market share in competitive, price-sensitive regions.

5.2. Differential Pricing Model

- **Advantages of Segmented Pricing:** Differential pricing maximizes accessibility by tailoring prices to each region's economic capacity. High-income markets can sustain the \$13 price or higher, while middle- and low-income regions benefit from reduced prices that align with their purchasing power. This strategy helps SII achieve both revenue and market penetration goals.
- **Challenges and Considerations:** Differential pricing introduces complexities in logistics, regulatory compliance, and brand perception. It may also attract scrutiny over price discrepancies, requiring transparency and clear communication with stakeholders to avoid reputational risk. Partnerships with global health organizations can offset these challenges and ensure pricing aligns with each region's needs.

5.3 Recommended Approach: Hybrid Pricing Strategy

To effectively address diverse global market needs while ensuring financial viability, SII should implement a **hybrid pricing strategy**. This approach balances profitability, market reach, and equity by combining global and differential pricing models.

Components of the Hybrid Model

1. Baseline Pricing for High-Income Markets

- **Price Range:** \$15–\$20 per dose.
- **Objective:** High-income countries can afford premium pricing due to robust healthcare budgets and less price-sensitive demand.
- **Rationale:** Generating higher margins in these markets subsidizes lower prices in emerging and low-income markets.

2. Differential Pricing for Low- and Middle-Income Markets

- **Emerging Markets:** Pricing at \$8–\$12 per dose for upper- and lower-middle-income countries ensures affordability without significant profit sacrifices.
- **Low-Income Markets:** Prices reduced to \$4–\$8 per dose, supported by partnerships with global health organizations like GAVI and the Gates Foundation, ensuring accessibility.

3. Subsidies and Partnerships

- Engage with GAVI, WHO, and CEPI (Coalition for Epidemic Preparedness Innovations) to subsidize production costs for low-income countries.
- Work with governments to secure bulk procurement contracts, which can offset operational risks and ensure consistent revenue.

Key Benefits of the Hybrid Model

1. Accessibility and Equity:

- Ensures vaccine availability in low-income regions, maintaining SII's mission of serving global health needs.
- Addresses disparities in purchasing power by tailoring prices to regional income levels.

2. Revenue Optimization:

- Higher margins from high-income markets compensate for reduced prices in other segments.
- Expanding market share globally diversifies revenue streams and mitigates risk.

3. Market Positioning:

- Reinforces SII's reputation as a global leader in affordable vaccines.
- Builds goodwill with governments and international organizations, fostering long-term partnerships.

Quantitative Assessment and Financial Modelling

To finalize and implement the hybrid model, SII should conduct detailed financial and operational analyses:

1. Breakeven Analysis

- Identify the minimum number of doses needed at each price point to recover fixed and variable costs.
- Example: With an average production cost of \$6 per dose, breakeven sales volumes differ across regions:
 - High-income markets: ~500 million doses at \$15 per dose.
 - Low-income markets: ~800 million doses at \$5 per dose, with external funding.

2. Sensitivity Analysis

- Analyze the impact of changing variables (e.g., demand elasticity, production costs, competitor pricing) on profitability.
- Model scenarios for fluctuating demand in post-pandemic endemic phases, accounting for booster dose requirements.

3. Revenue and Market Share Modelling

- Project revenue under various pricing scenarios to identify the optimal mix of affordability and profitability.
- Example: Pricing at \$10 in middle-income markets increases demand by 20% compared to \$13, generating higher overall revenue despite lower per-unit margins.

Financial Projections and Scenario Analysis

The revenue and potential outcomes for the Serum Institute of India's COVID-19 vaccine price plan are examined in this section, along with the potential effects on the company's earnings, profitability, and market share of the Covishield vaccine's cost control. In order to ensure that the vaccine is cheap for all nations based on their financial capacity, these forecasts seek to find a sweet spot where SII and other manufacturers may turn a profit. The price of SII is currently \$13, however there are various choices that have been evaluated for their impact on both short- and long-term revenue.

Price	Quantity Demanded (in billion units)	Revenue
\$0.00	0.00	0.00
\$3.00	3.00	9.00
\$5.00	5.00	25.00
\$10.00	10.00	100.00
\$13.00	13.00	169.00
\$20.00	20.00	400.00
\$30.00	30.00	900.00

Important findings:

- Relationship between Price and Revenue:** The amount demanded is higher at lower prices (e.g., \$0.00, \$3.00, \$5.00), while the revenue is comparatively lower. For example, for \$3.00, 3.00 billion units are demanded, generating \$9 billion in sales. Even while the quantity demanded begins to decline as the price rises, the price per unit causes a dramatic increase in revenue. For instance, even if only 30 billion units are requested, income soars to \$900 billion at \$30.00.
- Revenue Maximization:** The highest price points provide the largest revenue; at \$30, for example, revenue reaches \$900 billion. This implies that there is still a lot of demand at this price point in this situation since the market is quite sensitive. The enormous revenue at the top price, however, suggests that this might be a luxury or niche industry where demand isn't greatly stifled by higher prices.
- Pricing Strategy:** A pricing plan that strikes a balance between quantity requested and price is crucial for a firm analyzing these findings. Businesses may discover that a small price reduction could result in more units sold and higher overall income in marketplaces where quantity requested is elastic. However, if the market is less price-sensitive, a higher pricing approach for premium or luxury goods could result in significantly larger revenues without a major decline in demand.

Conclusion and Recommendations:

Low price ranges (such as \$0–\$10) are great for increasing the amount demanded, but they might not bring in enough money per unit. ideal for mass-market goods or when achieving bulk sales is the goal.

Mid-Price Range: \$10 to \$20, for example balances revenue and quantity demanded. For companies trying to maintain a healthy level of demand while maximizing overall revenue, this is probably the sweet spot.

Considerable Price Range: Although the quantity requested declines, prices in the \$20–\$30 range provide considerable revenue. This implies that raising the price of luxury or premium goods might result in much larger income without having a major impact on demand.

Revenue Analysis:

Revenue is determined by multiplying the quantity required by the price (Revenue = Price × Quantity required).

(DATA: as given in the source material for the capstone project)

- Although the highest amount needed is 7.34 billion units, no revenue is made at \$0 because the price is free.
- With a slight decrease in the amount demanded to 7.25 billion units, income rises to \$21.74 billion at \$3.
- Revenue rises to \$35.93 billion at \$5, while the amount demanded somewhat decreases to 7.19 billion units.
- Revenue rises to \$70.36 billion as the price rises to \$10, while the quantity demanded falls to 7.04 billion units.
- Revenue rises from \$70.36 billion to \$193.07 billion between \$10 and \$30, but the number requested falls from 7.04 billion units to 6.44 billion units.



Price elasticity of demand and the declining quantity demanded as the price rises are highlighted by the fact that, at the price point of \$122, income reaches \$448 billion while quantity demanded falls sharply to 4.00 billion units.

Revenue Maximization:

When the quantity requested and the price are at their highest, revenue is maximized. Considering the information supplied:

- The price of \$122 generates the maximum revenue, reaching \$448 billion, even if 4.00 billion units are needed.
- This shows that even if fewer units are sold, revenue keeps rising as prices rise to \$122. As the amount demanded declines, the marginal revenue (MR) from raising the price falls.

According to economic theory, the intersection of the price axis and the marginal revenue (MR) curve results in revenue maximization. In this instance, even if fewer copies are sold, the company sets the price at \$122 to maximize revenue. Given that customers are less sensitive to price fluctuations and that SII can generate significant profits even from a smaller client base, it appears that the price elasticity of demand is inelastic at this price point.

2. Market Share Analysis: The percentage of the whole market demand that a business is able to obtain at various price points is known as market share. It is computed by dividing the entire market demand at a price of \$0, which denotes the greatest market demand, by the quantity desired by SII at each price. Using the following formulas, we can determine the decline in market share (amount required) relative to the 7.34 billion overall market:

$$\text{Market Share} = \text{Quantity Demanded at Px} / \text{Total market (7.3 billion i.e. quantity demanded at price 0)} \times 100$$

The changes in market share with change in price, starting at price of 0 is as follows:

Price (\$)	Quantity Demanded (QD) (Billion units)	Market Share (%)
0	7.34	100%
3	7.25	$(7.25 / 7.34) \times 100 \approx 98.8\%$
5	7.19	$(7.19 / 7.34) \times 100 \approx 97.9\%$
10	7.04	$(7.04 / 7.34) \times 100 \approx 95.9\%$
13	6.95	$(6.95 / 7.34) \times 100 \approx 94.7\%$
20	6.74	$(6.74 / 7.34) \times 100 \approx 91.8\%$
30	6.44	$(6.44 / 7.34) \times 100 \approx 87.7\%$
122	4	$(4.00 / 7.34) \times 100 \approx 54.5\%$

Market Share Remarks:

Elasticity and Price Sensitivity: A decline in market share results from a decrease in the quantity requested as the price rises. SII has a 100% market share at \$0. The market share drastically declines as the price rises. The market share falls to 54.5% at a price of \$122, suggesting that higher prices result in a smaller client base and a notable decline in market share. This implies that even while revenue is maximized at \$122, the business loses a sizable chunk of its market, which might not be ideal in the long term if keeping customers is a top concern.

Breakeven Analysis and Profitability:

The breakeven point occurs when total revenue equals total costs, and the firm begins to make a profit. Higher prices like \$122 allow SII to generate more revenue per unit, meaning that the company can cover fixed costs more efficiently with fewer units sold.

At lower rates, such as \$3 to \$10, SII would need to sell a bigger quantity to meet its costs, but the revenue per unit is lower. This could be a more attractive alternative if the company values market share or if costs are rather high.

At higher prices, such as \$122, SII can reach its breakeven point with fewer units sold due to the higher margin per unit. However, it would need to guarantee that the production expenses and fixed expenditures are closely handled, as the reduction in quantity demanded could affect overall sales volume.

Given,

- Total Cost = \$392 million
- Fixed Cost (COST OF CAPITAL) = 14% of Total Cost = $0.14 \times \$392 \text{ million} = \$54.88 \text{ million}$
- Variable Cost = Total Cost - Fixed Cost = $\$392 \text{ million} - \$54.88 \text{ million} = \$337.12 \text{ million}$
- Quantity demanded at each price – Given above

Economic Analysis:

1. Selling Price of \$0: Outcome: The breakeven point is undefined as no revenue is generated. This price is not viable from an economic standpoint.

3. Moderate Selling Prices (\$10 and \$13):

Breakeven Units: 39.2 million units at \$10, and 30.15 million units at \$13.

Analysis: These price points strike a balance between affordability for customers and achievable sales volume. They are more realistic for breaking even compared to the \$3 price.

Implication: A price point in this range could be sustainable with proper marketing and operational efficiency.

2. Low Selling Price (\$3):

Breakeven Units: Approximately 130.67 million units. **Analysis:** Achieving such a high volume of sales is extremely difficult and may not be feasible in most markets due to production, logistical constraints, and market demand limits.

Implication: Low-margin pricing requires an exceptionally high sales volume, increasing the risk of losses if the target volume isn't met.

3. Higher Selling Prices (\$20 and \$30):

19.6 million units at \$20 and roughly 13.07 million units at \$30 are the breakeven units.

Analysis: By drastically lowering the breakeven point, these pricing necessitate fewer units to cover expenses. They might, however, place the product in a more upscale market niche, which might lower the overall possible market size.

Implication: While raising prices can hasten profitability, they may also reduce the clientele because of affordability concerns.

4. Premium Selling Price (\$122):

3.21 million units are needed to break even.

Analysis: The lowest breakeven threshold is reached at this price level. It appeals to a certain market by positioning the product as premium.

Implication: Although fewer units are required to break even, a strong value proposition and strong brand are still necessary to draw in customers and defend the high price.

Conclusion:

Achieving the ideal price point requires striking a balance between volume and revenue. While high pricing (\$30 and beyond) can lower risk but need premium positioning and marketing, moderate prices (\$10–\$20) are best for sustainable operations and reasonable breakeven.

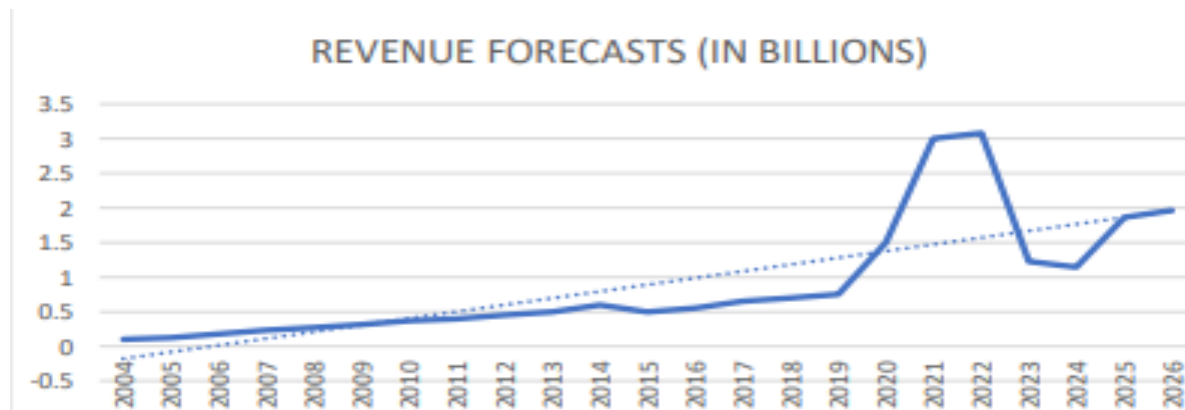
REGRESSION ANALYSIS

Price and quantity demanded have a significant negative association, according to the regression analysis. The quantity demanded falls by 0.03 units for every \$1 increase in price, according to the price coefficient of -0.03. A perfect fit is shown by an R-squared value of 1, which indicates that 100% of the variance in demand can be explained by the model. The statistical significance of the link is confirmed by the exceptionally high t-statistic and P-value.

This implies price elasticity of demand is inelastic, with demand being less responsive to price changes. The regression analysis indicates a strong positive relationship between Price and Revenue, with a coefficient of 6.44 for Price. This suggests that for every \$1 increase in price, revenue increases by \$6.44. The R-squared value of 0.998 indicates that the model explains 99.83% of the variation in revenue, showing a strong fit. Given the significant t-statistic and p-value, the relationship is statistically robust.

FUTURE REVENUE PROJECTIONS (FORECASTS)

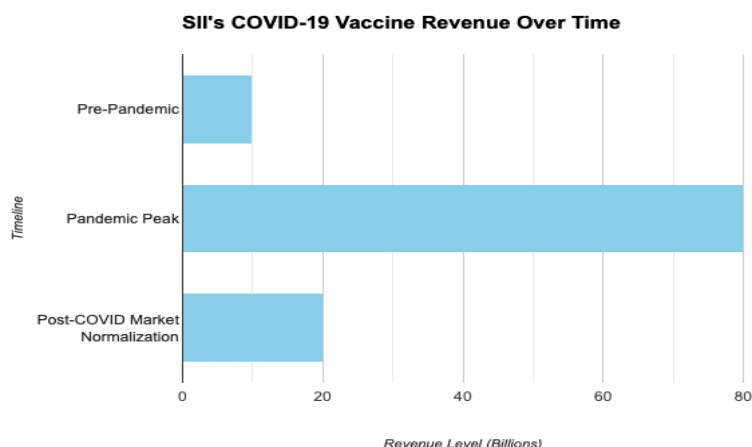
Revenue prediction for year 2025 and 2026 using regression analysis and econometric model



TIME SERIES DATA (USING EXHIBIT 9 AND OFFICIAL WEBSITE OF SII AND CAREEDGE BUSINESS SOFTWARE)

S. No	Year	Revenue (in bn)
1	2004	0.1
2	2005	0.12
3	2006	0.18
4	2007	0.23
5	2008	0.27
6	2009	0.31
7	2010	0.37
8	2011	0.4
9	2012	0.45
10	2013	0.5
11	2014	0.6
12	2015	0.5
13	2016	0.55
14	2017	0.65
15	2018	0.7
16	2019	0.75
17	2020	1.5
18	2021	3
19	2022	3.08
20	2023	1.223
21	2024	1.143
22	2025	1.864
23	2026	1.961

TIME SERIES REVENUE ANALYSIS



Role of Covishield in Revenue Surges (Post-2020):

- **Pre-2020:** Steady growth in revenue, reaching \$0.75 billion in 2019, driven by routine vaccines (polio, hepatitis, etc.).
- **Post-2020 Surge:**
 - 2020: Revenue jumped to \$1.5 billion due to the high demand for Covishield, the COVID-19 vaccine.
 - 2021: Revenue surged to \$3 billion as Serum Institute produced millions of doses and supplied to COVAX and other countries.
- **Key Driver:** Covishield production was the main contributor to the massive revenue increase in 2020-2021.

Decline in Revenue After 2022:

- **2022-2023:** Revenue dropped to \$.2 billion in 2023 from \$3.08 billion in 2022, as COVID-19 vaccine demand decreased.
- **Factors:**
 - Decreased demand for COVID-19 vaccines worldwide because the majority of nations have already immunized sizable segments of their populations.
 - Reduction in output and termination of mass immunization campaigns.

Post-COVID Market Normalization: As a result of decreased vaccine demand and fewer new markets for COVID-19 vaccinations, revenue levels went back to what they were before 2020.

Prospects for the years 2025 and 2026:

- **2025 Projection: \$1.864 billion.**
 - Recovery and Growth: New vaccine advancements, growing markets, and possible rises in routine vaccine demand.
- **2026 Projection: \$1.961 billion.**
 - Slow Growth: Consistently high vaccination sales, occasionally boosted by new products or booster shots

Based on the case analysis, The Serum Institute of India (SII) has a complex and strategic approach to COVID-19 vaccine pricing, including financial projections and strategic recommendations. In the face of global uncertainty and target markets' differing economic capacities, the company, under the leadership of CEO Adar Poonawala, had the difficult task of figuring out a competitive price for its vaccine, Covishield.

Key Findings

1. Financial investments and strategic alliances:

Early in the pandemic, SII was able to take advantage of a validated vaccine candidate thanks to its partnership with Oxford University and AstraZeneca. The institute made significant investments—more than \$200 million—to construct new facilities and begin production ahead of schedule. This proactive strategy sought to minimize delays that might impede mass vaccination efforts by guaranteeing a swift rollout after approvals were obtained.

2. Pricing Moral dilemmas in a Worldwide Setting:

SII's original choice to charge \$13 per dose (or \$26 per person for two doses) for Covishield was more expensive than its customary vaccine costs but much less than those declared by rivals such as Pfizer and Moderna. Aligning this price with the economic realities of various markets was the difficult part, though. Due to their greater purchasing power, wealthier countries like the United States and the United Kingdom had higher price thresholds, whereas low- and middle-income countries had limitations that required more affordable prices.

3. Striking a Balance Between Profitability and Accessibility:

Despite the fact that the high upfront costs and increased operating costs appeared to justify the \$13 per dose pricing, competitors such as Johnson & Johnson put pressure on the company to maintain a not-for-profit price of \$10 per dose throughout the pandemic. Furthermore, SII's pricing strategy became even more complex due to geopolitical factors, such as Russia's accelerated vaccine development timeline.

4. Market Segmentation and Pricing Strategy:

The strategic recommendations emphasized a tiered pricing approach based on the economic status of different countries. High-income countries could absorb higher prices, while SII could offer lower rates to low-income countries through partnerships with global health organizations like GAVI and CEPI. This approach aligns with SII's long-standing philosophy of balancing commercial success with social impact.

5. Long-term viability and financial projections:

As economies of scale are achieved, it is anticipated that the initially high cost of vaccine production will decline. In order to guarantee widespread access, especially in developing countries, SII's business model involves recovering initial costs and then lowering prices. However, a flexible pricing and production strategy is necessary due to the uncertainty surrounding demand fluctuations and competition from newer vaccine entrants.

Conclusion

According to the analysis, SII's move to establish itself as a key participant in the global vaccine supply chain during the COVID-19 pandemic was both audacious and essential. SII gained a competitive edge by making early investments and establishing important alliances. The intricacy and significance of efficient pricing in the pharmaceutical sector, particularly in times of global health emergency, are underscored by the examination of the Serum Institute of India's (SII) pricing strategies. A number of factors, including production costs, market competition, and the need to strike a balance between profitability and worldwide accessibility, influenced the decision to price the Covishield vaccine at \$13 per dose. The pricing strategy must, however, continue to be flexible in order to take into account both public health requirements and market conditions.

Although SII's initial pricing strategy guaranteed quick market penetration and financial viability, our case study shows that there are chances to optimize pricing to serve various market segments. According to the quantitative and qualitative evaluations, SII could expand its reach in both high- and low-income nations by implementing a differential pricing strategy. This would guarantee fair vaccine distribution while preserving profitability. According to financial projections, SII's long-term revenue could be improved by modifying prices in response to market demand and competitor actions, particularly in the post-pandemic phase when competition increases but demand stabilizes.

The strategic suggestions emphasize that SII must continue to use a two-tiered pricing structure, charging higher prices in affluent markets to offset the cost in low-income areas. This is in line with SII's objective to

maintain its financial stability while giving priority to access in underprivileged areas. Effectively meeting global needs will require constant adjustments to pricing and production capacities due to the fluctuating nature of vaccine demand and competition.

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