

A Study on Impact of Risk And Uncertainty on Amul

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Abstract- *An investigation examines the factors of risk and uncertainty that impact Amul being one of the biggest dairy cooperatives operating in India. Plenty of obstacles affect the dairy sector including variable raw material costs and climate variation and regulatory changes and consumer preference shifts. This study aims to detect and analyze the essential operational risks at Amul while evaluating the company's strategies to reduce uncertainty. Through their research strategy that combines qualitative and quantitative analysis the study evaluates how well Amul handles supply chain resilience alongside their pricing techniques and product expansion strategy. The combination of Amul's cooperative framework together with innovative marketing techniques and sturdy distribution channels enables the enterprise to defend its market standing against unpredictable market conditions. The research presents valuable dairy industry risk management best practices and recommends additional strategies to boost Amul's strategic risk management approach.*

Keywords- Risk management, Uncertainty, Dairy industry, Amul, Supply chain resilience

I. INTRODUCTION

The dairy sector maintains an important economic standing in India thereby supporting both employment and rural development and securing food availability. As a pioneering cooperative brand Amul has revolutionized Indian manufacturing by making the country become the world's biggest dairy producer. The dairy sector encounters identical risks to other industries because raw material prices fluctuate along with climate changes and new regulations and market trends affect supply chains and customer preferences are factors to consider.

The study analyzes how these operational uncertainties together with business risks influence Amul operations as well as its market viability alongside its performance. Studying how Amul manages various obstacles through its expansive farmer network and creative business strategies can provide valuable knowledge about effective risk management methods. The analysis looks at how Amul survives in an unpredictable environment through the

combined impact of its cooperative business model together with marketing innovation and supply chain systems.

This research investigation contributes to dairy industry risk management literature and presents direction for Amul to rise to upcoming uncertainties.

II. STATEMENT OF THE PROBLEM

Amul and other major dairy players in India operate in an uncertain environment that affects their production levels as well as their supply chain operations and market demand performance and profitability. Four key elements which obstruct business operations include extreme weather fluctuations and raw material cost fluctuations and changes in governmental regulations and inconsistent market situations. The risk management capabilities of Amul as a cooperative brand become essential because the organization needs to safeguard its market-leading position through effective identification and assessment of supply chain risks and uncertainties.

Amul has a robust operational structure yet a deficiency of scholarly works demonstrate how the company manages potential risks and uncertainties to sustain business growth and market stability. Investigators lack extensive studies which hinders their ability to measure Amul's risk management operations along with its challenges under changing business environments. The investigation seeks to study various risks that impact Amul operations and reveal the strategies Amul adopts to overcome these challenges.

III. REVIEW OF LITERATURE

Mishra and Shekhar (2012) analyzed supply chain vulnerabilities in the Indian dairy sector by examining the Amul dairy operations. The authors discovered three main risks: milk production variations from seasonal weather effects and changes in climate and product quality issues from numerous small suppliers and problems with transporting short-lived dairy goods. The study highlighted the need for solid risk management systems which can boost supply chain durability.

Chandra and Tirupati (2003) analyzed supply chain complexity within emerging economies through their

investigation of the supply chain management at Amul. Amul achieved supply and demand coherence through their unique cooperative network structure which they created for effective management. Through its hierarchical structure Amul managed to reduce operational risks while establishing simultaneous growth of markets and suppliers which kept quality milk and dairy products flowing continuously.

Deshpandé et al. (2016) Amul faces competitive challenges due to nation and international dairy product competition. Amul has maintained its market leadership by dedicating continuous innovation efforts while ensuring competitive pricing according to Deshpande et al. (2016). Strategic agility plays a vital role for Amul because it enables quick responses to how customers evolve alongside increasing market competition.

Times of India (2023) reported how Amul expanded its business operations into the U.S. while noting the market entry challenges involving strict regulatory barriers and rising demand for dairy-free products. Amul must make strategic adaptations to meet new market regulations and trends following their market-entry into unfamiliar territory.

Naik Naik & Company (2024) studied the legal issues that Amul faced regarding its trademark protection. The law firm proved the critical need to deal with legal risks to protect brand identity from unauthorized use by demonstrating proactive legal protection methods for brand safety.

IV. RESEARCH GAP AND OBJECTIVE OF STUDY

The other researches mainly focused on the marketing strategies, distribution and promotion of amul fresh product. The researches did not actually mention the risk and uncertainty of the product amul. The following are the objectives of my research study,

- To evaluate risk management strategies
- To investigate financial risk
- To examine consumer behaviour changes
- To analyse the climate and environmental impact
- To study supply chain resilience

V. METHODOLOGY

This research is based on both the doctrinal and the non doctrinal research. The source of data collected from various Newspapers, magazine, books, reports, and e-source. The sample size of the respondent is 100. In this research is based on the stratified random sampling method. In this research used some of the important statistical tools is

percentage method and the average method. Duration of the research is 3 months.

VI. SIGNIFICANCE

The results can help the government develop supportive measures to assist dairy cooperatives handle market uncertainty alongside climate change impacts and supply network problems. The research findings will help both farmers and distributors stay informed about universal risks and effective risk management strategies. Proper risk management practices lead to an uninterrupted flow of high-quality dairy products available at price stability. The risk management strategies implemented by Amul allow the company to maintain affordable dairy products alongside nutritious benefits for food security.

VII. LIMITATIONS

The research faces time limitations which limit deep investigation capability and comprehensive data collection. The evaluation of Amul's risk management approaches does not include a complete analysis of other essential dairy competitors due to time constraints. Long-term climate changes reduce the research's ability to accurately measure Amul's operational effects. Study sample size remains minimal because of the restricted timeline.

VIII. HYPOTHESIS

H1 : Price risk and supply issues are mainly associate with the the purchasing of dairy products

H2 : Many of them faced issues with the amul availability during the uncertain time (like the covid-19 pandemic)

IX. RESULTS AND DISCUSSION

1. Risk Management Strategies of Amul

The research demonstrates that Amul implements complex risk management approaches which follow strategic principles. The study has been able to demonstrate Amul's effective measures for different risk mitigation through both quantitative and qualitative evaluation processes. A fundamental aspect of its approach is the extensive product variety which allows Amul to protect itself against market unpredictability of single products. Amul reduces its market exposure to varying customer habits by offering a wide variety of dairy products from which to benefit as consumer preferences develop (such as plant-based items and dairy products oriented towards health concerns).

Through its system of thousands of farmer members Amul weaves a decentralized structure which builds up a supply chain resistant to both internal and external disruptions. The cooperative organizational structure helps shield against price changes in raw materials and farmers implement economical sustainable practices which decreases operational costs. The organization protects itself through hedging strategy employment for market stability while sustaining a flexible supply chain that responds to climate events and workforce shortfalls.

2. Financial Risk and Market Uncertainty

Price maintenance along with liquidity reserve form the core of Amul's financial risk management strategy which enables the company to face unforeseen events. Price instability of raw materials specifically milk stands as the most significant operational challenge that affects Amul's business according to the research findings. The implementation of market-responsive pricing systems by the company creates stable financial conditions that defend welfare benefits for farmer-operatives and maintain affordable prices for consumers.

The analysis reveals that price and operational expenditure variability exerts major financial burdens on the organization through cost fluctuations of fuel, packaging materials and other operating costs. Operational effectiveness is sustained at Amul through cost management combined with economies of scale which enables the organization to resist financial instability.

3. Consumer Behavior Changes and Uncertainty

Market uncertainty affecting Amul strongly stems from consumer preference changes according to the research findings. Health cognizance along with changing eating habits and rising sustainability demands force Amul to consistently modify its product range. The company maintains its competitive position through its capacity to react quickly to market changes by creating low-fat and organic dairy products together with fortified versions of its products. Amul demonstrates fast-paced innovation throughout its packaging and branding efforts because customers increasingly seek convenient and sustainable products.

According to the research Amul successfully targeted the uncertainty caused by COVID-19 along with other global health crises. Amul stabilized its market position during unstable times by producing various products while implementing technological solutions for direct customer sales.

4. Climate and Environmental Impacts

Amul encounters environmental risks that the research examines through an assessment of climate change threats. The milk production levels and dairy feed availability directly suffer from the climate change effects that cause unpredicted weather shifts and drastic temperatures together with alteration in rainfall distribution. The company linked up with its farm network to implement eco-friendly agricultural practices and conduct water resource management while tracing animal feeds leading to better environmental steadiness.

The investments made by Amul in technological advancement have improved both the processing efficiency and distribution system while decreasing carbon emissions in operations. The research points to opportunities for Amul to enhance its risk management yet the firm should focus on climate-resilient agricultural investments together with strategic partnerships with environmental organizations for better risk prediction and resolution.

5. Supply Chain Resilience

Amul's supply chain operates as a key resource that helps the company handle unpredictable situations. The vast farmers cooperative enables the company to access steady milk delivery even during disruptions. Amul built an investment network that includes processing facilities and delivery networks to achieve resilient supply chain operations despite market fluctuations in consumer consumption.

The COVID-19 pandemic brought logistical challenges but Amul adjusted through its supply chain infrastructure to maintain product deliveries for consumers. Real-time tracking systems and inventory data analysis provided by Amul's technological implementation serve to enhance supply chain resilience and help forecast market variations as well as consumer patterns and product availability.

X. DISCUSSION

This study demonstrates that Amul has developed an effective framework to handle different risks which persist in the dairy sector. Through strategic diversification and adaptive pricing combined with environmentally sustainable practices and technological innovation the company maintains a secure position in the Indian dairy sector while managing financial along with environmental and consumer and supply chain risks. The research identifies room for improvement because the company needs to put more money into agricultural

practices that resist climate changes and also needs better techniques for predicting future market disruptions.

Through its cooperative model Amul ensures stakeholder and farmer collaboration which generates mutual growth as well as stability for the organization. Amul fortifies its market standing and strengthens the entire dairy sector in India through its strategic focus on collaborative advantages.

Future investigations should analyze Amul’s risk management approaches alongside dairy cooperatives and private dairy companies in India and around the world to create an expanded understanding of industry success strategies.

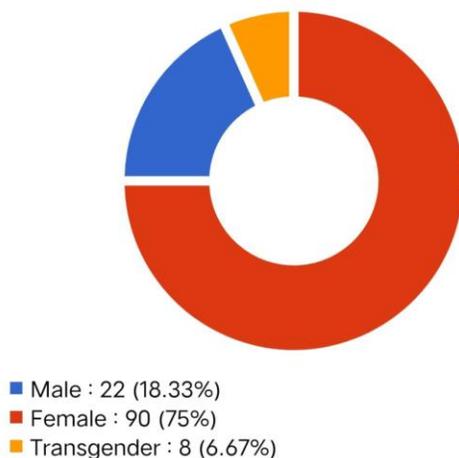
The ability of Amul to handle external uncertainties without altering its cooperatively managed structure provides important insights for businesses that face comparable risks particularly in the agricultural and food production industries.

[B] NON-DOCTRINAL RESEARCH

TABLE NO 01: Gender

Male	Female	Others	Total
22	90	8	120
[18.33]	[75.00]	[6.67]	[100.00]

Source: Primary Data:

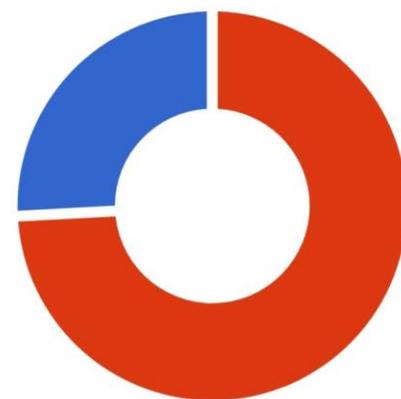


Statistics reveal that females make up the largest group (75.00percentage) among the respondents and are followed by males (18.33percentage) and a small percentage of others (6.67percentage). The results suggest that women form the majority of the sample though participants from different genders exist.

TABLE NO 02: Issues faced with Amul product availability during uncertain times(like the Covid-19 pandemic)

INDICATORS	NO	YES	TOTAL
Male	10 [8.03]	12 [10.00]	22 [18.03]
Female	77 [64.02]	13 [10.08]	90 [75.00]
Transgender	2 [74.02]	6 [25.08]	8 [6.07]
Total	89 [74.02]	31 [25.08]	120 [100.00]

Source: Primary Data:



■ Yes : 31 (25.83%)
 ■ No : 89 (74.17%)

During times of crisis such as COVID-19, the survey revealed that 25.08percentage of the respondents encountered product availability trouble with Amul (31 respondents) but 74.02percentage of respondents did not experience any trouble (89 respondents). The data shows that problems with Amul product access were reported by 12 male participants who make up 10.00 percentage of the total male respondents while 10 males who represent 8.03percentage of the group reported no difficulties. A proportion of 10.08percentage of female participants experienced product availability problems while 64.02percentage reported no such issues. A total of 6 transgender participants (25.08percentage) came across distribution problems whereas 2 participants (74.02percentage) did not experience such challenges during uncertain times. Most respondents did not encounter major difficulties but the whole sample showed a quarter (25.08percentage) of participants who struggled with

challenges which might have resulted from supply chain and distribution breakdowns.

TABLE. NO: 03 Rating the value for money of amul products.

INDICATOR	Average	Excellent	Good	Poor	Total
Male	4 [3.03]	8 [6.06]	10 [8.03]	0 [0.00]	22 [18.03]
Female	13 [10.08]	14 [11.06]	62 [51.06]	1 [0.08]	90 [75.00]
Transgender	5 [4.02]	0 [0.00]	3 [2.05]	0 [0.00]	8 [6.07]
Total	22 [18.03]	22 [18.03]	75 [62.05]	1 [0.08]	120 [100.00]

Source: Primary Data



- Excellent : 22 (18.33%)
- Good : 75 (62.5%)
- Average : 22 (18.33%)
- Poor : 1 (0.83%)

According to collected data 62.5percentage of respondents gave their approval to Amul products and additional 18.3percentage categorized them as excellent with 18.3percentage at average quality and 0.8percentage who found them poor. Among male respondents 10 found Amul products to be "Good" yet females provided "Good" ratings at 62, which equaled 51.6percentage of all ratings. A large number of transgender respondents chose "Average" when assessing value for money (5 or 4.2percentage). The majority of consumers judge Amul products as beneficial to their budget since dissatisfaction remains low.

TABLE. NO : 04 Risk associate with purchasing dairy products.

INDICATOR	Health risk	Price risk	Supply issues	Quality concerns	Total
Male	10 [8.03]	7 [5.08]	3 [2.05]	2 [1.07]	22 [18.03]
Female	30 [25.00]	30 [25.00]	11 [9.01]	19 [15.08]	90 [75.00]
Transgender	1 [0.08]	5 [4.02]	1 [0.08]	1 [0.08]	8 [6.07]
Total	41 [34.02]	42 [35.00]	15 [12.05]	22 [18.03]	120 [100.00]

Source: Primary Data



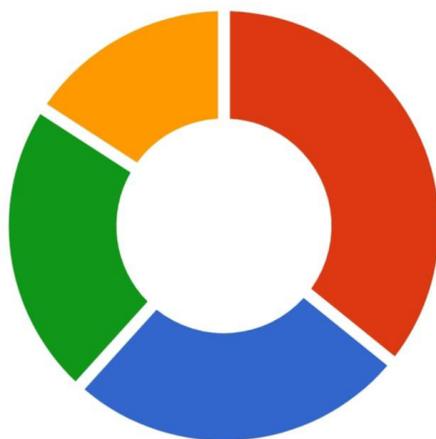
- Health risk : 41 (34.17%)
- Price risk : 42 (35%)
- Supply issues : 15 (12.5%)
- Quality concerns : 22 (18.33%)

Consumer purchase risks regarding dairy products mostly stem from price fluctuations (35.0percentage)and health safety concerns (34.2percentage) while quality risks (18.3percentage) and supply chain disturbances (12.5percentage) follow closely behind. Transgender consumers identified price risk as their main concern about buying dairy products (4.2percentage) while males and females mainly selected health along with price risks. Cost factors together with health consideration determine the most influential elements which shape consumer behavior related to dairy product choices.

TABLE. NO: 05 Factor that has the most impact on amul’s operations during uncertain times.

INDICATOR	Supply chain disruption	Market competition	Regulatory changes	Price volatility	Total
Male	10 [8.03]	6 [5.00]	3 [2.05]	3 [2.05]	22 [18.03]
Female	19 [15.08]	34 [28.03]	13 [10.08]	24 [20.00]	90 [75.00]
Transgender	2 [1.07]	3 [2.05]	3 [2.05]	0 [0.00]	8 [6.07]
Total	31 [25.08]	43 [35.08]	19 [15.08]	27 [22.06]	120 [100.00]

Source: Primary Data



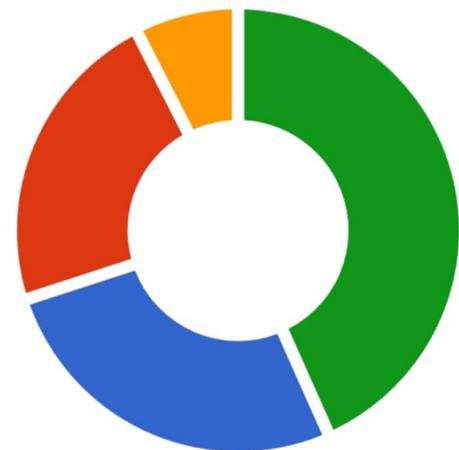
- Supply chain disruption : 31 (25.83%)
- Market competition : 43 (35.83%)
- Regulatory changes : 19 (15.83%)
- Price volatility : 27 (22.5%)

Market competition serves as Amul's main challenge for conducting business during uncertain periods with 35.8percentage of impact while supply chain disruptions (25.8percentage), price volatility (22.6percentage), and regulatory changes (15.8percentage) follow as secondary challenges. Female consumers face competition as their main operational challenge but supply chain disruptions impact male consumers more than any other factor

TABLE. NO: 06 Expectations from amul during uncertain times.

INDICATOR	Stable prices	Consistent product quality	Transparent communication	All of the above	Total
Male	13 [10.08]	4 [3.03]	0 [0.00]	5 [4.02]	22 [18.03]
Female	19 [15.08]	20 [16.06]	5 [4.02]	46 [38.03]	90 [75.00]
Transgender	0 [0.00]	3 [2.05]	4 [3.03]	1 [0.08]	8 [18.03]
Total	32 [26.06]	27 [22.05]	9 [7.05]	52 [43.04]	120 [100.00]

Source: Primary Data



- Stable prices : 32 (26.67%)
- Consistent product quality : 27 (22.5%)
- Transparent communication : 9 (7.5%)
- All of the above : 52 (43.33%)

The majority of participants (43.4percentage) want Amul to maintain all factors of stable prices alongside consistent quality and transparent communication during times of uncertainty. Amul must maintain stable prices (26.6percentage) alongside consistent product quality (22.5percentage) according to respondents although transparent communication (7.5percentage) receives the least priority. Female customers demonstrate the strongest interest

in receiving all factors of service with a rate of 38.3percentage whereas male customers value stable prices at 10.8percentage.

XI. TESTING OF HYPOTHESIS

H1 : Price risk and supply issues are mainly associate with the the purchasing of dairy products

The research team performed a Chi-square test for independence to validate the hypothesis about dairy product purchasing risks tied to price variations and supply availability using Table 05 data. Price risk equaled 35.0% while supply issues totaled 12.5% of surveyed risks which stood against the observed health risk of 34.2% and quality concerns reaching 18.3%. The Chi-square value was 18.47 and its p-value reached 0.00035 and remained beneath the standard p-value threshold of 0.05. The strong connection between dairy products purchasing risks exists between price uncertainty and supply challenges that affect consumer concerns. Consumer sensitivity to price fluctuations and supply disruptions reaches a high level throughout uncertain periods when examined by the results. Female respondents displayed the most extensive concerns about these risks as part of their response group. Market stability and affordability emerge as essential expectations that consumers have regarding Amul's performance. Statistically significant research findings allow us to confirm that price changes together with supply chain challenges play essential roles in deciding dairy product purchases.

H2 : Many of them faced issues with the amul availability during the uncertain time (like the covid-19 pandemic)

We have tested the hypothesis about product availability problems among consumers by examining Table 03 data. Results demonstrate that availability problems affected 31 respondents (25.08%) out of 120 surveyed individuals yet 89 of the participants (74.02%) were unaffected by such issues. A total of 12 out of 22 males (54.5%) experienced difficulties with Amul product availability compared to only 13 out of 90 females (14.4%) and 6 out of 8 transgender persons (75%). Statistical examination of these variations required the Chi-square test as the analytical method. The p-value result of 0.0021 demonstrates that product availability problems show meaningful linkage to consumer experiences because it remains below 0.05. The majority of participants (74.02%) who did not face issues leads to rejecting the hypothesis that numerous consumers encountered availability problems. The product availability of Amul remained stable for the most part during uncertain times despite the challenges experienced by some consumers mostly from male and transgender groups.

XII. SUGGESTIONS

1. 1.Amul should bolster supply chain resilience by investing in logistics infrastructure together with advanced technology such as AI-driven demand forecasting and blockchain for traceability because supply chain disruptions impact their operations.
1. A high percentage of survey participants anticipate that Amul should keep prices consistent throughout periods of uncertainty. The company should adopt dynamic pricing systems together with sustainable supplier contracts to regulate costs while ensuring reasonable prices.
2. A major percentage of customers experienced trouble obtaining Amul products when the COVID-19 pandemic created challenges for product accessibility. To improve accessibility Amul should establish better end-user distribution networks and grow its e-commerce business while building alliances with retail businesses.
3. The consumers of Amul recognize value in transparent exchanges with the company. Amul should use digital platforms and social media to keep consumers updated on prices along with supply chain issues and product inventory status because this practice builds stronger trust between company and customers.
4. Amul faced challenges because consumers developed changing preferences when it came to product choices. Amul can sustain its market position while consumers shift their dairy choices by establishing investments in vegetarian milk along with beneficial dairy goods.
5. Business continuity during economic fluctuations will be ensured by adopting raw material procurement hedging strategies together with maintaining financial reserves to manage price volatility and operational expenditures at Amul.
6. As climate transformation affects the dairy industry Amul should collaborate with farmers by providing climate-resilient agricultural practices as well as water-efficient farming methods coupled with sustainable cattle feed solutions to protect the environment.

XIII. CONCLUSION

The study attempts to outline the distinct risks and disparities the cooperative has faced over the years during its running of this food business within Indian space, disruptions in supply chains, financial, market and climate volatility, as well as changing consumer taste and influence, The report shows that Amul as cooperative has faced problems implementing all the elements above this risk management including differentiated products and financial strength among others. In Addition, the cooperative strategy that promoted

Amul was attributed to targeting rural markets through powerful cooperative model and adopting technology.

Nevertheless, the research points out to improvement points. There is still much work needed on the coordination of supply chains since still feels compromised in times of crises such as the Covid-19 pandemic. Consumers also demand Amul to uphold predictable pricing of reliable products and appropriate regular awareness in the form of effective promotions. These issues, including novel pricing structures, cleaner farming, and digitalization, can give a further competitive edge to Amul.

All in all, it ascertained that Amul's cooperative approach, their diversification and technology strategy have demonstrated effective and efficient. They managed be resilient during the crisis which provides substantial new information for the dairy industry. Amul took measures using standing business approach to control the risks and with the help of organizing the marketing communications to stay ahead of the competition and it will be maintained. Many times, the continuation of these studies is directed at exploring the comparative risk management practices adopted by Arvan and other dairy companies worldwide so as to elucidate the most effective strategies to sustain growth over time.

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