

Indian Journal of Commerce, Business & Management (IJCBM)



A Peer Reviewed Research journal of Commerce, Business & Management

ISSN : 3108-057X (Online)

3108-1282 (Print)

Vol.-2; Issue-1 (Jan.-March) 2026

Page No.- 65-76

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<https://ijcbm.gyanvidya.com>

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A RESEARCH STUDY ON PRODUCTION ECONOMICS AND MARKETING PERFORMANCE OF FIREWORKS IN VIRUDHUNAGAR DISTRICT, TAMILNADU

ABSTRACT : The fireworks industry is one of the most important traditional industries contributing to the economic development of Virudhunagar District, Tamilnadu especially Sivakasi, which is widely known as the fireworks capital of India. The industry provides employment to a large number of skilled and unskilled workers and plays a significant role in regional income generation. Despite its economic importance, fireworks manufacturers face several challenges related to both production and marketing. Rising prices of raw materials and chemicals, irregular availability of inputs, increasing labour costs, safety and compliance expenses, and strict government regulations have considerably increased the cost of production. These factors directly influence the profitability and sustainability of the industry. In addition to production-related issues, marketing fireworks has become increasingly complex due to intense competition, seasonal demand, price fluctuations, transportation costs, and the role of intermediaries. In many cases, manufacturers are unable to fix selling prices that adequately cover production costs, forcing them to offer discounts and incentives to retain customers in a highly competitive market. This situation adversely affects their profit margins and long-term economic stability. The present study aims to analyse

Research study on production economics and marketing performance of fireworks in Virudhunagar District, Tamilnadu by examining the cost structure, pricing trends, and major marketing problems faced by manufacturers. The study is based on both primary and secondary data. Primary data were collected from fireworks manufacturing units through field surveys, observations, and interviews, while secondary data were obtained from published reports, journals, and official records. Statistical tools such as percentage analysis, chi-square test, sign test, and factor analysis were used for data analysis. The findings of the study provide insights into key economic constraints and suggest suitable measures for improving efficiency, profitability, and sustainable growth of the fireworks industry.

Keywords : Economics of Production, Fireworks Industry, Cost Structure, Marketing Economics, Virudhunagar District.

INTRODUCTION : Fireworks are a category class of explosive pyrotechnic devices employed for aesthetic enjoyment, entertainment and religious celebrations. The four primary commonly used displays of fireworks are: noise, sound, smoke and floating objects fireworks that create effects take many forms. They might be engineered to emit flames and sparks in various colours. As the most anticipated Diwali celebrations approach Sivakasi, renowned for its firecrackers and match industries, is poised for a substantial surge in Diwali crackers production. Approximately 75% of firecrackers and matches produced in India are from Sivakasi. So the whole country depends upon Sivakasi for the supply of fireworks. The advancement of the industry is closely linked to the contentment of employees engaged in the firework sector. Sivakasi, a rapidly developing town in the Virudhunagar District, hosts a significant number of commercial and industrial enterprises, particularly in the fireworks industry. This sector is characterized by its labour-intensive nature, relying heavily on both male and female workers. Many women enter this workforce to alleviate their financial hardships and contribute to their household income. However, they encounter numerous challenges at their workplace, including poor working conditions. Consequently, this study aims to investigate the extent of job satisfaction among employees and their performance within the firework industry. The study on employment and related problem of the fireworks workers and their economic situation and the manufacturers have adopt several strategies in marketing to maintain a stable position of its fireworks brands in the sales. Economically, if we want to increase the production of firecrackers, then the workers working in the firecrackers factory should also be increased, only then the production capacity will increase and on that basis we can sell more in the market. As far as crackers are concerned, if the production capacity increases, the sales will increase. There are many costs involved in selling in the market. He has to

advertise in such a way as to entice his customers by providing facilities like discounts and offers to his customers. Also in the manufacturing segment it has to employ more strategies to further improve its crackers sales. The fireworks industry plays a vital role in the economic development of Virudhunagar District, Tamilnadu particularly in Sivakasi, which is popularly known as the fireworks hub of India. The industry not only contributes significantly to industrial output but also provides large-scale employment opportunities to skilled and unskilled workers. A major share of the population in this region depends directly or indirectly on fireworks production and marketing for their livelihood. Hence, the economics of production and marketing assumes greater importance in understanding the sustainability of this industry.

The cost of production in the fireworks industry is influenced by various factors such as raw material availability, chemical prices, labour wages, safety measures, and compliance with government regulations. In recent years, increasing input costs and strict regulatory norms have created financial pressure on manufacturers. Along with production challenges, marketing fireworks has also become complex due to intense competition, seasonal demand, price sensitivity of customers, transportation costs, and the need for aggressive promotional strategies. Effective marketing plays a crucial role in determining the success of fireworks manufacturers. Pricing strategies, discounts, dealer commissions, advertising expenditure, and distribution channels directly influence sales volume and profitability. Therefore, a detailed study of the economics of production and marketing is essential to identify cost-related problems and suggest suitable measures for improving efficiency, profitability, and long-term growth of the fireworks industry in Virudhunagar District, Tamilnadu.

REVIEW OF LITERATURE : J.Suresh Reddy (2003), in his research titled "Impact of E-commerce on marketing" emphasizes that marketing is one of the business functions most significantly influenced by the advent of emerging information technologies. The Internet offers businesses novel avenues for communication and engagement. It facilitates the establishment of cost-effective relationships with customers across marketing, sales, and customer support, fostering positive interactions that serve as the basis for enduring relationships and promoting repeat purchases. Online shopping enables customers to conveniently purchase products from the comfort of their homes, regardless of their location in the world.

Charles R.Schwenk (2007) intended to study risk involved marketing decisions of over simplifying marketing strategy in business process. It was studied how strategic marketing policies created and what were the factors influenced effective marketing strategic policies. It also analyses major phases of creation of marketing strategy. The major

phases of marketing strategy creation were identification of essential marketing decision, development phase according to marketing survey and selection phase of marketing strategy.

Ramalingam L.P.(2008), in the article "Buyer Behaviour Towards Online Shopping," identifies that the predominant demographic of respondents interested in online shopping is males aged 25-40. This group significantly outnumbers female respondents. Most individuals reported making purchases primarily for personal use, with a notable frequency in acquiring CDs and DVDs. Additionally; occasional shoppers constitute a large segment, with time efficiency being the primary motivation for online purchases. The overall satisfaction level among respondents tends to be neutral, as many express neither satisfaction nor dissatisfaction. Concerns regarding data transmission security and privacy protection pose challenges for the burgeoning Indian e-commerce market, particularly in the realm of online shopping.

Although these studies provide valuable insights into marketing strategies and consumer behavior, they are largely generic in nature and do not focus on industry-specific economic issues. Very limited research has been conducted on the fireworks industry, particularly with respect to the combined analysis of production costs and marketing economics. Existing literature also lacks empirical studies at the regional level, especially in Virudhunagar District; where the fireworks industry is highly concentrated. Moreover, issues such as rising input costs, pricing constraints, seasonal demand, and intermediary margins have not been adequately addressed. Hence, there exists a clear research gap in analyzing the Research study on production economics and marketing performance of fireworks in Virudhunagar District, Tamilnadu the present study.

STATEMENT OF PROBLEM : The focus of this research is on the marketing strategies employed for crackers in the Virudhunagar district, Tamilnadu. Marketing strategies encompass the various activities aimed at fulfilling an organization's marketing objectives. These strategies define the specific actions an organization will undertake in the marketing domain and outline the goals associated with each of these actions. Additionally, marketing strategies involve the development and execution of marketing programs. This study examines the current marketing strategies utilized by prominent manufacturers to promote crackers in Virudhunagar. It covers pricing, distribution, product strategies, marketing communication, and sales promotions. Furthermore, the research addresses market segmentation, as well as consumer and competitive analysis. The role of distributors is crucial, as they play a significant part in ensuring that the product is effectively distributed and accessible to the end consumer. So, establishing the most appropriate distribution strategy is a major key to success. The area which the distributor is

covering, the brand portfolio he maintains, the services he renders to his customers, all are forming part of his strategies and assessment of which is a must for determining his contribution in the marketing of crackers. Assessment of the strategies of manufacturers and dealers cannot be made without understanding the perception of the consumers on the product and the sales services rendered by them. Marketers make use of the perception of consumers to formulate new marketing strategies or to revise existing ones. So a combined analysis of manufacturer and distributor strategies along with consumer perception assessment is highly relevant to any study.

SCOPE OF STUDY :

The following areas may be suggested for future research:

- Study on problems faced by the cracker industries.
- Study on problems faced by the workers of fireworks industries.
- The study covers the cost of production, problems faced by the producers of the cracker and marketing strategies followed by them. Further the study also includes the consumer behaviour towards the features of crackers and usage.
- The study also explains how crackers provide employment to workers and dominate the sale of explosives.

OBJECTIVES OF STUDY : The main objectives of the study are:

- 1) To analyzed the cost structure involved in the production of fireworks in Virudhunagar District, Tamilnadu with special reference to raw materials, labour, safety compliance, and transportation costs.
- 2) To examine the pricing practices and marketing strategies adopted by fireworks manufacturers in a competitive and seasonal market.
- 3) To identify the major problems faced by manufacturers in the production and marketing of fireworks and their impact on profitability.
- 4) To study the role of intermediaries in the distribution of fireworks and to suggest suitable measures for improving economic efficiency and sustainable growth of the industry.

PURPOSE OF THE STUDY : Fireworks industry has given employment to nearly 1, 00,000 people directly. Approximately 1,50,000 individuals are engaged in indirect employment related to fireworks, encompassing activities such as the production of paper tube, wire cutting, box fabrication, transportation by lorry, as well as sales and distribution across the nation in the early years, new fireworks units were initially planned on expectations that the demand for fireworks would register a steady, even growth rate. However, the growth rate has slowed down due to recession in the fireworks industry leading to a stagnant situation.

It is mainly due to the following reasons:

- (1) The quality of the fireworks products of Sivakasi is below the standard of the fireworks products produced by China, the major competitor.
- (2) The non-availability of direct transport facilities, particularly shipping facilities to intended countries.

The purpose of this study is to ensure that the crackers industry remains economically viable despite the sluggish situation

HYPOTHESES OF THE STUDY:

The study is formulated with the following null hypotheses.

H₀₁: There is no significant relationship between major production cost components (raw materials, labour, safety, and transportation) and the selling price of fireworks (tested using Chi-square test).

H₀₂: There is no significant difference in the opinions of fireworks manufacturers regarding major marketing problems such as price fluctuation, seasonal demand, competition, and intermediary margins (tested using Sign test).

H₀₃: The various production and marketing variables do not significantly influence the overall economic performance of fireworks manufacturers (tested using Factor Analysis).

These hypotheses are tested to examine the economic viability of the fireworks industry in Virudhunagar District, Tamilnadu.

RESEARCH METHODOLOGY : Data was collected from the fireworks units, on the spot, by observation method and from interactions with workers, foremen and factory managers. In order to trace certain unexplored areas, which would be beneficial to the producers and workers of fireworks units, selective insight studies were made on Chinese crackers, Sparklers, Flowerpots and Rockets. The researcher watched very closely every small aspect of the process of manufacture of fireworks right from the beginning to the end, with the idea of economizing men, money materials and time.

It is quite necessary to observe directly the various processes of manufacture of fireworks items in various companies choosing a minimum of three each from leading, moderate, small and newly started ones. A lot of other studies were made observing the records maintained for various purposes in various sections of fireworks units. The various tests conducted in laboratories inside factories, the various methods testing the quality of fireworks products, the management of the units by the office people, foremen and personnel in charge of various sections in the factories were elaborately studied.

Observation method was followed to get information on product design, manufacturing processes involved in the production of fireworks, plant layout, materials handling, production planning and control, quality management, waste management and

safety management. This method became a vital one to know the practical problems that the fireworks manufacturers face in their factories. During data collection, care was taken to check and cross check the information obtained from the workers, section supervisors, foremen, office people and officials of factories.

The subject matter of the project necessitates the use of both primary and secondary data sources. Secondary data has been gathered from various websites, reports, journals, and these. The primary data as obtained through an interview schedule conducted data has been organized in a manner that facilitates comprehensive interpretation through the preparation of an appropriate number of tables.

PRIMARY DATA : Primary data was gathered to obtain firsthand insights regarding a specific topic and to facilitate the analysis of information. The data collection primarily involved conducting a survey through a prearranged structured interview. Furthermore, discussions with employers contributed to understanding the various challenges and concerns faced by employees and fireworks owners. Additionally, some information was observed and documented for incorporation into the research study.

SECONDARY DATA : Secondary data was gathered utilizing documentary research techniques. This data primarily pertains to theoretical dimensions, emerging trends, and diverse concepts relevant to the study. Information has been sources from a variety of materials, including Books, Journals, periodicals, Newspapers, magazines, and Websites among others.

TOOLS OF ANALYSIS :

For the analysing data, the following statistical tools were applied:

- (a) Percentage Analysis,
- (b) Chi- Square Test,
- (c) Sign Test, and
- (d) Factor Analysis.

PERCENTAGE ANALYSIS : Simple Percentage Analysis involves calculating a ratio using absolute figures. While interpreting the collected data may pose challenges, determining percentages facilitates the identification of relative differences among two or more attributes.

The formula for calculating the percentage of respondents is as follows:

$$\text{Percentage} = \frac{\text{Number of Respondents}}{\text{Total Number of Respondents}} \times 100$$

Table 1: Percentages

COST STRUCTURE OF FIREWORKS PRODUCTION

| Cost Components | Number Of Unit | Percentage (%) |
|-----------------------|----------------|----------------|
| Raw Materials | 53 | 37.9 |
| Labour Cost | 41 | 29.3 |
| Power and Fuel | 13 | 9.3 |
| Safety and compliance | 15 | 10.7 |
| Transportation | 18 | 12.8 |
| Total | 140 | 100 |

Result : Table 1 reveals that raw material cost (37.9%) forms the major portion of total production cost in the fireworks industry. Labour cost occupies the second highest share (29.3%), indicating that the industry is highly labour intensive. Transportation and safety and compliance together account for notable share, reflecting the regulatory and logistical challenges faced by manufacturers in Virudhunagar district.

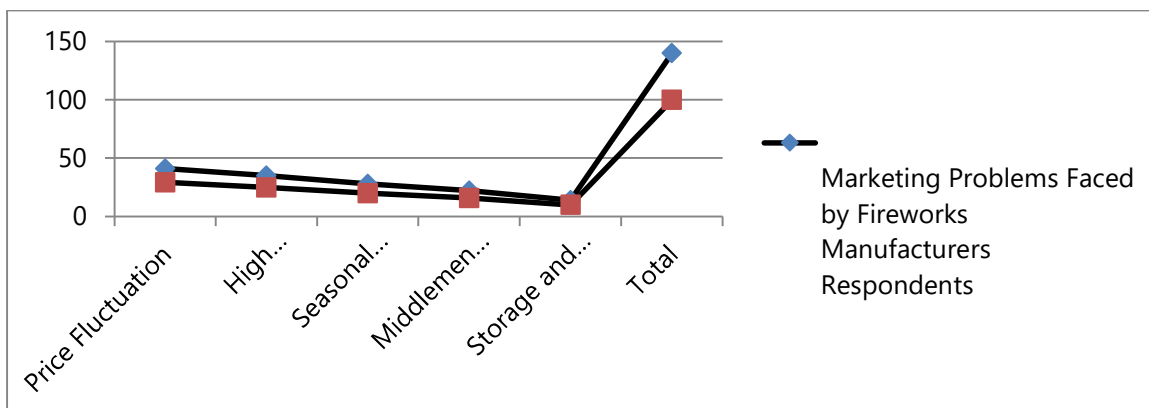
Table 2: Percentages

Marketing Problems Faced by Fireworks Manufacturers

| Marketing Issues | Respondents | Percentage (%) |
|---------------------------------|-------------|----------------|
| Price Fluctuation | 41 | 29.3 |
| High Competition | 35 | 25 |
| Seasonal Demand | 28 | 20.0 |
| Middlemen Margin | 22 | 15.7 |
| Storage and Distribution Issues | 14 | 10 |
| Total | 140 | 100 |

Result : The table indicates that price fluctuation (29.3%) is the most severe marketing problem faced by manufacturers. Seasonal demand and high competition tighter contribute significantly to market uncertainty. The role of middlemen and storage difficulties also affects profitability, highlighting the economic vulnerability of fireworks marketing.

Chart 1:



CHI-SQUARE TEST : Chi-square is a statistical method frequently employed to assess the alignment between observed data and the expected data derived from a specific hypothesis. This test is denoted by the symbol χ^2 , and it necessitates that the data be presented in frequency format. The chi-square test is recognized as one of the most straightforward and widely utilized nonparametric tests in statistical analysis. The Greek letter Chi, represented as χ , is integral to this test. Initially introduced by Karl Pearson in 1900, the χ^2 statistic quantifies the extent of deviation between theoretical predictions and actual observations. In chi-square tests, data is typically expressed in terms of counts or frequencies, and while the original survey data may be on a nominal scale or higher, it can be categorized if it is on a higher scale of measurement. Consequently, the chi-square test serves as a robust analytical tool. It is essential for researchers to determine the appropriate statistical test that corresponds to the chi-square.

Table 3: Chi-square

Relationship between Production Cost and Selling Price

| Particulars | Value |
|-----------------------------|--------------|
| Calculated chi-square Value | 9.87 |
| Table Value (5%) | 7.81 |
| Degree of Freedom | 3 |
| Level of Significance | 0.05 |
| Result | Significance |

Result : Since the calculated chi-square value (9.87) is greater than the table value (7.81), the null hypothesis is rejected. This indicates that production cost and selling price are significantly related. An increase in raw material and labour cost directly influences the market price of fireworks.

SIGN TEST : This method is classified as a non-parametric approach within the realm of statistical analysis. It is applicable to both nominal and ordinal data types and imposes fewer stringent requirements regarding the measurement level of the data. In the process of collecting responses from the sample employees, a '+' symbol is noted if a worker answers 'yes' to any given statement, while a '-' symbol is recorded for a 'no' response. Consequently, the responses from all sampled employees are documented using these symbols. The objective of this study is to assess whether the 'yes' and 'no' responses of workers for each statement are statistically equivalent. This test is suitable for both small samples ($n < 20$) and large samples case ($n > 20$). Here, n denotes the number of respondents

who answered 'yes' and 'no' responses for all 13 statements formulated for this study exceeds 20. The null hypothesis posits that there is no significant difference in the responses among the participants across the various facilities provided.

Table 4: Sign Test

| Response | No of Respondents |
|--------------|-------------------|
| Positive (+) | 92 |
| Negative (-) | 48 |
| Total | 140 |

Result : The Sign Test shows that a majority of respondents (92) expressed a positive opinion regarding profitability. This confirms that, despite challenges, fireworks manufacturing remains economically viable, especially during peak festive seasons.

FACTOR ANALYSIS : A technique has been utilized to identify the primary components influencing the welfare facilities provided by the fireworks sector in Virudhunagar District. Factor analysis, which is a multivariate statistical method, does not distinguish between dependent and independent variables. In this process, all variables under investigation are analysed together to uncover the fundamental factors. Factor analysis functions as a data reduction method, efficiently condensing a vast number of variables that add to data complexity into a smaller set of manageable factors. These factors represent a substantial portion of the initial dataset.

FINDINGS : The study reveals that raw material cost constitutes the largest share of the total production cost, followed by labour expenses, indicating that the fireworks industry is both input-intensive and labour-intensive in nature.

Rising prices of chemicals, safety compliance costs, and transportation expenses have significantly increased the overall cost of production for fireworks manufacturers.

Chi-square analysis shows a significant relationship between production cost and selling price, confirming that increases in input costs directly influence market prices.

Marketing analysis indicates that price fluctuation, seasonal demand, and intense competition are the major problems faced by manufacturers, affecting profitability and sales stability.

SUGGESTIONS :

Fireworks manufacturers should adopt effective cost-control measures, particularly in procurement of raw materials through collective purchasing or long-term supplier agreements.

Improved production planning and efficient labour management can help reduce wastage and lower operating costs.

Manufacturers should develop appropriate pricing strategies that balance cost recovery with market competitiveness, especially during peak festive seasons.

Strengthening direct marketing channels and reducing dependency on intermediaries may help improve profit margins and ensure sustainable economic growth of the fireworks industry in Virudhunagar District, Tamilnadu.

LIMITATION OF THE STUDY :

Even though an elaborate study was made on the problems in the production of fireworks in Sivakasi, it was subject to the following limitations:

1. The study was confined mostly to the production of certain fireworks items like Chinese crackers, sparklers, flowerpots, caps and rockets.
2. The study was limited to Sivakasi only.
3. Since it was a pioneering study, it was mostly exploratory in nature.
4. The study relates to the qualitative nature of several responses which could be analysed properly only on the basis of scoring method. The result is limited to the reliability of the method used in the measurement and the analysis of the data.

CONCLUSION : The present study has examined the A Research study on production economics and marketing performance of fireworks in Virudhunagar District, Tamilnadu with special reference to Sivakasi. The findings reveal that the industry plays a vital role in regional economic development by providing employment and income opportunities. However, rising production costs due to increasing prices of raw materials, labour wages, safety compliance, and transportation have placed considerable financial pressure on fireworks manufacturers. Marketing challenges such as seasonal demand, price fluctuations, intense competition, and intermediary margins further affect profitability. The study establishes a significant relationship between production cost and selling price, indicating the need for efficient cost management and rational pricing strategies. Overall, the study concludes that while the fireworks industry remains economically important, its long-term sustainability depends on improved cost control, effective marketing practices, and supportive policy measures to enhance productivity and profitability in the sector.

CHAPTER PLAN : The present study is classified into seven chapters for neat and clear presentation. The first chapter includes the introduction and research design of the study. The second chapter of study focuses on the reviews of relevant literature related to study concepts and issues discussed in the statement of problem of the study. The third chapter on production process of crackers. The fourth chapter, the study of the economics of production of crackers. The fifth chapter of the study of marketing strategies of fireworks. The sixth chapter role of middleman and retailers in crackers marketing. The seventh

chapter summarizes the finding of the study, suggestion, conclusion of the study and further scope for research in the current subject issues.

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