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Investigate How CEAT Manages its Raw Materials, Production Processes, and Distribution Channels

Mr.Arvind Vikas Gaikwad , Prof.Ashok Desai, Dr.Ashwini Kshirsagar

Mr.Arvind Vikas Gaikwad ,MASTERS OF MANAGEMENT STUDIES & Alamuri Ratnamala Institute of Engineering and Technology (ARMIET),

Prof.Ashok Desai, MASTERS OF MANAGEMENT STUDIES & Alamuri Ratnamala Institute of Engineering and Technology (ARMIET),

Dr.Ashwini Kshirsagar, MASTERS OF MANAGEMENT STUDIES & Alamuri Ratnamala Institute of Engineering and Technology (ARMIET),

Abstract

The research paper aims to provide a comprehensive understanding of CEAT's supply chain management practices, focusing on three critical areas: raw materials management, production processes, and distribution channels. The combination of primary and secondary data collection methods ensures a robust and nuanced exploration of these aspects.

The primary data collection involves interviews with key personnel directly engaged in CEAT's supply chain operations. This approach offers firsthand insights into the company's strategies, challenges, and successes in managing raw materials, optimizing production, and streamlining distribution channels. These interviews provide a qualitative dimension to the research, offering a deeper understanding of the day-to-day decision-making processes within CEAT's supply chain.

Complementing the primary data, secondary data collection involves an extensive review of existing literature, company reports, and industry publications. This approach allows for a broader contextualization of CEAT's practices within the global tire manufacturing sector. By benchmarking against industry best practices, the study can identify areas where CEAT excels and areas for potential improvement.

The paper's structure facilitates a systematic exploration of CEAT's supply chain, starting with an overview of the company's supply chain structure. This sets the stage for a detailed examination of how CEAT manages its raw materials, delving into procurement strategies ensuring a stable and reliable supply chain. The investigation then shifts to production processes, assessing the adoption of technology, implementation of quality control measures, and the overall operational efficiency in tire manufacturing.

Recognizing the significance of distribution channels, the research explores how CEAT tailors its network to meet diverse market demands. This involves considerations of geographical variations, customer preferences, and adherence to regulatory requirements. The role of technology and innovation in enhancing overall supply chain management is a

key focus, showcasing CEAT's adaptability and forward-thinking approach.

The research findings contribute valuable insights for academics and industry practitioners alike. By understanding CEAT's approach to raw material sourcing, production optimization, and distribution efficiency, companies in similar industries can draw lessons to enhance their own supply chain strategies. The ultimate goal is to shed light on strategies that contribute to CEAT's sustained success in the highly competitive tire manufacturing landscape, thereby offering practical guidance for industry stakeholders and researchers alike.

KEYWORDS

CEAT ,Supply Chain Management,Raw Materials,Production Processes,Distribution Channels,Operational Efficiency,Customer Demands,Competitiveness,Tire Industry

1. INTRODUCTION

CEAT Limited, a prominent player in the global tire manufacturing industry, stands as a testament to a rich history that spans almost a century. Established in 1924 in Turin, Italy, as Cavi Elettrici e Affini Torino, the company has evolved into an Indian multinational enterprise under the ownership of the RPG Group. With an expansive product portfolio covering passenger cars, two-wheelers, trucks, buses, light commercial vehicles, earth-movers, forklifts, tractors, trailers, and auto-rickshaws, CEAT has established itself as a key player in the tire market, producing over 165 million tires annually.

The journey of CEAT's transformation is marked by pivotal moments, beginning with its incorporation as CEAT Tyres of India in Mumbai on March 10, 1958. Initially collaborating with the Tata Group, the company expanded its horizons by setting up a research and development unit in Bhandup in 1972. Notably, in 1981, the merger with Deccan Fibre Glass Limited marked a significant chapter in CEAT's growth.

The 1980s presented challenges, including a change in ownership with Alberto, the son of the founder, selling Cavi Elettrici e Affini Torino to the investment firm SOFIT. This led to financial difficulties in Italy, and Pirelli ultimately acquired the rights to the CEAT name, which later found its home with the RPG Group in 1983. In 1982, RPG Group officially acquired CEAT, and a decade later, in 1990, the company was rebranded as CEAT.

Partnerships and collaborations have played a crucial role in CEAT's global expansion strategy. In 1993, CEAT joined forces with the Yokohama Rubber Company to manufacture radial tires at their Nashik unit. The collaborative spirit continued in 1999 when CEAT formed a joint venture, CEAT Kelani, in partnership with Asia MotorWorks (AMW) and Kelani Tyres, to manufacture and market CEAT tires in Sri Lanka. This venture resulted in the commissioning of a radial tire manufacturing unit in Kalutara in 2006.

The company's commitment to innovation and quality is evident in its diverse product offerings catering to heavy and light commercial vehicles, off-highway applications, passenger cars, tractors,

motorcycles, scooters, cycles, and SUVs. CEAT's global footprint is further extended through its exports across Asia.

As CEAT continues to navigate the dynamic landscape of the tire industry, a critical aspect of its operations lies in the efficient management of raw materials, production processes, and distribution channels. This research endeavors to delve into the intricacies of CEAT's supply chain management, aiming to uncover the strategies and practices employed by the company to ensure operational efficiency and meet the diverse demands of its customers. By analyzing these key elements, this study seeks to contribute valuable insights to the broader understanding of best practices in supply chain management within the tire manufacturing sector.

2. Body of Paper

CEAT Limited, a leading tire manufacturing company, has embarked on a transformative journey towards smart factory enablement and production optimization across its facilities in Chennai, Nagpur, and Halol. The company aims to extend this technological advancement to all its plants in the near future. This strategic shift has positioned CEAT as an intelligent, transparent, and scalable interconnected system, moving away from traditional manufacturing processes.

Smart factory enablement at CEAT involves a comprehensive upgrade of its technology platform, incorporating Edge and Cloud architecture into the overall framework. This transformation has resulted in the creation of an ecosystem comprising more than 10 technologies, facilitating the design, development, and deployment of digital solutions. The introduction of a Digital Analytics Center of Excellence (CoE) with over 25 experts underscores CEAT's commitment to resolving manufacturing issues through digital levers.

Collaboration tools have become integral to CEAT's operations, ensuring seamless communication through messaging and storage platforms. The company has prioritized the modernization of data centers in its factories, adopting environmentally conscious designs that consider factors such as temperature, humidity, air flow, power, and cooling data. Leveraging Hyper-Converged Infrastructure (HCI), CEAT has achieved a 40% reduction in power consumption by consolidating its application landscape.

CEAT has forged connections with Original Equipment Manufacturers (OEMs), vendors, and value chain partners, creating a connected application ecosystem. The integration of enterprise systems with key stakeholders expedites automation and agile implementation. The company has embraced low-code and no-code platforms to accelerate application development, particularly in areas such as quality assurance and manufacturing functions.

In its pursuit of automation, CEAT employs robotic process automation tools and cutting-edge technologies to streamline end-to-end processes. The company has ingrained an agile way of working into its culture, embracing a "fail fast, learn fast" approach. Virtual reality-based training stations on the shop floor for tire building machines exemplify CEAT's commitment to continuous improvement in

operational efficiency. These stations include tutorials, practice sessions, and evaluation modes, enhancing the training and performance monitoring of operators.

As CEAT advances in this interconnected world, it places significant emphasis on cybersecurity. The company continues to invest in appropriate tools and technologies to safeguard its operations against potential threats.

CEAT's smart factory enablement and production optimization initiatives showcase a commitment to technological innovation, sustainability, and efficiency. The integration of digital solutions, collaborative tools, and advanced technologies positions CEAT as a frontrunner in the tire manufacturing industry, paving the way for enhanced raw material management, streamlined production processes, and optimized distribution channels.

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CEAT Limited, in pursuit of its vision and goals, is dedicated to fostering environmentally friendly products across diverse geographies while prioritizing customer delight and safety. A key aspect of realizing this vision involves a robust focus on research and development (R&D) initiatives aimed at achieving value enhancement through virtual design simulations. This approach has significantly reduced the need for physical prototyping and testing, leading to a reduction in overall lead time and enhanced resource efficiency.

The company's commitment to sustainability is evident in its emphasis on responsible sourcing and green raw materials. CEAT places a strategic focus on developing fossil-free tires and incorporating eco-friendly raw materials, creating opportunities for small enterprises and start-ups within its platform. The company actively engages in capacity building around green materials, aligning its sustainability initiatives with global environmental goals.

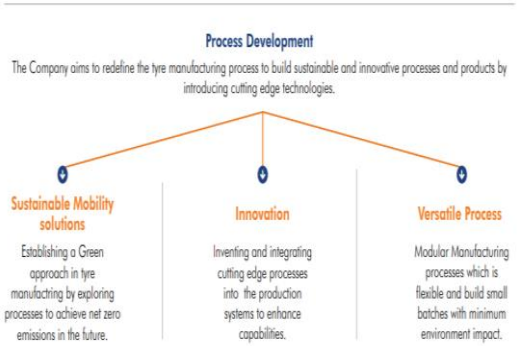
As part of CEAT's commitment to advancing electrical mobility, the company places significant importance on noise reduction, low rolling resistance, and long tire life for electric vehicles (EVs). CEAT has successfully launched products such as EnergyDrive for passenger cars, EnergyRide for two-wheelers, and WinEnergy for electric buses, gaining approval from original equipment manufacturers (OEMs). The adoption of electric vehicles has shown a positive trajectory, reflecting a growing awareness of environmental concerns.

Rolling resistance, a critical factor influencing fuel efficiency and environmental impacts, is a major focus area for CEAT. The company makes substantial R&D investments to lower the rolling resistance of tires, particularly in passenger car radial (PCR), truck and bus radial (TBR), and two-wheeler (2W) segments. Notably, CEAT achieved low rolling resistance milestones in the TBR segment during the reported period.

Additionally, CEAT has introduced low-weight tires to meet consumer needs, improve fuel efficiency, and enhance handling and braking performance. The development of fossil-free tires using sustainable and renewable materials is a priority for the company, aligning with its commitment to reduce greenhouse gas (GHG) emissions and mitigate climate change. Several projects in this domain are underway in the fiscal year 2022-23, marking

significant progress in creating environmentally conscious tire solutions.

The company's commitment to sustainability is further underscored by its target of extensive evaluation for 89-90% of production of fossil-free tires. CEAT's dedication to innovation, technological advancement, and environmentally conscious practices positions it as a key player in the tire industry, contributing to a safer, smarter, and more sustainable future for mobility.



Lighthouse Recognition for Halol Plant:

CEAT's Halol plant achieved the prestigious Lighthouse designation from the World Economic Forum (WEF), making it part of the Global Lighthouse Network (GLN). This recognition is awarded to factories globally that have successfully implemented Industry 4.0 use cases and scaled them across the value chain. CEAT deployed Fourth Industrial Revolution (4IR) use cases, such as advanced analytics, resulting in a 20% reduction in cycle times, a 46% decrease in process scrap, and a 15% reduction in energy consumption. CEAT is the first tire company globally and the first auto ancillary company in India to receive this recognition, setting global benchmarks in the fast-evolving industry.

OEM Audits and Approvals

- CEAT places significant importance on its association with Original Equipment Manufacturers (OEMs). OEM audits are viewed as opportunities to engage with OEM partners, adopting best-in-class practices and exceeding customer expectations.
- CEAT's Nagpur plant completed 11 OEM audits, receiving OEM approvals and an Appreciation Letter for Good Quality parts from Honda.
- Halol plant successfully completed 22 OEM audits, securing 10 new approvals, and received recognition for consistent high-quality performance from Maruti Suzuki, best performance in quality customer satisfaction from Renault Nissan, and a quality month celebration from TATA.
- The Chennai plant received approvals from 12 OEMs and achieved 14 new OEM approvals. It is the single-source vendor for Peugeot Societe Anonyme (PSA) and scored high in the Process Control Plan Audit (PCPA).

Technology Initiatives and Digital Endeavors:

- CEAT focuses on continuous improvement and innovation across its plants, leveraging digital and Industry 4.0 technological advancements.
- Advanced analytical solutions optimized cycle times by 20%, ensuring better adoption of green material without compromising productivity.
- Predictive analytical-based air optimization solution reduced manual audits by over 90% and saved power by 25%.
- Halol plant implemented an Internet of Things (IoT)-enabled dynamic heating system, challenging conventional curing press warm-up processes.
- Digitally enabled scrap monitoring tool reduced overall scrap generation by over 45%.

Fully Automated Warehouse - CEAT Chennai:

- CEAT's Chennai warehouse, with a capacity of 2 lakh finished tires, integrates state-of-the-art automation for tire handling and uses Machine Learning (ML) powered visual analytical solutions for foolproof tire palletization.
- The warehouse aims to improve the quality of delivery and reduce dispatch time, showcasing CEAT's commitment to innovation and efficiency.

These initiatives collectively demonstrate CEAT's commitment to embracing cutting-edge technologies, achieving operational excellence, and setting industry benchmarks in quality and sustainability. The company's recognition as a Lighthouse facility further solidifies its position as a leader in the tire industry.

Global Automobile Industry Outlook:

The global automobile industry is anticipated to encounter challenges in CY 2023, attributed to the ongoing energy crisis, sluggish global demand, and persistent supply-chain disruptions. Despite these hurdles, global new-vehicle sales are expected to remain relatively flat, with a modest increase of 0.9% in new car sales and a decline of 1.3% in new Commercial Vehicle (CV) sales. A noteworthy bright spot in the industry is the Electric Vehicle (EV) space, projected to experience continuous growth with a 25% increase in sales in CY 2023. However, challenges such as cost, range uncertainty, and battery safety issues persist as obstacles to widespread EV adoption. Governments restructuring incentive schemes for EVs may also impact demand.

The automotive industry is undergoing a transformation to align with emerging market needs, focusing on smart mobility and electric vehicles. This transformation involves extracting more value from the core business and reinvesting cash flows into new opportunities. Cloud and data play a crucial role in this transformation, with original equipment manufacturers (OEMs) adopting multi-cloud strategies to create digital services and accelerate innovation. The integration of cloud technology and data analytics enables OEMs to develop innovative products and services that cater to evolving customer needs. Manufacturers are also investing in culture change, shifting from a conservative automotive culture to an agile, innovative, and risk-taking one to facilitate rapid innovation and adapt to market changes.

Indian Automobile Industry Overview:

The Indian automobile sector is a vital contributor to the manufacturing industry and a significant source of employment. In December 2022, India became the third-largest automobile market globally, surpassing Japan and Germany in sales. India holds a prominent position as a major manufacturer of 2/3 Wheeler vehicles and ranks as the fourth-largest manufacturer of Passenger Cars worldwide. On a year-on-year basis, all segments, except tractors, recorded positive growth in domestic sales, with supply constraints easing, contributing to increased production numbers.

In the passenger vehicle segment, further growth is expected in FY 2023-24 due to a healthy order book

and production ramp-up. However, prices for passenger vehicles may increase as companies prepare to comply with stricter emission norms effective from April 2023. The demand for two-wheelers has been sluggish due to weaknesses in the rural segment, but a gradual recovery is anticipated. For tractors, volumes are expected to improve based on improving customer sentiments and finance availability. While the volatile geopolitical scenario has impacted export tractors in the domestic market is expected to grow, aligned with the growth in the agricultural sector.

RAW MATERIAL TRENDS Natural Rubber The production of Natural Rubber in India has increased by 12.2% during the first three quarters of FY 23, compared to the same period in the previous year. Consumption of Natural Rubber has also increased by 9.5% during the same period in the previous year, with a 5% increase in the tyre sector and a 21.8% increase in the general rubber goods sector. The stock held with growers, traders, processors and consumers is estimated to be around 450,000 tons. On the other hand, Synthetic Rubber production has decreased by 5.8% for the first three quarters of FY 23 compared to the previous year. Carbon Black The prices of Carbon black price have started declining from Q3 FY 23 due to the decrease in crude oil prices, in addition to drop in premiums in the commodity market. The Tyre industry is expected to witness growth in sales in FY 24, driven by increase in automobile sales, particularly Commercial Vehicles ('CVs') and Passenger Vehicles ('PVs'). Positive rural sentiments, backed by the anticipation of regular monsoon, is expected to support two-wheeler sales as well. Tyre demand from the replacement market is expected to grow, owing to continued economic growth, improving industrial activity, steady agricultural output and the government's focus on infrastructure, mining and road construction.

Raw Material Trends in the Automotive Industry:

Natural Rubber:

- Production Increase:

Natural Rubber production in India has seen a notable increase of 12.2% during the first three quarters of FY 23 compared to the same period in the previous year.

- Consumption Rise:Consumption of Natural Rubber has also surged by 9.5% during the same period, with a 5% increase in the tire sector and a substantial 21.8% increase in the general rubber goods sector.

- Stock Levels:The estimated stock held with growers, traders, processors, and consumers stands at around 450,000 tons, indicating a substantial volume in circulation.

- Synthetic Rubber Decline:In contrast, the production of Synthetic Rubber has decreased by 5.8% during the first three quarters of FY 23 compared to the previous year.

Carbon Black:

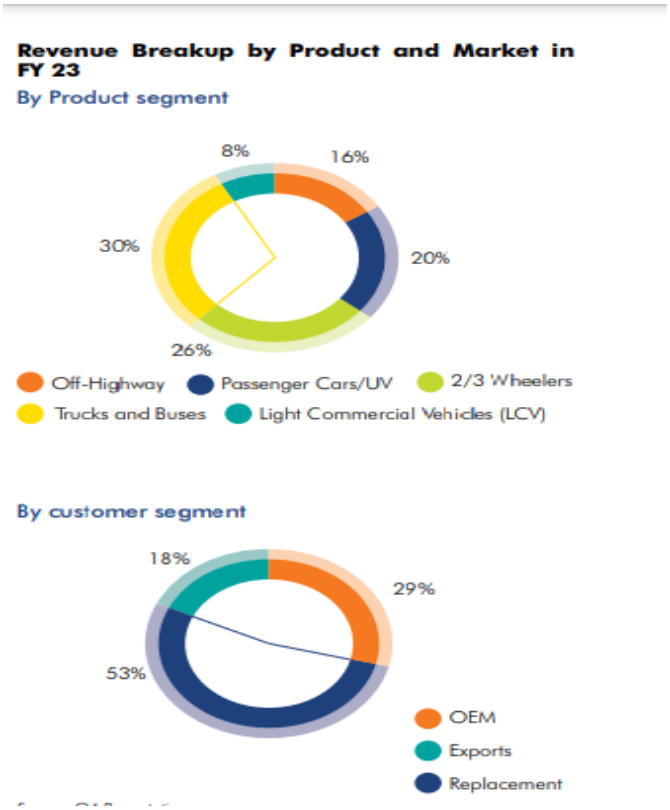
- Price Decline:Carbon Black prices have experienced a decline starting from Q3 FY 23. This can be attributed to the decrease in crude oil prices and a drop in premiums in the commodity market.

Outlook:

- Tyre Industry Growth:The tire industry is anticipated to witness growth in sales in FY 24, driven by increased automobile sales, especially in Commercial Vehicles (CVs) and Passenger Vehicles (PVs).

- Rural Sentiments:Positive rural sentiments, coupled with the anticipation of regular monsoons, are expected to support two-wheeler sales.

- Replacement Market Demand:The demand for tires from the replacement market is expected to grow, supported by ongoing economic growth, improved industrial activity, steady agricultural output, and government initiatives focused on infrastructure, mining, and road construction.



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