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A STUDY ON THE ROLE AND APPLICATION OF THE AUTO SECTOR IN SMEs

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ABSTRACT

In this changing environment, the global vehicle sector faces numerous obstacles. There are a lot of new difficulties confronting the firms, and original equipment makers are moving many of the obligations to the suppliers. The Indian auto component industry, which is dominated by small and medium-sized businesses, has performed admirably during the previous decade. The application of inventory choice is going to be made based on some qualitative variables considered by top management and implemented on a regular basis. As a result, the current study focuses on the issue, role, and application of inventory decisions by SMEs in the auto component manufacturing business. Finally, give suggestions to better the automotive industries and their applications

(Keywords: History and Development, Operation and Problems, Types of applications, Recommendations)

1. INTRODUCTION:

Small and medium-sized enterprises (SMEs) in the automotive component manufacturing industry play an important role in the vehicle manufacturing sector. The smooth supply of car components to automobile assembling firms is only possible if the component production and supply of basic raw materials necessary for auto component manufacturing are properly coordinated and controlled. The raw materials employed in the process are diverse in terms of component type and value. Many components are in short supply. Some components necessitate the use of specialized materials, as well as unique skills and process technology. Bottom and middle level managers do not consider these elements while making inventory decisions using either deterministic or probabilistic and stochastic models. The intermediate level management does not take qualitative aspects into account when making an inventory application decision.

Small and medium-sized businesses (SMEs) are naturally at a disadvantage when dealing with the overall management of the supply chain(s) that affect them because they are small and extremely fragmented. Small and Medium Enterprises (SMEs) typically lack a thorough understanding of the whole supply chain outside of their immediate operations and contacts, in contrast to Multi National Companies (MNCs), which have a wider geographic reach and more resources.. The systematic analysis and deliberate decision-making that take place inside the many business activities of an organization to produce efficient and cost-effective flows of resources, including material, information, and cash, is known as supply chain management (SCM).

To put it another way, it is the synchronization and coordination of the movement of resources within the network of suppliers, industrial sites, distribution hubs, and clients. These network components make up the various supply chain tiers. The supply chain is the network that gathers raw materials from suppliers, converts them into finished products at production facilities, and distributes them to ultimate customers via distribution centers. Individual business functions of the company's supply chain network are comprised of these activities. Operational decisions are similar to day-to-day decisions for planning activities for a few days. These analyze the most profitable manner to perform out daily activities in order to meet immediate needs. The total decision quality is always determined by the success of the top-level management's utilization of a high-quality product.

2. REVIEW OF LITERATURE:

The present study is literature review .The literature study includes the purchase of material, chain management, roll, issue, and application of inventory decisions, the right technique, and to draw effective solutions to resolve the issues and inventory application the SMEs in the auto industry.

Keah Choon Tan (2004) Over the past decade, the traditional purchasing and logistics functions have evolved into a broader strategic approach to materials and distribution management known as supply chain management. This research reviews the literature base and development of supply chain management from two separate paths that eventually merged into the modern era of a holistic and strategic approach to operations, materials and logistics management. In addition, this article attempts to clearly

Enagbonma O. and Eraikhuemen I.B (2011) This paper deals with the problem of computing optimal ordering policies for a single product with fixed lifetime of exactly m periods. We presents a proposed cost function for the inventory 62 system with fixed lifetime. The necessary condition for a minimum was derived. Decisions regarding when to order or not is investigated under some conditions. Guidelines for managing a real fixed lifetime perishable inventory system are given.

P.Radhakrishnan et al. (2009) Inventory management plays a vital role in supply chain management. The service provided to the customer eventually gets enhanced once the efficient and effective management of inventory is carried out all through the supply chain. Thus the determination of the inventory to be held 66 at various levels in a supply chain becomes inevitable so as to ensure minimal cost for the supply chain. Minimizing the total supply

chain cost is meant for minimizing holding and shortage cost in the entire supply chain. The minimization of the total supply chain cost can only be achieved when optimization of the base stock level is carried out at each member of the supply chain. A serious issue in the implementation of the same is that the excess stock level and shortage level is not static for every period. In this paper, we have developed a new and efficient approach that works on Genetic Algorithms in order to distinctively determine the most.

Wu J.W. et al. (2000) considered a deteriorating inventory model with fixed cycle length, single replenishment per cycle, time-varying demand, Weibull distribution deterioration, and complete backlogging. The objective is to find the optimal time point at which inventory falls to zero, and hence identify the optimal order quantity

Baten and Kamil(2010) presented a continuous review model for the control of production-inventory system subject to generalised Pareto distributed deterioration. They used the principle of control theory to determine what should be the optimal level of inventory in the system. **Benhadid et al.** (2008) also used control theory to show how to manage inventory in a production system with deteriorating items and dynamic costs

W. Elmaghraby and P. Keskinocak (2003)The model we consider is that of the new supplier's determination of a pricing strategy to maximize their revenue in the supply chain given perfect knowledge of the pricing strategies of their competitors and the strategy of the procurement decision maker. This model is fairly simplistic in its approach to pricing, but illustrates some important optimization techniques that can be used by a supplier to handle a so-called "static" pricing situation, where the demand is known and the prices and procurement strategies of the other players in the supply chain are known and fixed for several periods. Discussion of more complicated dynamic pricing

Shah and Shukla (2009) study a deteriorating inventory model with constant demand rate, constant deterioration rate and waiting-time-dependent partial backlogging. The convexity of the total cost function is shown numerically and the optimal order quantity is obtained through minimizing the total cost

Geetha and Uthayakumar (2010) studied an EOQ based model for deteriorating products with permissible delay in payments. They considered constant demand rate, non-instantaneous deterioration, and waiting-time dependent partial backlogging. The necessary and sufficient conditions of the existence and uniqueness of the optimal solutions are provided. An up-to-date review paper is published recently by Li et al. (2010)

3. STATEMENT OF THE PROBLEM:

The application of auto sectors is a crucial aspect of inventory management. Inventory costs have a substantial impact on the profitability and performance of a business. Inventory management and application decisions rely on recognizing important success factors and making the correct choices at the right time. In order to apply the outcomes of inventory function and inventory application decisions in a dynamic market context, it is

critical to focus on decision making and the factors driving decision making. The study is titled "A study on the role and application of the auto sector in SMEs".

4. NEED FOR THE STUDY:

The application is based on the accuracy of the information and the dependability of key variable identification. The current study aims to cover the elements influencing inventory management application. The auto industry is a complex and lengthy product line division in the industrial sector.

5. OBJECTIVES OF THE STUDY:

- To study the history and development in the automobile industry.
- To study the operation and problems of the automobile industry.
- To study the many types of applications in the automotive sector.
- To study and recommendations for enhancing the application of the automobile industry

6. RESEARCH METHODOLOGY:

Secondary data was employed in this investigation. Secondary data is gathered from both print and electronic sources. Reports, periodicals, journals, published research papers, thesis works, unpublished industrial reports, news paper reports, and other text books are all examples of print media. Electronic media sources include digital data bases, web portals, indexed articles in open access portals, industry association reports, and so on.

7. ANALYSIS AND DISCUSSION:

India is the world's third largest vehicle producer, with a large and expanding auto component sector. By selling more than 4.25 million automobiles in 2022, the country has surpassed Japan to achieve third place in the world's largest vehicle market, trailing only China (first) and the United States (second). This industry produces a wide range of vehicles, including passenger automobiles, commercial vehicles, two-wheelers, three-wheelers, and four-wheelers. The auto industry has also played an important role in supplying raw materials, components and parts, and services to the automobile sector.

6.1. India's Automotive Industry Develops

Small and Medium Enterprises (MSEs) play an important role in the Indian auto components sector, which manufactures a wide range of vehicle parts such as engine and gearbox parts, steering and suspension components, exhaust systems, and more. They have implemented new technologies and techniques over time to improve production quality and efficiency. As a result, MSEs have been able to broaden their product offerings and become more market competitive.

MSEs have also contributed to a more transparent and efficient supply chain, allowing for better collaboration between manufacturers and suppliers. This has resulted in improved production planning and cost control. MSEs have also aided the car component business in entering fresh, more specialist markets. As a result, they have used their cost benefits to become more competitive in global marketplaces, allowing them to extend their customer base and improve their revenues.

6.2. Role of SMEs in auto sector

Since independence, traditional small-scale industries have been a focus. Medium-sized businesses are new entrants who have recently become a focus of government policy. The small scale segment is a manifestation of India's socioeconomic development model, and it has met the country's long-term aspirations in terms of contribution to Gross Domestic Product (GDP), industrial base, employment, and exports. This sector contributes significantly to India's industrial base. recognizing the importance of SMEs in the country's industrial development, the government has launched a number of programmes in a variety of areas, including financing, technology, innovation, market information, technical training, and developmental support.

These activities are critical in assisting SMEs' growth. However, it will be the internal dynamics of industries, as well as the course that India's industrial development follows, that will propel the emergence of SMEs. The auto component industry is one such sector that will benefit SMEs significantly.

6.3. Application of inventory problems

The majority (65–75%) of any industrial organization's working capital is made up of materials costs. There is a tone of proof that ineffective materials management causes productivity losses.

The most frequent problems with materials management functions include: receiving materials before they are needed, which increases inventory costs and increases the risk of quality degradation; not receiving materials when needed; incorrect materials takeoff from drawings and design documents; subsequent design changes; damage to/loss of items; failure during installation; selection of the type of contract for specific materials procurement; and vendor evaluation criteria.

6.4. Application of automobiles

Automobile and automotive are two words that sound similar. Although they differ slightly, both are nearly identical. Automotive engineering covers all aspects of a vehicle's development, including its design, manufacture, and maintenance. Although certain two-wheelers are also categorized as vehicles, most automobiles are four-wheelers. There are many different types of autos, including gasoline, diesel, electric or battery-powered vehicles, steam engine vehicles, petrol engine vehicles, etc. Automobiles come in a variety of shapes, sizes, and with a variety of mechanics and parts. In a car, each component has a distinct function. As a result, there are numerous applications of mathematics that can be used, depending on their structure, mechanics, and parts.

6.5. Applying It to Design

For anything, including a vehicle, design is an essential component. Math underpins every aspect of an object's design, from sizing components to estimating performance. Without mathematics, building a car would require trial and error, with overly designed parts being insufficient and under designed parts being deadly. There are two different sorts of design: interior design and exterior design.

Inside Decorating

The science of interior design uses a lot of math and trigonometry. Every gauge, switch, dial, and readout in the car are exactly calculated within a set of dimensions since these dimensions affect where the pillars, supports, and dashboard are placed.

Exterior design

It is a creative process that incorporates science and math’s. Geometry is the foundation of all shapes used in external design, including circles, trapezes, square and rectangular shapes, and splines.

7. Application in Production

In the auto industry, mathematics is used at every stage, including during production. Math is used frequently by employees, engineers, managers, and even machines in their day-to-day work activities including calculating, reasoning, embedded communication, etc. The majority of the time, their main work of creating things includes mathematical activity.

Workers

They are directly involved in the manual labour necessary to produce an entire automobile and all of its individual parts. They utilise elementary maths, such as geometry, to determine how much room they require and the kinds of objects they are producing. They perform basic calculations every day as well.

Machines and Engineers

Engineers work with difficult maths. Because they are experts in their subject, they employ combinations, algebra, coding theory, probability and statistics, etc. to solve challenging problems.

8. Application in Working Principle

We need to understand automotive engines before we can talk about how they operate. A device that transforms thermal energy into mechanical energy is an automotive engine. There are two different kinds of car engines:

Internal combustion engines, which burn fuel inside the combustion chamber like petrol and diesel engines,

External combustion engines, which burn fuel outside the combustion chamber like turbines and steam engines.

A carburetor is a mechanism used in automotive engines to deliver a proper ratio of air and fuel mixture for easy combustion in the engine. The carburetor's operation is based on Bernoulli's concept. This indicates that when the fluid's velocity increases, the pressure lowers.

Mathematics is also used in gearbox (to shift gears at the appropriate time), braking systems (to determine the braking distance required to safely stop), determining all dimensions of the piston, shafts, gears, combustion chambers, length and width of pipes to control pressure and volume of fuel and air, and so on.

9. Application in Financial Management

The association between mathematics and finance is far deeper than one might imagine. Mathematical insight in finance translates into the ability to make more money, see success with greater certainty, and minimise and hedge the necessary risks because it allows us to predict exactly how much money we can make or how much risk there is, or we can learn how to minimize risk by selecting the right combinations of financial instruments.

- **Accounting:** Maintain a record of all incoming and leaving records. Maintain a record of your stocks and bonds. Determine your interest and equity.
- Assessing market risk. You cannot determine how much capital you need to hold unless you know how much risk exists.
- Economics: To compute future results using simple models, supply and demand, money supply based on current macro actions and trends.

Nowadays, every department in every sector offers progression chances and vocations that match your personality. This generation is all about smart technologies. There are many employments in every subject, and mathematics is everywhere. Jobs in the automobile sector can teach you new skills, allow you to work in a technological work environment with long-term job security, and provide you with competitive earnings and benefits. If you know how to play with numbers and want to work as an automotive engineer in the automotive business, you will have more options in the future.

Above all things, an automobile must have the following three qualities: performance, power, and strength.

- There must be Excellent Performance
- There must be Balanced Power
- There must be Strong Will.

Behind all of humanity's potential future accomplishments lies one fundamental principle: the allure of mathematics.

10. **SUMMARY:**

The term was created with the intention of providing a summary of the numerous applications used in the auto sector. This includes some of the industry's methods and approaches as well as significant difficulties, worries, and strategies utilized to reduce inventory lapses among SMEs. The title tries to give detailed information on the history of the issue, capacity planning in auto SMEs, and problems in auto SMEs. In India, SMEs are the main actors in the automotive sector, supplying the parts, pieces, and accessories used in the production of automobiles, trucks, buses, and other vehicles. Numerous automobile parts, such as engine parts, brake parts, suspension parts, body parts and gearbox parts, are produced by SMEs.

Small and medium-sized enterprises (SMEs) utilise innovations to provide better goods and services, which helps the automobile sector thrive. They may easily change to meet the demands of a shifting market. The field of applied mathematics known as theory is primarily concerned with systems-theoretical elements of control and signal processing as well as methods of optimization, such as mathematical programming and optimal control. Mathematical economics and operational research applications challenges are also intimately tied to the discipline. Defining the study's scope, significance, and goal provides a summary of the journal's contents.

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