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Automated Supply Chain Management in IIOT 4.0 (Car Manufacturing)

Saikrishna V[1], Nithileashwar S[2] and Muralidharan Venkatesan[3]
Students, Department of Mechatronics Engineering[1,2]
IoT-Product Engineer, IoT-Product Architect, Cognizant Technology Solutions, Chennai, India[3]
Vellore Institute of Technology, Chennai, India[1,2]
Corresponding Author: nithileashwar10@gmail.com, saikiven03@gmail.com

Abstract: *Fully Automated supply chain management in Industrial IOT increases the productivity of an industry manufacturing cars exponentially than the industries that operates and depends on the human labour and power. All the stages of supply chain management are automated starting from the materials required for manufacturing a car to selling of car to the consumer (i.e end to end). The automation in each stage is done with components such as RFID device (passive), beacon tags and various type of sensors depending on the requirement of the consumers. These devices are connected wirelessly and the data obtained from it is pushed into the cloud, where we can access the data and refresh it view the data frequently as per our requirement. By this we can know the availability of stocks, live tracking of materials arriving into the warehouse and to the distributors etc. The data which is pushed into the cloud is then viewed in application built for this purpose for easy access of users. The application also helps the user to know the current condition of their car and helps them maintain it in a very healthy condition.*

Keywords: Supply Chain Management

I. INTRODUCTION

Supply chain management is the management of the flow of goods and services and includes all processes that transform raw materials into final products. It involves the active streamlining of a business's supply-side activities to maximize customer value and gain a competitive advantage in the marketplace. Industry 4.0 represents the approach of the Fourth Industrial Revolution, where Information and Communication Technologies (ICT) form the infrastructural foundation for tomorrow's innovative industrial technologies. We are already at the cusp of this revolution, in which the worlds of production and network connectivity are integrated through the Internet of Things(IoT) and Cyber physical systems (CPS).The advanced technologies involved in Industry 4.0 are restructuring entireproduction systems by transforming analogue and centralized workflows into digital and decentralized production processes. Supply chains are being transformed globally by the development of a more digitalised environment, where value chains are connected and distribution systems are increasingly intelligent, autonomous and automated.

Industries today are able to keep track of their consumers and sales history with the distributors by having them stored in their cloud. This ensures the security of data as well as it can accessed anytime the manufacture wants to.In the supply chain the manufacturers(industries) are able to maintain a good relationship with distributors and suppliers which is very essential in both ends so that the outcome results in profit and they are able to meet the demands of the consumers precisely every time. Most of the industries do this as they maintain a good contact and communication with the distributors and suppliers. Industry 1.0 evolved in the late 18th century, by which mechanical industrial facilities were introduced. Water and steam-powered machines were created to assist workersin the large production of commodities. Industry 2.0 arose at the beginning of the 20th century, which created electrically powered machines. Electrical energy was used as a primary energy source, and a mass production system was introduced in the industry. Industry 3.0 arise at the end of the 20th century with the creation and manufacture of a range of electronic devices. This significantly automated the machines, resulting in reduced effort,improved speed, improved precision, and, in some circumstances, complete replacement of the human. Industry 4.0 provides an explosion of the Internet and telecommunications industries. It has led to paradigm shifts in manufacturing and traditional manufacturing operations and uses advanced information and manufacturing technologies.

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As globalization increases the complexity of supply chain processes, businesses are increasingly subscribing to analytical standards to improve their decision-making capacities and enhance the efficiency of their supply chains.To be able to survive the competitive environment and ensure qualitative progress, a business needs to invest in responsible supply chain management to efficiently and sustainably respond to disruptions. A smooth-functioningsupply chain ensures speedy fulfilment of goods and services delivery when catering to ever-changing customer demands. Every aspect of the supply chain requires thorough monitoring and timely assessment to ensure productivity and maximized performance. This holds the power to either make or break a business. And supply chain management executives must ensure that these operations are carried out smoothly so businesses can focus on the quality of their services. Every stage of supply chain is key and more importantly the logistics plays a key role indetermining the company's productivity as the materials are not ordered in bulk rather when they go out of stock. Soit is important keep a live track of logistics and availability of stocks. For this purpose beacon stickers can be used inevery material and which can be tracked using passive radio frequency devices inside the vehicle. This ensures that all the stocks are flawlessly shipped to the warehouses and we can also track the movement of logistics by fixing a gps device in the device. We can keep a live tracking of it by uploading the data got through rfid devices in the cloud or through a application designed where the data from cloud is sent to the application which is much more easy to access. Though industries are able to track the availability of stocks manually it is not as precise and quick as using technologies to do them. Having real-time data on the availability of raw materials and manufacturing delays allows companies to implement backup plans, such as sourcing materials from a backup supplier, preventing furtherdelays. Without real-time data, companies often don't have time to initiate plan B, resulting in issues such as out of stock inventory or late shipments to end consumers. High percentage of companies have not invested in real time data. The leaders of the supply chain invest on the upcoming technologies such as IoT, AI and analytics, data science and capture real time data which helps them to predict then future flow in their supply chain management and helps them to plan accordingly. These investments make one a leader in supply chain management.

Supply chain technology that works well connects previously isolated data. When distinct sections of your supply chain (such as individuals, software systems, or external trading partners) don't exchange information in a consistent, reliable, and repeatable manner, you have an information silo. When functions and departments inside a corporation (sales, production, distribution, and so on) do not communicate information, silos can form. This results in inaccurate forecasts, flawed executions and longer reaction times. When information is made end to end i.e accessis given to specific members in every department of supply chain, it also helps the companies to get the feedback from their end costumers (i.e consumers) and are able to make changes to the products according to the reviews obtained. This cannot be achieved easily but it is possible if there is communication platform directly between only the consumers and manufacturers. This can be achieved through a exclusive application built by the company's software team for the consumers.

In the process of making supply chain management automated sensors play a very crucial role. Sensors are a key component in IoT. A sensor is a device that detects the input stimulus, which may be any quantity, property, or condition from the physical environment, and responds to a measurable digital signal. the input stimulus could be pressure, force, flow, light, heat, motion, moisture, or any one of a vast number of other environmental phenomena.The response output is usually an electric form of a signal, like the voltage, current, capacitance, resistance, frequency, etc., which is converted to readable display or transmitted by electronic means over a network for readingor other dispensation. In Industry 4.0, there is a need for an integrated and smart network that moves towards intelligent production. Sensors can capture and analyse data to make effective decision-making, and self- optimisation is possible for automation in production lines. The supply chain industry relies heavily on asset monitoring solutions and technology for streamlined supply lines. As industry shifts into in-process sensors as a management technique, sensors are used for process and condition monitoring. Sensors will have crucial prospects for growth in using the Industrial Internet of Things (IIoT) for automated production processes.

Sensors link multiple devices and systems and enable various machines to communicate to track systems and equipment at each facility. Because sensors are also highly capable of processing onboard, they can assess atmosphere conditions and appropriately change operations. These decisions are based on vast quantities of evidenceand can be analysed much more rapidly and precisely than anybody can expect. This eliminates all of the risks associated with human error and ensures that production and quality can be increased with minimum monitoring. In a wide variety of industrial and commercial environments, sensors deliver valuable knowledge, boost production, advertise, sell, compete, reduce costs, and enhance business performance and overall productivity. The use of Industry 4.0 concepts is expanding as businesses realise the future

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reliability and competitiveness that industrial IoT systems can achieve. Industry 4.0 concepts are available for industrial applications from factory management to agile production lines, intelligent manufacture, stock tracking and supply chain control. Companies seek self- optimised and integrated production processes; the highest priority is the processing and reviewing data at lower field levels. It offers attractive commercial opportunities for sensors since they facilitate the IoT paradigm in the industry. In order to measure process parameters such as the deflection of a tool, cutting forces, the tool load and temperature for an insight into the machining process, the process control was using integrated sensors.

II. Moving Towards Automated Supply Chain Management

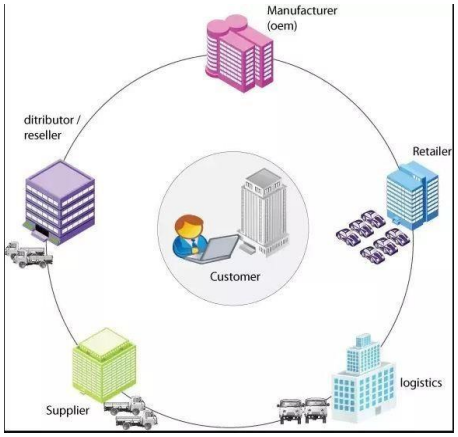

Figure 1: Different stages of management

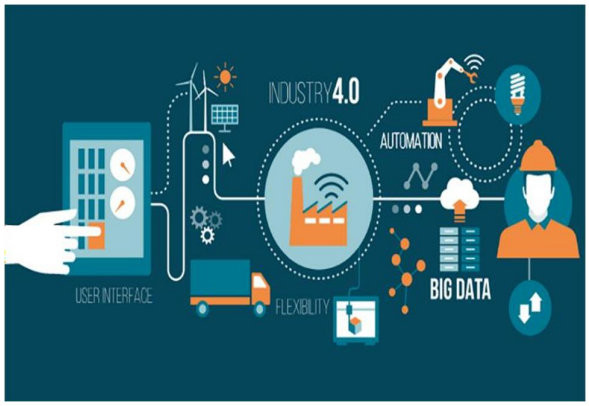

Figure 2: Overall view of Automated IIOT4.0supply chain management (smart industry)

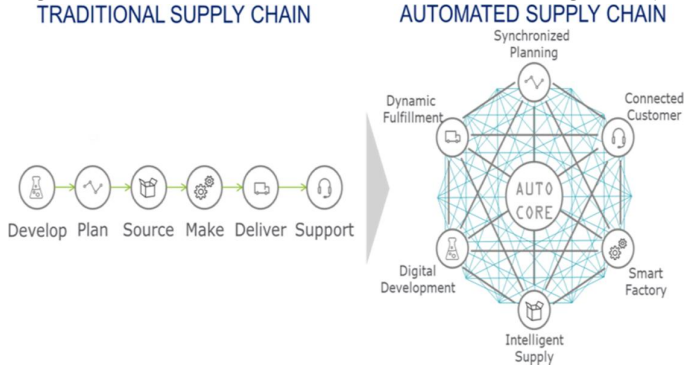

Figure 3: Transformation from Traditional to automated supply chain

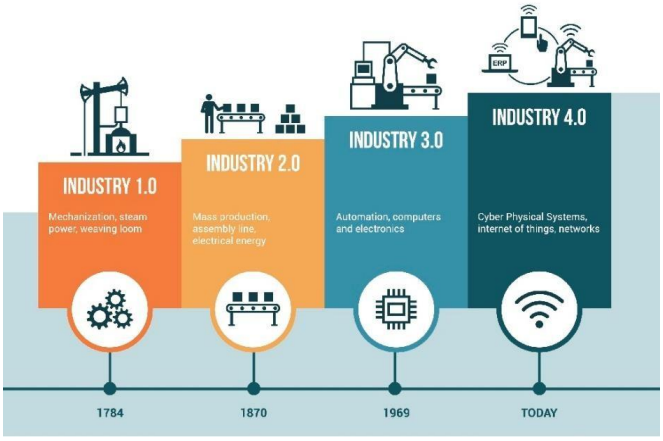

Figure 4: Evaluation of IIOT 4.0

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III. Raw Materials

Raw material is defined as the crudest form of product possible, which is used as an input for making another product. Raw material is essentially the unprocessed product and is the chief constituent of the primary product that is processed or manufactured. Its a major component in any supply chain, the unprocessed materials, components, or partially finished assemblies that are required to build or produce a product. These are both the building blocks and the starting point for any final product and ensuring adequate supply and proper management of raw materials is critical. Moreover, they represent an investment that affects the cash flow and financial health of an enterprise. So it is also very important that a company(producer) maintains a very effective material management in order keep the production of products unbroken.

Materials management is a core supply chain function and includes supply chain planning and supply chain execution capabilities. Specifically, materials management is the capability firms use to plan total material requirements. Materials management is also responsible for determining the amount of material to be deployed at each stocking location across the supply chain, establishing material replenishment plans, determining inventory levels to hold for each type of inventory. The order for the materials are placed by producers after the purchase order(PO) of wholesalers is accepted by the producers .Only a very low percentage of companies have shifted to automation both in transportation of raw materials as well as in material management.

Implementing IoT devices will speedup the movement of materials to producers as well can reach the destination faster. IoT devices use sensors to measure specific aspects of the world around them, including location, temperature, humidity, light levels, movement, handling, speed of movement and other environmental factors. In the supply chain, Internet of Things devices are an effective way to track and authenticate products and shipments using GPS and other IoT technologies. In this stage of supply chain materials such as steel, aluminium, magnesium, copper, plastics, composites, rubber, glass, fabric/leather etc are ordered by the producer and manufacture the components placed by the wholesalers in their purchase order according to the customer requirement.

IV. Producer/Suppliers

The role of a producer in supply chain management is to produce components for manufacturing a car. All the components for manufacturing a car are not manufactured by the wholesaler in his industry. Rather they place purchase orders to producer in bulk quantities. The main components of the car include the chassis, the engine, the transmission system, the body. These major components contain various sub components such as the chassis includes from the engine to the exhaust system. The chassis of a vehicle is essentially the skeleton of the vehicle. The chassis is where most of the vehicle's structural integrity comes from as the chassis holds all the other pieces of the vehicle together.

V. Logistics

Efficient logistics management is increasingly becoming a survival fctor for the automotive sector. In conditions of post-crisis impacts to automotive industry and very strong competitive pressure of automakers in global market, the flexibility to management of materials and information flow in automobile assembly plants is declared as the key specification to future growth.

The complexity of customized models and variants is on the - 25 - increase, especially with regard to how individual vehicles are equipped. Automobile manufacturer must schedule the supply at few thousand sub-assemblies and components in vehicle, with billions of possible combinations to car outfit. Key trend in the automotive production is standardization of modules of construction to common platforms.

Vehicles can be adjusted to the individual requirements of customers and delivery schedules enable Original Equipment Manufacturer(OEM) to produce multiple models), at the same manufacturing facility in assembly plant. This sharing of components is crucial for reducing costs .The model diversity is an important sales argument and order-to-delivery time is the key factor to the automotive market and manufacturing process. These require changes in assembly operations and working logistics and for that reason automotive supply chain needs to be managed more flexible and agile and The Operations of Technology Should be Well Integrated and The Resources Of the Company Should Have High Technical Leads To Carry Forward The Full Potential of Manpower.

Automotive supply chain includes all managing business activities to relationships between the sales channel, distribution, warehousing, manufacturing, transportation, and suppliers, and related functions and facilities in the flow to transformation

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of goods and services from the raw materials stage to the sub-assembly modules and to the finished products and deliver them to end user – customer.

Internal logistics focus on the relationship linking procurement, transportation, inventory control with information systems, planning, production, inspection, and delivery of goods in a seamless process. External logistics links the collaborative operations with sub-suppliers, sales, warehouse management, distribution networks, service providers, contractors, and customers.

Supply chain management focuses on the processes that are needed to synchronize supply to customer demands, allows the optimization of inventory held, and minimizes waste. Original Equipment Manufacturer reduced their number of direct suppliers, and persuaded their suppliers to be more involved in product development. Today, Original Equipment Manufacturer outsource not only the manufacturing, but also the development of complete modules to suppliers across the several brands they own. Thus engineering service companies play an increasingly important role in the network of actors involved in new car development - engineering firms often become third partners in the cooperation between suppliers and Original Equipment Manufacturer for new product development.

The major automotive manufacturers and Tier 1 suppliers have been in the forefront of adopting new management and manufacturing practices (e.g. lean production, excellent production, intelligent manufacturing, sustainable manufacturing, learning organization, JustIn-Time inventory, e-commerce...). These practices are being driven down to Tier 2 and Tier 3 suppliers in order to improve cost and production efficiencies

The automotive industry has pioneered the use of information and communication technology (ICT) tools to increase the level of global communication between OEMs and suppliers. A key role of newer technology is to ensure that schedule information from multiple customers in multiple regions with various production systems can flow accurately and consistently into a supplier's internal business systems to streamline processes and make it easier to react quickly.

Automotive OEMs and suppliers require capability to manage shorter production lifecycles using processes such as Make-To-Order, Assemble-To-Order, and Configure-To Order. Production sequencing is especially important for car manufacturing companies where multiple products are being built from the same base platform. As automotive production can also vary according to product model or customer demand, component manufacturers also need the ability to dynamically plan, control and synchronize production runs of differing length operating independently.

Original Equipment Manufacturer assembly Plant
↓
Tier 0(Pre assembled modules)
↓
Tier 1(Sub assemblies)
↓
Tier 2(Components, Parts)
↓
Tier 3(Raw materials, single parts)

Technology In Logistics is what that's going to rule in Mere Future and the Main technology products used for Supply Chain Management Especially in Logistics is the GPS, IOT, RFID and Smart Bins. The Sensors Are the Key Part to Identify each and every Step of the SCM Right from the tracking part. Apart from GPS tracking the parts for car manufacturing before being loaded up on the truck for shipment can be made IoT connected by sticking RFID label/tag on each material and in the outside of boxes we can place a common RFID label inside which materials are placed in very large numbers.

The RFID labels/tags are read using Passive RFID reader which are placed inside the container of the logistics. It uses radio waves to transmit signals that activate the tag. Once activated, the tag sends a wave back to the antenna, where it is translated into data. The transponder is in the RFID tag itself. RFID systems usually comprise an RFID reader, RFID tags, and antennas. The data can be pushed into the cloud and it can be viewed there. The data can be tracked live according to our requirement i.e refreshing data after seconds or minutes accordingly.

By this, The IoT device will transmit its location, which can be picked up by GPS satellites and used to track movement of goods. The movement of goods can also be tracked or located using the devices that are attached in raw materials or in container box inside the vehicle via cellular networks also and the data obtained can be uploaded into the cloud.

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Tracking speed of movement and the traffic flow of products makes it much easier to predict how goods will move through the supply chain. Suppliers, manufacturers and distribution centers can prepare to receive goods, which reduces handling times and ensures the efficient processing of materials. The data that is obtained using this tracking can identify where and when goods are delayed in transit.

This allows for contingency planning and alternative routes to speed up the supply chain. Verified tracking through IoT devices means that supply chain management can validate exactly when goods arrive i.e the Estimated time of Arrival(ETA). This can trigger other administrative tasks like supplier payments or onward shipping requests. Ultrasonic sensors are also placed inside the container which detects the distance of goods inside the container. This can be used in two ways, the first way is that it can be used for theft alert.

In case if the materials inside the container are found to exceed more distance than it is coded in ultrasonic sensors, a alert message can be raised or a buzzer can be used which alerts the driver. Secondly also by some means if the doors of the container gets opened, and the materials start sliding down out of the container, similarly an alert message and buzzer is used for alarming.

In either of the ways it results only in benefit. Building cars is not a parallel process, it is largely sequential. The aim of the pull orientation in automotive manufacturing is to keep material flowing on a permanent, continuous basis without interruptions in order that all workstations in the flow just produce the quantity which is required from the next workstations .So the Process for maintaining this objective is called Supply Chain Manage

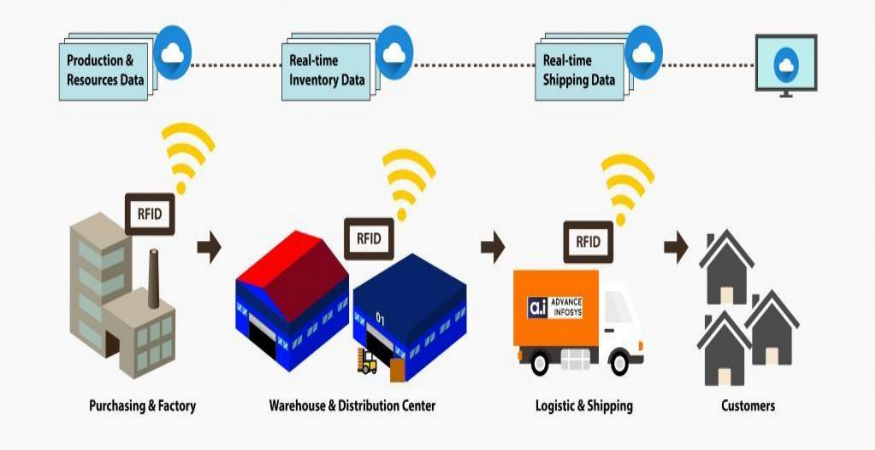

Figure 5: Using RFID in logistics

VI. WHOLESALER

6.1. Warehouse

The components for manufacturing a car are placed in the company's warehouse through logistics. In the warehouse, for assembling the components contract employees are assigned. Usually the contract labourers are not permanent, they may work for a week or a month or sometimes for a day. So when a new contract employee comes to work, it is very difficult for the employee to find in which location and shelves the components are present. So this search time reduces the productivity in number of cars produced that day. So these shelves can be replaced by so called smart bins IIOT. Each component that is placed in bin already have rfid readers and rfid scanners can be placed to read the product's code.

A small lcd display can be placed in each bin which shows the name of the component, bin number and the number present inside the bin. When the employee picks or puts the component inside the bin number decreasing or increasing is shown in the lcd display. To make it more efficient we can give an additional language option to select, so that employees can choose their language according to their comfort. This data can pushed into the cloud and then to the database or a separate web or mobile application can be created and the data can be uploaded to it through cloud.

This data is pushed into an application or cloud because once the components in a bin or many bins run out of stock, the inventory manager of the warehouse can very easily know that he/she needs to order for more stocks in order to keep the production running from anywhere. It is not required that the manager must be in the warehouse to know about the quantity

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of stocks. In the entrance of the warehouse a big lcd display is kept which contains information such as the floorplan of the warehouse, number of bins and their respective locations.

6.2 Assembly Line

In the assembly line of the car, place the tools and the men in the sequence of the operation so that each component part shall travel the least possible distance while in the process of finishing. In an assembly line, car assembly is split between several stations, all working simultaneously. When a station is finished with a car, it passes it on to the next. More the work stations, more number of cars can be operated on at the same time, each at a different stage of assembly. For more safety and efficient maintenance of cars, sensors are used.

IR proximity sensors and ultrasonic sensors can be used to avoid accidents and to detect objects around the car. The ultrasonic sensors can be used to detect the distance of other vehicles in front of the car, while the IR sensor can be connect to the brake. In case if the car driver doesn't apply the brakes and the car still is in high speed and the distance is 200m ,then we can raise a alert message stating "Apply brakes" and If the distance is less than 50m, then the brakes are automatically applied.

A coolant temperature sensor (CTS) (also known as an ECT sensor or ECTS (engine coolant temperature sensor) is used to measure the temperature of the coolant/antifreeze mix in the cooling system, giving an indication of how much heat the engine is giving off. The engine temperature sensor informs the engine's ECU about the current & ongoing variations in the engine temperature. ECU, in turn, adjusts and regulates the fuel quantity & ignition timing. The data from the engine temperature sensor provides readings for engine temperature gauge on the dashboard. Fuel sensor is a device designed to make accurate measurements of fuel level in vehicle tanks

A separate temperature sensor to measure the temperature in the surroundings and the air conditioner inside the car automatically sets its temperature. Parking sensors are proximity sensors for road vehicles designed to alert the driver of obstacles while parking. These systems use either electromagnetic or ultrasonic sensors. Blind spot monitors are an option that may include more than monitoring the sides of the vehicle. It can include "Cross Traffic Alert," "which alerts drivers backing out of a parking space when traffic is approaching from the sides.

Reverse parking sensors are used as a vision. When the driver engages reverse gear, rear parking sensors get activated. As the car approaches a vehicle or vice versa, the intensity of beep increases as the distance between two cars starts decreasing. Additionally door sensors are added for the safety of the people inside the car. If any of the doors or not locked properly, then a beep is raised continuously. Also if the car approaches a minimum of 20km/h, all the doors are automatically locked. Gyro sensors are essential in electronic stability control (ESC) systems, which improve vehicle safety by sensing when a vehicle is skidding and intervening to control braking and engine torque.

Figure 6: Capability and benefit of sensor in IIOT4.0

The most common use for an electronic pressure sensor is to measure the pressure of the vehicle's critical fluids such as engine oil, gearbox and transmission oil, and the hydraulic oil in the braking system, cooling system and fuel systems. Pedal Force Sensors (vehicle sensors) are designed to measure load applied to the brake, accelerator, and clutch pedals during acceleration, deceleration, and transmission shift events. Flow sensor electronic or electro- mechanical device to measure the flow of a fluid such as a gas or liquid and provide output signals to the controller.

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Gas sensors are portable electronic device used to sense the presence and properties of a range of gases and relay signals to the controller in form of output signal that detect harmful gases and provide a vital to monitor gas concentration with many safety concerns. Light sensors support the field of vision of the driver, making the usage of the headlights more efficient. Using sensors that detect the ambient light, or illuminance, around the vehicle, this system will automatically turn on your lights if it is getting too dark.

Table 1: Types of Sensors Used in Cars

Serial No	Sensor Used
1	IR Proximity Sensor
2	Ultrasonic Sensor
3	Radiant Temperature Sensor
4	Reverse Parking Sensor
5	Parking sensors
6	Engine temperature Sensor
7	Fuel Sensor
8	Door Lock sensor
9	Temperature sensor (For air conditioner)
10	Gyro Sensors
11	Pressure Sensor
12	Force Sensor
13	Flow Sensor
14	Gas Sensor
15	Light Sensor

6.3 Yard Management

The components after running through the assembly line comes out to be a fully manufactured car. Each manufactured car is given a unique code called as the vehicle identification number(VIN). A VIN is composed of 17 characters (digits and capital letters) that act as a unique identifier for the vehicle. A VIN displays the car's unique features, specifications, and manufacturer. This data can be simultaneously uploaded into the database as each car comes out fully manufactured. In the yard, according to the area of the yard number of passive RFID readers can be placed around at distances depending on the frequency range. In each car ,a RFID chip can be installed which contains all the details including VIN.

When the cars are shipped to deliver to the distributors/retailers, there is a high chance that the cars which are manufactured before months are still not loaded into shipment. So in order to overcome this problem, the RFID readers present in the yard can be used to scan the RFID chip in the car and invoke the car battery so that the headlights of the car are made to blink. Thus also we can identify the VIN and other details that is stored in the database and load the cars for shipment accordingly.

VII. Retailers & Consumers

Retailers helps to control product quality, inventory levels, timing, and expenses. Either way, the retailer sells those goods to the end-user at a markup—the difference between their purchase price and the resale price. This is how retailers make a profit. By managing the supply chain, retailers are better able to cut excess costs and deliver products to the consumer faster through tighter control of internal inventories, internal production, distribution, sales, and the inventories of company vendors. Retailers must be set up to sell directly to consumers in some form or another. This involves not only decisions about physical and digital locations but about how to market products and connect with customers. With your primary customer value proposition front-of-mind, you can segment the risks that would negatively impact how the supply chain contributes to that value proposition and build resilience capabilities to mitigate major risks.

Most modern retailers typically make their strategic decisions based on the following:

1. The type of store (e.g., major national chain vs. small stores in select cities vs. online only)
2. The market served (e.g., high-end product consumer vs. cost-conscious consumer)

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Optimal product assortment

1. Customer service (e.g., an in-store customer relations rep vs. a toll-free 800 number)
2. Market positioning (e.g., customers with discretionary income vs. those with disposable income)

Technologies place a great place to Help Customers in Various Process from the Customization of the cars they wanted to experience and an app for the maintenance of the vehicle and a GPS Tracker To look where the Car is at right now. A Website is Designed for Few customers who even wanted to design their own cars on how they want it and letting us to Manufacture and Deliver it to Them. To seize the opportunities created by the boom in eCommerce, retailers, manufacturers, and logistics providers alike have all taken steps to make their supply chains more customer centric. Retailers Will Collect the Data from the Consumers and Send it to Wholesalers Through Cloud. The head unit will Screen the Free Services Offered by the Retailers. Data Received by the Wholesalers Will Make it more efficient for the consumers to showcase the Condition and Maintenance Data of their Vehicle In the Same Head Unit Apart From the existing Applications. It's not just you need to turn on your head unit of your Vehicle to know and Access the These Data We Will Provide You with an Exclusive Mobile Application which is also made compatible as a Web Application.

Certainly, supply chains can be re-engineered to support better customer service – near-shoring can decrease lead times, and fulfilling online orders from stores can improve Stock Keeping Unit optimization. But many companies underestimate the value of the primary customer touch point for eCommerce orders – the final- mile delivery experience. This experience drives customer perception of the retailer, the supplier and the final-mile delivery company. Consumers will find the most cost-effective suppliers in order to offer customers the best value; they will search for innovate partners to give consumers the best products and services; and they will endeavour to create a supply chain that is resilient to disruption and is ethically sound to ensure service quality.

VIII. CONCLUSION

Fortunately, with the right agreements, modelling, optimization and analytics, it's possible to accurately understand and control automotive supply and manufacturing costs:

- Get robust contracts and agreements in place with all internal and external automotive parties that accurately defines costs, provides expense controls and requires reporting on meeting those targets.
- Run financial modelling and analytics that takes into account the total fixed and variable costs associated with building specific vehicles.
- Use predictive analytics to understand how automotive costs will change depending on internal and external factors.
- Audit pricing and costs on a regular basis to ensure everything is aligned with your modelling, agreements and expected cost controls.

This is an issue with automotive supply chain visibility, and you can use various processes to deal with the problem:

- Agree with suppliers and manufacturers that they will conduct internal quality management checks and audits on critical parts and manufacturing processes.
- Arrange for independent, external audits of suppliers and manufacturers to ensure adherence to quality standards.
- Implement rigorous batch control and tracking to identify the source of potentially faulty parts.

Although every automobile manufacturer will manage risks differently, there are several principles supply chain managers can follow to mitigate negative consequences:

- Conduct an extensive risk identification and prioritization exercise to seek out all of the potential issues that could hit the automotive supply chain. Prioritize these risks by the impact they could have, the likelihood of them happening and the ease with which they can be mitigated or resolved.
- Get contingency and risk mitigation plans in place with key vehicle parts suppliers and manufacturers. This could include backup manufacturing, alternative logistics providers or even relocating some operations to different countries to take advantage of tariffs or trade deals.
- Analyze the automobile marketplace to understand exactly how consumer demands are changing. Build these findings into overall strategy and understand exactly how these findings filter down.

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All the Components that are used in this Supply Chain Management Process Last Long With Regular Maintenance ,Also The Budget is Cost Effective and There are High Chances that all the Units involved Will Face an exponential increase in profits in this end-end Autonomous Supply Chain Management.

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