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Supply Chain Management in Automobile Industry

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Abstract

The organization of the supply chain in the automotive industry suppliers contributes to the development of production in many ways, including quality of products, cost and delivery to OEM and customer subsystems. Focusing on the results, competitive supply chain capabilities not only ensure the timely supply of components, but also ensure the performance of incoming deliveries to provide a marking for manufacturers to ensure the delivery of high quality end products at a competitive price. Today, in order to achieve these goals, the continuous development of the global supply chain has become the main supply option required by most automobile manufacturers. Lean renewal and logistics strategies should be implemented to achieve the performance goals, many of which may need to remain in good condition. The implementation of these strategies requires manufacturers to fully utilize the potential of today's innovative network systems and supply chain processes.

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1. Introduction

It is becoming increasingly difficult to stay in the market and become popular among customers, not to pay attention to the development of competitors and not to raise their position levels in the market. This means that it is important for the manufacturer to control the quality of the product and how it is protected, to make the price more attractive to consumers, and to provide new technologies that show how modern and financially sustainable the manufacturer is.

The number of brands and models increased and this trend will endure in the future. Nowadays, people often look for something that distinguishes themselves from others. For this reason, the personality that the companies share with their customers is important.

This position may encounter a company with other problems. For example, focusing on usability and individuality can easily distract us from the most significant factors of our time, quality and cost. Moreover, it can cause companies to fail.

Sales and service are faulty due to SCM. High quality SCM reduces delivery time, risk of damage, saves a lot of money to the manufacturer, etc. Nowadays it is much more hard to attract attention because buyers have a widespread range of products in the market. Customer without hard work.

The most effective way to achieve this is to lower the price and introduce modern technologies. Only the introduction of new technologies and the creation of new supply chain methods can help.

Research Questions

- What are the most risky members in SCM?
- How to develop the Supply Chain Members in order to eliminate and decrease the risks?

- What are the future challenges and opportunities of automobile industry?
- Challenges of the SCM in the automobile industry?

The aim of the study is to provide information or solve a problem. The purpose of this study is to solve a problem that exists in a company's supply chain. Then, this study is a scientific decision that will include two main scientific research methods: qualitative and quantitative. These methods will be used in this study in different scales and according to the author's assumption, the qualitative method will be used more frequently. In addition, the study itself is a case study aimed at identifying the problems of a particular case.

Research process represent:

- 1) data collection;
- 2) data analysis;
- 3) Solution development;
- 4) Analysis of results

2. Literature Review

2.1 What is supply chain management ?

Supply Chain Management (SCM) is a wide range of activities required for planning, controlling and implementing the most rational and cost-effective product flow to the final consumer from the acquisition and distribution of raw materials.

The SCM includes integrated planning and implementation of the processes required to optimize the flow of financial, material and information capital in areas including demand planning, sourcing, production, inventory management and storage, transport - or logistics - and areas with excessive or defective return areas. products. Both business strategy and special software are used in these jobs in order to create competitive benefit.

Supply chain management is a wide-ranging and complex task that depends on the success of each partner from suppliers to producers and beyond. Therefore, effective SCM involves change management, teamwork and risk management to ensure consistency and interaction between all actors.

In addition, the concept of a closely related corporate social responsibility that assesses the sustainability of the supply chain, including sustainable supply, as well as environmental, social and legal issues, and the impact of the company on environmental and social welfare - is a concern for modern companies.

2.1.1 History of supply chain management

Over the past thirty years, the conception and theory of business management has endured radical changes and developments. Many old traditions of doing business were questioned, and many new philosophies and approaches were created, including business process reengineering, strategic management, flexible manufacturing, lean thinking, a balanced scorecard, a blue ocean strategy, Iran. Supply chain management is undeniably one of the new and well-developed management approaches that have arisen and developed in totally industries around the world.

The earliest event of the term “management of the supply chain of a mobile” can be outlined back to the early 1980s, when we now know that it is published in recognizable media and literature. In fact, it was first published by Oliver and Webber in 1982 and published in the Financial Times article describing the company's supply and supply management areas. However, in the early 1980s, supply chain management was mainly focused on procurement and cost-cutting activities. An important development and significant increase in publications in the turf of supply chain integration and supplier-buyer relations occurred at a time when the notion we know today regularly appeared in the 1990s.

Thus, it is clear that SCM is not one of the traditional academic themes that happened for hundreds or thousands of years, but relatively a young and even emerging subject. Only newly has the business world begun to use this concept. So the question is "why now?". The resounding answer to this question is that our business background has changed, which includes globalization, tougher competition, increased customer expectations, technological influence and geopolitical factors, and so on. In such an updated business environment, an organization-oriented approach is no longer adequate to ensure the required competitiveness. Therefore, managers need to understand that their businesses are merely part of the SC in which they contributed, and it is the SC that wins or fails in the rivalry.

As a result, the field of competition moves from “organization versus organization” to “SC versus SC”. The endurance of any business today no longer depends solely on its own ability to strive, but rather on the ability to collaborate in the SC. Ostensibly independent relationships between organizations in the supply chain are becoming increasingly interdependent. You are "drowning or floating in the supply chain." It is for this reason that the need arises in SCM

Hence, the desire to become an admirable business simply due to a fully self-oriented management approach can be very illusive. A more practical and truly more reliable way to better manage a business is to manage it laterally with the supply chain through apt strategic locating, tolerable structural configuration, cooperation, leadership and combination. The principal reputation of this is not derived from systems or cerebral, but rather opposes the improvement of business efficiency and the market results of customers. These tangible benefits and the success that it provides makes the subject imperative.

Thus, seeking to turn into a magnificent business basically through an altogether internal looking administration approach can be extremely illusive. What's progressively down to earth and in fact increasingly guaranteed method for better dealing with a business is to overseeing it alongside the store network through proper key situating, satisfactory basic setup, joint effort, incorporation and initiative. The central significance of doing as such does not get from the speculations or thinking, rather it is resisted by the business execution improvement and market estimated client results. It is the substantial advantages and achievement that it conveys makes the subject significant.

Store network the board is additionally inescapable and pervasive. One can barely discover any part of business that has nothing to do with inventory network the board. Take a case of value the board – a significant piece of the present business

the board, and ask yourself an inquiry: would you be able to oversee and improve the quality standard of your item or administration estimated by the end-shopper without dealing with the providers and purchasers in the inventory network by any means? Obviously not. Business esteem creation is dependably an aggregate commitment from the entire included store network.

Cultivating complete the surplus of literatures, one will come to grasp that there are as many dissimilar classifications as many of those who be concerned to write about it.

However, a extensive abstract accord on the notion of offer Chain (SC) and provide Chain Management (SCM) is on the far side anybody's cheap doubt. Founded on that, the writer would like to suggestion his definition of SC here and SCM in the following piece.

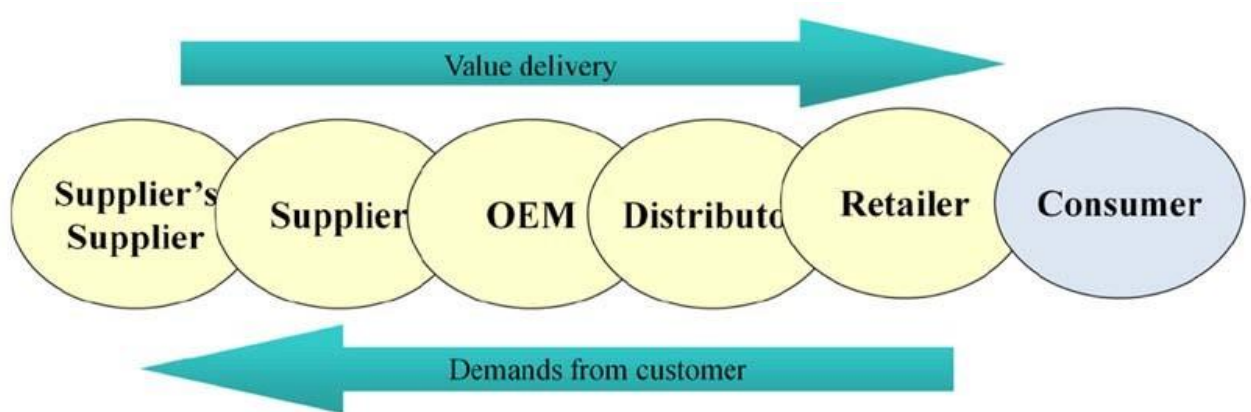
There are a number of key characteristics in this definition that were used to portray the supply chain. Earliest, a SC is being designed that can only be shaped if there is more than one sharing company.

Secondly, the contributing companies in the supply chain regularly do not belong to the same property, and therefore there is legal independence between them. Thirdly, these companies are linked by a common obligation to add value to the flow of ingredients complete the supply chain. This substantial flow for each corporation comes as converted resources and comes out as value added.

It is unthinkingly clear that the SC can be embodied as something like a "chain" in which the "links" are the partaking companies that are interconnected in the value-adding process (see Figure 1). The connection on the input indirect of the material flow is the supplier of the supplier; and there is a customer on the exit crosswise of the material flow. Between them, there is usually an OEM -

manufacturer of original equipment. OBM sometimes represents OBM - the manufacturer of the original brand, and sometimes unbiased a “focal company”.

Figure 1: OEM definition



Source: Chopra & Meindl 2013, 15-16) (Lu 2011, 8-11)

It is clear that in the real world the SC is much more complicated than that depicted in Figure 1. In fact, this is not a “chain”, but rather a “network” when you consider that for each company participating in the chain there are usually several suppliers and several customers. There are also imaginable nested chains within chains. For instance, a supply chain for engine manufacturing is an embedded supply chain within a linked automobile SC.

It depends on how you would like to see the SC, there are analogous, but changed names that you can call the SC. If you see the supply chain mostly as a value chain, you can call it a “value chain”; if you see the SC as a constant demand from the consumer and extends to mining suppliers, you can call the SC a “demand chain”.

Later business associates between organizations are widespread, how can a supply chain border be drawn? To answer this question, you need to understand the four internal drifts of the supply chain.

Material Flow: Altogether production supply chains have solid flows from raw materials at the beginning of the supply chain to ended products at the end of the SC. The supply chain for equipment will cut wood at the beginning of the supply chain, and home equipment at the end of the supply chain. The incessant flow of wood has been misshapen through the chain and as a result, the furniture ties the entire supply chain together and defines its clear boundary. The furniture supply chain should never be disordered with the chocolate creation supply chain, because the material flows between them are clearly dissimilar and never interconnect with each other.

Information flow: all supply chains have and use information flows. There are many information flows in the SC, such as demand information flow, predictable information flow, production and planning information flows, as well as project information flows and NPI. Altered the material flow, information can go in both directions, both upstream and downstream. Interestingly, most of them are unique to a particular supply chain. Information on fashionable women's clothing does not matter for the supply chain of motorcycles. Some supply chain will have its own fixed of information flows that are vital to its existence, which are often desirously protected from other supply chain flows.

Financial Flow: All supply chains have a financial flow. This is basically cash flow or blood flow in the SC. Without this, the supply chain will assuredly collapse. Though, for slightly supply chain there is only one source of such a

financial flow - the consumer. This empathetic of a lone source of funding led to the perception of a “single entity” in relation to the supply chain, which is a very useful basis for integration and cooperation in the supply chain. The distribution and sharing of this single financial resource during the supply chain will allow better alignment of the contribution and remuneration of the contributing companies.

Commercial Flow: The entire supply chain characterizes a transactional commercial flow. This means that the material flow over the supply chain changes its property from one company to another, from supplier to buyer. The transactional course of buying and selling swings the ownership of the physical flow from the supplier to the buyer to the conclusion of the supply chain - the final consumer. This transactional commercial flow will solitary take place in the supply chain, where more than one company exists. On the other hand, if it is with an organization, there will be a substantial flow, but no change of ownership, and, therefore, no commercial flow.

The four streams designated above not only better explicate the meaning of the supply chain, but also term it more strictly. They represent the four main areas of problems and SCM research, which concealments most of the known problems in the published literature.

1.2 Supply chain design and planning

One of the vital issues in supply chain management is the enlargement and planning of the overall network architecture of the supply chain and value extra flows that pass through it. This means that managers must step back and assessment the supply chain by way of a whole and formulate strategies and processes that maximize the total value added of the supply chain and minimize the entire supply chain costs. The core content of such architectural design and planning includes configuration, degree of vertical integration, strategic outsourcing, location decisions, capacity planning, and work with the whip effect. There are also other parts of design and planning, such as relationships, which will be covered in a separate chapter.

The arrangement of the supply chain is how the members of the company involved in the chain are associated to each other to deliver a product or service to an end user. For an OEM, how many providers it uses, how suppliers are clustered or categorized or categorized, geographically located, affiliation and independence of suppliers, the choice of distribution channels are all configuration issues for the supply chain. The detail is that companies have the opportunity to customize their supply chains in the method they consider the most suitable and profitable. However, there is no single “best” structure for all supply chains. It altogether depends on industries, market conditions, steps of the product cycle, and so on.

The development of a global network of transnational corporations can be an interesting example for understanding the application of the supply chain conformation. In the period before the Second World War of the 1930s and the 1940s, mainly European offshore companies, including Unilever, Royal Dutch / Shell, ICI and Philips, were inventors in the development of a “global supply chain” and twisted their feelers, such as holdings companies around the world. continent. Each national subsidiary was granted a high degree of operational independence from the parent company; understanding self-developed product, production and marketing. This is a semi-partitioned “free” configuration. Such a “non-interfering” attitude was a response to conditions at a time when transnational transport and

communications were slow, costly and unreliable; and national markets were highly discerned.

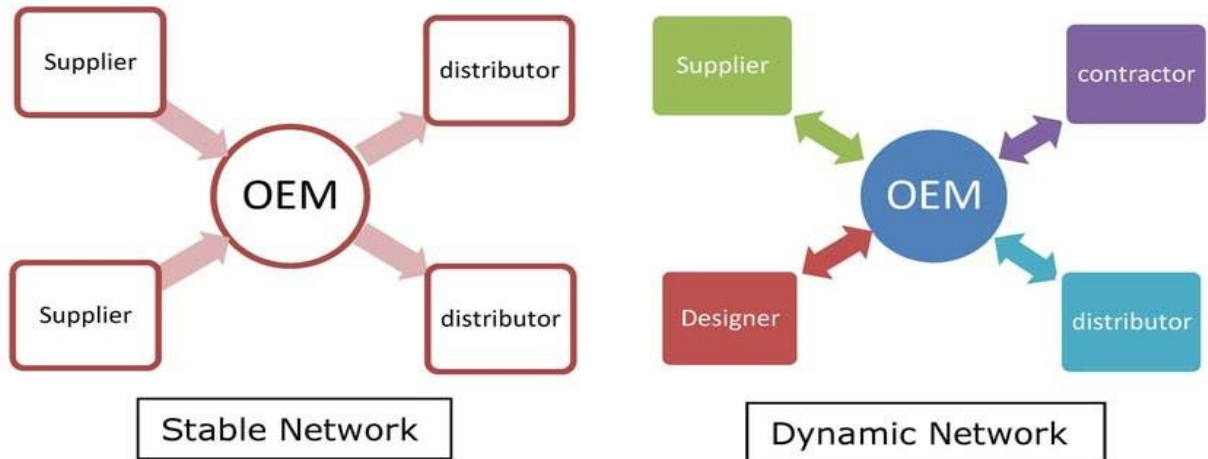
In the 1950s and 1960s, American transnational corporations dominated the world, plus GM, Ford, IBM, Coca-Cola, Caterpillar, Procter & Gamble. The configuration of these transnational corporations with their subsidiaries has acquired an evolutionary form. Although subsidiaries worked with a high degree of self-sufficiency from the parent company, American parent companies dominate in terms of strategic leadership and resource support. This was partly because at that time the United States was the largest and richest market in the world. The American base was the source of new products and technological processes. The main competitive advantage of subsidiaries was the ability to use the resource.

In the 1970s and 1980s, the Japanese faced difficulties throughout the world. Its multinational corporations, such as, Honda, Matsushita, Toyota, NEC and Sony, have come a long way from export to globalization and have created specific market foundations. A distinctive feature of the configuration of Japanese transnational corporations was their desire for global strategies from centralized internal bases. While foreign subsidiaries initially engaged in sales, spreading and customer support. By creating plants of unprecedented scale to serve the growing global demand, Japanese corporations were able to use significant scale and gain an advantage.

Supply chain configuration can also be pragmatic in terms of network relationships. When an OEM builds its supply chain through multi-level suppliers and multi-level distributors with medium and long-term stability, it can be called a “stable network”. When OEM does not have many of these long-term multi-tier suppliers and customers, but instead uses dynamic and mostly short-term suppliers and distributors to realize a high level of operational flexibility and strategic flexibility, this can be

called Dynamic Network. Two extensive types of network configurations can be illustrated in Figure x.

Figure: OEM Network



Source: Fundamental of supply Chain Management, Dr. Dawie Lu, 2011

For comparison, a multi-level stable network has more resistor over the activities of its suppliers and traders than a dynamic network. A surprising mistake in a dynamic network can lead to unrecoverable product defects. Along with this, there is a higher risk in managing operating costs and quality standards. However, a dynamic network is much more flexible than a stable network, since it can quickly form a new network in the supply market to meet the changed demand in terms of both volume and diversity. It also has improved capabilities for modernizing technologies and stimulating innovation courses. Which network configuration is better? It completely depends on the goals and desired features of the network in a business context.

2.3 What is automobile industry?

The car was first discovered and developed in Germany and France in the late 1800s, but the Americans rapidly began to dominate the automobile industry in the first half

of the twentieth century. Henry Ford introduced innovative serial production technologies that became the standard, and in the 1920s Ford, General Motors and Chrysler became the Big Three automobile company. Manufacturers, II. During World War II they directed their resources to the army, and later in Europe and Japan the production of automobiles increased dramatically to meet the growing demand. The industry, which is vital for the extension of American urban centers, has become a joint global enterprise with growing Japan as a leading automobile manufacturer in the 1980s.

While the car had the largest social and economic impact in the US, it was initially improved by Germany and France at the end of the nineteenth century by people such as Gottlieb Daimler, Karl Benz, Nikolas Otto and Emil Levassor.

When were the cars invented?

Designed by Wilhelm Maybach for the Daimler Motoren Gesellschaft, the 1901 Mercedes merits credit for being the first modern car in everything.

The thirty-five-horsepower locomotive weighed only fourteen pounds per horsepower and reached fifty-three miles per hour. By 1909, Daimler employed about seventeen hundred employees to produce less than a thousand cars a year, thanks to the establishment of the most integrated automotive plant in Europe.

Nothing can show that the European design is better than the sharp contrast on the single-cylinder, three-cylinder, inclined, steerable steering wheel in the Oldsmobile Ransom Olds 1901-1906, which is only a motorized carriage with this first Mercedes model. The ancients, however, were sold for only \$ 650, allowing middle-class

Americans to reach them, and the release of the Ancients, who reached 5.508 units in 1904, passed all the cars that were previously produced.

Henry Ford and William Durant

Mass. J. Frank and Charles Duryea, Mass., Developed the first effective American gasoline car in 1893, then gained the first American automobile race in 1895 and sustained the first sale of an American-made gas car. next year.

Thirty American manufacturers shaped 2,500 cars in 1899, and in the next decade about 485 companies were operational. In 1908, Henry Ford familiarized Model T and William Durant founded General Motors.

New companies have worked in a previously exclusive consumer goods market. The US needed more land transport than European countries in its massive land area and in the interior of dispersed and isolated populated areas. High demand was achieved pointedly higher per capital income, with a fairer distribution of income than European countries.

Model T

Given the American production tradition, it was inevitable to produce higher quantities of cars at lower prices than in Europe. The lack of interstate tariff barriers encouraged sales in a wide geographical region. The chronic shortage of cheap raw materials and skilled labor has contributed to the mechanization of production processes in the United States.

This required standardization of products and led to the mass production of products such as firearms, sewing bicycles, machines and many other items. In 1913, the United States shaped around 485,000 606,124 cars in the world.

Ford Motor Company is far ahead of its competitors in aligning modern design at a reasonable price. The Cycle and Automobile Trade Journal called the four-cylinder Ford Model N (1906-1907) 600 horsepower. well made and presented in large quantities on the shaft of each shaft. Di After receiving the orders, Ford developed the production equipment and was able to supply 100 vehicles per day after 1906.

Inspired by the success of Model N, Henry Ford was resolute to create a Henry machine for a wide variety of people Model. The four-cylinder T-model, which was originally proposed in October 1908, was sold for \$ 825. The two-speed terrestrial gearbox makes operation easier and features such as a removable cylinder head make it easy to repair. The high chassis is designed to clear impacts on rural roads. Vanadium steel has made the T model easier and harder, and the new casting part methods (especially the engine block dump) have helped to maintain the price.

Striving for high-volume manufacture of Model T, Ford introduced modern mass production technologies in its novel factory in Highland Park, Michigan (although it did not have a mobile meeting line until 1913-1914). In 1912, Model T sold for \$ 575, below the average annual salary in the US.

When Model T was not produced in 1927, its price was reduced to \$ 290 per section, 15 million units were sold, and mass personal de mobility in became real.

Automotive Industry Growing Pains

Ford mass production methods were quickly assumed by other American car manufacturers. (European automakers did not use them until the 1930s.) The higher capital costs and higher sales that were needed put an end to an era of easy entry and free competition between many small manufacturers in American industry.

The sum of active car manufacturers fell from 253 in 1908 to simply 44 in 1929, with about 80 percent of the industry's products accounted for Ford, General Motors and Chrysler, planned from Maxwell in 1925 by Walter P. Chrysler.

Most of the residual independent were destroyed during the Great Depression, when Nash, Hudson, Studebaker and Packard held on to the ruins only in the aftermath of World War II.

Model T was supposed to be a "farmer's car" that met the transportation needs of a realm of farmers. Its admiration was to diminish as the country was urbanized and rural areas emerged from the mud with the adoption of the Federal Road Aid Act of 1916 and the Federal Highway Law of 1921.

Moreover, the Model T remained largely unchanged for a long time after it was technologically obsolete. The owners of the model T began to trade larger, faster, smoother, more stylish cars. The demand for rudimentary transportation, which the Model T met, in the 1920s grew more and more to meet the demand for used cars, which accumulated in dealer areas as the market became saturated.

Car Sales Stall

By 1927, the need to replace new cars exceeded the demand from new owners and buyers of several cars combined. Given the daily earnings, automakers could no longer sum on mounting the market. Segment sales were initiated by moderate-priced car manufacturers in 1916 to compete with the Model T, and by 1925 about three-quarters of all new cars were believed on time through a loan.

Although several luxurious items, such as pianos and embroidery machines, were sold on time before 1920, it was sales of cars by installments during the twenties that determined the obtaining of expensive consumer properties on credit as a middle-class practice and a pillar of the American economy.

GM Introduces ‘Planned Obsolescence’

Saturation of the market coincided with technological inaction: innovations in both products and production technologies became progressive rather than dramatic. After the Second World War, the main differences that differentiated the models from the T model were at the end of the 1920s: self-start, totally enclosed steel frame, high compression fraction engine, hydraulic brakes, synchronization and low burden. Balloon Tires

Remaining innovations - the design of an automatic transmission and hinged frame - appeared in the 1930s. In addition, with some exceptions, cars were produced in the early 1950s, almost as in the 1920s.

Under the leadership of Alfred P. Sloan Jr. in the 1920s and 1930s to tackle market saturation and technological inaction, General Motors brought the planned product aging and, as an example, put a new emphasis on modeling, which is largely a cosmetic-year model. change - a three-year significant restyling planned, the life economy dies and is rearranged to coincide with the annual small developments between them.

The goal was to guarantee that consumers were not satisfied enough to trade before the current tools available, and apparently more expensive for a new model. Sloane's philosophy was, "The main purpose of the company ... was to make money, just to make cars." GM did not believe that cars need the "design should be the best equal to our competitors." Lead the design or manage the uncertified experiment risk. "

For this reason, the engineering was exposed by stylists and accountants. General Motors has become a model for a rational, technologically driven company.

Since Sloanism changed Fordism as the dominant market strategy in the industry, Ford lost its sales leadership in a profitable area with low Chevrolet prices in 1927 and 1928. In 1936, GM won 43 percent of the US market; Ford, with 22 percent after Chrysler, took the third place with 25 percent.

Although automobile sales fall during the Great Depression, Sloan can boast of GM "who cannot make a profit in any year of the company". (GM remained in the sector as Ford's profit until 1986).

World War II and the Auto Industry

The automotive industry played a decisive role in the production of military vehicles and military equipment through the First World War. During the Second World War, as well as the launch of several million military automobiles, American car manufacturers produced seventy-five major military items, most of which were not related to cars. The total cost of these materials was \$ 29 billion. The US is one-fifth of the country's total military production.

Since the production of vehicles for the civilian market ended in 1942 and tires and gasoline were definitely rationalized, the number of trips by cars in the war years sharply declined. The services that were served in the depression and ready for recycling were fixed shortly after the vehicles were serviced, which caused a great demand for new cars at the end of the war.

Detroit's Great Trinity put the slogan in an unreasonable end in the post-war period. The models and options have expanded and every year the cars have become longer and weightier, more powerful, more adapted to tools, more expensive to buy and operate;

The rise of Japanese car manufacturers

The technique used in the post-war period was subject to questionable aesthetics of the non-functional style for economy and security. Quality worsened until the mid-1960s, when American cars were delivered to retail customers with an average of twenty-four imperfections per unit of safety. Moreover, Detroit's higher unit profits from gas-powered 'social road cruisers' were produced at the expense of increased air pollution and social costs associated with depletion of world oil reserves.

The period of the yearly restyled craft ended with the introduction of federal principles for automobile safety (1966), pollutant emissions (1965 and 1970) and energy consumption (1975); After the oil shocks in 1973 and 1979, the price of gasoline increased; and with the growing impact of the US and world markets in specific, before the German Volkswagen Bug (modern model T) and later Japanese economic, functionally designed, well-designed small cars.

In 1978, 12.87 million records reached a record high level of American-made automobile sales fell to 6.95 million, in 1982 the share of the US market from 17.7 to 27.9 percent increased. In 1980, Japan became the world's leading automobile manufacturer, and this position continues to be preserved.

U.S. Carmakers Retool

In contrast, the American auto industry has undergone a main organizational restructuring and technological revival in the 1980s. The management revolution and the reduction of GM's production capacity and its staff, Ford and Chrysler, led companies to become more strong and more rigid with lower breaking points, allowing companies to profit from smaller volumes in increasingly competitive markets.

Production quality and employee enthusiasm and participation programs were given priority. In 1980, the industry undertook a five-year modernization and re-equipment program of \$ 80 billion. Functional aerodynamic design swapped the style in the studio in Detroit, as annual cosmetic changes were canceled.

Cars have become smaller, more economical, less polluting and safer. In the process of computer aided design, engineering and production integration, goods and production are increasing.

Legacy of the U.S. Auto Industry

The car was the key to the change in America in the twentieth century. In the 1920s, industry became the basis of a new society focused on consumer goods. By the middle of the 1920s, it ranked first in terms of product value, and in 1982 it took every sixth job in the United States.

In the 1920s, the automobile was one of the main consumers of the steel industry and was the lifeblood of the oil industry, the biggest consumer of many other industrial goods. The technologies of these auxiliary industries, especially steel and oil, have revolutionized their needs.

The car encouraged participation in outdoor recreation and encouraged the growth of tourism and tourism-related sectors such as service stations, roadside restaurants and motels. Structure of streets and highways, one of the major public expenditure items, peaked when the largest public works program in history came into force in accordance with the Interstate Highway Act of 1956.

The car completed rural isolation, and most importantly brought urban facilities to rural areas, including better medical care and schools (paradoxically, even though the agricultural tractor makes the traditional family farm old). It is a modern city, road and road transport product in industrial and residential suburbs.

The car altered the architecture of a typical American house, changed the concept and composition of urban neighborhoods and saved housewives from the narrow spaces of the house. No other historical force has created a revolutionary change as Americans work, live and play.

In 1980, 87.2 percent of American families had one or more cars, 51.5 percent - more than one, and 95 percent of inland car sales were changed. The Americans were really automatic dependent.

However, although car ownership is almost worldwide, the car no longer acts as a progressive strength of change. New powers - electronic media, laser, computers and robots - are probably among them - probably building the future. The period of American history, which can be called the automobile period, is entering a new era of electronics.

CUTTING TOOL MATERIALS

The first developed tool steel was produced by Robert Mousch in England in 1868, which proved to be much better than carbon steel previously used for the tool. This new tool steel is made by John Fowler & Co. Leeds' iron shafts were spinning at a speed of 75 feet per minute. They can make 1/2-inch rough cuts to process steel wheels in drill mills. Frederick W. Taylor (1856-1915) was credited with revolutionary research in the field of materials for cutting tools. In 1900, the Taylor Paris exhibition drew attention to visitors with the fact that it was shaken from blue heat in an American lathe chips and the tip of the cutting tool was red.

Taylor was the first to carry out methodical experiments with cutting tools that lasted more than 26 years and cost more than \$ 200,000 - a lot of research and development costs back then. Steel Mousche contains 7% tungsten, 2% carbon and 2.5% manganese. Maunsel White at Bethlehem Metallurgical Plant and Taylor found that chromium was an effective substitute for manganese used for curing steel, but it also increased its efficiency. Then they increased the content of chromium and tungsten (tungsten to 14%) and added the silicone to increase the impact resistance. An experiment with a heating temperature indicated that if the tool warms to 20,000 F (just below the melting point) instead of 15,500 F, the cutting speed will be increased to 80-90 feet per minute (compared to 30 feet per minute). failure occurred simultaneously. Titanium and molybdenum were tested, but were rejected for being too expensive, but the addition of 0.7% vanadium led to further improvement.

EFFECT OF NEW CUTTING TOOLS

With this radically improved cutting material, all existing machines had to be old. Proof of this, A.G. A reputable German machine manufacturer, Ludwig Lowy tested new steel tools for maximum performance by testing on a lathe and a drilling machine. Four weeks later, both cars were scrapped! The main drive shafts are stuck; pressure bearings were destroyed; the keys fell from the gears and shafts; Cast gears were broken and lubrication systems were inadequate. In order to benefit from the new cutting tools, the new machines should be designed and manufactured to obtain the best cutting speeds for different cuts, with heavier, more feed and drive power, geared steel gears and better lubrication and at increasing speed ranges of both drives. materials, different diameters of the workpiece, different depth and cutting thickness. Taylor, not only the designer of the machine tool, but also a unit of pressure, speed and tool feed unit can be converted into features.

Interestingly, machine-to-vehicle transmissions are largely caused by the car, but the speed range required for the vehicle is closer and wider than the vehicle. However,

the problems with higher shaft speeds and voltages were similar. The long, unsupported shafts of existing machines tended to deflect and vibrate under load. To fix this error, automotive type gears made of hardened nickel-chromium steel were accepted. Automotive applications for machine applications are also adapted. Since its development for automobiles, robust and long-lasting oils are available.

OTHER MACHINES DEVELOPED FOR AUTO INDUSTRY

The pressure and excitement of supplying automotive parts were responsible for the development of many production methods:

In connection with the widespread electrification that emerged at the turn of the century, arc welding was introduced. John S. Lincoln began experimenting with the creation of equipment for arc welding around 1902, but only in 1912, Lincoln Electric Co. began to produce such equipment. Full commercial recognition was to wait for the merger procedure to prove itself during the production of the First World War. In 1918, Lincoln patented the use of carbon monoxide as a protective agent for arc welding, which was not so popular with modern automobile manufacturers, but was widely restored in the automotive industry in the 1950s.

In 1903, A.B. For short cylindrical parts, Landis issued an automatic feeding patent to the magazine, making it possible to mill the pins effectively. In 1915, LR Heim was granted a patent on a decentralized grinding principle; where it ensured the accuracy of the system used with David Wilkinson's 1820 backhoe; In 1922 Cincinnati Milling Machine Inc. He took Heim's invention and presented the first series centerless grinding machine. The car was immediately recognized in the automotive industry using a 20-inch diameter wheel to grind shoulder parts such as pusher and valve pusher. By 1925, automotive valve bodies were grounded on centerless machines at a speed of 350 hours per hour. It was necessary to pull the

adjustment wheel back to cut the cut and release the workpiece. It was too slow for the car requirements (even then). Between 1932 and 1935, in Cincinnati, the grinding machine developed a cam-type steering wheel with its component operating in one cycle of the glass wheel.

Although it was brown, Charles H. Norton and A.B. developed a more advanced grinding machine. Landis, in 1905, and Norton Co. and Landis Tool Co. By eliminating bending in the shaft, they set the work to two moving heads, proposing special grinding machines for the automotive crankshafts balanced with the carrier bearings.

In 1910, A.B. Landis broke ties with Landis Tool Co. and Landis Machine Co. opened an engineering laboratory to develop inventions and launched the 1912 camshaft grinding machine, providing automatic feeding from one cam to another. The main camshafts were adapted to the workpiece and were larger than the workpiece, thus reducing the error. Norton also developed a camshaft grinder at the same time. The machine allowed the engine developers to define the rigid camshafts of hardened alloy steels instead of forming these control mechanisms separately from the ground parts.

James Hild developed domestic mills at the same time. Until 1905 Hild planetary movement I.D. The grinder, the motor cylinders were boring, then opened and discarded. Increases in castings often deflect a boring tool that creates irregular rollers. Subsequent finishing work did not help to improve the level of the cylinder walls, and engine designers were barred from the internal combustion process because of the efficiency they could squeeze. When operating a smaller grinding wheel that is eccentric around the axis of the cylinder, the planetary wheel ID

Chopper can bring an unprecedented flatness to the interior walls of the engine. Parallelism with Hild's prototype machine was about 0.00025 inches.

To fully grind the cylinder, a piston equipped with appropriate precision rings was required. Using a mandrel, the wear surface of the piston ring can be machined, but the upper and lower surfaces must also be grounded so that the piston ring engages in its grooves. In 1902 German Reineker created a machine for grinding the edges of rings used in steam and gas engines. Two years later, Hild developed a similar car for the automotive industry. The grinding wheel was mounted on a horizontal axis and the piston ring was held in the work table with a magnetic chuck. The edge of the grinding wheel rotates the work table.

His introduction as a production technique was probably rebuilt by Anson Stevens in the United States for his potential in the automotive industry in 1873, although British Joshef Whitworth returned to his internal key cutting method. In 1898, John N. Lapoynt received a patent for a pull pin that has hitherto been carried out by pushing a threaded tool through a hole in the workpiece, severely limited by the physical force of the compression hole in the workpiece. Special molding machines in 1918

Brooch production was developed and the first hydraulic broaching machine was produced in 1921. Then, in 1934, external or surface broaching was introduced.

Automobile manufacturers had an equally powerful influence on the machines. With the assembly time of Model T shortened from one and a half days to half an hour, it was understood that no mechanical workshop was able to deliver the pieces so quickly. E.P. Bullard Jr. started designing a new machine for multiple production. When everything was ready, Bullard headed to Detroit, where he arranged a meeting

with Ford. Ford sat next to the head of car design and factory operations S. Harold Wills. The two men listened carefully to Bullard, but when they both expressed their skepticism, the machine builder revealed his strongest argument. Old Mr. Ford, "thought Bullard, an How long will it take you to make a flywheel?, Bul Eighteen minutes Ford was the answer. Will shook his head. . Would you test our car if I guarantee to reduce it to two minutes? Dakik Bullard asked. Ford smiled: "Take half our time and do business." The first Bullard Mult-Au-Matik from Highland Park was subjected to a 54-day and night-long test. Completed flywheels were removed from the vehicle at intervals of more than one minute.

EVOLUTION OF NEW MACHINE TOOLS

The production date attracts attention with the development of form production in the automotive industry, as well as improvements in machinery and cutting tools, as well as the outline of new and more advanced materials for car production. In the early 1920s, machine builders were competing with one another in the production of machine tools with higher productivity, especially for the automotive industry. Power transfer methods for machine tools are constantly being improved. The helical gears for linking the parallel shafts are increasingly used to provide a smooth transition. Superior steels and heat treated gears were mutual where hardened and ground gears gained popularity in places demanding more precision. The use of motorized drives and ball bearings and the hydraulically increasing trend in place of mechanical gearboxes have been notable developments in machine tools of the 1920s. Centralized control has become popular, and in some machines, it has been possible to quickly switch quickly without stopping the machine using a combination brake clutch. In 1927, another definite trend became visible; The trend towards the so-called production type and more specialized equipment from a widespread machine. The design of this single-purpose machine, it was necessary to change only a few key details to adapt the machine to a wide range of work. In the early 1930s, this trend had changed completely.

Interesting participation of equipment changes during the model change will be evident from the details of the work done during the transition from Model T to Model A Ford in 1927.

For this, the company has spent about \$ 10 million to purchase 4,500 new machines and 15,000 rework. Preparation for the creation of a new rear axle required the construction of a whole set of machine tools. Approximately 160 gear engineering machines were rebuilt for \$ 3,000 each to make two gears for a new rear axle assembly. In 1932, Ford introduced a new V-8 model (\$ 460-650) to replace the A, and became the first company to use steel alloy steel shafts instead of forging.

MACHINE TOOLS AFTER WORLD WAR II

The Second World War put an end to the automotive industry as most factories were demanded for the production of military equipment and machinery. After the war, many car manufacturers were in poor condition.

Efforts to renew the industry have begun with a new effort and many new technological strategies have emerged for the production of the le Machine that changes the world End. This is evident from actions such as the creation of the automation department at Ford in 1946. The department is concerned with ensuring that the equipment operates at maximum speed (often impossible without automatic loading and unloading), and also increases job security by eliminating manual control. Press the install button. On October 21, 1948, the Automation Department approved more than 500 devices worth \$ 3 million. The US is forced to increase production by 20% and eliminate 1000 jobs. Most of the initial works were on presses and sheet feeders, extractors, turnover devices, stackers, loaders, unloaders, etc. It contained.

The next automation project relates to the engine block processing line in which

automation is to process blocks inside and outside the machines. Instead of performing mechanical processing between the machines, a new approach to automation by combining operations in a single machine was first introduced at the Morris automobile plant in Coventry, UK in 1924. For application, a series of standard machines have been connected to a continuous bed of 181 feet. 53 operations in engine blocks. In total, the vehicle had 81 electric motors. In 1929, Graham Page set up a system of operations in the cylinder compartment with automatic luminaires and luminaires with a crossover bar to move the machine from the machine to the machine; The system contained all the main elements of a modern transfer machine.

Over the years, many improvements have been added to the automobile manufacturing process. Perhaps in 1950, the concept of "through the door" started. In 1970, the first welding robot in the automotive industry may have been launched. Designed by Fisher's body. This 6-axis manipulator (SAM) was able to manage 510 commands distributed in 10 separate programs.

NUMERICAL CONTROL AND COMPUTERISED MANUFACTURING

I. Shortly after World War II, John T. Parsons envisaged the use of mathematical data to power a machine. The electronic machine control system was developed as part of a program supported by the US Air Force. The first commercial production facility NC, Bendix Corp. It was produced in 1954 for machines produced in 1955. In 1957, Barnes Drill Co. He built a drilling machine with four parallel horizontal drilling spindles moving along vertical paths to bring the desired spindle to position, and only this spindle would be fed later. In 1958, Hughes Aircraft and Kearney & Trecker worked together to create a flexible automatic line of three machines: each for milling, drilling (and threading) and drilling. The three machines were related to

each other via loading and unloading equipment, and the entire system was controlled by a tape called Digitape developed by the Hughes aircraft. The entire line was named Milwaukee-Matic Model I. Using the Milwaukee-Matic II in December 1958, Milwaukee-Matic II, a multifunctional CNC horizontal spindle machine that can automatically replace the cutting tool on the spindle, using the first CNC machine tool or machining center in the machine tool industry, the second industry He was born to make the beginning of his revolution. In 1960, the first organizer with transistor technology was introduced. The integrated circuits (ICs) were introduced in 1967, making it possible to reduce the number of components by 90% and also to reduce the recording volume by 80%.

With the growth of automation, more and more specialized equipment has emerged for the production processes due to the availability of unlimited markets and long-term models. Nevertheless, uniform in the automotive industry, the times of mass production systems with special tools are changing rapidly. The flexibility to change the model quickly without stopping becomes the basic need of the production system. Computerized production

can be answered. In the following sections we will cover the details of trends in the various areas of the manufacturing industry of the automotive industry: in general processing, manufacture of main engine components, manufacture of gears, stamping of body panels, welding of body, painting, coating and final assembly of vehicles.

2.3.1 History of Automobile Industry

Fredrik Taylor, who wrote the Principles of Scientific Management in 1911 in logistics and the father of industrial engineering, attentive the initial work on how to improve manual loading operations. Operations research began with the

analytical value of scientists in the investigation of military logistics problems in the 1940s as a result of the complex demands of the Second World War. When Industrial Design and Operations Research was used in an integrated environment to address supply chain and logistical problems while trying to maintain individual identities, most of its greatest achievements were achieved. This is increasingly called by the industry as inc Supply Chain Design Bu. Supply chain history

Management: The Early Years

In the 1940s and 1950s, the concentration of logistics exploration was on how to use mechanization (eg pallets and pallet lifts) to progress very labor-intensive factual handling processes, as well as how to use and better use interplanetary with shelves and improved warehouse design and better space. The concept of unit load pallet has grown popularity and the use of pallets has become prevalent. In the mid-1950s, this concept was extended to the transport management with the development of ships, trains and trucks for the transportation of these containers as well as intermodal containers. This was a prerequisite for the globalization of the supply chain that had to come later. Although the terms storage, and da material handling ”have been used to describe most of these efforts, this study can be seen as a basic practice of industrial design, not a discipline of its own.

By the 1960s, there was a marked tendency to relocate more time-dependent cargoes to freight instead of railway transportation. This has managed to the need for joint attention of storage, loading and unloading operations and freight traffic issues under the need Physical Distribution label. The Board of National Physical Distribution was established in 1963 to focus the sector's attention on this field and has rapidly become the dominant organization in this turf. Academic research and education has surveyed this trend in order to meet the needs of this field in the growing sector. This area has been widely accepted in

both industry and academia, mainly due to basic paradigm shifts in computers in the 1960s and 1970s. Almost all transactions and accounting processes were done manually until the 1960s. The computerization of this data created a great opportunity for innovation in logistics planning, from the randomized warehouse in the warehouses to the inventory and the orientation of the trucks. Technologies from operations research have become much closer to reality, especially where researchers can only work on theoretical models. However, in the transition from theory to practice, many more complex research questions remained unresolved. In the late 1970s and early 1980s, this led to the manufacture of a Production and Distribution Research Center, a Material Processing Research Center and a Computational Optimization Center in Georgia. Each of these centers focused on the various aspects of what this new computer technology is possible.

History of Supply Chain Management: Logistics Comes of Age

In the 1980s, significant changes occurred in the past of supply chain management were noted. The arrival of personal computers in the early 1980s greatly improved the accessibility of computers to planners and created a new graphical planning environment. This has created a stream of new technologies, including flexible spreadsheets and cartographic interfaces that significantly improve logistics planning and execution technologies. The Production and Distribution Research Center was the first innovation leader to combine cartographic lines with optimization models for supply chain design and deployment planning. The material conduct research center provided leadership in the development of new control technology to automate material handling. The Computational Optimization Center has developed new sweeping optimization algorithms that have previously enabled us to solve the difficult tasks of air transport planning. Most of the methodology developed in these centers began to enter commercial technologies rapidly.

Perhaps the most imperative trend for logistics in the 1980s was that it began to expansion tremendous appreciation in the industry, which was very lavish, very vital and very complex. Business executives, if they want to invest in educated experts and new technologies, have realized logistics as an area where they have the opportunity to improve results significantly. In 1985, the National Physical Distribution Board changed its name to the Logistics Management Board (CLM). The reason for the name change in the new CLM was to li reflect the evolving discipline, including integration of incoming, outgoing and reverse goods, services and related information flows,. Prior to this, logistics was almost entirely used to describe provision for military movements.

History of Supply Chain Management: Technological Revolution

The logistics explosion intensified in the 1990s due to the appearance of enterprise resource planning (ERP) systems. These systems, in part, are managed by planning systems for the material needs developed in the 1970s and 1980s, partly because they exist in almost all companies and rarely communicate with each other and partly because of problems. existing systems may cause catastrophic failures due to the inability to process the 2000 date. In spite of some important problems related to the establishment and operation of ERP systems, until 2000, many large companies have established ERP systems. The outcome of this change in ERP systems is a great improvement in data availability and accuracy. The new ERP software has also greatly increased the gratitude of the need for better planning and integration between logistics machinerics. The consequence was a new group of Advanced Planning and Scheduling (APS) software.

Supply Chain Management History: Globalization and Supply Chains

The widespread acceptance of the term ur supply chain, is mainly a result of the globalization of production since the mid-1990s, in particular production growth in China. US imports from China increased by about \$ 45 billion. Every year in the

United States more than \$ 280 billion in 1995. US in 2006 year. The emphasis on globalization stressed the need for logistical strategies for working with complex networks, including several organizations with several countries with different controls. The tendency to use the term supply chain management logistics to mention to tactical and operational issues is increasing in reference to strategic issues and logistical issues. This growing link with strategic supply chain management was also reflected in the fact that in 2005, the name of the Logistics Board of Directors changed the name of the Board of Supply Chain Professionals. Company Logistics is part of the supply chain process that plans, implements and controls the effective, efficient forward and backward flow and storage of relevant information between the goods, services and the point of consumption to meet the customer requirements Supply Chain Management, within a specific company Although there is a systematic, strategic coordination of the traditional business functions and tactics between these business functions, and to improve the long-term routine of individual companies and the supply chain as a whole in the supply chain”.

History of Supply Chain Management: The Forthcoming of Supply Chain and Logistics

Since the 1980s, computer technologies have been developing at such a phenomenal rate that at present they are far ahead of the capabilities of the logistics and logistics sectors to adequately use new technologies. Given the scale of Internet use today, it's hard to be certain of that Microsoft Internet Explorer 1.0 was released in 1995. Communication capabilities have radically changed our ideas about communication and information distribution. Conversely, supply chain planning and logistics are still based on distributed models resulting from the use of personal computers. There is no distrust that academic exploration can provide a new peer group of supply chain and logistics arrangement technologies based on consolidated planning and

distributed collaboration. These technological advances can greatly benefit from traditional supply chain and logistics tasks such as warehousing and distribution, transportation and production logistics. However, there are also several non-traditional zones, such as healthcare logistics and public-spirited logistics that can benefit greatly by relying on perceptions and technologies that have already proven their helpfulness in traditional supply chains and logistics. Finally, there is very valuable information that can be obtained by systematically studying the supply chain and logistics efficiency of companies in different industries and countries.

2.4 Future problems of AUTOMOBILE INDUSTRY

There is a real understanding that major changes in the automotive industry are inevitable. It is not yet known whether they will be as comprehensive as some estimates, and whether they will be good or bad is a matter of personal opinion.

We will look at the most serious problems facing the automotive industry in 2018, defined as 'the most important changes since the automotive industry in 1908 by Henry Ford received.

Overhaul of the purchase process

A couple takes the car and the dealer takes the keys

Tesla sues auto dealers in many US states because they sell their vehicles directly to customers, not to their vendors. These rejected representations claim that this is a breach of industry norms, and lawmakers make different decisions in different states: Alabama, Texas and Utah, where Tesla is banned from direct sales; New Hampshire, Arizona and Missouri are among those allowed.

Although this is not a problem outside the United States, it shows the types of changes that can occur in all directions. Normally accepted assumptions are questioned by developments in automotive technology: cars that analyze the condition of parts and automatically order spare parts directly from the manufacturer, which are suspicious about the role of maintenance businesses; Downloading and installing system updates automatically questions the need to purchase a new car to access the latest software.

The Euro group states that in the competition has increased to a new level art that most companies are not yet ready and the new generation is challenging the concepts of classical mobility. We believe that it is important to keep up with these changes and we tend to disagree.

Presence and interpretation of new data

Business papers on a office desk with a smartphone and a laptop and a social network diagram and a digital business graph with three colleagues discuss data in the background

According to Accenture analysis, modern cars collect approximately 25 GB of data per hour from various built-in sensors and cameras. This data allows you to get a real-time image of performance, speed, status of components, and more. For example, in the event of an accident or accident, the data gives an idea of the cause and effect and helps us understand how to prevent such incidents in the future.

Transferring, storing and analyzing these large volumes of data will change the performance of parts of the automotive industry. Continuing with the fault example, the analysis can be done remotely and you can send the necessary events to the scene, instead of waiting for the roadside mechanic to arrive and evaluate. The state of the components can be estimated in real time, which means they can be changed as needed and not in optional moments, for example every 10,000 miles.

Such changes are likely to be beneficial for both drivers and manufacturers. Other companies need to be attentive of changes made to ensure that they are not left behind: service companies and especially those involved in data analysis.

Independent cars

Car galleries

Perhaps the greatest technological development is the emergence of tools in which human control is not necessary. Despite the recent and tragic failure, when such a car kills a pedestrian, the technology is gaining increasing popularity all over the world.

The KPMG report assessed countries' readiness for self-driving cars and assessed the willingness of governments to organize and support their development, infrastructures, private sector investments and large-scale tests based on the strong presence of the automotive industry. First came the Netherlands, then Singapore and the US. England ranked fifth.

Since Tesla, Uber, Apple, Google and Samsung (and only a few of them) work on self-driving technology, will in cars without drivers become real? Will you be able to driveless? The automotive industry should be prepared to adapt to the radical changes that this technology can bring.

Environmentally friendly cars

Since Elon Musk fulfilled its mission of making the senses of electric vehicles heavy and soft smooth and privileged, the industry has evolved. In the following chart prepared by Bloomberg, it is estimated that the number of producers planning an environmentally friendly alternative offer will triple between 2015-2020.

2.5 The role of the automobile industry in the economy of developed countries

The automotive industry is a capital rigorous and knowledge-intensive industry that plays an imperative role in the socio-economic progress of the country. At present, the industry, which includes an increasing number of countries in automobile production, is growing and the placement of the forces in the automotive market is repetitively changing. The role of the automobile industry in the advance of the modern economy and the expectations for its development are determined by the position of motor vehicles in the structure of the national economy. The article explains the antique development of the automotive industry in developed countries, analyzes the existing situation, makes estimates and emphasizes the main trends in the automotive industry. At present, the development of the country's economy is difficult to imagine without the expansion of the automotive industry. In 2017, 73.4 million cars and 23.84 million automobiles were produced universal, according to the world automotive manufacturer's canyon OICA association. According to international guesses, the annual average turnover of the global automotive industry is over 2.75 trillion. Euro 2. Automotive industry in the last ten years (2007-2017) increased by 25%. Cars are one of the largest spread products in the world; for example, surpassed oil revenues; for example, in 2016, global car exports by countries are appraised to be 698.2 billion dollars. UNITED STATES OF AMERICA. The industry is also a great innovator, participating more than 84 billion euros in research, development and construction. Therefore, among the leading 2500

companies in the field of investing in research and development, there are three main sectors: pharmaceutical and biotechnology, production gear and the automotive industry. For instance, only in 2014, the volume of investment in the R & D of the VW AG⁴ was about 13 billion Euros, and in 2016, in two years, it amounted to approximately US \$ 13.2 billion. It is worth noting that tax revenues from the carmakers in 26 industrialized countries are more than 430 billion euros per year.

The automotive industry consumes iron, steel, aluminum, plastics, glass, textiles, computer chips, carpets, rubber and more. According to statistics, about half of global oil, rubber consumption, about 1/4 of glass production volume and 1/6 of the steel production volume fall into the automotive industry. The industry ranks second after the aircraft industry in terms of the volume of products consumed from other industries. In the developed country economy, the growth in the automotive sector is 1% and the GDP growth is 1.5%. The indirect impact of the automotive industry on GDP is increased by the relevant industries provided by the automotive industry. In the developed countries, the automotive industry is a leading engineering branch. There is no single big economy in the country without a major automobile industry. Therefore, the share of the automotive sector in the GDP of developed countries varies between 5% and 10%. Share of this sector

German engineering production is 14%, Japan is 12%, South Korea is 10%. The one dollar invested in the automotive industry rises gross domestic product by \$ 3 (average multiplier). According to this indicator, the automotive industry is not equal among other industries. According to various estimates, the gross revenue of the automotive industry will increase significantly by 20, 2030, and the industry will bring additional revenue of 1.5 trillion. (Increase revenue by 30%). At the same time, revenues from the sale of traditional automobiles, as well as the revenue from after-sales service and spare parts sales, will be about 5.2 trillion UAH. In 2015 this figure was only 3.5 trillion UAH. Together, these revenues can increase the annual growth of the auto industry to 4.4%. The total figures of the global automobile industry have

made the International Automobile Manufacturers' Organization "OICA" equal to the sixth largest economy in the world. Modern carmakers and automotive market experts estimate the global automotive market's annual growth rate will be around 3.6%, which is unevenly the same as the dynamics of world GDP⁶. Therefore, the automotive industry is unique of the key sectors of the economy that enables the growth of other industries and the country as a whole. The success of the auto-building multifaceted depends on the welfare and fate of millions of people and, to a large extent, the defense capacity of the country. The automotive industry in countries such as the USA, Japan, Germany and South Korea is a fundamental example of a global user super industry formation. Table 1 shows the rate of macroeconomic strictures of these countries and the progress of the automotive industry.

Table 1. The ratio of macroeconomic parameters and the share of automotive parameters of the leading countries in 2017

Parameters		USA	Japan	Germany	South Korea
Share of GDP in world production (%)		24.42	5.6	4.57	1.85
The share of the automotive industry in world production (%)		12.3	10	6	4.9
The share of the automotive industry in GDP (%)		12	12	14	10
The country's share in world exports of goods (%)		9.1	3.8	8.1	3.2
Commodity exports (billions of dollars)		1504.9	624.9	1329.5	526.8
The volume of exports of machinery and transport equipment (billion dollars)		664.9	400.6	729.6	315.1
The volume of export of cars (billion dollars)		53.8	91.9	151.9	37.5
Number of employment in the automotive industry:	Direct (th.)	870	803	807	320
	Indirect (million)	7.2	5.5	1.8	1.83
Share of industry in GDP (%)		19.9	26.6	32.5	39.7

Source: The role of the automobile industry in the economy of developed countries, Behzad Saberi, 2018

3. Efficiency of the SUPPLY CHAIN MANAGEMENT in the automobile industry

3.1 Analysis of the SUPPLY CHAIN MANAGEMENT in the automobile industry

Over the last century, the automotive culture has spread to the world. Like other products, the car has shaped not only the global economy, but also the lifestyle of billions of people. In Europe alone, the automotive industry (including related works) is responsible for approximately 12 million jobs; More than 8 million in the US; and more than 5 million in Japan

Despite its resistance, the industry has undergone constant change. Modern cars - with electric drivers or assistants - shot Henry Ford, Ferdinand Porsche and Kiichiro Toyoda. They were also surprised by the growing demand for the environment and the emergence of new players, especially in China. So what's next?

This in-depth study gives an idea of where the automotive industry is going. It is based on numerous discussions and discussions that analyze the data of the top 17 (on-the-go) global OEMs, which constitute the top management of leading automotive original equipment manufacturers (OEMs) and 80 percent of global sales. This study was designed to answer the most important questions:

1.And how is the industry and industry developing?

2.What are the future challenges and opportunities?

3.How can OEM OEMs benefit from these new challenges and opportunities?

4.What are the implications for different market segments?

McKinsey's analysis tells a story that is optimistic and sometimes surprising in many ways. But the most important point of the story is that the global automotive industry is entering a period of large-scale and transformative change as sales continue to change and environmental standards are getting harder. Course: Companies that want a successful and long-term future should make the right strategic decisions in the next decade.

The future will not be the same for each country or type of vehicle, so this report has separated the markets accordingly and divides the sector by region: Europe (except Russia), North America (USA, Canada, Mexico) Japan and South Korea, BRIC countries (Brazil, Russia , India, China) and the rest of the world (RO).

The report also divides the industry into three main vehicle segments, depending on the brand and location of cars in different markets. The premium segment (representing the highest prices and margins) constitutes 10 percent of the market. Cost segment - middle price range; This includes the majority of cars sold in all markets (70 percent). The entry segment belongs to the most expensive vehicles in various classes, which account for 20 percent of other vehicles.

3.2 Challenges of the SUPPLY CHAIN MANAGEMENT in the automobile industry

The automotive supply chain obligates many altered aspects and is a very multipart system. Companies operating in this sector need to ensure that their supply chain management systems are working correctly and that profits are increasing with your customer base. In fact, when the automobile industry endures to grow, problems continue to emerge. If you do business with small and medium businesses, most of these problems can be difficult and / or impossible for an independent solution. Strategic supply chain management should always be a top priority to keep pace with these challenges. To prepare for some possible problems you may encounter, here are seven major supply chain problems affecting automobile companies and how a third party (3PL) logistics company can help you overcome these obstacles.

Excess stock

Believe it or not, there's a good place to manage your inventory. You must keep your stocks in good condition, but you should not make a surplus. The automotive industry has grown in the last few years, but that doesn't mean you need it. You can continue balance by working with a third-party logistics business partner. They usage software that monitors and measures your inventory data, which can tell you which products are most frequently requested. You can make better decisions about how much each item will be on hand if the items that should be available are seen exactly.

Number of comments

If you need to do a large number of product reviews for any reason, it may be costly for your company. Such disruptions in the services of your supply chain can be a long and complex problem that can spread your name, upset your system, and affect your customer's reputation. Particularly if you have a complex global chain, the risk

of negative consequences is higher. Your teams will be essential to monitor and receive quality control as well as all affected products. When it comes to the automotive industry, your customers' health and safety should be your top priority. If you have to deal with the withdrawal of an airbag, it can seriously damage your standing and cause a long-term impact on your business.

Global supply chain control

If you are an automobile manufacturer, distributor or provider, you provide and supply an extensive series of products internationally. You need to be able to make timely transactions so that you can include costs. To achieve this, you must have fully understood each item in your supply chain, and you must have all the data you need to create a plan for future growth. Third-party logistics companies can offer software that will allow you to automate your process and achieve full visibility at every stage.

Logistics chain: flexible and reliable

You need to be flexible and dependable when adapting to demand changes or responding to opponents. In high and low season, you need to set up and manage every aspect of your business, so you get a steady return and benefit from a good return on investment. Regardless of the circumstances, it is recommended that you work with a third-party logistics partner that is as flexible as you are. Having a reliable and reliable partnership can guarantee a positive supply chain.

Geographical expansion monitoring

Careful planning is needed to grow your business, monitor customers' geographic expansion and add new features to different locations. In order to be successful, you will need a logistics partner who understands your processes and can implement

your plan anywhere. They should know the local standards and situations of the region and have a reliable and open connection with you at all period of the supply chain.

Cost and location

As innovation, technology and consumer demand and production intensity increase, automobile manufacturers will poverty their suppliers to work in the field. Automobile companies will require their suppliers to have manufacturing heads in each jurisdiction they have. Every place of an undertaking should be evaluated according to the following factors: financing, changing of the workplace or recruitment of labour, rules and regulations of a new jurisdiction, protection of quotas and product quality for customers, optimizing production lines during the transition, closing an enterprise and establishing others, etc. Since the cost and location, they require effective financial planning, then companies may miss profits.

Environment and Ethics

Supply chain management in the automotive industry includes a variety of quality standards and guidelines that make you responsible for your company's safety, ethics and environmental impact. Your third-party logistics partner must understand these requirements for the quality of your industry. Your business must have a well-known background in delivering solutions that meet these requirements, as well as the internal controls needed to solve international challenges.

3.3 What are the future challenges and opportunities of automobile industry?

In addition to sales growth, four goals will determine the near and middle term future. The sector's response to these problems may increase profitability by 2 billion

euros in its baseline scenario. These problems, for existing markets, will be more important than emerging markets.

Difficulty and cost pressure. Increasing regulations on environmental and safety standards will increase costs, but will also increase the complexity as they need to be managed separately from domestic markets. The increasing number of derivatives that serve various vehicle segments and markets on a single platform also increases complexity. At the same time, OEMs will need to develop alternative transmission technologies for low-emission vehicles, and ultimately will not know that it will be the dominant technology of the future. This will require momentous investment. In addition to all these printing factors, taking into account the constant change in the net price due to the smaller budget available for the new functions, it will be more difficult for OEMs to allocate these functions to new functions when obtaining economic benefits.

Divergent markets. The share of developing countries in world sales will increase from 50 percent to 2020 percent in 2012, and their share in world income will increase by 10 percent. However, the position of existing production and supply bases is not well matched to future sales. Moreover, there is the possibility of a portfolio mismatch car, because smaller car classes grow more than others, especially in rapidly developing markets. Finally, OEMs need to prepare for the after-sales market in China, which will grow about 20 percent per year.

Digital requirements Research shows that digital channels are currently the main source of information for customers in purchasing cars. The next step for many can be an online purchase. This may be an opportunity for OEMs, but also means the potential competition threat of online retailers and puts pressure on the existing

dealer structure. The increasing role of digital technology also extends to the driving experience. Consumers want to combine mobility with communication. This can be an opportunity for OEMs, but only if they can find out how to evaluate that desire.

Replacing the industrial scenery. As OEMs are attempting to develop alternative powertrain technologies, suppliers are more likely to provide value-added content per vehicle. In addition, OEMs should ensure that their suppliers meet their future market requirements and their production plans, especially in the developing markets. OEMs in Europe have a unique challenge: clear restructuring management. And everyone will have to deal with new Chinese players entering new segments and markets.

In addition to the assumptions of the elementary situation, these problems can cause additional risks for the profit of the car. The recent restrictions on the pharmaceutical and dairy industry in China can lead to stricter regulations for the automotive industry. Therefore, taking into account the negative scenario that could lead to a 50% decrease in profitability, it is possible to have a negative impact on profits up to EUR 15 billion.

In addition, OEMs will have to abandon the cost of developing new power units. However, in a less favourable scenario, market restrictions may lead to lower marks. Assume a 5% reduction in margins for electric vehicles (EV) and a 2% reduction in hybrids (HEV); this could increase the future profit of 4 billion euros. These two models point to the need to identify appropriate strategies because the creativity will not be sufficient to overcome these risks associated with the overall objectives. Such penetration and pricing scenarios should be modelled and understood to adopt new active security features and various link offerings for customers.

As the phones become smarter, so do the cars. They won't think, but they will answer and remind. The road is equipped with cars, hazard warning applications, traffic information services, numerous infotainment and increasingly active safety features. Number of network tools will increase by 30 percent per year for the next scarce

years; Every fifth vehicle will be connected to the internet by 2020. These cars will be in the premium segment (about 50 percent) and more in the price segment (3 percent in 2011), where they will have network solutions up to 2020. Providing service via vehicle - Internet radio, smartphone features, infotainment services, driver assistance applications, tourism information, etc. - A promising area for future profits and differentiation. Creating new technical functions for safe, comfortable and ultimately autonomous driving. To do this, OEMs need to manage shorter product and service development cycles, such as software.

Other technological updates. They will also need to build relationships with subsidiaries that develop vehicle-adapted applications. Given that vehicle owners spend about 50 minutes a day on their vehicles, there is a real opportunity to make money from digital media revenues and create additional, highly efficient revenue streams. But again, especially if new players enter the market from a "digital arena", competition will intensify. Ultimately, end-users will look for applications that make driving a more convenient and integral part of their daily lives. The whole area is at the early stages of development both for the provision of technologies / services and for the dominant players.

With a few clicks, potential vehicle buyers can access a great deal of information and the volume and volume of materials available on the Internet will only increase. In 2012, 70 percent of shoppers stated that the Internet was the main source for information collection, brochure placement, and advertising and test reports. Five years ago, customers visited the dealers five times before buying cars; they are now well informed in the gallery and give the dealer a chance to turn the scanner into a receiver.

Dealers are still important for decision-making and overall customer experience, but to a lesser extent in research and product comparison stages. This puts OEMs on different tasks. On the one hand, customers need to create a modern web application that allows them to purchase in digital format based on experience.

For example, comparison tools, automotive configurators and other online tools. On the other hand, the customer needs to provide an exciting interaction and persuasive experience in the decision-making process and in altogether the contact points in the purchasing process. The purchase path and post-purchase experience are made up of several contact points and are really two of the most innovative areas for superior customer service. Innovative retail concepts, such as brand service centers using high-tech digital, personalized visualization tools, or pop-up stores that promote a particular product, can be helpful to create a mix. This will require joint investments and intensive collaboration from dealers and OEMs to create uninterrupted customer transactions across all network and digital network channels. Another cost-effective strategy is to create an online representation to promote direct sales. If half of the car buyers have the opportunity to test driving or similar experiences, they claim to make a deal over the Internet. In order to create solutions and customer experience in the purchasing process, OEMs will need to determine the best combination of online and offline contacts. The awards are great for those who understand this. OEMs will need to manage production volumes up to 70 percent in Asia by 2020. This means creating a local supplier base, creating an protracted supply chain and strengthening the supplier's capacity. This is particularly important because the obligation to improve green mobility means that suppliers will become more significant, especially for internal combustion engines to continuously improve and also for various alternatives to electrical power train.

On the one hand, traditional automobiles based on internal combustion engines should be optimized using engine management systems, size and also light or automatic transmissions should be used. On the other hand, there are long-term opportunities for different options of the electric drive - and these were not the main competencies of most equipment manufacturers. ICE will need technical and logistical support to extend the ICE-based vehicles with solutions for electric powertrain and anticipated adoption after 2020, either by managing long-term transit

to electric vehicles or taking into account stricter regulatory requirements and continuous technical advancements. However, OEMs may consider long-term positioning in the development and / or manufacture of electronic motors, battery packing, and integration. In addition, electronics and software will play a leading role in automobile innovation. In 2012, approximately 90 percent of automotive innovations were equipped with electronics and software, particularly in the area of active security and information entertainment. Since these capabilities will be critical, OEMs should consider solutions

“Vertical partnership development with their preferred suppliers. This will allow OEMs to reduce R & D costs as well as develop and implement new features more quickly.

4. Conclusion

In modern times, the development of no country's economy cannot be fictional without the development of the automobile industry. In recent years, the global part of the automotive industry in GDP is growing and growth dynamics will create new jobs and increase the average salary. The automobile industry contributes to the growth of tax base and state budget revenues, develops sub-industries, affects scientific and technological progress, and indicates the level of effective demand and the standard of living of the country's population and more. Therefore, the active functioning and development of the automotive industry is not only economically significant, but also socially important for every country. Evidence shows that future opportunities will outweigh problems. However, these events will greatly stimulate changes in the sector over the next ten years. OEMs who understand and anticipate

these challenges and opportunities in the future and solve them well will have more opportunities to succeed in this complex industry.

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