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Applications of Information Technology tools for Supply chain Management in Automotive Sector

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Abstract

This study focuses on the Supply Chain Management (SCM) practices using IT tools in the Automotive Industry. It also illustrates some of the variables that have accelerated the adoption of supply chain management. Focus is also placed on current settings, considerations, and accessible applications, in addition to a comprehensive description of the existing IT instruments and their apparent benefits. Addressing a variety of different point and initiative solutions in a variety of supply chain contexts highlights the relevance of current communication technologies in transforming IT into a facilitator of SCM. This article examines how an integrated IT strategy might assist Supply Chain Management in automotive firms. The evaluation and use of EDI, ERP, bar codes, inventory management, transportation management, and warehouse management systems have been reviewed and discussed extensively.

Keywords: Information Technology Tools, Automotive Sector, Supply Chain Management, IT Applications and Benefits.

1.0 Introduction:

The automotive industry today is experiencing heavy growth, which creates a demand for materials and an increase in competition. As well, the competitive environment in the global market has forced manufacturers to reconsider what and how the products should be supplied as well as produced in the automobile industry [1]. Information technology (IT) is critical for a firm's performance in the business environment. A strong IT infrastructure allows businesses to increase their competitiveness in tackling initiatives such as reducing cycle times, implementing cross-functional processes, and implementing redesigned processes. Most organizations and small businesses use computers for administrative functions, business activities, and access to information and to maintain relationships with clients via the Internet. The number of automobile industries equipped with software for managing partners' relationships, resources, and production is very small [2].

In the automobile industry the supply chain processes have influenced greatly impacted by the proliferation of digital technologies around the globe. Many corporations now find that using Information Technology (IT) in their companies and across their supply chain gives them a competitive advantage. An SCM network consists of a network of interconnected companies that are responsible for ultimately providing customers with the products and services they request. Booz Allen Hamilton executive Keith Oliver coined the phrase in 1982 [3]. The SCM's main drivers are Inventory (How much to create and as well as stock), Shipping and transfer (moving of product how and when), Production (mainly when, how and what to manufacture), Information (basics for making all the decisions, Location (Best place to carry out the things).

In the manufacturing sector today, whether the company produces consumer goods or machine tools, an industry has to keep up with a variety of consumer demands. Such organizations are often striving toward the reduced delivery times and profit margin, greater quality products, smaller lot sizes, greater product flexibility [2].

Capability, on the other hand, is defined as the ability to employ resources to complete an activity [4]. According to these authors, capability makes up a blend of activities and processes that result from a shared learning experience from the use of a business' assets [4-5]. A capability, in the broadest sense, simply identifies that someone or some entity is able to do something, regardless of efficiency or perfection. There is a subtle difference between capability and competence as highlighted [5-6]. Competencies, in their opinion, are made up of a collection of capabilities rather than being limited to single capability. As a result of the research, it is claimed that capability is defined as the action of using an organization's assets in order to produce, produce, and commercialize a product, in order to provide a customer with essential value [7]. This phenomenon can occur by coordinating and integrating the organization's activities [4-8], conjugating the technologies used by this organization [9] and managing the organization's human resources. By adapting the above capability definition for the new logic of competition, this study defines SCM capabilities. The term "organization" is replaced by "supply chain," while "customer" is replaced by "final customer," in order to emphasize that we refer to the customer of a chain rather than the firms' direct customer. A crucial element of these capabilities is the management of relationships between members of the chain. Consequently, organizations need to intensify their relationships with each other to deal with this new paradigm. SCM capability is defined in this study as a set of actions that are utilized to create, produce, and commercialize a product, which provides customers with a valuable benefit through the use of the assets in a supply chain. Coordinating and integrating activities and processes in a supply chain, conjugating techniques, managing human resources, and

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managing relations among members make up a supply chain. It is recommended that two or more entities establish a supply chain link before establishing a SCM capability. Lambert and Cooper suggest that the importance and capabilities of supply chain parts should be taken into account when determining which parts of the chain to manage [10]. In his article Evans and Danks, along with Min and Keebler, offer a number of ways to categorize SCM capabilities [11-12]. The techniques, policies, and systems of SCM are described by Rice and Hoppe, who classify it as a technique, practice, or policy. They identified ESI (Early Supplier Involvement), JIT (Just in Time), postponement, Supplier Park, and VMI as examples of SCM capabilities (Vendor Managed Inventory) [13]. This form of categorization is also used by Lummus et al. to describe JIT as an SCM capability [14]. The main SCM capabilities in the automotive industry considered in our research, based on the definition we provided, the interviews with experts, and the literature review, are: In Plant Representatives (IPR), Vender Managed Inventory (VMI) and Quick Response, e-Business Concurrent Engineering, Just-in-time (JIT), Just-in-Sequence (JIS), CoDesign1, Early Supplier Involvement (ESI), Follow Sourcing, Milk Run, Modularization, Global Sourcing, Supplier Park, Postponement

Information technology (IT) plays a critical role in the operation of businesses. Supply chains become stronger and more resilient as a result of seamless information flow, without sacrificing their efficiency. Most firms have been using IT systems in supply chain management (SCM) in order to improve their performance in global competitive markets in recent years [15]. In the recent years, technological advances and scientific advances in management have made it possible for many industries to acquire, share, and use information [16]. In other words, this study explores how IT influences the performance of firms in SCM. Throughout literature, collaborative investments in IT have become a strategic thrust among supply chain stakeholders to improve transparency [17-18]. The growing use of integrated information systems and enabling technologies has made creating seamless supply chains between suppliers and customers possible, improving the performance of suppliers, reducing the unpredictable nature of customer demands, and ensuring a stable business environment [15]. Although supply chain stakeholders must invest in IT to adopt the new systems, such collaboration is not as frequent as we would like, even though such efforts can build unique value that one firm cannot generate independently [19-20].

2. Information Technology Tools:

A supply chain's performance is dependent on the accuracy of information as it provides the basis for decision-making. Supply chain performance is increased through information technology, which includes methods for gaining awareness of, analyzing, and executing information. A number of information technologies, including those that use the internet, are commonplace in supply chain areas [20-23]. Fig.1 shows the list of IT tools used in supply chain areas.

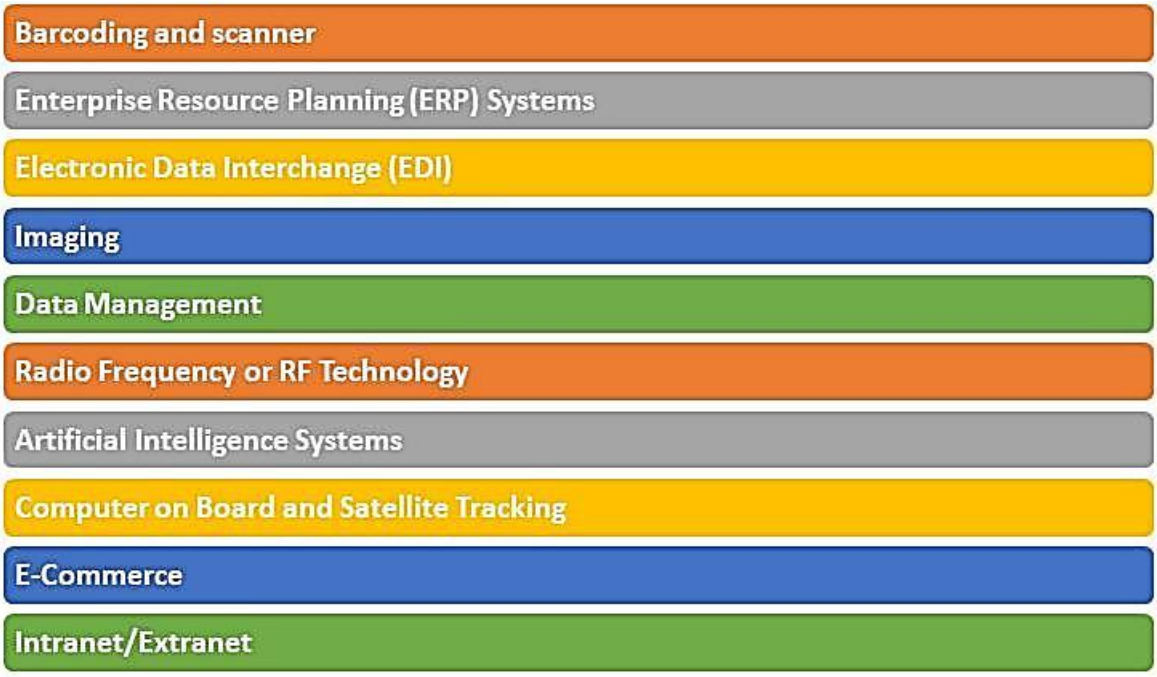

Fig.1: List of IT tools used to improve supply chain performance

2.1. Barcoding and Scanner

Among the most common techniques for automatic identification, this is the most widely used. In order to move products efficiently and effectively during the supply chain, there must be consistency between bar code technologies as there are many of them. Information exchange as well as information collection is facilitated with barcoding and electronic scanning, both of which provide identification technologies. Receipt tracking at warehouses and grocery store sales are two typical applications. To compete in today's market, warehouses, retailers, carriers' wholesalers, and shippers have developed and implemented auto-ID capabilities in order to stay competitive. The technology of auto-ID permits the members to track and communicate movement details efficiently. Codes can be placed on containers, items, and even on rail cars to allow them to be read by computers [20-23].

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Almost all consumer products carry a universal product code (UPC). Every product and manufacturer has a unique 5-digit bar code (UPC). The products shipping Receiving, and handling with standard bar codes reduces errors. By way of example, a bar code can distinguish packaging size and flavour. Consumer goods retailers frequently use UPCs to verify consumer purchases. In order to identify cartons, pallets, or containers of products for shippers and carriers, bar codes are used [23].

2.2. Enterprise Resource Planning (ERP) Systems

Systems that automate business operations are known as Enterprise Resource Planning Systems (ERP). Integrating these systems across the entire organization allows for real-time transaction-based information to be processed. Data capture for the whole organization is done with one package of software. Thus, everything from customer orders to inventory to financials and financial reports are accessible from one source. Most companies view their IT infrastructure as being based on ERP systems, such as those from Baan, SAP, and PeopleSoft. Enterprise Resource Planning systems have become tools for capturing information and automating processes relating to finances, inventory and customer orders, thus reducing manual labour and issues. Integrating enterprise resource planning systems requires using a common data model, understanding the value of the shared data, and framing a point of regulations for data access. Aside from the hefty costs associated with the purchase of ERP applications, the implementation of these systems will necessitate extensive company-wide changes. Changes in organizational people, structure, and change management are aspects that will be affected by Business Process Reengineering (BPR). The system has been beneficial to many companies while it has been problematic for some. In general, the customization training necessary for each user is also extensive [22].

2.3. Electronic Data Interchange (EDI)

Business documents and information are transferred from one organization to another in an electronic format through electronic data interchange. In this process, business data is exchanged within organizations, from computers-to-computers machine-processable format. An EDI specifically replaces more traditional methods of transmitting documents such as mail, telephone, and fax in its attempt to eliminate duplicate information entry and improve the speed and accuracy of information flow. EDI systems include the following components: the first one is consists of a standard format and syntax that is agreed to by the network users and has been standardized through EDI standards. The second one (EDI software) enables the interpretation and transmission of particular database information of companies into standard EDI formats. The third one is an EDI network, means of sending documents, usually directly or through a third party [23].

2.4. Imaging

Logistics are significantly impacted by image processing technology. Using it, firms can provide clients with electronic copies of essential documents, which can then be distributed to them as needed or stored centrally until needed. Most of the transportation companies give the delivery proof to their customers by using this technology. Signing an electronic pad automatically digitizes the consignee's signature, making it available for future use. A signed copy of the document can be easily downloaded as proof of delivery when needed [23].

2.5. Data Management

The management of data is done on handheld devices today. In addition, CD-ROMs are now an important aspect of data management. Additionally, computer systems are very good at storing, managing, and retrieving data. An application program can retrieve data stored in a database management system. Logistics faces this challenge because of the large amount of data generated, which might need to be analysed in the future. Several methods of connecting data together in relational database structures enable data access and sorting today. This provides a lot of versatility. These days, companies are utilizing LANs connection that comprises of a network of minicomputers connected to a number of microcomputers or terminals. The LAN allows access to a common database, software, and other system features. LANs make microcomputers as powerful as mainframes [23].

2.6. Radio Frequency or RF Technology

Warehouses and distribution centres benefit most from radiofrequency (RF) technology. By using electromagnetic energy waves, users can transmit information to a base station from a terminal, which is connected to a computer. It is possible to hold the terminals by hand, use a forklift to move them, or install them in a fixed location. RF systems are able to update inventory records in 'real time' when used in conjunction with a bar code inventory system. It leads to a significant improvement in shipping accuracy and in order picking [2, 23].

2.7. Artificial Intelligence Systems

The principles and methods of artificial intelligence (AI) involve the thinking of a computer and the use of symbolic images to represent the intelligence used to make inferences. Intelligence comprises a wide array of cognitive skills, such as problem solving, learning, understanding language, and acting in ways which could be treated intelligent when found out across the humans. The term artificial intelligence (AI) is used to refer to a number of fields including voice recognition, natural language translation, expert systems, computer-aided instruction, robotics, and expert systems (ES). A process of using AI to model the time required to respond to customer requests. Various modes, locations, and routings can be modelled with respect to transportation costs and time. This is for determining which warehouse should serve which plants and how much inventory they should have. In order to determine the level of sensitivity of a customer service system, different levels of reliability are modelled, and the sensitivity analysis is used to determine how much input can be varied without impacting the structure of the best solution [23].

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2.8. Computer on Board and Satellite Tracking

A number of RF principles can be applied to computer system and communications on board. Unlike traditional communications, by the 2 orbiting satellites the communications are facilitated, one of which is used to connect the driver with the dispatcher. Additionally, the dispatcher has access to a resource that provides continuous tracking of the vehicle, so if a shipment is late, they can assess the situation. A truck driver can access some on-board capabilities, such as a GPS unit, that gives truck's location of real time info and heading directions to its planned terminus [23].

2.9. E-Commerce:

A traditional warehouse or retail store's business model can be adapted to facilitate online business transactions, which is an extension of e-commerce. Due to the widespread use of computers and the internet, consumers can now easily locate products, locate retail outlets, and purchase goods and services in the comfort of their homes through the click of a mouse. Both businesses-to-consumers and businesses-to-business transactions are included in e-commerce. Electronic procurement involves integrating e-commerce with procurement activities. The early applications of e-commerce were rooted in procurement [23].

2.10. Intranet/Extranet

Usually, a firewall protects access to an intranet, which is a dedicated internet to a particular organization. This platform is becoming a standard for corporate information systems since it is a highly effective platform for implementing web-based workflows. Intranets are small private networks connected via local area networks (LANs) or wide area networks (WANs), which use internet technology and are protected by firewalls (access control servers). Many servers, clients, database programs, and ERP applications are connected by the Internet. The limited access of the private network which intranets operates are only limited to the firm's employees. A firm's intranet only contains information that is relevant to that firm and often contains proprietary, sensitive, and exclusive information. There are many applications for intra-business commerce that can be made possible by intranets. An extranet, often known as an extended intranet, connects intranets in separate places. The Internet is typically used for internet-based transmissions of extranets, in that it provides transmission security or privacy of very little. Intranets and extranets connect a corporation's intranet to its business partners, government and customer network, supplier network, financial server. It is an open and flexible platform that can be used for the supply chain management since an extranet permits business to communication and collaborate via the internet [23-30].

3. Benefits and Applications of Information Technology Tools for SCM:

Applications of EDI: The automotive industry has been using EDI for more than 40 years to ensure that production lines are moving as quickly as possible and delays are minimized. Components, modules, and parts are designed, manufactured, and installed by suppliers in a triad structure. Fig.2 shows the benefits and applications of IT tools in supply chain management. In the auto industry, there are numerous players that should be EDI-compliant. The following mentioned points explain the application of EDI in automotive industry [26].

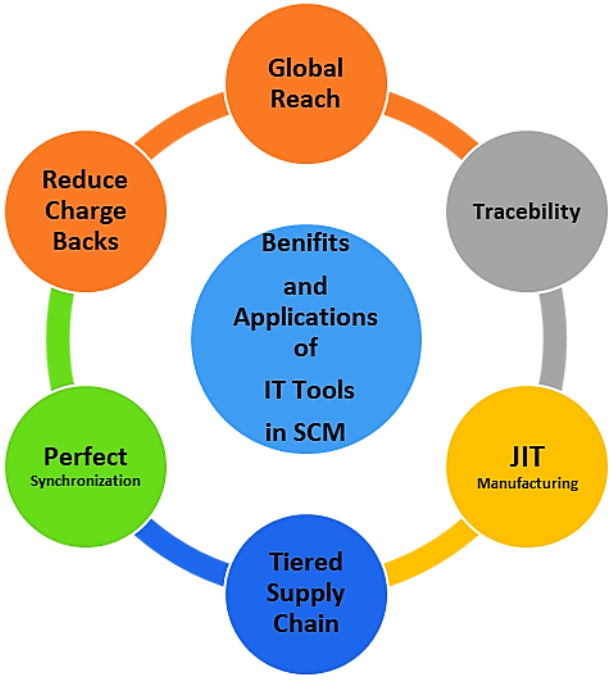

Fig.2: Benefits and applications of IT tools in SCM

3.1 Global Reach

Thousands of different parts are used to construct a vehicle today, and they are available from suppliers around the world. No matter where their fabricators are located, automotive companies can on-board them quickly with EDI. Automotive manufacturers often use low-cost suppliers or emerging market companies that lack communications technology skills and also lacking

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information. It is necessary for automotive manufacturers to provide easy-to-use EDI tools so these suppliers can trade documents [26].

3.2 Traceability

Automobile businesses must always be aware of where things are at all times, because there are so many moving parts. Businesses can view where an order is at any moment and when it is expected to arrive using EDI. Dispatching and flagging delays and hiccups in real-time allows companies to adjust without losing time [26].

3.3 Essential for JIT Manufacturing

In manufacturing to accomplish the just-in-time (JIT), a system of EDI is necessary. A set of best practices developed to ensure production lines throughout the world run efficiently and correctly is JIT, often referred to as lean manufacturing or Toyota production system (TPS). For about decades, this methodology was widely used in the industry of automotive. Transparency is essential for JIT manufacturing: companies are notified of when shipments are scheduled to take place and can always see their inventory levels [26].

3.4 Tiered Supply Chain

Many of the parts used in cars and trucks are sourced from suppliers through a tier system. The Tier 1 production sector creates the major systems and vehicle modules, which are close to the final product. To best comply with the JIT manufacturing process, they are typically located near a car manufacturer. The components used to assemble Tier 1 modules are produced by Tier 2 companies. Tier 3+ suppliers are further down the process, which is also recognised as part suppliers. Components and modules are made from the raw materials they produce. Several automotive manufacturers and Tier 1 suppliers employ specific business rules, so everyone involved must adopt industry-compliant EDI and adapt to it [26].

3.5 Perfect Synchronization

The automobile sector has a lot of diverse players, as you've seen. Auto requires everyone to hit their deliveries and, therefore, the production line, at the right time, just like a dance team that is completely in sync with everybody hitting their steps at the correct time. This flawless coordination is made possible by EDI [26].

In manufacturers and suppliers' internal management systems, EDI is seamlessly integrated. A company's software program converts the data into the language necessary, and then creates sends, records, and stores messages automatically without human intervention. As advanced ship notices (ASN) are sent between partners constantly, production isn't hampered because issues are reported and addressed immediately [26]. ASNs are used by the automotive industry to verify that the product sent by a supplier matches the purchase order submitted by the business partner. EDI notifies the client when a disagreement occurs, and the issue is rectified within a short period of time. As a result, the production line will continue to run smoothly [26].

3.6 Reduce Charge Backs

Everything appears to be moving along smoothly in theory, but there are some bumps are present in the road. If EDI isn't perfect and delivery dates are not met, the automotive industry is known for imposing huge fees. Suppliers receive monthly detailed trouble reports (DTRs) from manufacturers, which highlight any slowdowns. Manufacturers are penalized heavily for late ASNs and late JIT deliveries when they issue chargebacks; these fees can equate to thousands of dollars [26].

3.7 Benefits offered by EDI [23].

1. There will be less paperwork to create and file.
2. The manual processing has been reduced which in turn improves accuracy.
3. The order transmission speed has been increased.
4. Mailing, data input, filing, and other clerical/administrative tasks require less effort.
5. Because of the decline in clerical risks, through purchasing there's an opportunity for a proactive contribution.
6. Order placement and related processing and handling costs have been reduced.
7. A faster response time to acknowledgments and shipment advice has improved access to information.
8. Improving accuracy and reducing order cycle times led to reduced inventory.

3.8 Applications of BARCODING: The supply chain uses bar codes to track goods and identify at every step of the process. The most prominent use of bar code scanners is at the checkout counter of hypermarkets as well as supermarkets. The manufacturer name and product name has been specified by this code. In automobile assembly plants, for example, tracking moving parts, such as PC components, is another application. The vertical- or horizontal-ordered lines of a bar code are called picket fences, and they can be displayed either horizontally or vertically. The warehouse management system, for example, may be used to track the goods received in a warehouse and add them to the warehouse's inventory. Stock is barcoded and placed in storage according to a storage location, and when it is dispatched, the stock record is amended according to the new location. Considerably the operations could be speed up by the usage of bar. However, barcodes can be defaced or labels can even fall off during transit, creating problems. It is crucial that the equipment be maintained properly so that its long-life can be prolonged [2, 25-28].

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3.9 BENEFITS of BARCODING [2]:

Fig.3: Benefits of Barcoding

1) **Improved Accuracy:** By analyzing precise data for any of the company's functions, we can produce better quality products, make better decisions, forecast more accurately, and cut costs. One error in every 300 characters is typical for human data entry. Approximately 1 error per 36 trillion characters can be detected with barcode scanners. Barcoding is the best tool to ensure the accuracy of 100 percent for most manufacturers.

2) **Improved Efficiency:** The work can be done more quickly by the barcoding. Using barcoding has a significant time saving advantage over other methods such as keyboards depending on the operation or application. Data entry errors are also eliminated by barcoding.

3) **Improved Traceability**: Due to barcode's ability to record data more accurately and automate the process, the work could be tracked easily which is in progress more precisely. The process of tracking down documents, folders, tools, materials, instruments such as gauges, or anything else moving within operations can take quite some time. By using barcodes, users can more easily identify the issues of quality, and claims of warranty, or safety concerns at the time of lowering production interruption. Identifying defects early can reduce in-process costs and virtually eliminate product recalls.

4) **Ease in Adhering to Customer or Regulatory Requirements:** As time goes by, large customers, like the U.S. government, and manufacturing industries has a standard of product coding standards for their vendors. These standards are automatically met due to pre-established barcoding patterns, or "symbologies". Regulatory authorities or clients frequently develop guidelines as stringent rules for their vendors. Barcoding allows uniform code collection and data collection, thus ensuring that universally compliant product information is collected and relayed.

3.10 Applications and Benefits of ERP [2]:

The automotive manufacturing sector often relies on Enterprise Resource Planning (ERP) systems to make complex processes within their organizations more efficient. Those involved in the automotive industry understand the value of ERP well. An ERP system with the best features can do a number of things, including:

- Provide a thorough system which could be reviewed at any moment.
- Organize and coordinate functions related to "SCM".
- Become a tool for collaboration and internal communication.
- Give a clear picture of what's going on in the company from beginning to end.

Benefits: Enhance staff contentment, Real-time reporting allows you to catch overages before they become a problem, Apps, data, and access are all valuable organisational assets that will be protected, Cost-effective mobile devices.

4.0 Applications and Benefits of E-Commerce [21]:

1. Retail and Wholesale: Electronic stores are designed to offer goods and other services to consumers by offering shopping carts and electronic catalogues designed to facilitate the process.
2. Manufacturing: E-commerce enables buyers and sellers to purchase items on a market together with information on runback offices.
3. Auctions: Direct selling of goods between customers is referred to as customer-to-customer e-commerce. Online auctions (bidding systems) are a part of it. Ex: Customers of the airline have the opportunity to bid for a price.

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4. Marketing: Data collection may be accomplished through web and E-commerce using: a) needs b) pattern of buying c) preferences d) behaviour

The Benefits of E-Commerce are [27]:

- Getting more out of what is put in.
- Elimination or reduction of rework, waste, and losses in the production process.
- Gives the customers what they want, when they want it, in the best possible way.
- Cost savings
- The development of product in a faster way,
- Gaining access to international markets and,
- Shortened supply chain

Applications of Enterprise Resource Planning (ERP) Systems [2]:

1) Various value chain operations are integrated.
2) Inventory control is accomplished.
3) Supervising and controlling a large number of projects at the same time
4) Visibility within the company
5) Error reduction and operational excellence
6) Improvements in CRM and access to information in real time

4.1 Benefits of ERP [2]:

1) Minimizes the expense of quality
2) Communication and collaboration have been improved.
3) An in-depth analysis
4) Productivity is improved
5) Customer service has improved.
6) Keeping rules and regulations up to date is easy
7) Management of inventory and production optimized

4.2 Applications of AI system [23]

1. Modelling customer delivery response times.
2. Using different modes, locations, and routes, you can calculate the costs and times of transportation.
3. The aim is to model multiple levels of reliability for customer service responses and
4. Calculate the maximum variation in the inputs that will not affect the optimal solution structure by using the sensitivity analysis.

4.3 Benefits of AI:

Automation can enhance the entire manufacturing and maintenance process for the automotive industry by improving user experiences, allowing for faster innovation cycles, and speeding up innovation cycles. With artificial intelligence, you can tap into enormous amounts of vehicle data, gain actionable insights, and enhance security and privacy.

5. Trends in the Automotive Industry:

We present here some of the majority trends impacting supply chains in the auto industry over the last few years. The following were the key trends we discovered during our research: Changes in supply chain business strategy; globalization; outsourcing; rationalization and reduction of supplier numbers; development of new materials; shorter vehicle model life spans; increased product variety; and use of global platforms. Following that, each trend is briefly discussed. Changes in business orientation in the supply chain, in terms of supply chains, the automotive industry has seen significant changes in business orientation [31-33]. Increasingly, cars are being manufactured using build-to-order supply chains (BTO). This allows each customer to order a customized subset of components to configure a final product [34]. According to Hill, globalization refers to changes leading to a more integrated and interdependent world where commerce, finance, markets and production are no longer confined to local boundaries [35]. Among today's most globalized industries is the automotive industry [36]. Market saturation in the triad region (Western Europe) and a potential for growth in developing countries have contributed substantially to globalization in the automotive industry [37]. Based on a comparison between emerging countries and the Triad region (Europe; Japan; the U.S.A. and Canada), present the relative growth in car production in emerging countries [38]. Approximately 63.4% of the increase in global production occurred since 1971 to 2003 (roughly 41.8 million units) was attributed to emerging countries, whose production increased by a factor of seven over the period studied. Part of a business organization's set of products and services is executed by another organization in a collaborative and interdependent relationship. Pires defines outsourcing as a comprehensive and difficult-to-reverse relationship between a business and one or more suppliers in the supply chain [39]. Automotive industry supply chain members share responsibilities according to such a trend, in which original equipment manufacturers have delegated

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various operations that have been formerly their sole responsibility to several of their first-tier suppliers [40]. As a result, outsourcing benefits businesses by reducing costs and increasing quality, while at the same time allowing them to focus on the areas of technical expertise they possess [41]. By 1998, the added value of suppliers in the automotive business had gone from US$ 496 billion in 1988 to US$ 958 billion, indicating that outsourcing is gaining ground in its majority [42]. Suppliers will continue to create more value. As of 2015, Mercer/Fraunhofer estimates that the proportion of total vehicle value built at suppliers will rise to 77% from the 2002 level of 65%. Dudenhöffer and Büttner estimate that suppliers will have a 50% share in product development in 2010 [43]. Supply chains in the automotive industry have been affected by other trends as well. Environmental, safety, and cost concerns are increasing in rowing, leading to the development of new materials [44]. OEMs are increasingly relying on world platforms to benefit from large purchases of common parts, as well as in lowering time and cost associated with vehicle design. Rather than having one project for each model of each brand, many models are part of one project [45]. OEMs have been able to divide the variety of components as well as auto-parts offered in their industrial ones from those offered in their commercial ones. The shortening of the life span of vehicle models has also had a significant impact on supply chains in the automotive industry [46]. Similar increases in products and shorter product lifetimes are observed in other OEMs [47]. The increase in variant numbers and options offered by OEMs is another significant trend in the automotive industry [48]. A group formed by BMW and Mercedes models with total variations factory fitted exceeding the order of 10E18 is shown by Pil and Holweg, with Mercedes' Class E model exceeding the order of 10E24 [49].

5.2 Future Trends [29]:

Throughout this article we will discuss how the automotive industry will look in the future and give strategic advice on how to adapt to these changes. Our fundamental argument is that EDI strategy conversion, combining self-service tools with managed services (EDI service), is essential for automotive supply chain transformation.

Electric vehicles (EVs) are rapidly gaining traction, putting a tremendous strain on supply chains. Globally, more than two million electric vehicles were sold in 2019. In the near future, governments may propose bans on the sale of vehicle rely on petroleum products. The UK government, for example, has announced such a ban will be implemented in 2035.

Motor controllers, batteries, and electric motors will see a boost in demand as a result. Besides these components, there are also complementary parts such as charge ports, thermal systems, and battery packs. As a result, China has emerged as the most active EV market, providing opportunities for new businesses within the industry.

It is imperative that the global supply chain of the industry does not become any more complex as a result of the integration of these new suppliers and OEMs. Lucid, Nikola, and Rivian are three new players who have already made substantial progress; however, more needs to be done for success. Building stellar relationships with clients and suppliers is vital to taking advantage of the growing EV market.

In addition to autonomous cars and ride-sharing platforms, things like the automotive future are still largely unpredictable. By having visibility into the supply chain, can prepare for future scenarios.

5.3 Planning for the future require visibility [29]

Ensure timely production is a major priority for the auto industry through the supply chain. For the secure supply of their inventories, automobile manufacturers rely on suppliers in different countries. According to the U.S. Department of Commerce, $1.55 billion was spent by the U.S. automobile industry in 2018 on Chinese parts. Buying car components rather than making them is cheaper for most manufacturers. Among the products manufactured by these companies are steering wheels, tyres, brakes, engine parts, body panels, seats, steering wheels, batteries, and other components used in electric vehicles. For manufacturers to maintain their production lines, they must work with dozens or even hundreds of suppliers. The automotive supply chain is currently facing a number of difficulties. Changes in globalization, preferences, disruptive technologies and manufacturing processes contribute to this. For companies to stay on top of such challenges, it is imperative to attain optimal supply chain visibility, which can be achieved through the use of IT tools such as EDI. Through EDI-as-a-Service, these capabilities are taken to the next level by integrating all supply chain partners end-to-end with simplicity.

6. Conclusions:

A number of trends within the supply chain management space have accelerated enterprises' adoption of efficient and effective policies, technologies, practices, and including outsourcing, globalization, time to market and customization. A rising customer expectation and increasing competition, combined with an uncertain environment, make companies more susceptible to a more uncertain environment. A company must reach out beyond its boundaries to integrate all stakeholders if it wants to survive. In order for such efforts to succeed, IT tools must be adopted. An integrated IT strategy leads to numerous benefits for firms in Supply Chain Management, and this paper discusses the role that IT can play in this field. The current alignments of frequently used IT tools such as EDI, ERP, bar codes, inventory management, transportation management, and warehouse management systems are reviewed and adopted. A company's behavior will change as a result of technologies such as World Wide Web, electronic commerce, etc. To collaborate with their business partners, these companies must understand the importance of harnessing technology. To help those still struggling with IT implementation, more detailed and comparative case studies would be helpful.

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