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## EFFECT OF INFORMATION TECHNOLOGY IN THE AUTOMOTIVE SUPPLY CHAIN

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### ABSTRACT

This paper describe a summary of info flows and technology allowing the supply chain within the automotive industry. The supply base of many motorized manufacturers is being restructured, with great consequence for the way dealers connect with their automotive partners. EDI is by far the most common communication technique used in the automotive manufacturing, though additional approaches are used as well. All these methods and the ways in which they support the information flows are explained in more detail. Companies attempt to companies are attempting to find ways to recover their elasticity and responsiveness and in turn competitiveness by changing their operations plan, methods and skills that include the implementation of Supply Chain Management (SCM) paradigm. Hence, Information Technology (IT) can enhance the agility of SCM. However, IT impact on SCM are not equivalent. In this paper, we specify the areas that IT effects on automotive supply chain and evaluate it.

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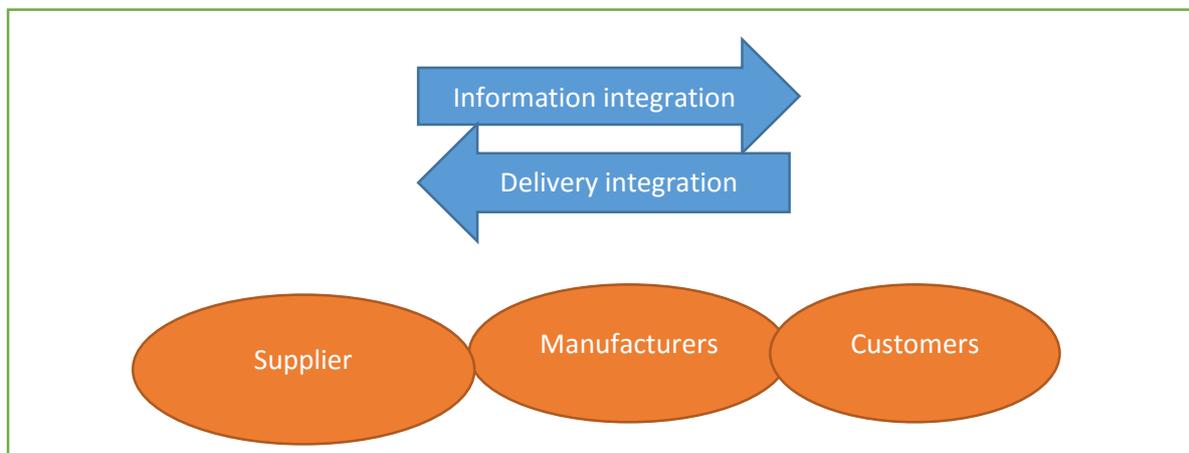
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## 1 INTRODUCTION

In today's manufacturers' world, dealers play an ever more significant role. The purchased resources of a regular manufacturer account for over 50% of the price of goods sold [1]. Suppliers consequently have a huge and straight impact on costs, in addition to quality, technology, speed, and responsiveness of buying companies. Reinforcing this point, Ragatz, Handfield et al.[1] noted that the "actual combination of suppliers into product value supply chains will be a key factor for some manufacturers in accomplishing the developments essential to continue modest". It is no longer company challenging in contradiction of company, but supply chain against supply chain.



**Figure 1: Integration in the supply chain. Source: [2]**

Therefore the eventual success of a single business will be contingent on management's capability to integrate the company's intricate system of business relationships. Figure 1 shows this integration along the supply chain. The management of multiple relationships across the supply chain is presence stated to as supply chain management (SCM) [14]; [3].

### 1.1 Supply chain management

A valuable description of supply chain management: "SCM is the mixing of key business procedures from end user through innovative suppliers that offers products, facilities, and data that add value for customers and other investors" [4]. For supply chains to be actual, operational information about the production procedure has to be shared among manufacturer and suppliers [16]. Characteristically the goal is to produce and organize the industrial process seamlessly across the supply chain in a way the competition can't simply match [2].

## **1.2 The automotive supply chain**

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## **1.3 Information technology and the supply chain**

Information technology is a significant organizer of supply chain addition, because of its ability to surmount both time and distance limitations [17]. Addition using information technology includes electronic data interchange (EDI), sharing data from traditional planning and control systems [2], but also the internet [14]; [5]. Information and communication technology (ICT) is evolving rapidly, which results in innovative use of these new technologies within supply chain management [15].

## **2. PROBLEM STATEMENT**

After studying the use of information technology to integrate and enable the supply chain, the writer came to the decision that though this is an applicable research subject it is still a split domain of hypothetical research. There has been a lot of writing about supply chain management, similarly in combination with the automotive manufacturing, but no overview of the dissimilar factors. Hence, it would be very interesting to see how information flows enabled by the information technology consequence in a more effective supply chain. The tangible problem statement is framed as follows: There is a lack of focused knowledge about the ground-breaking use of information technology within supply chain procedures in the automotive industry.

### **2.1 Research Questions**

To provide an answer to the above enlarged problem report the following research question have been framed.

- ❖ How do dealers and their carmaker clients use information technology to assimilate their supply procedures?

## **3. RESEARCH STRATEGY**

First of all it is significant to control how suppliers within the automotive industry cooperate with their clients, the real carmakers, and what type of relations they sustain. Only after these types of relations within the supply chain are reputable, it will be possible to make a

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valuation of the type's info flows replaced within these "supplier to automotive manufacturer" relations. Luckily there is a rational amount of research by this time done on this topic.

Furthermore, when the most commonly found associations and the consistent information flows are established, there will be a need to determine how these are relying on IT. Moreover, the nature and degree of automation are important to distinguish, for the reason that of the innovative value of the different IT applications.

In conclusion, based on this evocative literature study, the most important facts for the supply chain community of the automotive industry will be summarized.

#### **4. SUPPLIER ENVIRONMENT**

Supplier relationships with the automotive customers has been a field of constant change. Productivity has been and remains very significant to keep the total supply chain modest. According to Collins, Bechler et al. [6], "just-in-time (JIT) is no longer plenty to accomplish modest advantage. Enlarged pressure to attain yearly cost decrease targets and rationalize operations are driving automotive builders and suppliers to move beyond JIT, to reevaluate their respective supply chain activities and relationships [16] (this involves a reassessment of who does the value added work as well as where and how it is done) as they attempt to progress global performance."

<b>Percentage of companies with less than:</b>	
<b>10 suppliers</b>	38.21
<b>20 suppliers</b>	56.31
<b>have reduced their number of suppliers in the 1997-1998 period</b>	13.24
<b>Percentage of companies that do not change suppliers in less than 2 years</b>	93.56
<b>Percentage of companies that require certifications of their suppliers</b>	93.56

**Table 1: Supplier relationship from automotive manufacturers (companies) perspective. Source: [7]**

#### **4.1 Rationalizing the supply base**

Earlier teamwork among the builder and suppliers is more supply intensive. It is not feasible to uphold such costly relationships with a big group of suppliers, automatically leading to a smaller supply base. Where once contracts were short term, now relationships are long term and leading to partnerships between supplier and manufacturer [8]. Table 1 illustrates the nature of the relationship which most automotive manufacturers maintain with their suppliers.

#### **4.2 Defining a new set of supply requirements**

Frequently the first stage supplier efforts to enlarge the added value of their products and services by moving toward a more modular supply [6]. The concept of modular supply is that the (first tier) supplier is responsible for the assembly and the on-line installment of a module. A module is a “physically proximate “chunk” of components, typically from multiple systems, which can be collected into the vehicle as one unit” [13]. Lung and Volpato [12] state that “a weaker form involves setting up operations in a supplier’s park which is immediately adjacent to the automakers’ premises, delivering components and sub-assemblies by means of shuttles or tunnels that connect the workshops with one another (Ford’s Valencia plant in Spain or the Saarlouis plant in Germany).

#### **4.3 A warning about performance improvement**

Once studying the “performance improvements” appealed by new or changed business processes based on supply chain management, it is significant to note that those performance improvements often came at suppliers’ expense [8]. Though this observation is not a key element of this paper, it is applicable to take the example above into consideration, particularly when trying to reach performance improvements within the automotive supply chain. The variance among cost savings through better supply chain management and cost savings through lower margins of the suppliers is fundamental, and the latter indicates bad supply chain management.

### **5. INFORMATION AND VALUE FLOWS**

In this section the main types of data flows will be accessible. Among (first-tier) suppliers and the automotive manufacturers there are dissimilar types of info being exchanged. Logistics and banking are also important and stimulating fields of research, but outside the

scope of this paper. There is a limited number of dissimilar data flows which can be eminent within general supply chains [9]:

- Inventory level
- Sales data and forecasting
- Order status for tracking/tracing
- Production/delivery schedule
- Performance metrics

### **5.1 Inventory level**

Information about the level of inventory can extra for real inventory. The uncertainty of not sharing inventory information results in reserve inventories at both supplier and manufacturer, which is incompetent. The other consequence is that, at times, both parties misjudge the situation and have no inventories at all, causing production delays.

### **5.2 Sales data and forecasting**

Once sales data is based on order information a lot of doubt is introduced into the supply chain. This is meanly because order information offers a very uneven and possibly misleading view on the supply chain

### **5.3 Order status for tracking tracing**

Through the help of order status tracking or tracing the manufacturer can always find out which supplier is presently dispensation his order. This results in a high rate of first call problematic resolutions. This means that when manufacturer wants to do a review at one of its suppliers, the first call or internet lookup will deliver the answer, autonomous of where the order is processed inside the supply chain at that immediate in time.

### **5.4 Production delivery schedule**

By initial up internal production and delivery schedules by upstream supply chain partners, it is possible for downstream supply chain associates to progress their invention schedules. This opinion also works the other technique in the opposite direction, when manufacturers open up their production schedules for suppliers, it is then possible for the supplier to coordinate their own production and deliveries to meet those of the manufacturers.

## **5.5 Performance metrics**

Performance metrics are added information flows that are not included in the above flows. Product excellence data, lead times (of individual components), line up delays and service performance are examples. By sharing this kind of information, bottlenecks within the supply chain can be recognized and the overall performance better-quality. Computer aided design and computer aided manufacturing (CAD/CAM) identify and exploit core threads of comparisons in parts, products and procedures and can be used to convey designs and specifications numerically [7].

## **6. IT SUPPORT FOR INFORMATION FLOWS**

The information technology hasn't been explicitly presented. The information flows discussed in section 5 of this paper need an infrastructure to "flow" through the supply chain. In this section this infrastructure, which is IT [14], will be studied. On the other hand the systems provide the capability for computer-to-computer communications of business transactions and documents and became popular with the introduction of electronic data interchange (EDI).

### **6.1 EDI**

There are many definitions of EDI but it is generally defined as "the computer-to-computer exchange of intercompany business documents and information through standard interfaces which needs hardware, software and communications technology that allows those computers to transfer the data electronically (such as purchase orders, invoices, medical claims and price lists)" [10]. The function of EDI is to bridge essentially diverse systems used by unlike parties within the supply chain. All these parties have information systems that pathway similar data, but the data is not combined and used in the same way, nor do they use the same application programs and hardware.

#### **6.1.1 Internet-based EDI**

Internet-based EDI employs in principle the same standard with a diverse carrier of the communication. This is rather simplified, but enough for the use of this paper. In its place of very exclusive donate private communication lines, the internet simplifies the information flow. While transitioning to internet-based EDI, traditional EDI users can continue to connect with established suppliers through proprietary lines while deploying their supplier base using the Internet [10].

## **6.2 Internet**

This application of supply chain connection by means of the internet, a more elaborate presentment of the internet is functional. Threlkel and Kavan [10] have a nice summarization describing the most important advantages of the internet. “The Internet is the largest computer network in the world, established in some 150 countries and reaching some 57 million users with the wildest development seen in any industry. It’s most notable and attractive characteristic is ubiquity armored by the fast growing mass of users, private and commercial alike.”

## **6.3 Implementation within ERP systems**

Altogether links among suppliers and builders systems are becoming automated in order to achieve higher efficiency. Both EDI and the internet play an intricate part in this development. This is best summarized by Kelle and Akbulut [11], as the earlier discussed types of information flows are used: “Enterprise Resource Planning (ERP) software systems have focused on internal process integration of traditional functions, such as sales, production, and inventory management. The transaction based integrated processing delivers unlike tools that can support supply chain mixing but at the same time it has several aspects that obstruct the integration with business partners.

## **6.4 IT enabling the supply chain**

It appears clear that without the support of information technology these information flows could not be simplified [15]. Answering the third sub question stated at the start of this paper, there is no substitute for the electronic addition observed in today’s supply chains. When looking at the sheer volume of information exchanged in the automotive supply chain [16], it is unimaginable that this could be achieved without computers and the advanced infrastructure linking those systems.

## **7. CONCLUSION**

The use of EDI and the Internet in SCM is quickly increasing. The key ingredient for success in managing a supply chain is fast, precise data from a wide range of information including inventory level, sales data and predicting, order status for tracking tracing, production distribution schedule, presentation metrics and purchasing procurement. Addition of all the different information flows in the internal information systems is automating the supply chain and understanding competence benefits. The capability to respond quickly to market changes and to regulate inventory, production, and transportation systems accordingly is

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necessary for the automotive supply chain to remain profitable. Suppliers are still under pressure to conform to carmaker demands in the field of information technology, to minimize the risk of losing the business. The consolidation into larger first-tier suppliers has been one of the results and one of the initiators of new supply chain partnering.

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