

APPLICATION OF SAP Ariba SOFTWARE AS WEB EDI SOLUTION IN THE AUTOMOTIVE INDUSTRY

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Abstract: *Electronic Data Interchange (EDI) presents a necessity for successful communication between stakeholders, enabling fast data interchange without human intervention. However, the Internet-based version of EDI, Web EDI, provides new business opportunities, especially for small and medium-sized companies. This paper presents the application of SAP Ariba software as a Web EDI solution in the company from the automotive industry from the Republic of Serbia. The aim of this paper is to emphasize the advantages of the application of Web EDI, as well as to present the importance and implementation process of SAP Ariba software as a Web EDI solution in the observed company. The intention of this paper is to present the significance of SAP Ariba software for small and medium-sized companies that are cooperating with companies from the automotive industry, in terms of acceptance and follow-up of automotive standards and requirements. This paper explains the connection and main cooperation process between two companies in the automotive industry with the usage of SAP Ariba software as a Web EDI solution. This paper is valuable for all companies that are considering the implementation of Web EDI, especially for ones that are cooperating with companies from the automotive industry.*

Keywords: *Automotive industry, EDI, Web EDI, SAP Ariba*

1. INTRODUCTION

In today's turbulent business conditions, many companies cannot do business without appropriate information systems (IS). To manage business, the most applied is Enterprise Resource Planning (ERP). ERP presents "an IS with a centralized database that can be used to manage a company's entire business" (Bourgeois et al., 2019). It consists of separate modules for different operations (finance and accounting, costs management, procurement, manufacturing, customer relationship management, human resources, warehouse and logistics, planning, quality and others) and enables complete integration of data and operations of one company. Initially, ERP systems were primarily intended for use in big companies. With the expansion of IS and the development of cloud solutions, small and medium-sized companies started implementing ERP systems. One of the global market leaders in the ERP software industry is the German company SAP (System Analysis Program Development) (SAP, 2024). SAP offers various modularity of ERP systems. One of the latest released, in 2015, is SAP S/4 HANA (Prasetyo & Solidman, 2021) that presents a "next-generation SAP Business Suite application created exclusively for the SAP HANA Platform" (Pattanayak, 2017). In this paper observed ERP system is SAP S/4 HANA.

Once the company is enabled to integrate all information with the appropriate ERP system, the next step is connection with external stakeholders via Electronic Data Interchange (EDI), defined as "the computer-to-computer exchange of business information electronically, in a structured format, between business trading partners" (Goksoy, Vayvay & Karabulut, 2012). Data exchange is faster and leaner, bringing the opportunity for the company to improve internal processes and take maximum advantage of EDI systems applications (Janssens & Cuyvers, 2023). For the implemented EDI connection, companies must implement ERP software, that is usually the main obstacle for small and medium size companies, since ERP software requires significant financial and human investments. However, the implementation of Web EDI systems presents a solution for these companies since it can work completely independently from ERP software and enables successful data interchange.

The paper is organized as follows. After the introduction chapter, the terms EDI and Web EDI and their application for data interchange are presented in the second chapter. The third chapter emphasizes the importance of EDI application in the automotive industry. The fourth chapter presents SAP Ariba software, while the fifth chapter presents the application of SAP Ariba software as a Web EDI tool in the automotive industry. The sixth chapter presents the conclusion of this paper.

2. APPLICATION OF EDI AND WEB EDI FOR DATA INTERCHANGE

Adequate IS is one of the most important existence factors of many companies, while EDI connection is one of the competitive advantages for many companies, mainly in the manufacturing, trading, and logistics sectors (Goksoy, Vayvay & Karabulut, 2012). The importance of EDI is visible in today's fast-changing business conditions, where the main focus is on the fast response to any change, without loss in data and processing steps. When it comes to establishing EDI connection, companies first adopt EDI technology and then increase its use to improve competitive and financial advantages (Iacovou et al., 1995; Kumar & Crook, 1996). The second phase in this process is often integrating EDI with other applications, driven by the company itself or by customers (Goksoy, Vayvay & Karabulut, 2012). The main benefits that the company have from the EDI implementation are (Downing, 2002): reduction of paperwork and improvement of transaction efficiency, improvement of inventories/suppliers control, strengthened channel control and improvement of customer relationships. One growing trend in the business world is the formation of electronic partnerships with customers and/or suppliers. This aims to decrease time and distance obstacles, that affect the development of EDI.

For the majority of big companies, EDI presents a necessity that is usually integrated into the company's ERP system package. "Opposite to large companies, small and medium-sized companies often demonstrate a reluctance to invest in EDI mostly based on excessive investment costs when compared to the perceived benefits" (Mira da Silva, 2003). In this situation, "when a smaller stakeholder does not have sufficient resources to implement EDI, Web EDI presents a solution" (Bujak, Gurak & Jagodziński, 2018). For usage of the Web EDI company needs to have Internet access and Internet browser, decreasing investments in implementation. The basic functionalities of Web EDI are the same as that of the EDI. The Web EDI connection enabled completely new opportunities for small and medium-sized companies to become stakeholders with big companies, with the option to completely fulfil their requests (sending/receiving orders automatically in real-time, sending Advanced Shipping Notifications (ASNs), invoices and others) at reasonable costs. However, disadvantages of Web EDI implementation in companies are limited possibilities to integrate Web EDI with software of one's own (Bujak, Gurak & Jagodziński, 2018), repeated manual entry process into web forms and an increased risk of errors (Beck, Weitzel & König, 2003), increased security risk of illegal entry into software comparing to ones installed in local drive on computer (Zilbert, 2000) and others.

3. IMPORTANCE OF EDI APPLICATION IN THE AUTOMOTIVE INDUSTRY

The automotive industry "is one of the most influential industries in the world and involves a wide variety of companies that design, develop, manufacture and sell automobiles and their spare parts" (Masoumi, Kazemi & Hanim Abdul-Rashid, 2019). According to the same authors, the automotive industry presents "important economic sectors by revenue, since its turnover is equivalent to the sixth largest economy in the world". One of the most important requirements of the automotive industry is to have all processes strictly defined and followed by proper software solutions with a final target of creating continuous information and material flow (Stojković, Rajković & Lečić-Cvetković, 2018). Quality is imperative in the automotive industry, while standardization is the main tool for its achievement. The production process in the automotive industry is complex and knowing that most Original Equipment Manufacturers (OEMs) in the automotive industry make 30 to 35 [%] of value internally and delegate the rest to their supplier (Ambe & Badenhorst-Weiss, 2010), OEMs can forcefully demand from their suppliers to adhere to their specific standards (Großmann & von Gruben, 2014). Components of the supply chain in the automotive industry are presented in Figure 1.

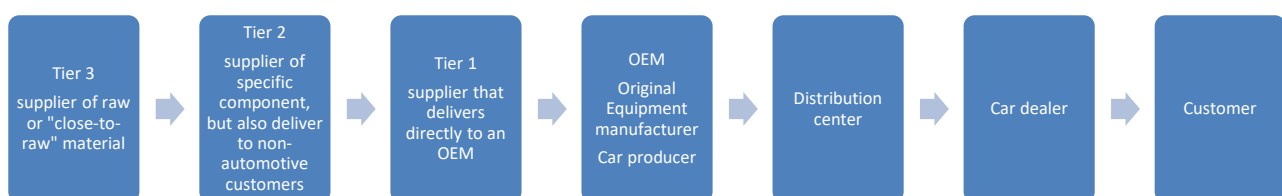


Figure 1: Components of the supply chain in the automotive industry (Ambe & Badenhorst-Weiss, 2010)

One of the required standards throughout the whole supply chain in the automotive industry is EDI connection. As previously explained, it is led by OEMs, and other levels (Tier 1 to Tier 3) has to accept it, where Tier 1 presents suppliers that deliver directly to an OEM (exclusively produces parts for the automotive industry), Tier 2 presents suppliers of specific component, who delivers to non-automotive customers and Tier 3 presents suppliers of raw materials.

The main focus of this paper is the importance of the EDI connection between Tier 1 (in this case customer) and Tier 2 (in this case supplier). Suppliers of Tier 1 are big companies that produce components built in

vehicles. Therefore, the majority of Tier 1 presents the most successful companies in the automotive industry with strict standards and requests to ensure quality and optimize their processes. For them, EDI connection is the standard that their suppliers (Tier 2) must implement. With an EDI connection, the main transactions that can be done between these two companies are:

- Automatic transmission and update of orders – lowers the risk of losing data in an exchange via E-mail or paper form or to miss to inform the supplier about changes in the orders;
- *Just-in-Time* creation of ASNs - enables customers to get real-time information about goods in transit and to reduce effort in tracking goods;
- Creation of labels according to defined standard – to optimize internal processes such as goods receipt and to reduce the need for re-labeling;
- Creation of other documents important for the delivery, and others.

As already mentioned, one of the main reasons why small and medium-sized companies decide to implement EDI lies in external pressure, from their customers. Two-thirds of respondent suppliers indicated they adopted EDI only because they were told by their, usually, important and big customers (Tuunainen, 1998).

4. SOFTWARE SAP ARIBA

Software SAP Ariba was founded in 1996 and purchased in 2021 by the German software company SAP for \$4.3 billion (Wang et al, 2022). According to the same author, through the use of the Internet and Business-to-Business (B2B) e-commerce, SAP Ariba automatize the purchase of commonly used supplies and services. The SAP Ariba “is a cloud-based innovative software that remodeled the process of buying, selling, and managing cash, while it can also be considered a strategic product that helps in the integration of Procurement & Vendor/Supplier collaboration” (Wang et al, 2022). SAP Ariba as a Web EDI tool is used in many companies, offering many solutions such as (SAP Ariba, 2024; Yarramalli et al, 2020):

- SAP Ariba SLP & Risk - enables supplier risk evaluation;
- SAP Ariba Spend Analysis – supports sourcing process with information about purchases, suppliers and –costs;
- SAP Ariba Sourcing – ensures achievement of savings by selecting qualified suppliers from a broad supplier network;
- SAP Ariba contract management – enables paperless contract management;
- SAP Ariba buying and Invoice management – automatize procure-to-pay processes;
- SAP Ariba commerce automation & Supply Chain Collaboration – enables “collaboration with trading stakeholders on a single networked platform to ensure the supply of direct materials through better planning, inventory visibility and automation” (SAP Ariba, 2024).

5. APPLICATION OF SAP ARIBA AS WEB EDI TOOL IN THE AUTOMOTIVE INDUSTRY

This chapter will present the application of SAP Ariba commerce automation & Supply chain collaboration in one of the leading companies from the automotive industry in the Republic of Serbia (Tier 1), where EDI functionalities are part of this solution. The observed company (Tier 1) uses SAP Ariba to connect with its suppliers (Tier 2) who doesn't have an ERP system that allows direct EDI connection. This software enables suppliers to use SAP Ariba as a Web EDI tool to see orders from their customers, create ASNs, labels, track stock on the customer side, do invoicing process directly from SAP Ariba and generate useful reports.

With the implementation of SAP S/4 HANA, the observed company set two standard requests towards their suppliers of direct materials: the creation of ASNs for every shipment and the creation of the Global Transport Label (GTL). GTL presents a label format which complies with different label standards in the automotive industry and can be used in both national and international transport processes along the supply chain. An important characteristic of GTL is the existence of a unique Handling Unit (HU) number that allows the company the full traceability of goods since HU numbers are also part of data in EDI. Having pallets with unique HU numbers in the company reduces the need for re-labelling since these goods are then distributed directly to the warehouse and later production, without additional manipulation activities.

Not all the suppliers have an ERP system that can support these requests. Therefore, the observed company decided to implement SAP Ariba as a Web EDI option for the ones (Tier 2) that are not capable of creating ASNs and labels according to GTL standards. In this case, costs for implementation of SAP Ariba are covered by the customer (observed company), so that suppliers do not have additional costs for usage of SAP Ariba. One important premise here is that SAP Ariba is integrated with ERP software SAP from the observed company via Cloud Integrated Gateway (CIG), that presents a middleware solution for the connection of SAP Ariba with ERP software SAP S/4 HANA. In the following subchapters, the structure of connection, supplier connection process and daily usage of SAP Ariba are presented.

5.1. Structure of connection

Message flow between ERP (SAP) software and SAP Ariba is presented in Figure 2. From ERP, the information goes to CIG via a Cloud connector that has a role in ensuring a secure connection to SAP “Cloud”. CIG add-on presents an extension of ERP that was developed in the observed company to enable additional functionalities of SAP software required for the implementation of specific operations in SAP Ariba. SAP Ariba Buyer account presents account which is used by the customer (Tier 1), while SAP Ariba Supplier account presents account used by supplier (Tier 2). If there are some discrepancies in data, messages sent from/to ERP software remain in CIG and require manual intervention to arrive at the final destination, that is SAP Ariba Supplier account/ERP software.

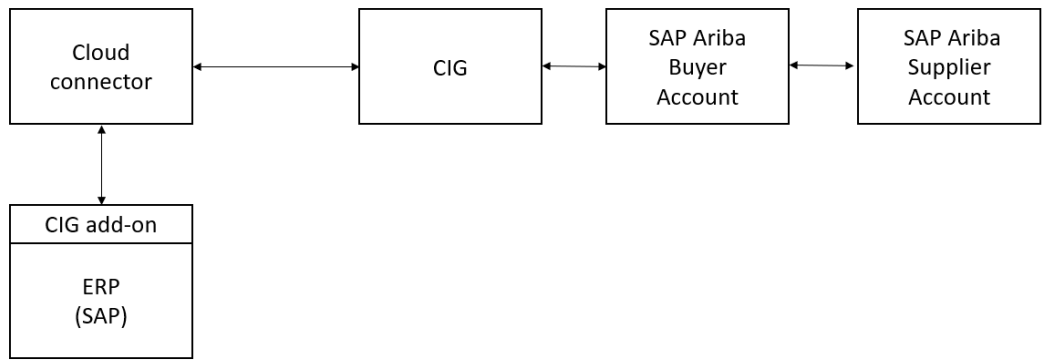


Figure 2: Message flow between ERP (SAP) software and SAP Ariba in the observed company from the automotive industry (Internal material from the company from the automotive industry, 2024)

Figure 3 presents the information exchange direction between ERP (SAP) and SAP Ariba for basic message types. Each message has a path flow presented in Figure 2.

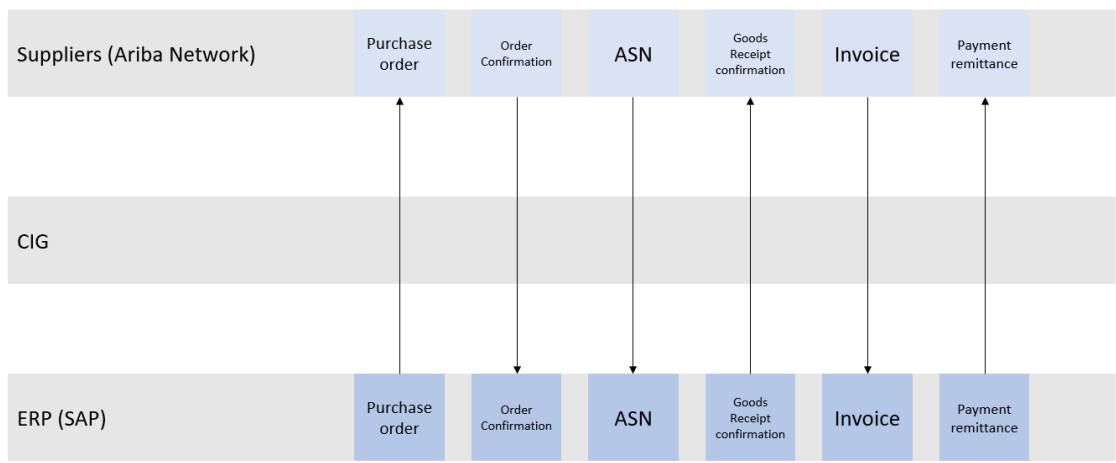


Figure 3: Direction of information exchange between ERP software to SAP Ariba in the observed company from the automotive industry (Internal material from the company from the automotive industry, 2024)

Communication between the observed company (Tier 1) and supplier (Tier 2) starts when Tier 1 sends orders from SAP ERP software to SAP Ariba. Once the supplier (Tier 2) receives the order, he has the opportunity to confirm the order in SAP Ariba. Confirmation is then sent back to Tier’s 1 SAP ERP software. In the company observed in this paper, order confirmation is not mandatory, so suppliers can skip this step. Once a shipment is ready, suppliers create ASN in SAP Ariba and this information is transferred to SAP ERP software of Tier 1. The next step is the goods receipt. After it is done, a receipt message is sent to the Tier 2 with information about the received delivery note number. Suppliers have the option to create an invoice in SAP Ariba and send it to SAP ERP. After paying the invoice, the payment remittance is sent from SAP ERP to SAP Ariba where suppliers can see it.

5.2. Supplier connection process

The beginning of the supplier connection process is starting the cooperation with the supplier. Suppliers are asked for their technical capabilities and can choose the type of connection – classical EDI or connection via

SAP Ariba (Web EDI). If the supplier chooses SAP Ariba, SAP Ariba enrollment team, provided with the supplier name and in the name of the customer (Tier 1) contacts the supplier and supports the supplier in acceptance of training relationship terms as well as in the creation of supplier profile in SAP Ariba. Once this part is done, responsible counterparts on the Tier 1 side are doing the necessary settings in SAP S/4 HANA to enable message exchange between customer and supplier. Additionally, maintenance of the HU configuration setup needs to be done by the customer, on the supplier level, to ensure a unique HU number for each pallet/box. After the process is finished, the supplier is provided with training and information on how to use basic functionalities of SAP Ariba – order checking, order confirmation, ASN & Labels creation and report generating. If the supplier is enrolled in a consignment or vendor-managed inventory process, additional training on these functionalities is provided.

5.3. Day-to-day business with SAP Ariba

Once the connection is established, SAP Ariba can be used for daily operations. Suppliers have the task of logging in to the SAP Ariba portal and checking whether new or updated orders exist. In supplier profile settings, they can also choose to get email notifications when updates are there so that they do not have to check and log in to SAP Ariba on a daily level. Before shipment, the supplier must start the creation of ASN to ensure the generation of labels. Once labels are available, suppliers are obliged to print them and put them on the pallets prepared for shipment. When labelling is done and goods are physically shipped, the supplier finishes the creation of ASN that is transmitted directly to the ERP software of the customer. Although this kind of connection simplifies day-to-day business and creates opportunities for small and medium-sized companies to become stakeholders with leading companies in the automotive industry, some of the obstacles are:

- This kind of connection brings additional tasks to the supplier's company because they are obliged to check orders and create ASNs outside of their system, manually, as well as to do re-labelling of pallets;
- Data interchange between ERP and SAP Ariba can show discrepancies, that require manual intervention from the customer side;
- Reaction time of SAP Ariba software is slower compared with the "classic" EDI, mostly depending on Internet connection;
- From time to time some issues appear, influencing SAP Ariba to stop working or having "bugs". It requires solving by the SAP Ariba support team, disabling suppliers to use the software until the issue is solved.

6. CONCLUSION

EDI brought meaningful business improvements to companies in all industries. The main advantage of Web EDI implementation is the enabled connection and cooperation between smaller companies, suppliers and leading companies from the automotive industry. In this paper, the application of SAP Ariba as a Web EDI solution in the company from the automotive industry of the Republic of Serbia is presented. Within the application of SAP Ariba, the company enabled its suppliers to perform transactions according to defined standards in the automotive industry. Additionally, the main improvements in the observed company were: decreased workload on a daily level – orders are automatically sent to SAP Ariba, abolishing orders sent via e-mail or fax, shipment information can be followed in real-time with ASNs, no need for additional tracking of the goods and contact with supplier, goods receipt process is simplified with usage of GTLs, and others. Application of SAP Ariba software as Web EDI simplified day-to-day business.

The first direction of further research of the authors of this paper would be the implementation of the additional functionalities of SAP Ariba software, such as consignment and vendor-managed inventory, in the observed company. The second direction of further research would be a comparison of functionalities of different Web EDI solutions used in the automotive industry, such as a comparison of SupplyOn and SAP Ariba software.

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