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# A Detailed Overview of Electronic Data Interchange Setup for a Third-Party Logistics Model in the Pharmaceutical Industry

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**Abstract:** ***This research article provides the reader with an overview of the coming together of the concepts of third-party logistics (3PL) and electronic data interchange (EDI) in the pharmaceutical supply chain context. The article provides a basic introduction to the services and advantages provided by 3PL providers for their pharmaceutical manufacturing clients. Furthermore, we look at a brief overview of the advent of EDI, its evolution and adoption in industries and the advantages brought forth by employing EDI technologies in a supply chain environment. The paper also presents a sample model of how a productive business relationship can be achieved between a 3PL and a pharmaceutical manufacturer by means of various industry-standard EDI interfaces.***

**Keywords:** EDI, 3PL

## 1. Introduction

As is common in global supply chains across industries, pharmaceutical manufacturers need to rely on various service providers in order to maintain true focus on the core competencies of drug exploration and development. In this context, one of the most common yet critical outsourcing partnerships is between manufacturers and 3PL providers. For the purposes of this article, we use the term 3PL as a collective to include other prominent models such as 2PL, 4PL and 5PL. However, to derive value from this partnership, both organizations need to invest resources into building an EDI enabled transactional model which significantly increases the speed and volume of day-to-day business transactions execution. Over the decades, various industry governing authorities have developed EDI standards for various types of business transactions. In this context, we explore how a working 3PL model can be set up by employing standard EDI interfaces.

### What is a 3PL

In the dynamic and highly regulated pharmaceutical industry, manufacturers constantly face the need to build and optimize a compliant end-to-end supply chain with unique needs for every brand they sell. Most manufacturers have deep expertise and control over core aspects of their supply chain including strategic sourcing, materials management, production planning and quality control either in-house or through outsourced contract manufacturing operations. However, they may choose to outsource non-core distribution and logistics aspects of the supply chain to third party logistics (3PLs) service providers. 3PL providers typically contract with several manufacturing clients, and bring their industry expertise, economies of scale, global network of facilities, transportation networks, and other infrastructure/technology assets to take over certain parts of the manufacturer's supply chain. 3PLs provide a gamut of services beyond traditional logistics including warehousing capacity, product track and trace, product serialization and aggregation, inventory management, transportation fleets, automated picking and sorting and other technological capabilities to ensure that the manufacturer's distribution processes remain effective, efficient and compliant with regulatory requirements such as Good Manufacturing Practices (GMP) and Good Distribution Practices (GDP) laid down by agencies such as Food and Drug Administration (FDA)and The Drug Supply Chain Security Act (DSCSA). With an established global presence, 3Pls can also handle complex international logistics with navigation through customs procedures and compliance with import/export constraints. Outsourcing of these processes allows the manufacturers to allocate their resources and personnel to core competencies of research, development, innovation, and operational transactions. It also enables manufacturers to reach a wider market in an accelerated timeframe, simplify new product launches, and decrease shipping times.

### EDI overview

To enable a robust and intelligent 3PL model between the pharmaceutical manufacturer and the 3PL provider, there is an imperative need for exchange of business documents such as invoices, purchase orders, advanced shipping notices, inventory positions, trace and tracking, chargebacks etc. on a constant, day-to-day basis. As one can imagine in correlation with the speed and volume of modern global businesses, thousands of such documents may need to be exchanged to simulate real-time business transactions, each with different format, terminologies and nuances. Thus, organizations leverage information technology powered automation instead of sending paper documents in the form of electronic data interchange which simply refers to the automated mechanism of communication and exchange of these business documents between the two parties in a standardized format. The most common definition of EDI is as defined by the National Institute of Standards and Technology (NIST) in 1996 – "the computer-to-computer interchange of a standardized format for data exchange. EDI implies a sequence of messages between two parties, either of whom may serve as originator or recipient. The formatted data representing the documents may be transmitted from originator to recipient via telecommunications or physically transported on electronic storage media" [1]. The use of standardized technology also

eliminates data related problems for two organizations using two different application/ enterprise resource planning (ERP) systems for their respective businesses.

Since its widespread adoption in multiple industries, EDI technology now forms the core of IT infrastructure for businesses looking to partner with external organizations in any capacity – as vendors, customers, shippers, freight forwards, logistics partners etc. As per recent market analysis reports, the EDI market size in the larger Healthcare market is estimated to be at $ 4.28 billion in 2024 and is expected to grow at a combined annual growth rate of 10.33% to $ 7 billion in 2029 [2]. This growth is spurred by many factors including the growth in the number of implementation formats and availability of newer delivery modes such as cloud-based technologies to deploy EDI. The impediments experienced by pharmaceutical manufacturers in drug/vaccine distribution during the COVID-19 pandemic has also accelerated digital transformation efforts since it is now apparent to organizations that they need to build new levels of resilience, visibility, automated processes and agility in their supply chains.

The evolution of EDI standards has also been an instrumental factor in more industries and businesses adopting this technology, fostering efficiency and standardization. The ANSI ASC X12 standard developed by the American National Standards Institute is corresponded globally by the UN/EDIFACT standard developed under the United Nations. Industry specific standards such as GS1 for global supply chains and VDA for the automotive industry showcase the adaptability of EDI development to meet cross industry needs.

**Supply chain benefits of EDI**

EDI adoption has been core to the success of global supply chains ever since its advent in the 1960s when the Transportation Data Coordinating Committee (TDCC) was tasked developing EDI formats which were employed in the railroad and shipping companies. The exchange of cargo documents to improve logistics efficiency and reduce paperwork encouraged the establishment of global EDI standards and led to other industries adopting EDI mechanisms. It is not surprising that the scope of EDI transactions has expanded rapidly over the past decades to include business transactions/documents in all domains of the supply chain. Some examples include bills of sales orders, purchase orders, deliveries, advanced shipping notifications, inventory lists, bills of lading, customs documents, acknowledgments and payment information documents.

For supply chain departments, the quality of EDI implementation can define the difference between success and failure. The most prominent and easily identifiable benefits are saved time and money achieved by switching process from paper transactions to digital medium, minimizing storage and labor expenses and reduction in errors which may require costly workarounds. Improved order accuracy and transparency achieved through streamlined orders and purchasing processes leads to an overall improvement in customer service levels. Greater speed of execution at greater volumes of all business transactions ultimately enables both the manufacturer and the 3PL provider to conduct more business thereby improving cash flow. Supply chain EDI transactions also enable both parties to maintain real time inventory levels and make instant adjustments to inventory to reflect business decisions. EDI based business models also provide security and regulatory control to the involved organizations through authorized user controls, and track and track capabilities built into the EDI solution.

**Enabling an EDI model**

For the purposes of this article, we will consider two main scenarios in the 3PL model – inbound shipments/ stock movements into the 3PL location (from the internal/ contract manufacturing sites) and a simplified outbound shipments/ order to cash cycle from 3Pl to the customer. Both scenarios consider the main stakeholders - customers (pharmacies, hospitals, individual patients etc.), 3PLs and manufacturers are connected via EDI interfaces as required. Although there can be many ways to set the three parties up, let us look at one such viable model.

**Scenario 1:** Inbound shipments into the 3PL location

As per decisions taken by demand and supply planning teams, inventory is moved to the 3PL locations dependent upon the orders received from the customers or in response to the stock situation at the 3PL. In either case, an (internal) purchase order is created in the manufacturer's ERP system to simulate the goods movement from an internal manufacturing/ contract manufacturing site to the 3PL site. This purchase order can be transmitted to the 3PL system (EDI 850) to make them aware of this decision to ship the product. This may be followed by an advanced shipping notification (ASN; EDI 856) with critical shipment information to enable the 3Pl to prepare for receipt. Once the inbound (to the 3PL) delivery (sent to the 3PL via EDI 940) is received on the 3PL sent, a goods receipt message (EDI 944) sent by the 3PL is used by the manufacturer to logically update the purchase order in the ERP system. If the 3PL must perform any follow-on quality procedures on the received shipment, they may update the manufacturer with the decisions taken on the respective lots – such as quality released, blocked, quarantined etc. The manufacturer can process these inventory adjustment messages (EDI 947) to update inventory statuses in their ERP system.

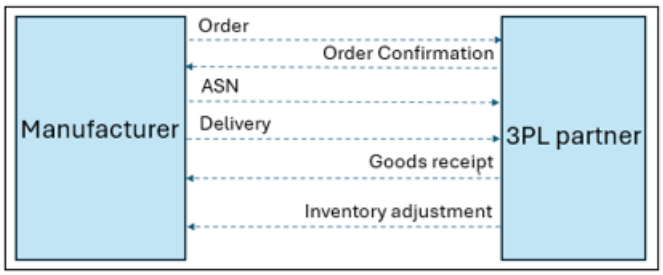


**Figure 1:** EDI interfacing in a stock movement scenario

**Scenario 2:**

In a make to order scenario, a standard EDI order to cash cycle typically kicks off with a customer creating an order (a purchase order in their ERP system) and transmitting it to the manufacturer (EDI 850) to inform the manufacturer about their decision to purchase pharmaceutical products. The manufacturer receives and processes this EDI message to

create a sales order in their ERP system. After running availability checks, approvals and other internal processes, the manufacturer may choose to acknowledge receipt of this order (EDI 855). The internal availability checks, manufacturing requirements planning (MRP) and other processes also enable the manufacturer to estimate the available item codes and quantities, delivery timelines, pallet codes, tracking details, ship from/to addresses, shelf life expiration dates etc. All these details are packaged into an EDI message (EDI 856) for advanced shipping notification (ASN) and sent to the customer. On the customer side, an ASN helps keep track of incoming inventory and efficient receipt amongst other benefits. This ASN is also parallelly transmitted to the 3PL partners to enable them to prepare for this shipment. Once a delivery document is created respective to the original sales order, the manufacturer send this document to the 3PL (EDI 940). This delivery document typically has similar data points as those in the ASN, but they are more frozen/confirmed in nature. The 3PL utilizes this information to make a delivery to the customer from their premises. Once the delivery is dispatched, the 3PL responds with a ship confirmation message (EDI 945) to the manufacturer. The manufacturer may be required to make updates to the picking quantity of goods and adjust the status of the delivery document. This message can also support receipt for return deliveries, and ship confirmation for partial quantities. Assuming that the delivery is being delivered by means of a carrier (such as UPS, FedEx etc.), the manufacturer may choose to enable EDI connectivity with the carrier as well. The carrier can provide important milestones/ updates on a delivery at various times by means of Information on delivery interface (EDI 214). Once the final delivery is made, the carrier may send a proof of delivery (EDI 214) with timestamp which can be recorded by the manufacturer on the delivery document in their ERP system. Depending on the contract with the customer, the manufacturer may choose to send the invoice (EDI 810) to the customer at an appropriate point in this cycle.

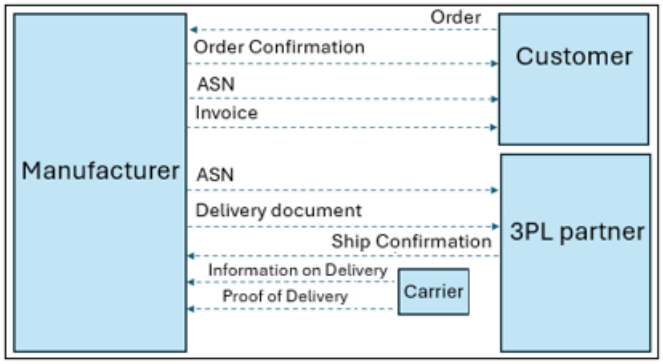


**Figure 2:** EDI interfacing in an order to cash scenario

Apart from the above scenarios, there are EDI interfaces relevant to periodic updates in inventory and master data, a few of which are depicted below. As part of day-to-day business transactions, there are constant updates in master data and transaction data which need to be communicated to/from the 3PL to be able to maintain a real time view by business stakeholders in both parties. Any material master and respective pricing updates in the product lifecycle management (PLM) and ERP systems of the manufacturer may be communicated to the 3PL by means of EDI 832. Sales report data may be shared by the 3PL by means of EDI 852. Similarly, periodic inventory reconciliation reports may be sent by the 3PL through EDI 846. Any need for inventory adjustments born out of the reconciliation exercise on either side may be done through EDI 947.

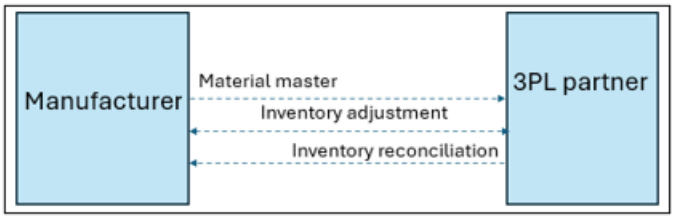


**Figure 3:** Other important EDI interfaces

## 2. Conclusion

An EDI enabled supply chain business model between a pharmaceutical manufacturer and 3PL service providers can help both organizations achieve significant business advantages. EDI technology has come a long way since its inception in the late 1960s and has taken on standardized forms for easy adoption in various industries and business scenarios. As more pharmaceutical manufacturers seek to leverage 3PL services to expand their global distribution footprint, EDI models in integration with ERP systems continue to gain popularity due to their efficiency and speed of transactions.

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