The Logistic Information System in SAP ERP Sales & Distribution and Material Management
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I. Introduction to SAP ERP Logistics

Logistics Components

Logistics in SAP ERP is built on a collection of applications, components, and functionalities which enable the automation of requirements relating to material handling and services, orders of internal customers, processes of production, storage and quality assurance, etc. The current version of SAP ERP 6.0 includes much new functionality of logistics that add new features, such as global trade management, compensation management and agency business, but the core has not changed much throughout the years.
Materials Management

- The Materials Management (MM) in SAP ERP is one of the oldest logistics functions that serves as a foundation of the entire company. The main components of MM include consumption-based planning, purchasing, inventory management, logistics invoice verification, and physical inventory. It houses master data objects that are shared with other system modules and includes the material masters, service masters, batch records, and vendor masters.
Logistics Components

Materials Management
There are also component-specific master data objects, such as purchasing info records, source lists, and quota arrangements. These are very important while the different logistics transactions are executed because the system will determine the correct data based on these records.
Sales and Distribution

- Sales and Distribution (SD) cover the entire chain of processes (order-to-cash) from customer inquiry and sales orders to the delivery of products to the customer destination of choice through billing and payment collection. The components of logistics execution are also heavily integrated and include picking, packing, and shipping.
Logistics Components

• Logistics Execution

The Logistics Execution (LE) functionality of SAP ERP covers the entire product movements in companies starting with goods receipts through inbound delivery including the standard processes of pick, pack, and put-away. This application is accomplished by using the Warehouse functions of the system. Following the transfer order process goods can be moved internally within the plant between the storage locations, using inventory management or shipping functions of outbound delivery to execute cross-plant or -company movements.
Logistics Components

Production Planning and Control

- The *Production Planning (PP)* functionality in SAP ERP helps in managing the production process of companies. The production process starts with the analysis of requirements and includes input from forecasts, planning tools and material master settings. The basic planning procedures are defined in different material requirements planning (MRP) types. This planning system reviews the past consumption values and sales figures, forecast and estimate statistical calculations to determine future requirements.
Logistics Components

Plant Maintenance

- The *Plant Maintenance* (PM) functionality is applied to maintain the equipment and other technical infrastructure used by companies and customers. It makes possible the execution of inspection of planning, timing, maintenance and prevention. Furthermore, it allows the execution of various external services. The PM has independent components on its own, for example, plant maintenance unit, master data handling unit and further logistical units.
Logistics Components

Customer Service

- The *Customer Service* functionality helps companies in servicing customers with warranty repairs and servicing products in those cases when materials can be sent back to be repaired or to be maintained on site. Guarantee services are especially important to help companies maximize the efficiency of their services and the satisfaction of their customers.
Logistics Components

Quality Management

- The *Quality Management (QM)* is fully integrated with other SAP functionalities and components, and configured to meet company- and industry-specific requirements. The standard QM supports the quality management tasks, such as quality planning, quality inspection, and quality control, as well as other supplementary integrated SAP logistics functions.
The SAP Global Trade Management (GTM) is part of modules from the SAP Business Suite. It was designed by SAP, taking into consideration those companies which are oriented with large scale trading contracts or partners around the world involving multiple trading countries. One of the main objectives of GTM is to keep and improve the effectiveness of the supply chain, primarily by integrating all elements of logistics, FI and settlements to the buyers and sellers.
Logistics Components

- The GTM processes concern both domestic sales and foreign sales. Each process begins with an inquiry and is followed by a draft contract, which is supposed to be confirmed as a final contract. The global trading business starts with a sales order for customers or a purchase order for vendors.

- The implementation and configuration of both SD and MM components and settings are obligatory. The customer and vendor master data should be configured to allow the GTM application to exist and integrate FI, MM and SD modules properly.
The integration of FI, MM and SD modules
Logistics Components

- Additional SD elements such as pricing conditions and sales transactions are also required. Enabling purchasing transactions in the MM side is also essential for the smooth operation of the GTM applications. The Trading Contract interacts with the Sales and Purchase orders, while Trading Execution interacts with the Delivery, Shipping, and Billing on the SD side, as well as Shipping, Goods Receipts, and Invoice Verification on the MM side. The FI modules of (AR and AP) postings are placed throughout the supply chain cycle.
Enterprise Structure in SAP

- Logistics is a process-oriented application, so it needs to reflect the company's structure (Chudy–Castedo, 2012). The enterprise structure consists of several levels across various areas, such as financial, logistical, manufacturing, sales and further areas. Let’s get an overview of the enterprise main components.
Enterprise Structure in SAP

- Client

The Client is the highest level in the SAP structure. (Note: The client number should be entered in the logon screen along with the users’ ID and password.)
Company Code

- The *company code* is the first functional level that belongs to *Financial Accounting*. The company code reflects a company's legal entity. As recommended the SAP has probably more than one company code.
Enterprise Structure in SAP

Plant

- The logistics structure reflects the operational structure of a company. At the top of the pyramid there is the plant. The plant is the element where a company's operations are executed (i.e., purchasing, production, inventory, and sales). The plant should be an SAP element that reflects a physical location within the structure of companies. Below the plant, there are several levels from different functional areas.
Enterprise Structure in SAP

Storage Location

- The *storage locations* are places where the stock is kept. In the SAP system, the storage locations retain the quantity and the value of each material that a company uses. Every time any material is received from a vendor, or sold to a customer, a production order is needed. The storage location reflects the results of these changes in the stock levels and it updates the *General Ledger* as well.
Enterprise Structure in SAP

Warehouse

- The warehouse and warehouse number represents all of the racks, cages, and crates that are used to store the products. The storage location informs us how many units of a certain product are available. The warehouse numbers signify the place of the products. It is built from a number of storage types, sections and bins. The storage types define the logical and physical locations to reflect either the physical layout of the facility or the logical division of zones based on the picking or put-away techniques. The storage type consists of one or more storage sections to subdivide or group together them into storage bins with similar features or uses, such as rack spaces or slots.
Enterprise Structure in SAP

Purchasing Organization

- The *Purchasing Organization* is an organizational unit within Logistics. Almost all business transactions related to procurement are carried out in a purchasing organization. The Purchasing Organizations represents the different purchasing groups (i.e. raw materials, assets and equipment etc.) of companies.
Enterprise Structure in SAP

- **Purchasing Group**
  - The *purchasing groups* denote the people in charge of the procurement. Each purchasing group has master data of its name, telephone and/or fax number, email address etc. The purchasing group is responsible for procuring a material or a class of materials for internal units and the contact for external suppliers.
II. Sales and Distribution

- The Sales and Distribution (SD) module functionality in SAP ERP covers the entire order-to-cash (fulfillment) process of companies (Mohapatra, 2014). The Global Bike Inc. currently uses a very simple process to fulfill customer orders. The process begins when GBI receives a customer’s purchase order, which it validates and authorizes via a sales order. The warehouse then prepares and sends the shipment, after which accounting forwards an invoice. The process ends when GBI receives payment from the customer.
II. Sales and Distribution

- This simple process has worked well for GBI up to this point. Because GBI has grown rapidly, however, the company wants to utilize the new ERP system it acquired to enhance its process for filling customer orders. Specifically, it wants to make the process more efficient and customer-friendly as well as more transparent by keeping track of the status of every order throughout each step in the process. In addition, it wants to incorporate other sales-related activities, such as developing leads and responding to inquiries, into the new process.
II. Sales and Distribution

- In this chapter, we discuss the fulfillment process in detail, with a special focus on how an ERP system supports the process. We begin by identifying the key organizational levels and the master data related to the process. Next we examine the process steps in detail, and we explain how fulfillment is integrated with other processes. We conclude by discussing the various reports related to fulfillment.
Organizational Structure in and Distribution

The SAP system allows complex volume of business units to be defined and to represent the functional and legal structure of a company. In this section, firstly, the components of enterprises will be overviewed.
Organizational Structure in and Distribution

Sales Organization

- The *sales organization* has an own enterprise structure in logistics to define for distributing goods and services. At least one sales organization has to be assigned to the company code for accounting. A defined sales organization has an own address, currency, a calendar etc.
Organizational Structure in and Distribution

Distribution Channel

- The distribution channel identifies a unique way for customers to obtain goods and services from the company, such as wholesale, retail, internet sales, and so on. One or more plants can be assigned to a combination of sales organizations and distribution channels. (Note: at least one distribution channel is needed for SD to function properly.)
Organizational Structure in and Distribution

After defining the distribution channel the following SD functions are available:

- defining materials and servicing master data,
- creating and maintaining customer master data,
- allowing complex pricing strategies,
- defining determination of sales document types,
- using the channels in sales statistics.
Organizational Structure in and Distribution

Division

- The SAP enterprise structure is usually based on a wide group of products or services. A distribution channel, similarly to a single division, can be assigned to multiple sales organizations, and exactly one division is needed for logistics function.
Organizational Structure in and Distribution

Sales Office

- In the SAP system, the sales office is optional. A sales office can be assigned to one or more sales areas and it can consist of sales groups, usually representing a salesperson or a group of salespeople.
Organizational Structure in and Distribution

Sales Group

- *Sales groups* are optional functionalities in the SD module and usually represent the salesperson or a group of salespeople.
Organizational Structure in
and Distribution

Sales Area

- One of the main components that required for SD to function properly is the sales area. A sales area is built from a combination of sales organization, distribution channel and division, as described earlier. Basically, the sales area defines distribution channel that a specific sales organization can use to sell products or services of a particular division.
Organizational Structure in and Distribution

Credit Control Area

- The *credit control* area is a FI organizational unit that maintains and monitors credit limits for customers. A credit control area can be assigned to one or more company codes.
Organizational Structure in
and Distribution

Plant, Storage Location

- A *plant* is needed to procure, store, and distribute goods and services, which is linked to the company code. It is also linked to the Sales Organization and Distribution Channel. A storage location is also recommended to inventory products to function and fulfill the deliveries.
Organizational Structure in
and Distribution

Shipping Point

- This enterprise structure is responsible for the distribution activities. At least one shipping point can mirror a physical shipping dock, a mail depot, or a group of people. A shipping point has its own address and calendar function, influencing the scheduling and processing of deliveries to customers, or replenishment deliveries. The shipping point also influences the pick storage location determination together with the plant and shipping condition. The organizational assignment of the shipping point is carried out at plant level.
Organizational Structure in and Distribution

Loading Point

- The Shipping points could have *loading points* representing specific logistics structures, such as loading docks, responsible persons for loading location that are assigned during the delivery process.
Organizational Structure in and Distribution

Transportation Planning Point

- The transportation planning point is assigned to the company code and allows for planning and execution of shipments. These optional points represent the physical transportation department that are responsible, amongst other things, for shipment and geographical territory responsibility. (Note: at least one planning point is needed for proper transportation functionality to be available, but they cannot be shared among multiple company codes.)
Processes in Sales and Distribution

- The package of SD module functionalities in SAP R/3 covers most of the standard business functions that are universal for each industry.
Pre-Sale Activities

- In real-life scenarios, before the sale takes place, the company needs to collect some information and create master data records in the SAP system about existing and potential customers. After master data records have been created, the actual contact with the sales prospects is made and can be recorded as an SD document in the form of an inquiry or a quotation. These documents help to determine important sales-related data that can be accessed for reporting purposes to evaluate sales activities, and finally to convert to sales orders. The full records of the sales activities establish the contact with customer to collect the payment. The storage of the pre-sales data also aims to establish large contracts and scheduling agreements.
Processes in Sales and Distribution

Order Processing

- *Order processing* is built on numerous activities and usually it starts with recording the actual sales order, then procurement steps if goods or services are not available, followed by delivery picking, packing, and shipping to the final destination.

- The sales order document stores the data of customer's firmed request for goods or services of the companies. The system maintains and establishes master data to fulfill the request. The sales order also contains customer information, partner data (*sold-to*, *ship-to*, *bill-to*), material, quantity, pricing, delivery date, shipping and other transportation information required for delivery.
Processes in Sales and Distribution

Order Processing

- The *goods availability check* is performed at the time of the order entry, generating the potential procurement requests as needed. The requirements created by the sales order can be filled from the available inventories, and procured by replenishment that is processed by internal source of transport or production orders and other external purchase order documents.

- On the shipping date, the delivery documents are created, and the route is determined by using SAP. In this case the process of picking, packing, staging processes can be determined. The transfer order includes master data from the delivery document, picking methods (grouped deliveries, wave picking) etc. The confirmation of the transfer order completes the picking activities.
Processes in Sales and Distribution

Order Processing

- The transportation functions of logistics module can start co-operating with freight service providers, the tendering process, and finished by creating the shipment cost document, which captures the payable activities related to the delivery for the customers. The delivery packing list and the bill of lading output are usually triggered at the completion of these steps.

- The posting of the goods issue completes the sales process and results in stock movement or a confirmation of service that changes the actual inventory, and modifies the accounts balance in Financial Accounting.
Processes in Sales and Distribution

Billing

- The last step of SD process, before collecting the customer's payment, is creating a billing document or invoice which is to be sent to the customer's *bill-to party* for payment request. The *billing data* are copied from either the sales or the delivery and other billing documents, creating credit or debit memos. When the billing documents are created, an account determination is performed, and the appropriate *General Ledger* postings are executed.
Processes in Sales and Distribution

Financial Accounting

- The material documents recorded when the goods issue was posted, and a subsequent accounting document stored the stock movement data. The transportation service provider ended up the purchase order as an entity for accounts payable, and the incoming payment from the customer was also posted against the invoice (as a billing document) was submitted during the previous steps.

- All activities in the SD process are reflected in the system as documents, master data, and pricing records, and they are used as a foundation for the sales info system (SIS) or SAP Business Warehouse (Chudy at al., 2015).
Processes in Sales and Distribution

Special orders

Cash Sale

- In cash sales, the goods are paid for immediately when your customer receives them, and the delivery document is created at save. In the cash sale delivery can be defined to be picking relevant or not depending on business requirements, so it may need to confirm picks and then post goods issue. Also, when the order is saved, the output condition is triggered to generate the paper invoice as a receipt for the customer.
Processes in Sales and Distribution

*Special orders*

**Rush Order**

- In a rush order, a customer picks up the goods, or deliver them the same day the order is placed, but the invoice for the customer is later created. In the standard SAP system, you define the sales document type SO for rush orders. The subsequent delivery document type LF is created immediately at order save. Then, execute picking, removing goods from storage, and posting goods issue. The goods are delivered to or picked up by the customer. Then, the billing documents are created most likely during the standard billing run batch processing, and invoices are printed and sent to your customer.
Master Data in Sales and Distribution

Master data in SD consists of information that does not change frequently (e.g., addresses) and pertains to customers, employees, SAP system users, materials, batches, condition records (discussed later), vendors, and more (Mohapatra, 2014). Master data are composed of specific master records; for example, a single customer will have a customer master record, and all of the customer master records together generate the *customer master data*. SAP software was created with the objective of serving almost any company, regardless of its size, industry, or country, predefined master data requires little customization.
Master Data in Sales and Distribution

*Customer Master Data*

- In SAP systems, customer master records are broadly divided into three parts: general data, company code data, and sales area data. These data are stored in tables, which consist of fields that are important from a Financial Accounting and Sales and Distribution perspective. General data contain address, communication, control, marketing, payment transaction, unloading point, contact person, and trade-related information etc.

- Company code data contain the fields important from a Financial Accounting perspective. Sales area data mainly contain the fields important from a Sales and Distribution perspective. The information about partners defined in the customer master record. There are different transactions that allow you to create, change, and display customer master data based on the combination of areas to be maintained.
Master Data in Sales and Distribution

Customer Credit Master Data

- The Customer credit master data are created and maintained for individual customers and for mass processing. The screens that constitute the customer credit master record are Overview, Address, Central Data, Status, and Payment History. The Address, Status, and Payment History are automatically populated from customer master and transaction data. The fields that have to be entered manually are Credit Limit (and its currency), Customer Credit Group, Risk Category, Accounting Clerk, Customer Representative Group, and other data from external rating agencies or internal information and texts.
Master Data in Sales and Distribution

Material Master – Sales Views

- The material master data are considered to be the most important master data in SAP systems and have many screens for storing Materials Management, Financial Accounting, Sales and Distribution, Production Planning, Quality Management, and Controlling information. The Sales and Distribution data are stored in three screens: Sales: Sales Org. Data and Sales: General or Plant Data.

In the next two sections we will discuss important sales-relevant fields in material master records and a couple of examples of customizing material master fields.
Master Data in Sales and Distribution

**Batch Management Master Data**

- *Batch management master data* is often used in process industries (i.e. oil and gas, concrete, paint, pharmaceuticals, fast-moving consumer goods, and others) or where shelf-life managements a concern (e.g., foods and beverages). A batch number is a number associated with a specific storage unit of a material. Products with the same batch number should be used.
The Company of GBI in SD

- The following sample company is used to demonstrate logistics functionalities. The Global Bike Group is composed by the Global Bike Inc. (GBI) in the US and in Germany the secondary Global Bike Germany GmbH. In North America, there are three geographical locations, namely Dallas, San Diego and Miami, that assigned to the sales regions (East and West). In Germany, Hamburg is established in the North and Heidelberg in the South of Germany. In order to visualize the organizational structure of Global Bike see Figure (4.).
The Company of GBI in SD

Sales Organization
- US West
  - San Diego
  - Dallas
  - Miami
- US East
- Germany South
  - Heidelberg
- Germany North
  - Hamburg

Global Bike Inc

Client

Global Bike Germany

Company Code

Sales Office
III. Material Management (MM)

- In this chapter we represent the procurement process, where the initial step in this process is to create a requisition, which is then converted to a purchase order and sent to a vendor. When the vendor receives the purchase order, it ships the materials, which the ordering party receives in the receive materials step. The ordering party also receives an invoice from the vendor, and it then makes a payment to the vendor.
Material Management (MM)

- This simple process has served GBI well until now due to its small size and closely connected operations. However, as GBI has grown and its operations have become more dispersed and complex, GBI’s management has come to realize that it needs to reevaluate how GBI procures materials so that the company can take advantage of the most effective and efficient processes. To accomplish this objective, management needs to familiarize itself with the various options available to GBI for executing the procurement process. In addition,
Material Management (MM)

Once management has attained a thorough understanding of the tactical and strategic aspects of this current procurement process, it can then design and implement a new process that best meets GBI’s needs. It can also determine the best way to manage this process using the SAP ERP system.
Material Management (MM)

Organizational Structure in Material Management

- The SAP system allows complex volume of business units to represent legal structure of a company in accordance with the procurement processes. In this section, we shall give an overview on the logistics components of enterprises used in Material Management (Bowersox–Closs, 2012):
Organizational Structure in Material Management

Client

- A *client* is an independent environment in the system that is self-contained both in legal and organizational aspect. A client in MM represents separated master records and other set of tables.
Organizational Structure in Material Management

- **Company Code**

  *Company Code* is the smallest organization unit for which a complete system can be maintained. The company code is a financial accounting unit that entry all logistics events that require posting to the accounts and create a complete audit for financial statements.
Organizational Structure in Material Management

Plant

- A *plant* is an operating area or branch within a company in logistics that subdivide the procurement process from the viewpoint of manufacturing, distribution, purchasing or maintenance and material planning etc.
Organizational Structure in Material Management

Storage Location

- *Storage Location* is an organizational unit that facilitates the differentiation between the various stocks of a material in a plant.
Organizational Structure in Material Management

Purchasing Organization

- The buying activity of a plant takes place at the purchasing organization. The Purchasing Organization unit is responsible for procuring services and materials. In other perspective it negotiates the conditions of the purchase with vendors.
Organizational Structure in Material Management

Purchasing Group

- The *Purchasing Group* is a key organizational unit that represents the buyer or group of buyers who are responsible for certain purchasing activities, such as the procurement of a material or class of material.
The Procurement Process

A typical procurement process includes the following phases (Akash, 2012):

**Determination of requirements**

- Purchase requisitions are created manually to inform the *Purchasing department* about material requirements. After setting an MRP procedure for a material in the material master, the SAP system automatically generates a planned order or a purchase requisition. If the system generates a planned order, it can later be converted to a purchase requisition.
The Procurement Process

Determination of supply source

• The system supports buyers in determining possible supply sources. The sources of supply determination can be used to create requests for buyer quotations (RFQs). In addition, purchase orders, contracts, and conditions can be referred to in transactions as logistics documents that already exist in the system.
The Procurement Process

Vendor selection

- After comparing the prize differences of various quotations, the appropriate vendors can be selected easily in the procurement process. The rejection letter in this process can be sent automatically if the conditions are not acceptable.
The Procurement Process

Purchase order processing

- The purchase orders can be created manually or automatically by the system. Data necessary for purchase orders can be copied from purchase requisitions or quotations. The option of working with outline agreements is also available.
The Procurement Process

Purchase order monitoring

- This process monitor the processing status of the purchase orders in the system, for instance if a delivery or an invoice has already been received for a purchase order item. The outstanding deliveries can also be reminded to the vendors.
The Procurement Process

Goods receipt

- In the *goods receipt* process the inbound deliveries are entered in the system by referring to the associated purchase order to reduce the number of entries that need to be made. Referring to the associated purchase order also allows us to check whether the goods are delivered in the required quantities and match the relevant purchase order. The system updates the purchase order history continuously.
The Procurement Process

Invoice verification

- The incoming invoices are verified in the system by referring to the relevant purchase order or delivery to check the calculations and accuracy of the invoice. The verification availability of purchase order and goods receipt data means that the system notifies differences in quantity and price.
The Procurement Process

Payment processing

- During the payment process the vendor’s liabilities are settled. The accounting department is responsible for running this program on a regular basis.
- Beside the general procurement process described here (see Figure 26.), other procurement processes are also possible.
The process of procurement

1. Determinations of requirements
2. Purchase requisition
3. Purchase order
4. Invoice verification
5. Goods receipt
6. Payment processing
7. Determinations of sources of supply
8. Vendor selection
9. Purchase order processing
In Material Management, there are a number of master data files that are fundamental to the functionality (Murray, 2010). The Material Master contains all of the information that is required for a material with regards to each area the material is used, i.e., sales, finance, manufacturing, quality and so on. The Vendor Master contains the information that is required for purchasing any item or service. The purchasing information record is used when purchasing specific items for a vendor. Batch data are held for each batch of material that is defined in the system. That data can be used to determine which batch is used or sold. Serial number data is used for items that need to be uniquely identified, for example, if each piece is purchased with a warranty.
Master Data in Materials Management

Material Master Data

- The Material Master data are comprised of data that relates to a number of different areas. For materials to be used successfully, the data have to be collected and entered into the Material Master record. Data do not only have to be entered for those areas but also for the specific organizational areas: plants, storage locations, sales organizations, and so on. For example, a material cannot be purchased without the relevant purchasing data being entered.
Vendor Master Data

- The Vendor Master record contains data that are used in purchasing. The Vendor Master has three distinct sections: general data, purchasing data, and accounting data. The general data have basic information on the vendor such as name, address, and telephone number. The purchasing data are entered for the vendor at a purchasing organizational level and include control data required in purchasing, partner functions, and purchasing defaults. The accounting data are the financial data that are entered at the company code level. These data include tax information, bank details, and payment methods.
Master Data in Materials Management

Purchasing Data

- The Material Master will contain some purchasing data at the purchasing organization level, which means that the material data may be different for one purchasing organization to the next. However, it is the purchasing information record that contains data to a unique combination of vendor and material. This means that the same material can be purchased from different vendors, and the price offered by each vendor may be also different.
Master Data in Materials Management

Batch Management

- The Batch Management is used when items of the same material number have the same attributes and can be identified using those attributes. For example, for a biological company, a batch of chemicals will be made at one time and that batch will have values for a number of attributes that will be different from a different batch. The batch values can determine whether a batch is suitable to be used, sold, or stored in a certain way.
Master Data in Materials Management

Serial Numbers

- A serial number is used to exceptionally distinguish items of the same material number. This is important for companies that use materials that are purchased with a warranty or materials that must be uniquely identified. For example, aircraft parts are serialized so that maintenance personnel can record data against that serialized part and replace it when it has performed a certain number of cycles.
Global Bike Structure for Materials Management

• The following company (GBI) is used to demonstrate logistics functionalities in MM. The Global Bike Inc. has three plants in Dallas, San Diego and Miami in the US. Thus, in Germany, in Hamburg and Heidelberg there are other ones. The storage locations refer to raw materials, finished or semi-finished goods and miscellaneous products.
Global Bike Structure for Materials Management

Forrás: ARIS(2015) alapján szerkesztve