

Original Article

Automation of Triangulation, Inter-Company, or Intra-Company Procurement in SAP SCM

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Abstract - Streamlining the procurement activities in the ERP system helps to optimize the timely availability of the required material at a competitive price through automation. In today's world, disruptions in Supply Chain Management are inevitable, and Global Organization's manufacturing plants across different regions can overcome such challenges with automation. Organizations can benefit from Triangulation (Tax benefit) or Inter Company or Intra Company Procurement processes to meet the growing market demands locally in a timely manner, providing quality products on time. Timely availability of the raw material or semi-finished material is the key area for the manufacturing plant to produce the finished material and meet the market demands. As there is no standard box functionality available to create Purchase Orders with these criteria in SAP, there will be delays due to a lack of visibility of the material presence in other manufacturing plants to raise purchase order or involves a lot of buyer involvement to process the purchase requisition which is generated from Material Requirement Planning (MRP) or either Overstock or Understock the Inventory in the Procurement Plant. This article will focus on the Successful automation of the triangulation process or to generate inter-company or intra-company stock transport orders or purchase orders with custom development in the SAP ERP system.

Keywords - Triangulation, SAP S/4 HANA, SAP ERP, MRP, Materials management, Inter-Company, Intra-Company.

1. Introduction of SAP Procurement Process

SAP SE is a German Multinational Company founded in 1978 [1]; it offers Enterprise Resource Planning Software Application, which is used across the globe by many Multinational Organizations. Any Enterprise can benefit if the procurement is optimized and automates labor-intensive manual tasks. Multinational Organizations present globally face the risk of Supply Chain delays and, in turn, risk meeting the growing market demands [2]. While processing the make-to-stock orders (MTS), either leveraging the triangulation process [12] for tax benefits in EU regions or having the intercompany process set up in the SAP ERP system to automate the requirement in a timely fashion. Manufacturing Plants in different regions will help supply the needed raw materials or semi-finished materials to the Production plants where the final product will be made. However, during this process, there is no visibility of the stock availability or during Materials Requirement Planning, there won't be any visibility of the External Vendor Stock to plan.

2. Literature Review

Inter Company process helps organizations benefit from stock availability and timely stock provision during the manufacturing process. There will be some scenarios where the availability of speciality material special manufacturing or sub-contracted manufacturing is restricted to some

manufacturing plants across the globe. In such a situation, it's always beneficial for the organization to leverage such stock. The limitation could be due to a shortage of raw materials in the open market or a lack of specific maintenance conditions for such materials. Besides the special or restricted material, there is a financial component connected to this process which will benefit the stock price or applicable taxes or warranty of such products in case of defects or return process with free material replacement will bring advantages in the Supply chain process.

Supply Chain Challenges [3], as the study mentions, drastic disruptions during COVID19 and shifts in dynamics to meet the growing demands. There were labor shortages, increased costs of materials, high freight costs, and geopolitical challenges. Organizations should leverage technological advances [13] to overcome these challenges and adapt to the new technological tools. This article will describe the process based on the requirement generation and material master data where it is more optimized to source the material from, which involves timely delivery and accurate deadlines to meet the growing demands.

3. High-Level Process Flow

A purchase requisition is a document to notify the Procurement department that Materials/Services are needed for production to fulfill the sales orders. In the case of global



organizations having multiple manufacturing Sites, the purchase requisition is raised to produce a Semi-finished/Finished product from other manufacturing Sites. For MRP materials, the organization's supply chain is supported by long-term material demand planning to ensure finished stock is readily available for sale to customers. At Large Organizations, Purchase requisitions are automatically created by MRP via a background program in SAP as a supply source at the demand site or manufacturing plant. But these same Purchase Requisitions, through an integrated SAP design, serve as a source of demand at the Organization supply site (often in a different Company code).

The authorized/approved Purchase Requisitions will be converted into Purchase orders to procure materials from another Site. A purchase order is a legal document issued by a buyer to a supplier and used to commit to a vendor to procure goods and services. Normally, when this purchase requisition gets converted to a purchase order when the vendor is assigned to an SAP plant, this purchase order is called a Stock Transport Order. SAP sourcing functionality and master data need to be maintained, i.e., Info Records & Source List; the Purchase order is supposed to be created with the vendor as the supplying company.

There are business benefits to transacting MRP materials via a trading company positioned as a third company between the supply and demand companies. The process of switching vendor code from Supplying company to Trading Company is known as Triangular Sale. In today's world, the organization utilizes extensively a triangulated sales process to transfer inventory from one legal entity (Supplying Company) to another legal entity (Demand Company). Most importantly, all purchase requisitions are not coming under the Triangular sale, and authorized users choose the option of Vendor switch between the supplying company and trading company. Also, some Purchase Requisitions are converted into Purchase orders with vendor flip in the background without Organization user intervention for long-term material demand planning to ensure finished stock is readily available for sale to customers, i.e., deployment.

As explained, this enhancement will be the key dependable step for Triangulation sales business processes. Organizations enable Intercompany triangulated sales processes by using this enhancement. The benefit is to provide accurate and timely conversion of eligible Purchase requisitions into Purchase orders. These benefits include accurate MRP material, quantity, and delivery date

information to maintain accurate demand information for supplying sites. The triangulated sales process also ensures proper billing between affiliates via the Purchase Order to Sales Order relationship.

3.1. Assumptions

- Supplier and Customer Business Partner Master Data and respective Purchasing and company code roles need to be extended, i.e., Supplying Company, Demand Company, and Trading Vendor Company.
- Material Master, Supplying Plant, Demand Plant, Trading Vendor Master Data and Customer Master Data will be available. The automatic PO check box should be enabled in the Material Master-Purchasing view and Vendor Master Purchasing view.
- Required Partner Functions of Supplier Business Partner, i.e., Vendor (VN), Invoice party (PI) etc. are available.
- The Purchase Requisition should be created through PPDS, and the Trading vendor should be blocked in the Transportation Lane of PPDS. Hence, a purchase requisition should be created with the supplying company as a supply source.
- All Purchase Info Records, Q Info Records, and Source list data should be available.
- Required Configuration should be in place for document type linkage between PR and PO S4 system under the "Define Document types for PR/PO & Setup for Stock Transport Order".

3.2. Dependencies / Constraints

1. Two Purchase Info Records and Q-Info records, one against the Supplying Company Vendor and the other one with the Trading Vendor company, should be in place.
2. The Source List should be maintained with both the Supplying plant vendor and the Trading vendor plant, and the trading plant vendor is a fixed vendor.
3. An authorized Organization internal user should have permission to reprocess this custom Transaction Code to convert the PR to PO with a selection screen and Output Result Screen. Also, Authorization to Process the selected PR and convert it into PO along with vendor flip.
4. Table entries required for the configuration for document type linkage between STR and PO, i.e., T160, T161A, and T161W.

Source List Example

Vend type	Valid from	Valid To	Vendor	POrg	PPL	Fix
Trading Company Vendor			P**X			Yes
Supply Company Vendor			P****		P****	

3.3. Functional Development Description

After the MRP run, demand is generated at the Demand company, and the Stock Transport Requisitions (STR) are created with the supply source as the supplying Plant Vendor. Below are various functional requirements to consider specific STR convert into Intra, Intercompany STO, Intercompany Orders along with Vendor Flip whenever required.

- Convert STR into Intercompany Purchase Order along with Vendor Flip.
- Convert STR into Intercompany Stock Transport Order without Vendor Flip
- Convert STR into Intracompany Stock Transport Order without Vendor Flip

An enhancement is required to convert the Stock Transport Requisitions (STR) to Purchase Orders along with Vendor flip functionality from supplying company Vendor to Trading Company. The enhancement program is like a standard PR to PO conversion program, and a custom Transaction Code (Z*) is needed to get the Initial Input screen, ALV Output screen and option to process the items from PR to PO. This program facilitates changing STR characteristics, i.e., Item category, Purchase Info record, and vendor before conversion of Purchase Order in case of a Vendor Flip scenario. Also, close the STR's which are successfully converted into Purchase orders.

Also, the Stock Transport Requisitions to Purchase Order Conversion interface execution mode differs on replenishment strategy, i.e., the Interface executes either in the foreground or background. The next section will explain in detail about the above three business scenarios and both execution modes.

3.3.1. Convert STR into Intercompany Purchase Order along with Vendor Flip

Business Logic for this Criteria

If the Source list has a vendor with a Fixed vendor Check box, this STR is going to convert into an "Intercompany Purchase Order" (also called a Triangulated PO), and the new vendor in PO will be the same fixed vendor in Source list against the material, and Plant combination.

The Procurement information needs to be copied from the Purchase Info Record. The STR characteristics, i.e. Item category from "Stock Transfer-7" to "Standard-0" and Infor Record from Supplying plant to Trading vendor Info Record, need to be changed.

3.3.2. Convert STR into Intercompany Stock Transport Order without Vendor Flip

Business Logic for this Criteria

If the Source list has no vendor with a Fixed vendor Check box, vendor flip is not required.

Convert the STR into an Intercompany Stock Transport Order with supplying plant vendor available in STR. The Procurement information needs to be copied from the Purchase Info Record, which is maintained with the combination of Material, Plant and Vendor.

3.3.3. Convert STR into Intracompany Stock Transport Order without Vendor Flip
Business Logic for this Criteria

If the Source list does not have any vendor with a Fixed vendor Check box, vendor flip is not required.

Convert the STR's into Intracompany Stock Transport Orders with supplying plant vendors available in STR. The Procurement information needs to be copied from the Purchase Info Record, which is maintained with the combination of Material, Plant and Vendor.

As mentioned above, the below section explains both the Background and Foreground execution mode of this STO to PO/STO conversion process, which differs from the replenishment strategy, i.e., MTS Deployment or ATO-Conversion of STR to PO/STO.

3.4. MTS (Make to Stock) Deployment–Conversion of STR to PO/STO thru Batch Job (Background)

3.4.1. Business Logic

If any STR with Status "D-Deployment STR" should processed in the background (selective screen variant setup in the batch job). Batch Job identifies deployed STRs and converts STR to Triangulated PO's/ Intercompany Orders / Intercompany STO per the STR plant data. Background job should not process STR's which are not with status "D."

Also, there is a system requirement to pass text identified into PO line item against the Deployment STR's, provided logic below to meet the requirement.

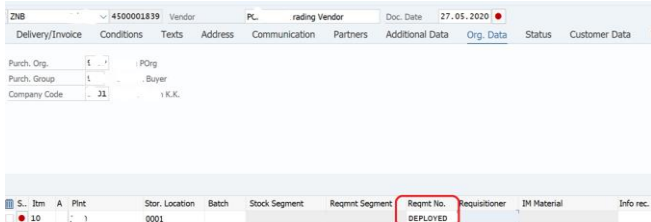
- If EBAN/STATU = D where & EBAN/BNFPO = Input EBAN/ BNFPO in custom Program

Screenshot showing PR's Table (EBAN) & Filed BNFPO.

Purch.Req.	Item	Doc. Ty.	Cat D	Proc.stat.	C	PGr	Material	MPN mat.
10000177	10	NB	B	B	A	1AB	AV543587XAM	
10000858	10	ZNB	B		R	1AB	AV543587XAM	
10000171	10	NB	B X	D	I	1AB	AV543587XAM	
10000172	10	NB	B X		I	1AB	AV543587XAM	
10000173	10	NB	B X		I	1AB	AV543587XAM	
10000650	10	ZNB	B X		I	1AB	AV543587XAM	
10000676	10	ZNB	B		I	1AB	AV543587XAM	
10000677	10	ZNB	B		I	1AB	AV543587XAM	
10000678	10	ZNB	B		I	1AB	AV543587XAM	

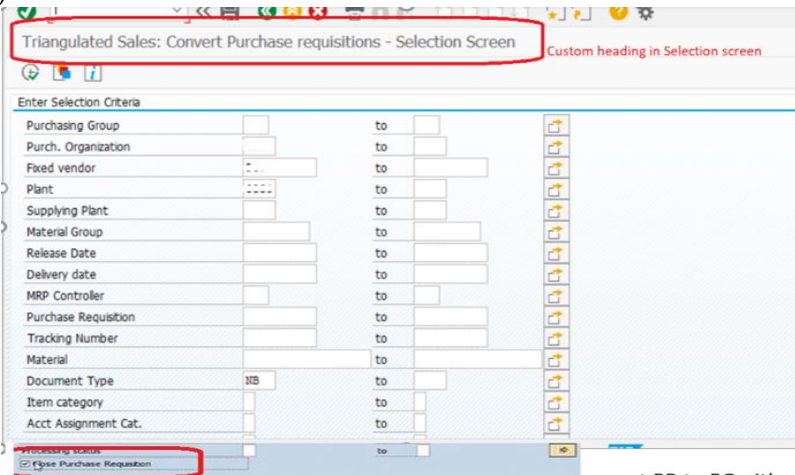
- If EBAN/STATU = D, populate text into the PO line as “DEPLOYED” to identify by looking at the field, i.e., EKPO/ BEDNR= DEPLOYED.

Screenshot showing PO Line with Requirement Number Field (EKPO-BEDNR)



- Close all STR’s status “D” which are successfully converted into P.O. The Field EBAN- EBAKZ = X when EBAN= EBELN is filled and EKPO- LOEKZ = Blank.

Screenshot showing PR’s Line with Closed Check box (EBAN-EBAKZ)

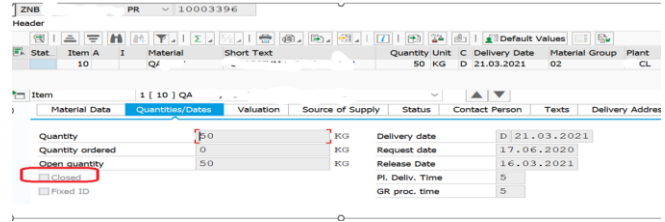


The result screen should have the ability to process STR, i.e., “Change Source & Create PO”, and convert STR to PO either collectively or individual STR. This screen should have all the SAP Output result screen features, i.e., Screen layout, Search, select/de-select, Sort, filter, download, etc. Also, the “Close Purchase Requisition” check box enables the functionality of Close PR by user choice in case STR is successfully converted into PO.

Changes in STR characteristics during STR to PO conversion

Business Logic: If any STR is processed into Triangulated PO (with vendor flip), the characteristics must be changed.

- Item Category (EBAN- PSTYP) from “7” to “Zero”
- Info Record from Supplying plant vendor to Trading Vendor – EBAN- INFNR



ATO-Conversion of Conversion of STR to PO/STO through the Selection Screen and Output Screen with the Option to Choose Vendor Flip

Business Logic

If any STR is processed in the foreground, Converts STR to Triangulated PO’s/ Intercompany Order / Intercompany STO as per the STR plant data (with and without Status-D)

Screenshot shows the layout of the Selection Screen. - Custom T. Code -Z****

3.5. Security and Authorizations

- An authorized internal user group (intercompany team) should have the capability to process this PR to PO in Buying a company in case the business needs PR selection and Output result screen and convert into PO with Vendor flip. Detailed Role Matrix needs to be published with authorizations. Standard ME59N authorizations need to be cloned for this custom Transaction.
- In the case of a Batch Job, the Batch user should have either restricted access or SAP ALL access to convert the PR to PO.

4. Results

4.1. Results of using this Development in SAP SCM

Timely availability of the materials, both raw form and semi-material materials, to produce the finished product is smoother and compliant.

4.2. SAP SCM Triangulation

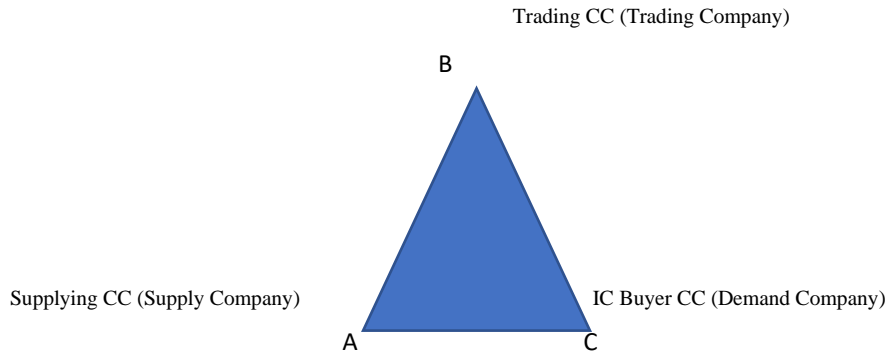


Fig. 1 SAP SCM Triangulation

SCM Process Flow:

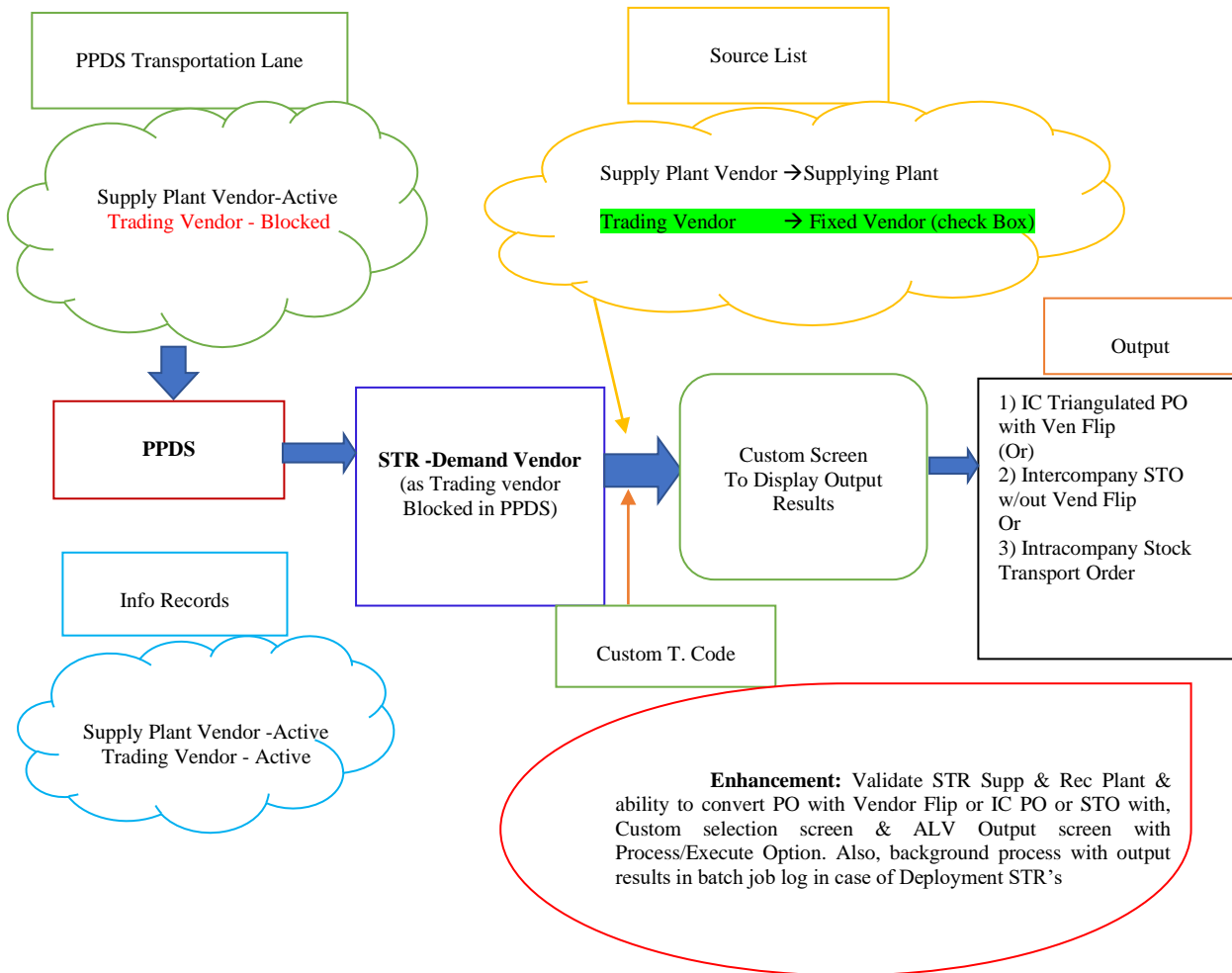


Fig. 2 SAP business process flow

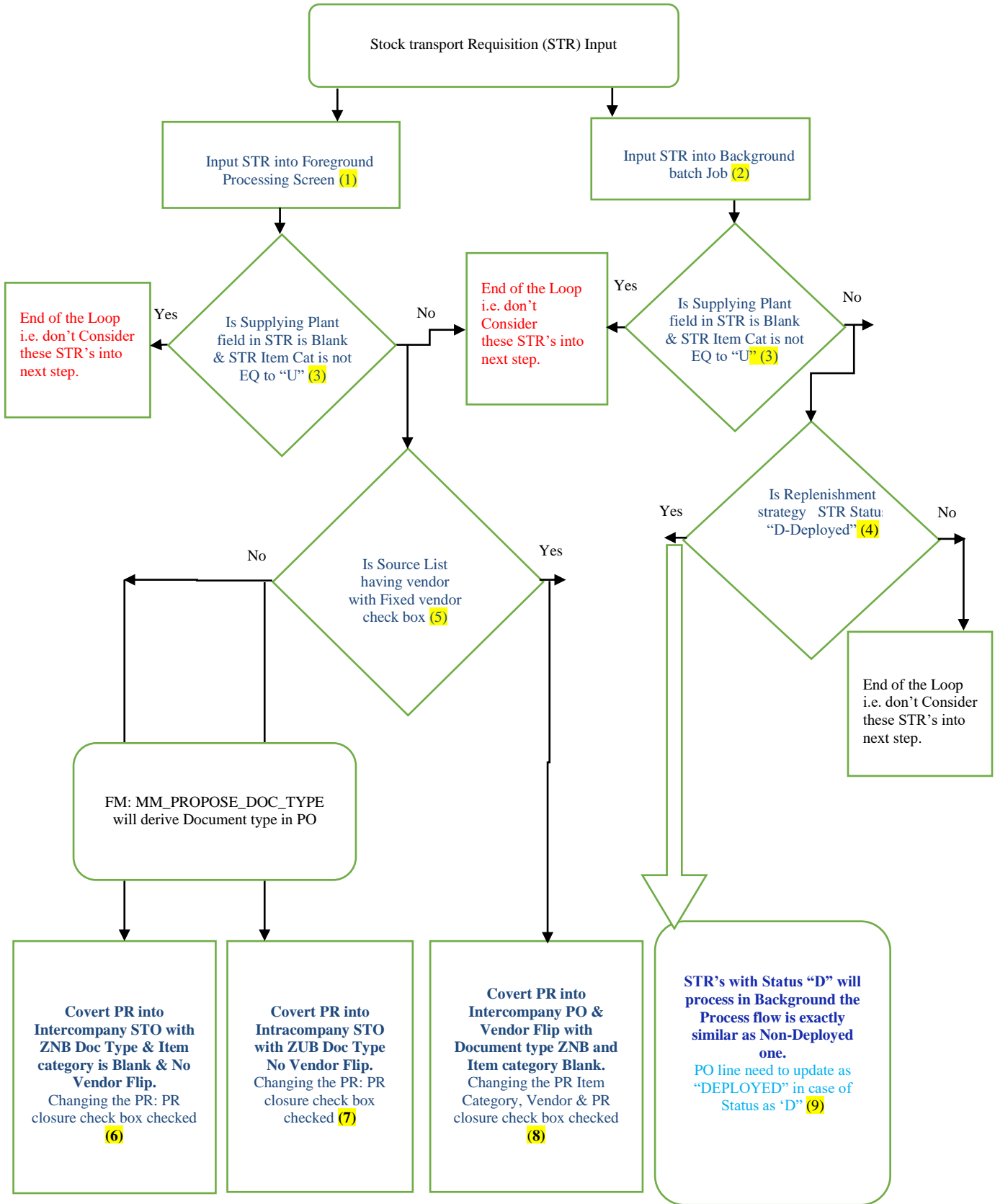


Fig. 3 SAP technical logic flow

Table 1. Technical logic for each decision

3	Supplying Plant field in STR is either blank and Item Category is not equal to ‘U’, don’t consider those STR’s. Else move to the next level of logic (3) EBAN/ RESWK = Blank (Supplying Plant) or EBAN/ PSTYP ≠ 7 (Item Category) – Don’t Consider those PR’s. where & EBAN/BNFPO = Input EBAN/ BNFPO.
4	Is the replenishment strategy of STR Status is “D-Deployed”, execute STR’s in batch (background)., Else, ignore STRs If EBAN/STATU = D, execute STR’s in the Background batch job; else, ignore.
5	Is Source List against the plant & Material combination having vendor with Fixed vendor check box, <ul style="list-style-type: none"> • Convert STR to Intercompany PO with vendor Flip-Tri angulated PO (Flow 5 & 8). Else <ul style="list-style-type: none"> • Convert STR to Intercompany STO (Flow 5 & 6) / Intracompany STO (Flow 5 & 7) without vendor Flip- Pass the Material & Plant values into Source List EORD / MARTN = EBAN/MATNR and EORD//WERKS= EBAN / WERKS & Document Creation date should fall in Source List Validity periods, i.e. EORD /VDATU & BDATU. Fixed Vendor Check box: EORD / LIFNR = EORD / FLIFN Check box checked
Flow 5 & 8	If EORD / LIFNR = EORD / FLIFN, the Check box is checked, then Convert STR into Intercompany PO with vendor Flip. <ul style="list-style-type: none"> • Vendor Flip from STR vendor to Source list Fixed vendor →EKKO/ LIFNR= EORD / LIFNR • STR Item Category (EBAN- PSTYP) changed from “7” to “Zero” • PO document type is ZNB (Std Program will take care) • Procurement data of the PO should reference from Info Record Std Program will take care)
Flow 5 & 6	If there is no vendor record with a Fixed vendor check box, i.e., EORD / LIFNR = EORD / FLIFN not checked Then, Covert the STR into Intercompany STO with the vendor, which is the Fixed vendor in STR, i.e. without Vendor flip. <ul style="list-style-type: none"> • STR Item Category (EBAN- PSTYP) changed from “7” to “Zero”- Std Program will take care of. • PO document type is ZNB (Std Program will take care) • Procurement data of the PO should reference from Info Record Std Program will take care)
Flow 5 & 7	If there is no vendor record with a Fixed vendor check box, i.e. EORD / LIFNR = EORD / FLIFN not checked Then, Covert the STR into Intracompany STO with the vendor, which is the Fixed vendor in STR, i.e. without Vendor flip. <ul style="list-style-type: none"> • Procurement data of the PO should reference from Info Record (Std Program will take care)
Flow 4 &9	Execution of Deployed STR in the Background (from step 4) is the same as STR execution in the foreground (from steps 5 to 8)

6. Conclusion

Enhancing the ERP system to best suit the business needs is often required, yielding tangible benefits in the long run. Robotic Automation Process helps streamline the

Supply Chain Activities with a carefully defined process. Savings in the Procurements are directly proportional to the Enterprise’s profit.

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