Original Article

Intelligent Optimization of Import Efficiency-Automated Goods Receipt Process in the Life Science Industry

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Abstract - This article focuses on optimizing import efficiency in the life sciences industry through the automated goods receipt process. The objective is to investigate the potential benefits of automated goods receipt adoption in enhancing import efficiency and reducing operational costs. In addition, the paper aims to illustrate the process of performing an automatic goods receipt for an import purchase order inbound delivery immediately upon creating the inbound delivery. The article outlines the importance of automatic goods receipt in finance, procurement, and warehousing. The requirement for an automated goods receipt arises when the customer owns the inventory when the goods depart from the vendor location, specifically for import vendors with incoterms Free on Board or Ex Works. The paper discusses the significance of this requirement in terms of finance's desire to own the dollar value, procurement's need to include the inventory in Material Requirement Planning but not make it available for ATP-Available to Promise for sale, and warehouse's aim to avoid having to perform goods receipt for in-transit inventory. This paper aims to provide industry professionals with valuable insights into adopting automated solutions for goods receipts in their operations. It presents a detailed analysis of the automatic goods receipt process and its associated value additions. The paper aims to aid organizations in enhancing their import efficiency, reducing operational costs, and improving financial control and accountability by adopting the solutions presented.

Keywords - Business Automation Solutions, SAP S/4 HANA, Logistics, Import Processes Efficiency, Life Science Industry.

1. Introduction

The life science industry is a highly regulated and complex sector that develops, produces, and distributes pharmaceuticals, medical devices, and biotechnology products. Due to the high value of the products and materials involved in this industry, it is critical to have a reliable and efficient automatic goods receipt process. This process involves receiving, inspecting, and documenting goods as they arrive, ensuring they comply with regulatory requirements, and tracking their movements within the facility.

In the life science industry [1], products and materials are often time and temperature sensitive. Therefore, any delays or errors in the goods receipt process can lead to significant financial losses, product quality issues, and regulatory compliance risks. For example, if a shipment of vaccines arrives late or is not stored at the correct temperature, it could result in spoiled products, lost revenue, and even harm to patients.

Moreover, the life science industry is subject to stringent regulatory requirements, including the Good Manufacturing Practice (GMP) regulations, which govern the handling and storing materials and documentation and reporting requirements. These regulations are in place to ensure that products are safe, effective, and of high quality. Failure to comply with these regulations can result in hefty fines, loss of reputation, and even legal action. Therefore, it is imperative for organizations operating in this industry to prioritize and optimize their goods receipt process to ensure compliance, efficiency, and cost-effectiveness.

To address these challenges, organizations can adopt critical insights and solutions presented in this paper to improve import efficiency, reduce operational costs, and enhance financial control and accountability. For example, implementing automation and artificial intelligence technologies can streamline the goods receipt process, reduce errors, and ensure accurate tracking and documentation. By adopting these recommendations, organizations can ensure regulatory compliance, maintain product quality, and gain a competitive edge in the life science industry.

In light of these facts, the automatic goods receipt process is a critical function in the life science industry that requires precision, accuracy, and traceability. The insights

and solutions presented in this paper can help organizations improve their import efficiency, reduce operational costs, and enhance financial control and accountability. This leads to increased customer satisfaction, improved financial performance, and a competitive advantage in the life science industry.

2. Literature Review

The automatic goods receipt process is critical in the life science industry [1] due to the high value of the products and materials involved, the complexity of the regulatory requirements, and the need for accuracy and traceability. In recent years, there has been increasing recognition of the importance of automating the goods receipt process, particularly in the life science industry, to ensure that products and materials are received on time, under the right conditions, and with complete traceability.

The life science industry involves products and materials that are often time and temperature sensitive. Therefore, any delays or errors in the goods receipt process can lead to significant financial losses, product quality issues, and regulatory compliance risks. In addition, these risks can arise due to inadequate monitoring of temperature and humidity during transportation, incorrect packaging or labeling, and errors in documentation and reporting.

One study [2] conducted by Sharma et al. (2016) investigated the impact of temperature excursions during the transportation of biologics, which can lead to reduced efficacy, loss of potency, and other quality issues. The study found that over 40% of temperature excursions occurred during transportation, highlighting the importance of maintaining the cold chain during the transport and storage of biologics.

A study [3] by Lash et al. (2018) investigated the impact of an automated goods receipt process on the efficiency and accuracy of receiving materials in a life science company. The study found that implementing an automated goods receipt process significantly reduced receiving time and improved accuracy compared to a manual process. The automatic process also improved traceability and compliance with regulatory requirements, as all data was automatically recorded and stored.

Moreover, a case study [4] published by Haldenwang (2020) described implementing an automated inventory management system at a life science company to improve accuracy and compliance. The system utilized barcode scanning and RFID technology to track the movement of products and materials through the supply chain, including receiving goods. Implementing the automated system significantly reduced receiving time, improved accuracy, and increased compliance with regulatory requirements.

Overall, the literature reviews state that the automatic goods receipt process is crucial in the life science industry to ensure that products and materials are received on time, under the right conditions, with complete traceability, and in compliance with regulatory requirements. Therefore, companies in the life science industry must prioritize implementing and maintaining an automated goods receipt process to minimize risks and ensure compliance.

This paper, in contrast, provides a comprehensive analysis of the financial benefits and sheds light on the practical implementation of the solution and corresponding steps.

3. Scenarios of SAP Solutions and Adoption

The importance of effective financial management cannot be overstated, as it is a critical component of the success and sustainability of any business. One key aspect of financial management is ensuring ownership of in-transit inventory, which involves tracking and managing the movement of goods and materials from one location to another. This process is essential for maintaining accurate inventory records, managing costs, and ensuring timely and efficient delivery of products to customers. This paper will explore the importance of ensuring ownership of in-transit inventory and provide insights on how businesses can effectively manage this process to enhance financial control and accountability.

Equally crucial is guaranteeing that inventory is only used once inspected and approved. The evaluated GR block stock option facilitates this process by enabling the placement of incoming inventory into a blocked status that must be released before use in production or other activities. This approach promotes financial control and accountability while also bolstering quality management efforts.

In logistics, it is possible to conduct an origin acceptance of goods before the actual delivery of the materials. Using origin [5] acceptance (posted with movement type 107) [27], the material's value is recorded in the stock, even though the physical delivery has yet to occur. This process is like a goods receipt that employs movement type 101 [7], with corresponding postings in the Financial Accounting system.

The option of valuated GR blocked stock represents a unique feature that may be judiciously employed in situations where a contractual agreement has been established with a vendor for quality inspection and acceptance to occur at the point of origin before the physical delivery of goods. Under such circumstances, an invoice is expeditiously issued upon acceptance. The system duly proposes the accepted quantity as the outstanding amount to

be invoiced during the invoice verification if the origin acceptance has been preplanned in the purchase order.

The judicious use of valuated GR-blocked stock provides the added assurance that the actual shipment of goods is only authorized following due acceptance. The release of the valuated GR blocked stock utilizing movement type 109 constitutes the ultimate arbiter of goods receipt at the company. Notably, the stock type selected for movement type 109 is instrumental in determining whether the receipt of the goods is to be posted to unrestricted-use stock, stock in quality inspection, or blocked stock, respectively.

To affect the preplanning of origin acceptance in a purchase order item, the Origin Acceptance checkbox must be meticulously selected within the item details section of the purchase order's Delivery tab page. It should, however, be explicitly underscored that the receipt of the goods for such a purchase order item must be posted utilizing valuated GR blocked stock in conformance with movement type 107.

Alternatively, businesses may opt for a receipt using the valuated GR blocked stock during the goods receipt posting process. Under this modality, the quantity posted using movement type 107 is meticulously excluded from updates as a quantity to be settled, ensuring the utmost integrity in accounting for the transaction.

In summation, the astute utilization of valuated GR-blocked stock constitutes an invaluable option that businesses can exploit when quality inspection and acceptance are mandated to occur at the point of origin before the physical delivery of goods. Furthermore, this method facilitates accurate and efficient accounting, safeguards contractual obligations with vendors, and promotes optimal operational efficiency in the long term.

4. Process Flow

Ensuring efficient inventory management and accurate financial tracking involves steps that must be followed precisely. The process starts with demand from various sources such as forecasts, reorder points, reservations, or customer orders [8-12]. The next step involves Material Requirement Planning (MRP) [13], which determines demand and creates purchase requisitions. Finally, these purchase requisitions are converted to purchase orders [14], which are communicated or transmitted to the supplier.

Upon receipt of the purchase order, the supplier begins production and processing of the order. Once the supplier has shipped the product, they typically send an EDI 856 - Advance Shipping Notice (ASN), creating an inbound delivery in the SAP system. This inbound delivery can be set up to automatically generate a goods receipt and create a movement type # 107, which will put the inventory in Valuated GR blocked stock.

Once the physical shipment arrives at the warehouse, the goods can be received and moved to unrestricted or quality or block stocks using movement type # 109 [15]. This entire process must be managed carefully to ensure that inventory levels are accurately tracked, financial transactions are correctly recorded, and all relevant stakeholders are kept informed of the status of the goods in transit. By following this process closely and utilizing the appropriate tools and technologies, organizations can achieve greater efficiency and accuracy in their inventory management and financial tracking processes [16].

Key steps
- The process starts with demand. Demand begins with the forecast, reorder point, reservation, or customer order.
- MRP - Material Requirement Planning is the next step. MRP looks at the demand and creates purchase requisitions.
- Purchase requisitions then get converted to the purchase order.
- Purchase order communicated or transmitted to the supplier.
- The supplier starts production and processing of the order.
- Supplier ships products and sends EDI 856 – ASN [28].
- ASN Creates inbound delivery in SAP.
- This inbound delivery can automatically goods received, and it has movement type # 107, which will put inventory in Valuated GR blocked stock.
- Once physical shipment arrives at Warehouse, it can be received and moved to unrestricted or quality or block stocks using movement type # 109.

One critical aspect of the process flow is the accuracy and timeliness of demand forecasting. Inaccurate forecasting can lead to overstocking or stockouts, negatively impacting the supply chain and customer satisfaction. Therefore, essential to ensure that the MRP system is appropriately set up and configured to generate purchase requisitions based on demand accurately.

5. Solutioning Steps in SAP

Automated goods receipt in SAP can bring numerous benefits to the Life Science industry, including faster processing times, increased accuracy, and enhanced financial control. However, several pitfalls can arise during the implementation and usage of this process.

One potential pitfall is the need for proper configuration and testing of the automated goods receipt process, leading to errors and discrepancies in the inventory and financial records. To mitigate this risk, performing thorough testing and validating the automatic goods receipt process before going live, including testing various scenarios and edge cases, is essential.
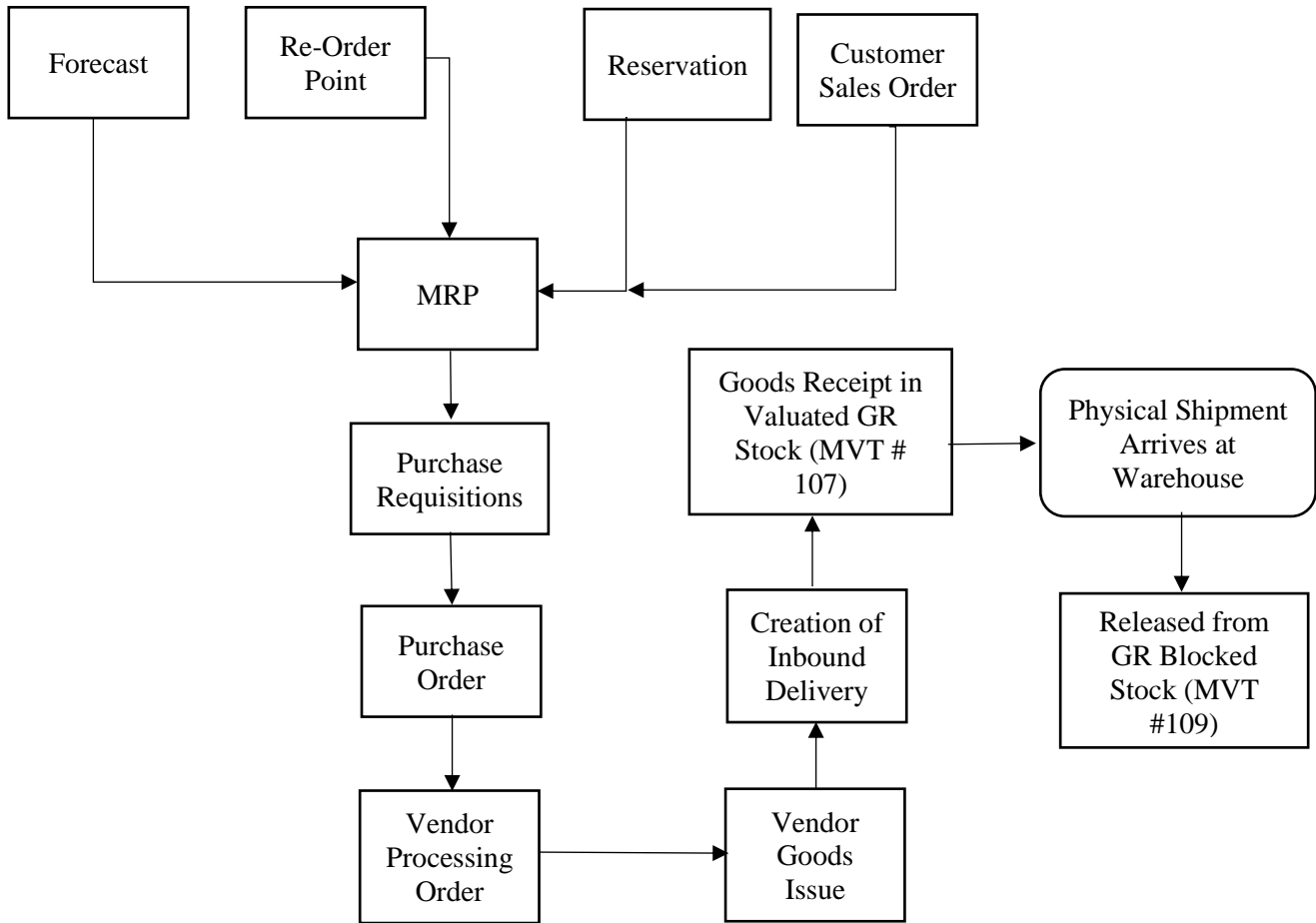
Fig. 1 Process Flow

Another pitfall is the potential for errors in the automatic postings, resulting in incorrect accounting and inventory records. This can occur if the process needs to be configured correctly or if errors occur in the data being processed. To mitigate this risk, it is essential to implement proper data validation and error-handling mechanisms within the automated goods receipt process.

Additionally, there is a risk of fraud or unauthorized access to the automated goods receipt process, leading to incorrect or fraudulent postings. To mitigate this risk, it is crucial to implement proper access controls and segregation of duties to ensure that only authorized personnel can perform and approve automated goods receipt postings.

Finally, the automated goods receipt process can be susceptible to supply chain disruptions, such as delays or incorrect shipments. This can lead to inaccurate inventory records and delays in production or sales. To mitigate this risk, it is essential to implement proper monitoring and exception-handling mechanisms within the automated goods receipt process, allowing for timely identification and resolution of any issues that arise.

It is important to note that the below example of specific configuration and settings for the automatic goods receipt process may vary depending on the SAP version and implementation.

Below is the SAP configuration –

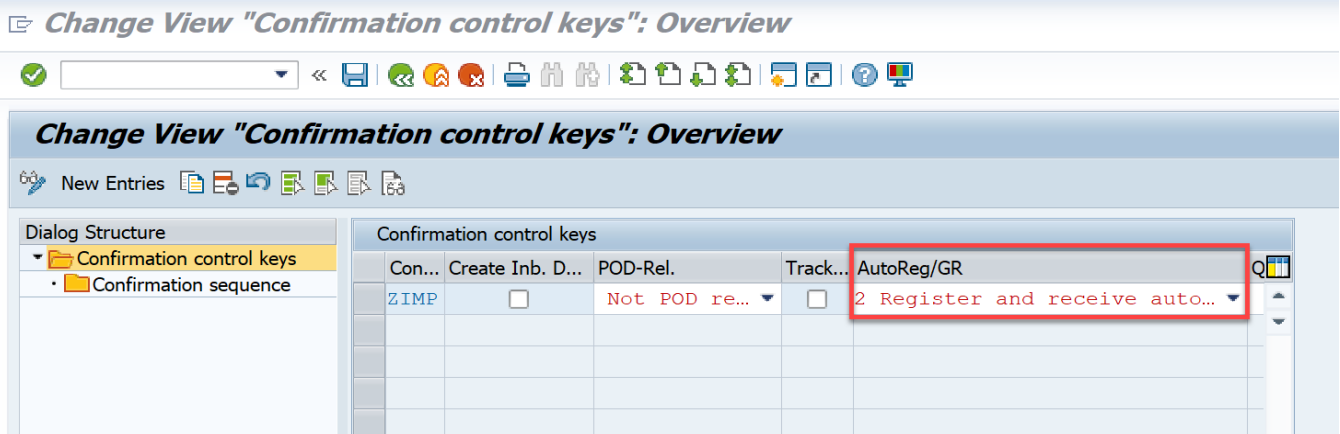| SPRO IMG Path	SPRO->Materials Management->Purchasing->Confirmations->Set up Confirmation Control [18]: For this confirmation control key, Auto Reg/GR should be set at 2.
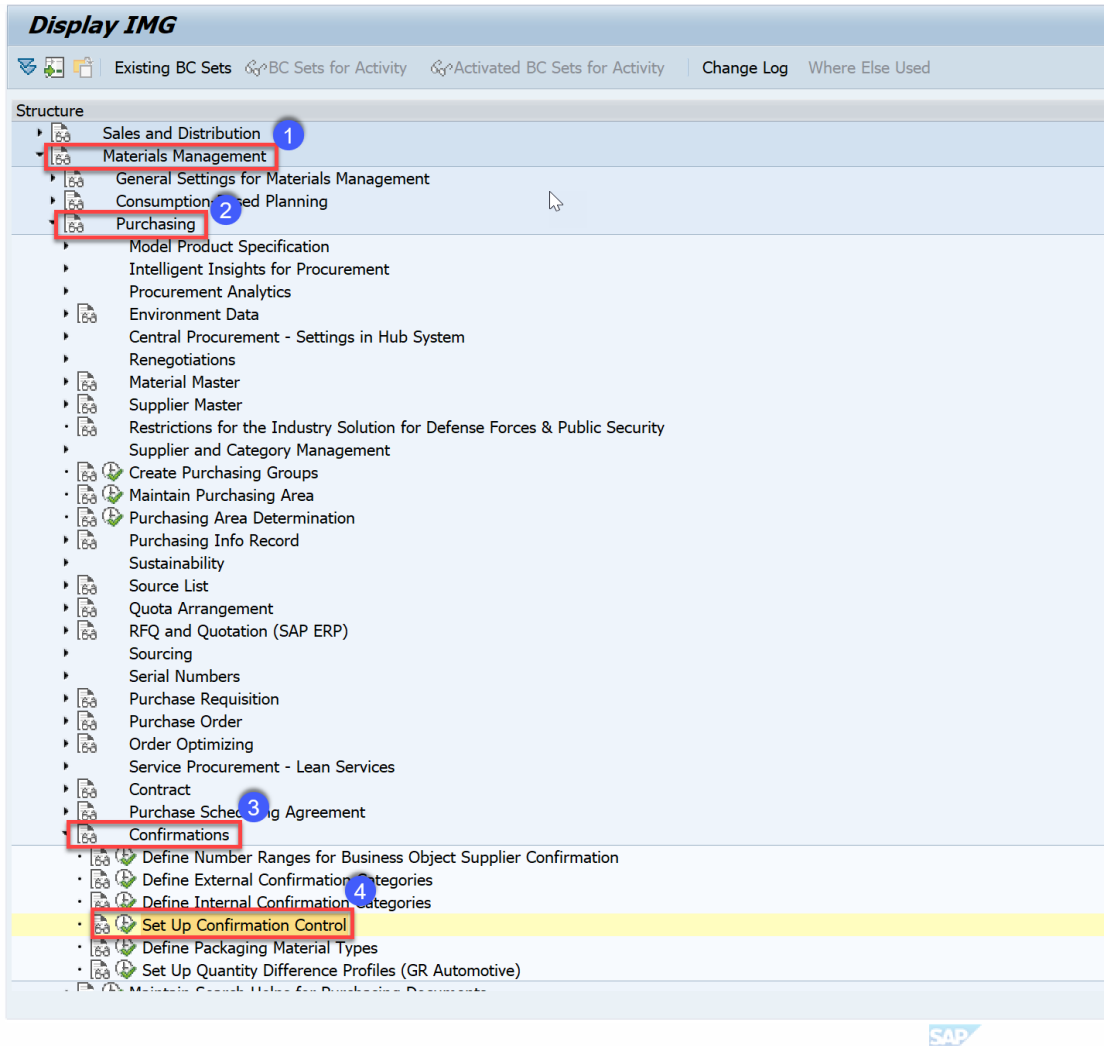
Fig. 1 Configuration

Fig. 2 Confirmation Control Key Setup

6. Solution Steps in SAP Solution Evaluation and Confirmation
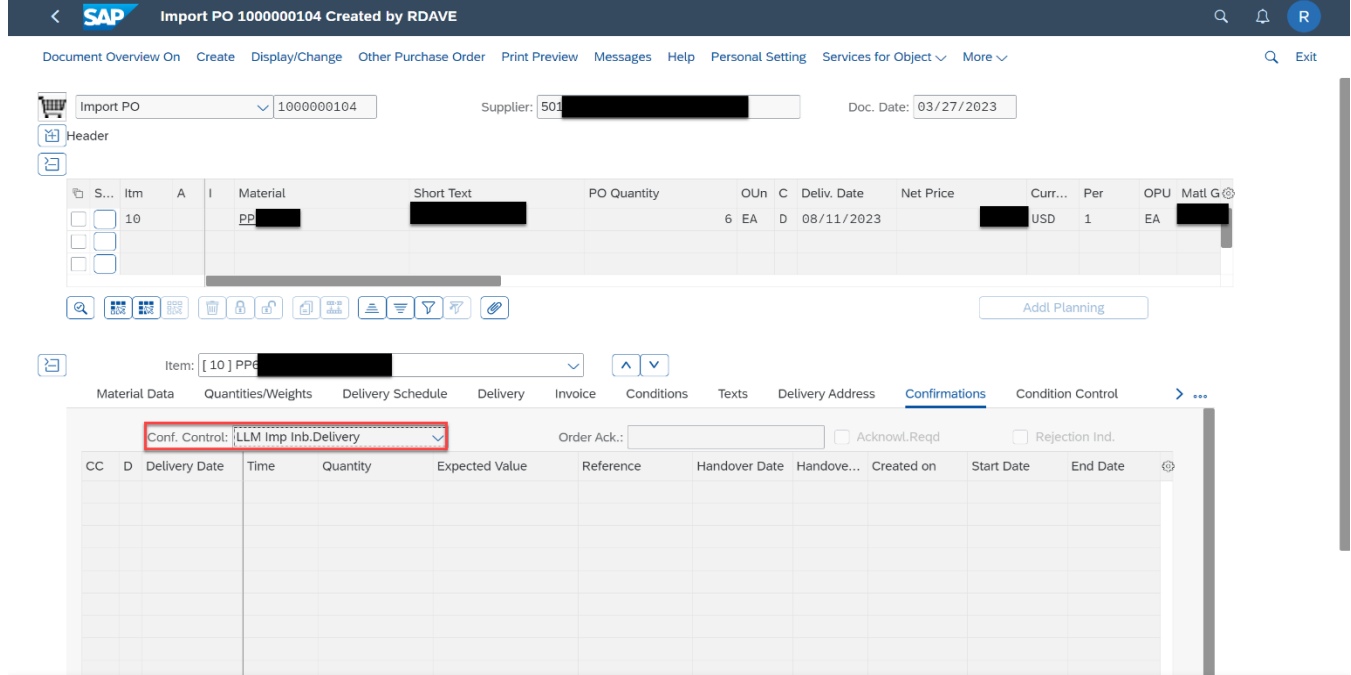## 6.1. Create PO in SAP with the Confirmation Control Key [19].

Fig. 3 PO Created with Confirmation Control Key

6.2. Create Inbound Delivery in SAP with the movement type: 107 [20].
Note: To change movement type, follow the SAP OSS Note: 214604 [21].
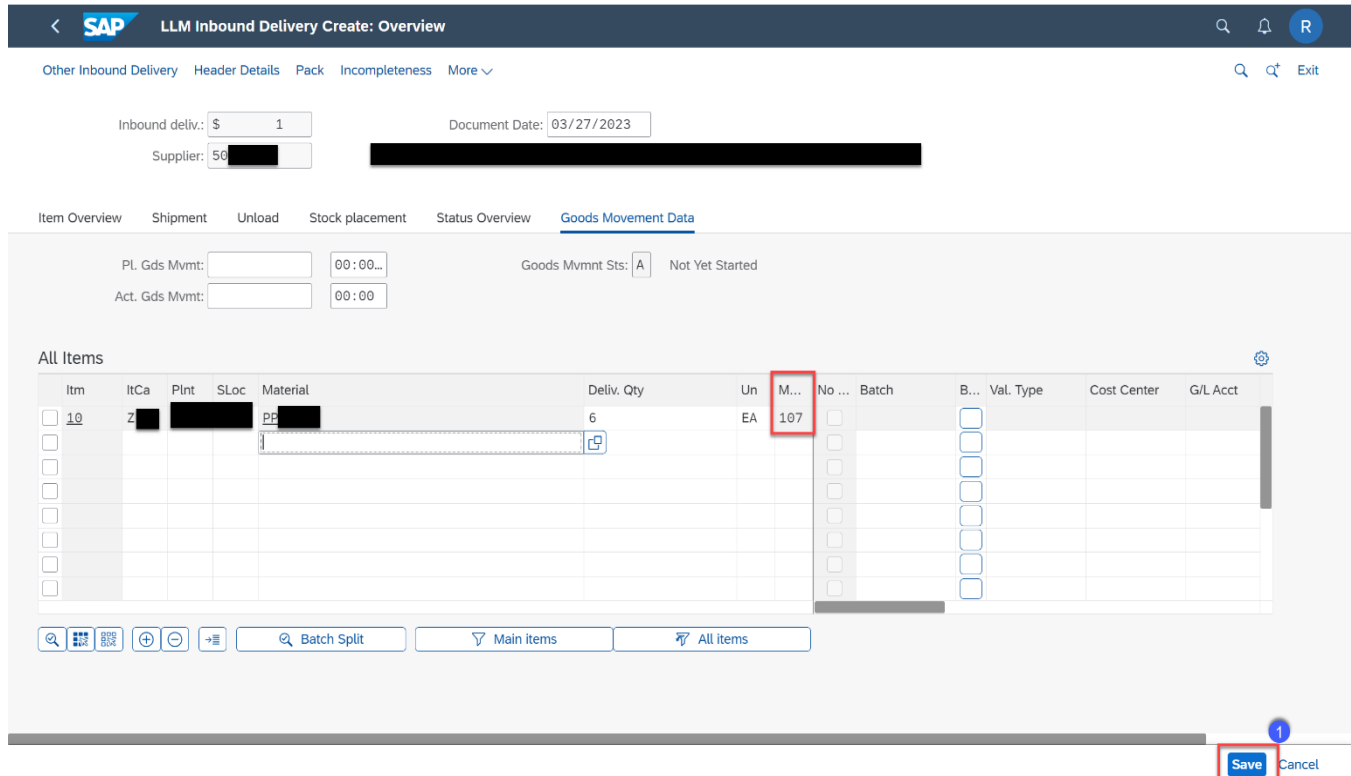
Fig. 4 Inbound Delivery Creation with MVT#107

6.3. As soon as Inbound delivery is saved, it will perform Goods Receipt, and Inventory will be in Valuated GR blocked stock [22].

Fig. 5 Goods Receipt Posted

6.4. Inventory report shows Inventory is in Valuated GR blocked stock [23].

Fig. 6 Stock -Multiple Materials

6.5. Purchase Order History Updated [24]

Fig. 7 PO History Update

6.6. Validating FI Documents [25]

Fig. 8 Validating FI Document
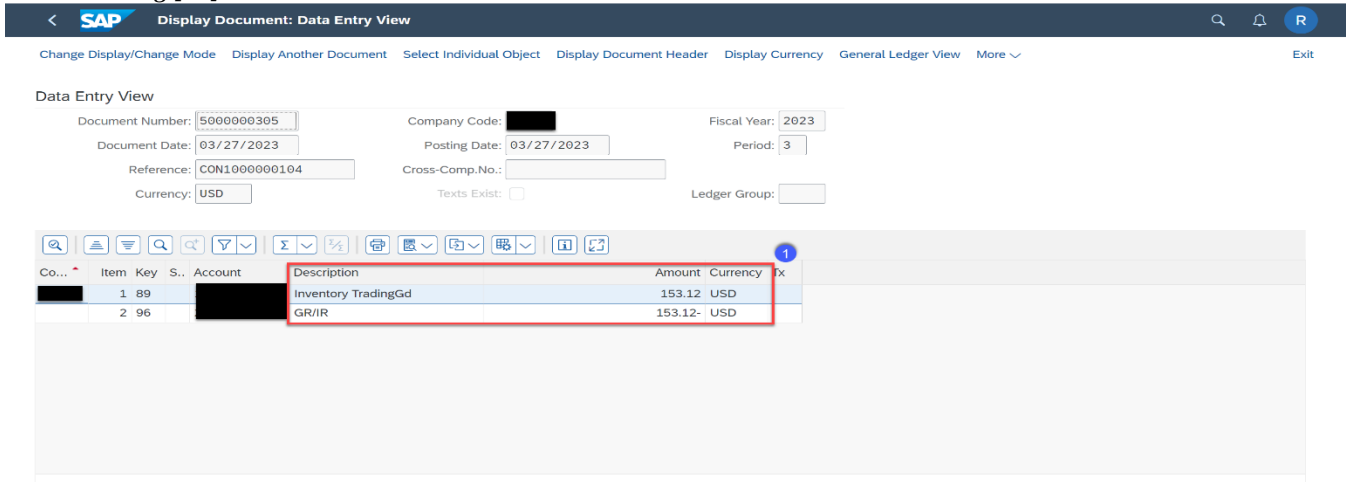
6.7. FI Posting [26]

Fig. 9 FI Posting

7. Results

The table overviews the financial benefits of optimizing the import process using an automated system. The module refers to a particular part of the import process that can be automated. The yearly revenue represents the total income the organization generates in a year. The total import PO cost per year is calculated by considering 35% of the annual revenue as the total cost for importing goods.

Module	Yearly Revenue ($ Billion)	Total Import PO Cost/ Year ($ M)[1]	Average PO Cost	Number of PO(s)/ Year[2]	Total Time Spend (Hr)[3]	Average Yearly Salary	Total $ Savings[4]
Warehousing/Operations	1.0	350	$25,000	14000	3500	$75,000	$126,202
	1.3	450	$25,000	18200	4550	$75,000	$164,063
	1.7	595	$25,000	23800	5950	$75,000	$214,543
Sales & Distribution	1.0	350	$25,000	14000	3500	$85,000	$143,029
	1.3	450	$25,000	18200	4550	$85,000	$185,938
	1.7	595	$25,000	23800	5950	$85,000	$243,149
Finance	1.0	350	$25,000	14000	3500	$95,000	$159,856
	1.3	450	$25,000	18200	4550	$95,000	$207,813
	1.7	595	$25,000	23800	5950	$95,000	$271,755

[1] Counting 35% of Revenue
[2] Total Import PO Cost Per Year/ Average PO Cost
[3] Number of PO(s) per Year * 15 min/PO
[4] Total Minutes * Per Minute Salary

"Average PO cost" is the average cost of each purchase order for importing goods. The number of PO(s) per year is calculated by dividing the total import PO cost per year by the average PO cost. This shows the frequency and volume of import transactions made in a year.

The total minutes spent represents the time taken to complete each PO transaction, which is assumed to be 15 minutes per PO.

"Average yearly salary" represents the salary paid to an employee who performs these tasks manually.

By automating the import process, organizations can save significant amounts of money.

The total $ saved is calculated by multiplying the whole minutes spent on import transactions with the per minute salary of an employee. This provides an estimate of the cost savings that can be achieved by automating the import process.

Assuming 15 min spent on each PO receipt and an average of 14,000, Import PO(s) are created per translation into 210000 minutes spent throughout the year, saving $126,202 from the warehousing/operation department. On the other hand, considering the same from Sales & Distribution and Finance departments translates to $143,029 and $159,856, respectively.

Overall, the savings of $504,808 for the organization (small organization client with revenue just below $1B).

8. Conclusion

Implementing an automated goods receipt in SAP can significantly improve supply chain efficiency, cost-effectiveness, and regulatory compliance, making it a critical strategic imperative for Life Science organizations.

Adopting this process can lead to significant cost savings, improved inventory management, and compliance with customs regulations. The importance of taking ownership of in-transit inventory from a finance workstream perspective cannot be overstated. The Valuated GR block stock option is a crucial tool in preventing the use of owned list until it has been inspected and approved. In addition, the confirmation control critical setting is an effective means of achieving automatic goods receipt of inbound delivery and can assist in optimizing warehouse management processes, enhancing accuracy, and improving efficiency.

This paper offers a reusable framework scaled across multiple sites and processes for end-to-end orchestration. By integrating automation into the process with minimal impact on the working environment and tools, labor shortages can be relieved by automating manual tasks. The process can be shifted from reactive to proactive with early insights. It is essential to consider potential pitfalls and implement the appropriate mitigation strategies outlined in this paper to ensure the success and effectiveness of the process.

The impact of an automated goods receipt in SAP can be far-reaching, and organizations must embrace this technology to remain competitive and deliver value to stakeholders.

References

[1] SAP Help Portal. [Online]. Available: https://www.sap.com/industries/life-sciences.html

[2] S. Sharma et al., "Impact of Temperature Excursions During Transport of Biological Products," *Journal of Pharmacy & Bioallied Sciences*, pp. S72-S78.

[3] Lash, A., Oates, J., and Kamstra, P., "Implementing an Automated Goods Receipt Process in a Life Science Company: A Case Study," *Journal of Commercial Biotechnology*, vol. 24, no. 3, pp. 27-32, 2018.

[4] P. Haldenwang, Automating life sciences inventory management: A case study, Control Engineering Europe, 2023. [Online]. Available: https://www.controlengeurope.com/

[5] SAP Help Portal, 2021. [Online]. Available: https://help.sap.com/docs/SAP_S4HANA_ON-PREMISE/8308e6d301d54584a33cd04a9861bc52/8b7b5fe73ef54063a2bfcfbe83cebd38.html?version=2021.002

[6] M. Ajin, T. Raghvan, and R. Pallavarajavarman, "Implementation of Automated System to Detect Cracks in Rails," *SSRG International Journal of Mechanical Engineering*, vol. 7, no. 6, pp. 28-32, 2020. [CrossRef] [Google Scholar] [Publisher Link]

[7] SAP Help Portal, 2022. [Online]. Available: https://help.sap.com/docs/SAP_S4HANA_ON-PREMISE/91b21005dded4984bcccf4a69ae1300c/9ddf815494758c4ce10000000a4450e5.html

[8] SAP online help: [Online]. Available: https://help.sap.com/docs/SAP_ADVANCED_PLANNING_AND_OPTIMIZATION,_ON_SAP_ERP/5cc5fb97c72c47168d497a0fa3e9f84f/fa437a80630a11da36bb000f20dac9ef.html

[9] Ravi Dave, Automatic Reorder Point (MRP Type: V2 or VM) Planning – Part 1, SAP Blog, 2023. [Online]. Available: https://blogs.sap.com/2023/02/15/automatic-reorder-point-mrp-type-v2-or-vm-planning-part-1/

[10] Ravi Dave, *Automatic Reorder Point (MRP Type: V2 or VM) Planning – Part 2*, SAP Blog, 2023. [Online]. Available: https://blogs.sap.com/2023/02/15/automatic-reorder-point-mrp-type-v2-or-vm-planning-part-2/

[11] SAP online help, 2022. [Online]. Available: https://help.sap.com/docs/SAP_S4HANA_ON-PREMISE/91b21005dded4984bcccf4a69ae1300c/37485192f5d746f2bfe85d9ad00bebf3.html

[12] SAP Help Portal, 2022. [Online]. Available: https://help.sap.com/docs/SAP_S4HANA_ON-PREMISE/7b24a64d9d0941bda1afa753263d9e39/ce158e56ba281e5ee10000000a4450e5.html

[13] SAP Help Portal, 2022. [Online]. Available: https://help.sap.com/docs/SAP_S4HANA_ON-PREMISE/f899ce30af9044299d573ea30b533f1c/86e15c58eb021f60e10000000a44147b.html

[14] Process Purchase Requisitions (Version 2), SAP Fiori Library. [Online]. Available: https://fioriappslibrary.hana.ondemand.com/sap/fix/externalViewer/#/detail/Apps('F1048A')/S30

[15] Bhumika Dodia, Usage of GR Movement Type, Stock Overview and FI Entry, SAP Blog, 2021. [Online]. Available: https://blogs.sap.com/2021/11/22/usage-of-gr-movement-type-stock-overview-and-fi-entry/#:~:text=Movement%20Type%20%E2%80%93%20109,Val

[16] Ravi Dave, Bidyut Sarkar, and Gaurav Singh, "Revolutionizing Business Processes with SAP Technology: A Buyer's Perspective," *International Journal of Computer Trends and Technology*, vol. 71, no. 4, pp. 1-7, 2023. [CrossRef] [Publisher Link]

[17] Surabhi Singh, Lata Bajpai Singh, and Anjali Rai, "Investigating the Analytics for Workforce Automation," *SSRG International Journal of Economics and Management Studies,* vol. 9, no. 5, pp. 23-31, 2022. [CrossRef] [Publisher Link]

[18] SAP Help Portal. [Online]. Available: https://help.sap.com/docs/sap-business-network-for-trading-partners/supplier-guide-to-sap-business-network-for-supply-chain/confirmation-control-keys-5a8464d9251d4e569414f7f456887118

[19] Manage Purchase Order, SAP Fiori Library. [Online]. Available: https://fioriappslibrary.hana.ondemand.com/sap/fix/externalViewer/#/detail/Apps('F0842A')/S25OP

[20] Create Inbound Delivery, SAP Fiori Library. [Online]. Available: https://fioriappslibrary.hana.ondemand.com/sap/fix/externalViewer/#/detail/Apps('VL31N')/S25OP

[21] SAP Knowledge Base Article: Workaround for category determination of inbound delivery items. [Online]. Available: https://launchpad.support.sap.com/#/notes/214604

[22] Display Inbound Delivery, SAP Fiori Library. [Online]. Available: https://fioriappslibrary.hana.ondemand.com/sap/fix/externalViewer/#/detail/Apps('VL33N')/S25OP

[23] Stock – Multiple Materials, SAP Fiori Library. [Online]. Available: https://fioriappslibrary.hana.ondemand.com/sap/fix/externalViewer/#/detail/Apps('F1595')/S25OP

[24] Display Purchase Order, SAP Fiori Library. [Online]. Available: https://fioriappslibrary.hana.ondemand.com/sap/fix/externalViewer/#/detail/Apps('F7117')/S30

[25] Material Documents Overview: SAP Fiori Library. [Online]. Available: https://fioriappslibrary.hana.ondemand.com/sap/fix/externalViewer/#/detail/Apps('F1077')/S25OP

[26] Display Document, Display Journal Entries, SAP Fiori Library. [Online]. Available: https://fioriappslibrary.hana.ondemand.com/sap/fix/externalViewer/#/detail/Apps('FB03')/S25OP

[27] SAP Help Portal. [Online]. Available: https://help.sap.com/docs/SAP_SUPPLIER_RELATIONSHIP_MANAGEMENT/5cd86364e18a49c6a01a79557b61416a/ba91d38a4e8d42ae9100cd79d8907a52.html

[28] Actual Commerce. [Online]. Available: https://www.truecommerce.com/edi-transaction-codes/edi-856.