

# Improved Supply Chain Efficiencies: Technological Innovations

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**Abstract: Purpose:** The purpose of writing this paper is to provide insights of custom enhancements in S/4 HANA in developing manufacturing execution cockpit a one stop umbrella to execute supply chain manufacturing execution transactions seamlessly.

**Problem:** Companies implement enterprise resource planning systems like SAP S/4 HANA to streamline the supply chain business processes end to end from procurement, production planning, advanced planning & optimization, manufacturing execution, warehouse management, sales and distribution, finance and controlling, product costing, trade promotions management, quality management etc. To execute a supply chain manufacturing business process within S/4 HANA system business users must execute multiple transaction codes within the systems which is not only time consuming but also hampers supply chain efficiency and productivity.

Based on the research paper *Secrets of Successful SAP Integrations: Mergers & Acquisitions* which talks about structured methodology for implementing SAP change management is one of the key parameters for successful SAP integrations, it's important to keep changes to minimum as much as possible when it comes to system changes and designing a manufacturing cockpit will ease the day-to-day supply chain manufacturing work of end users to a large extent.

Some of the business processes which can be optimized for increased productivity and efficiency by designing manufacturing execution product within SAP S/4 HANA are goods issue/reversals of handling units against production or process order for a manufacturing plant at warehouse management level and goods issue/reversals against production or process order for a manufacturing plant at inventory management level. Initial/Final confirmations against production or process order for a manufacturing plant to track order start and finish date/time and labor hours to make payments based on actual work performed. Goods receipt against production or process order for main product and by-product.

**Methods:** Methods used to address the research problem are real world experiences of designing and developing complex manufacturing execution cockpit systems.

**Conclusions reached:** It is possible to design and develop complex manufacturing execution cockpits with the help of SAP S/4 HANA functional expertise, technical ABAP coding expertise and supply chain manufacturing business expertise.

**Significance:** The significance of this research project is quite high as several things are at stake, to name a few high investments running in to multimillion US dollars used in implementing SAP S/4 HANA systems as part of digital and supply chain business transformation programs, increased supply chain efficiencies and productivities, risks of losing business confidence in information technology systems in general and enterprise resource planning S/4 HANA systems in particular, loss of business end user trust in the organization if the systems are not designed and developed correctly for a flawless manufacturing execution etc. These product innovations are highly significant because of the visibility of senior leadership teams as they are discussed in town hall meetings on regular basis.

**Keywords:** - SAP (Systems, Applications and Products in data processing), S/4 HANA Custom Enhancements, Supply Chain Manufacturing, digital and business transformation. Handling Units, ABAP Advanced Business Application Programming.

## I. INTRODUCTION

This report shares the real-world experiences of author working for most leading and distinguished manufacturing companies like BOSCH in automobiles, Honeywell International in aerospace, Conagra Brands in food manufacturing sectors acting as an internal advisor and Big 4 consulting Deloitte advising external fortune 500 clients like Illumina, Caterpillar, Avnet etc. Author comes with global exposure working across the globe APAC, United Kingdom and United States delivering most complex supply chain business and digital transformation programs.

## II. MATERIALS AND METHODS

Designing initial screen for manufacturing execution cockpit requires lot of creativity and innovative ideas, some of these innovative product development ideas are mentioned here. In the initial screen there is a need to identify the selection fields and selection methods depending on the required output for further execution of supply chain manufacturing transactions.

Initial screen can have a manufacturing plant, process/production order number as mandatory fields in addition to the search options for manufacturing plant and process/production order prompting the business users with order information system.

Select Goods Issue Method can have tabs like Goods Issue of Handling Units (HU), Goods Issue of Inventory Management (IM), Change Run Size etc. Select Goods Receipt Method can have tabs like Goods Receipt Section. Select Goods Issue Reversal Method can have tabs like Goods Issue Reversal of Handling Units (HU) and Goods Issue Reversal of Inventory Management (IM). Select Confirmation Method can have tabs like Initial/Final Confirmations. Further methods can be defined for standard and custom reports like process/production order review reports, manufacturing book of records, mass completion of process/production orders.

Output screen for Goods Issue of HU's tab can be designed to include posting date defaulting to current systems date and other columns for Handling Unit, Quantity on Hand, Unit of Measure, Material, Material Description, Phase, to be posted check box etc. and further reporting capabilities like find, filter, print, export to word & spreadsheet, Post Goods Issue and View Error Logs to name a few.

Output screen for Goods Issue of IM tab can be designed to include posting date defaulting to current systems date and other columns for Material, Material Description, Phase, Storage Location, Batch, Quantity Consumed, Quantity on Hand, Unit of Measure, Alternate Group, to be Posted etc. in addition to reporting capabilities like delete row, find, filter, print, export to word & spreadsheet, layout capabilities. Post Goods Issue and View Error Logs.

Output screen for Change Run Size can be designed to include columns like operation, resource/work center description, control recipe destination, operation description, type, run size, unit of measure, display alternate items data and change run size to be editable. Reporting capabilities like find, filter, print, layout design, export to word & spreadsheet, display material list to get all the materials being consumed for a phase.

Output screen for Goods issue reversal of Handling Units HU(s) can be designed to include columns like Handling unit, Phase, Reversal UOM, Reversal quantity, Last Goods Issue (GI) quantity, Cumulated phase GI quantity, Issued Production supply area (PSA), Current Bin, Quantity on hand, UOM, Material, Material description, Check box to Post + Correction + Put away, Check box to Unpack and Repack to Old HU, Check box for printing labels for newly created Handling Units, Check box for HU Cancellation so that last GI material document will be cancelled and quantity moved to new HU. Tabs for Reverse PGI (Post Goods Issue) and View Error Logs can be designed. Reporting capabilities to include tabs like Find, Filter, Print, Export to Spreadsheet, Choose/Change layout etc.

Output screen for Goods Issue Reversal of materials stored in Inventory Management storage location can be designed to include columns like Order number, Material, Material description, Storage location, Movement type, Delivery required, issued quantity, Base UOM, Batch, Material document, Posting date, Document date, Username, Requirement quantity, Date, Time, Material document year.

Reporting capabilities can be designed to include Sort in ascending order, Sort in descending order, Find, Filter, Summation, Print, Export to Spreadsheet, Chose/Change layout, Navigation profile, Refresh etc. Tabs to navigate into other reports to like Materials with Out Order can also be included for informational purposes with columns like warehouse Number, Storage type, Plant, Material, Material description, Storage bin, Storage location, Batch, Stock category, Stock, Available stock, UOM, Storage unit etc.

Process Order Review Report tab from initial screen of manufacturing cockpit can be designed to navigate to the respective report to include columns like Order, Material, Material description, Order Required quantity, UOM, Delivery Required quantity, Number of material documents, Issued quantity, Zero Loss quantity, Zero Loss Variance, Zero Loss Variance %, Variance with Scrap, Variance with Scrap %, Component Scrap %, Production Supply Area (PSA), Number of HU's in default PSA, Backflush.

Manufacturing Book of Record a SharePoint based web application can be integrated with manufacturing execution cockpit. Manufacturing execution cockpit can be designed to navigate to custom reports like Mass Complete Process Orders which includes columns like Order number, material, Material description, Batch Number, Base UOM, Delivered quantity, Confirmed quantity, Traffic lights for transactions like CO54 process message monitor, COGI for backflushing errors, COIP predefined confirmation processes, Backward Flush, Start and Stop of Machine to capture machine hours, Final labor, Confirmation status, Order status, Technical Complete TECO checkbox and Deletion flag checkbox.

Output screen for Initial/Final Confirmations can be designed to include Process order start & finish confirmation to include columns like process order number, material, material description, operation, start date, start time, finish date, finish time, posting date, delivery quantity, confirmed quantity, scrap, variance, order status etc. Similarly Process order labor confirmation can be designed to include columns like process order, material, description, operation, partial/final selection option, posting hours, posting date, UOM, variance, add/insert line etc.

Output screen for Goods receipt section can be designed to include Report production of By-product which can have columns like messages, material, material description, expected quantity, storage location, delivered quantity, UOM, production quantity, user id etc. Similarly Report production of Backward flush can include columns like messages, source order, material, material description, transaction quantity, UOM, user id etc.

### III. TESTING APPROACH AND METHODOLOGIES

As part of designing custom enhancements like manufacturing execution cockpit there are several complexities involved like software coding, advanced business application programming ABAP is the software language used to write the code behind the scenes and there is

a need to have expertise in ABAP coding besides SAP functional and supply chain business expertise. Design considerations are documented by functional experts which then get translated into technical specifications by technical experts. There is a development/build phase where the coding is done based on technical specifications and then testing of the code is executed as part of functional unit testing and system integration testing to make sure that these custom enhancements are working as expected across the cross functional areas of manufacturing execution, warehouse management/Handling unit management, inventory management, financial postings etc.

#### IV. CONCLUSION

Supply chain productivity and efficiencies can be drastically improved by technological innovations like designing and developing supply chain manufacturing cockpits. Though the complexity of designing such cockpits is huge as it requires special skills and expertise in multiple areas like SAP functional expertise, SAP technical expertise to code the software utilizing ABAP language Advanced business application programming. However, with all the complexities involved the return-on-investment ROI is huge in terms of improved supply chain efficiencies across the organization.

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