

Original Article

# Enhancing Manufacturing Efficiency with Mobility Applications

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**Abstract** - The COVID-19 pandemic caused global production processes and supply lines to be disrupted, posing hitherto unheard-of obstacles to the manufacturing sector. Manufacturers reacted by creating creative ways to maintain commercial operations and adjust to the new normal. One such solution was the rapid adoption of mobility applications, which allowed for remote monitoring and management of manufacturing operations. This article aims to provide users with valuable insight regarding the SAP mobility app and its comparison to the Standard SAP process. It is considered one of the latest and most cutting-edge technologies regarding shopfloor support. Its principal function is to allow users to initiate some Production transactions to reduce the steps involved in simple and easy actions like Production Consumption, Reversal of Consumption, etc. Thanks to its ease of use and flexibility, the SAP mobility app provides users with easier access to the required main fields. This central perspective behind the app leads to benefits, including significant time savings. The number of steps will decrease, reducing transaction complexity and shortening users' time. This is particularly beneficial for organizations looking to save production order processing time, a challenge exacerbated by the COVID-19 pandemic. The SAP mobility app's time-saving benefits can inspire users, motivating them to achieve more with their time and resources.

**Keywords** - SAP Mobility, Digital manufacturing, Production planning, Supply chain transformation, Production order consumption, Production order reversal.

## 1. Introduction

The pandemic has underscored the need to streamline processes and reduce processing time. The SAP mobility application, with its intuitive and easy-to-navigate interface, is a direct response to this challenge. This user-friendly design ensures that users can seamlessly navigate through their day-to-day tasks, optimizing the process they need to complete 100 percent of the time. This instills confidence in users and equips them with the capability to achieve their goals.

To assist the users utilizing the mobility application for SAP, some practical guidelines were provided in the article to help users remove those proximal barriers. By accelerating beneficial manufacturing processes such as Production Consumption [2] and Consumption reversal [3], users can continue their work and minimize the output from system downtime to keep the supply process running. With the aid of intuitive interface designs of technology and advanced response capability, comparative advantages, such as better accessibility and responsibility, can be acquired by the organizations, as well as increasing resilience to be prepared for possible threats in the supply chain. With better

preparedness in advance through the Supply chain, business productivity and cost-saving can be enhanced.

## 2. Literature Review

- **Advantages of Mobility Applications:** The advantages of utilizing mobility applications in manufacturing have been emphasized by many researchers. For instance, Chen et al. (2017) [4] discovered that mobile applications can enhance employee collaboration and communication, resulting in improved coordination and quicker decision-making processes. According to Wang et al. (2018) [5], mobility applications can offer manufacturers instant access to data and analytics, empowering them to optimize their operations and make well-informed decisions.
- **Case Studies:** These offer insightful information about the real-world applications of mobility technologies in manufacturing processes based on the experiences of companies that have used them. Smith et al. (2019) [6], for example, looked at how to put a mobile maintenance management system into a manufacturing facility. They discovered that it resulted in a notable decrease in maintenance expenses and downtime. Similarly, Li et al. (2020) [7] found that mobile quality control apps



increased the precision and effectiveness of quality control procedures after studying them.

- Effect on Performance and Efficiency The effect of mobility applications on manufacturing performance metrics and efficiency has been measured in several studies. For example, Zhang et al. (2016) [8] found that production efficiency increased by 20% due to using a mobile production scheduling tool. Likewise, Han et al. (2017) [9] discovered that mobile applications for inventory management increased accuracy by 15% and decreased stockouts by 30%.
- Trends and Technologies of the Future developments in augmented reality (AR), the Internet of Things (IoT), and predictive analytics are anticipated to improve the manufacturing sector's use of mobility applications. For instance, Wang and Liu (2022) [11] investigated the use of augmented reality-based maintenance applications to increase equipment uptime and reliability, while Zhao et al. (2021) [10] presented a framework for integrating IoT and mobile applications to enable real-time monitoring and control of manufacturing processes.

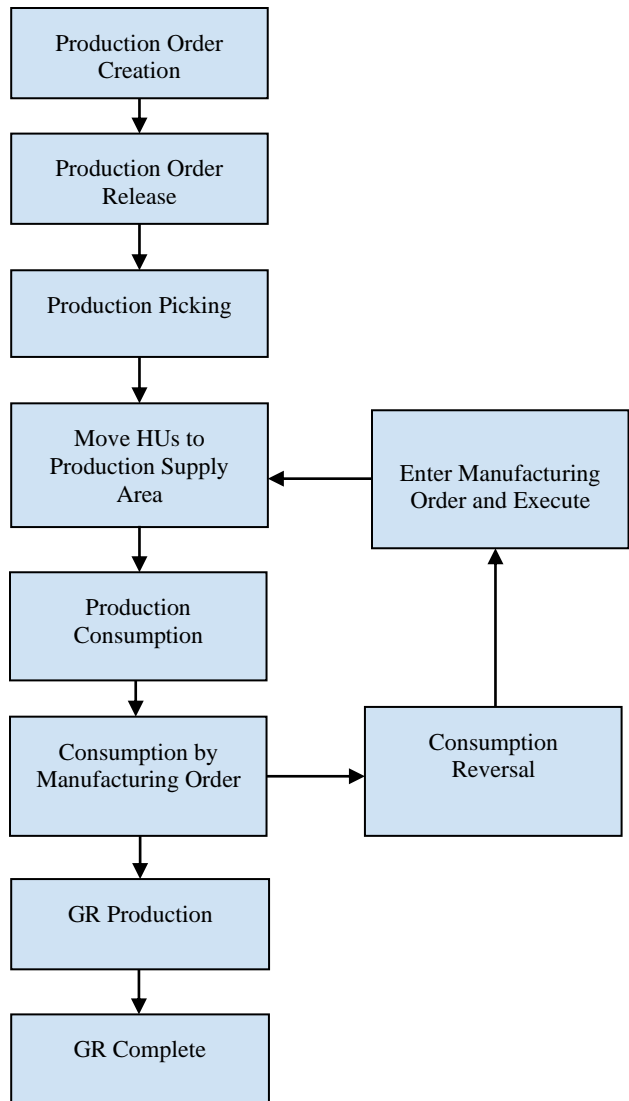
### 3. Architect

The process described below involves creating a production order, releasing it, consuming it, reversing it, and receiving the goods. Let us elaborate on each step to provide a more comprehensive understanding.

- Production order creation: A production order [12] specifies the material to be processed, the time and place, the quantity, the work, the resources, and how the order costs will be billed. With the generation of a production order or any other type of request from material requirements planning, the data is forwarded to shop floor control, and order-relevant information is added to ensure order processing. Both production orders and cost accounting depend on cost estimates.
- Production order release: This step means approving the production order [13] to proceed to the next step of the manufacturing process. It ensures the required resources have been met and production can start with the mandated quantities and schedule.
- Production order picking: Production order picking [14] selects and retrieves materials or components defined in a production order. These materials or components are then gathered from the inventory locations and taken to the production area in preparation for manufacturing within a production order.
- Production Consumption: After the production order is created and released, the next step is production consumption [15], where post-consumption for packed and unpacked goods happens. You can post consumption for staged-relevant items, which must be picked and staged from a production supply area (PSA). The warehouse users use the Radiofrequency transaction code /N/SCWM/RFUI [16] or the Good movement

transaction code MIGO [17] with movement type 261 in the SAP standard Production Consumption process.

- Production Consumption Reversal [18]: When an order is Picked, Packed, and confirmed; however, there is a problem with stock material/components, e.g., quality issue, defective goods, and short quantity, the warehouse user will perform Production consumption reversal. The warehouse users use the Radiofrequency transaction code /N/SCWM/RFUI or the Good movement transaction code MIGO with movement type 262 in the SAP standard Production Consumption Reversal process.



- **Mobility Application**

Consisting of two tiles:

A. Production Consumption/Reversal

- I. Production Consumption tile: The process involves the product and the components staged to be consumed when the user scans the components with an RF device.

II. Consumption Reversal tile: The process involves the products and the components consumed being reversed for various reasons such as component quality, wrong component entered by the user, etc.

B. Goods Receipt Production [19]:

In this step, receipt verification of finished products is entered into inventory upon production completion. It handles accounting entries to record the number of produced products and update inventory levels.

**4. Product Design**

**4.1. Consumption Posting**

Selection Layout:

Consumption by manufacturing order	
Manuf. Order:*	X

Selection layout

- Manufacturing order\*: Mandatory; The user should scan the manufacturing order [20-21] from the production order barcode list. Validation: AUFK- AUFNR; E: Manufacturing order required or E: Invalid Manufacturing order.
- The mobile application validates the manufacturing order keyed in by the user. If there are any errors, it captures the appropriate error message.
- The user clicks the execute button after the provided data is successfully validated. Which automatically redirects to the next page.

Display Layout:

Consumption posting			
Manufacturing order	Finished product	Product description	
Item/ Component	Stor. Bin	Order Qty	
Scan Component			
Consumption items			
Item	Product	Qty	UoM

Display layout.

- The display layout will be displayed with the heading Consumption posting.
- Below are the fields and the logic:

Field(s)	Logic
Manufacturing order	From AUFK-AUFNR
Finished Product	Pass Manufacturing order from AUFK to AFPO and get AFPO-MATNR.
Product Description	Pass Material from AFPO to MARA and get MARA-MAKTX.
Item/ Component	Pass Manufacturing order from AUFK to RESB and get RESB-MATNR.
Storage Bin	Pass Manufacturing order from AUFK to RESB and get RESB-PRVBE.
Order Qty	Pass Manufacturing order from AUFK to RESB and get RESB-BDMNG.
Item	RESB-RSPOS.
Product	RESB-MATNR.
Qty	RESB-BDMNG.
UOM	RESB-MEINS.

- The user then scans the barcodes of all the components required for the Product and then clicks on the execute button to perform consumption.
- The “Consumption done for all items” message will be displayed if no error message is displayed.

**4.2. Consumption Reversal**

Selection Layout:

Cons. Reversal by Manuf. Order	
Manuf. Order:*	X

Selection Layout

- Manufacturing order \*: Mandatory: The user should scan the manufacturing order from the production order barcode list. Validation: AUFK- AUFNR; E: Manufacturing order required or E: Invalid Manufacturing order.
- The mobile application validates the manufacturing order keyed in by the user. If there are any errors, it captures the appropriate error message.
- The user clicks the execute button after the provided data is successfully validated. Which automatically redirects to the next page.

Display Layout:

PMR - Consumption Reversal			
Manufacturing order	Finished product	Product description	
Item/ Component	Stor. Bin	Order Qty	
Scan Component			
Consumption items			
Item	Product	Qty	UoM

Display layout

- The display layout will have the heading PMR - Consumption Reversal.
- Below are the fields and the logic:

Field(s)	Logic
Manufacturing order	From AUFK-AUFNR
Finished Product	Pass Manufacturing order from AUFK to AFPO and get AFPO-MATNR
Product Description	Pass Material from AFPO to MARA and get MARA-MAKTX
Item/Component	Pass Manufacturing order from AUFK to RESB and get RESB-MATNR
Storage Bin	Pass Manufacturing order from AUFK to RESB and get RESB-PRVBE
Order Qty	Pass Manufacturing order from AUFK to RESB and get RESB-BDMNG
Item	RESB-RSPOS
Product	RESB-MATNR
Qty	RESB-BDMNG
UOM	RESB-MEINS

- The user then scans the barcodes of all the components required for the Product and then clicks on the execute button to perform consumption reversal.
- The “Reversal done for all items” message will be displayed if no error message is displayed.

### 5. Solutions by using the Mobility Application

To overcome the numerous steps needed in the standard process, Production Consumption and Consumption reversal using mobility applications resolves them by providing accessible and limited steps to complete the processes, as shown in the screenshots below.

#### 5.1. Production Consumption

The Production Consumption tile is created.



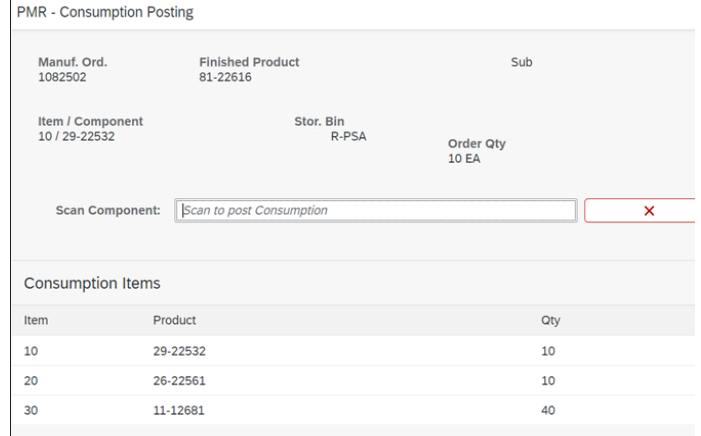
The user navigates to the tile, provides the order number, and executes.



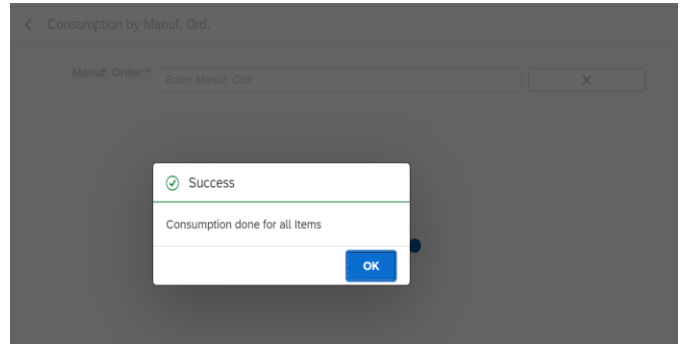
The order will be displayed with the product and all three components.

Users can scan and execute the components [22-23] once or twice.

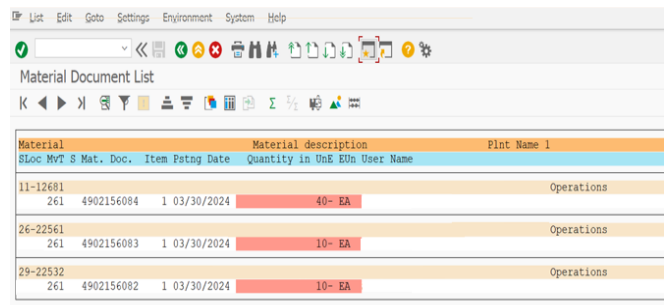
This feature confirms all the components in one step, reducing the user's processing time compared to the standard process.



The “Consumption done for all Items” message will be displayed.

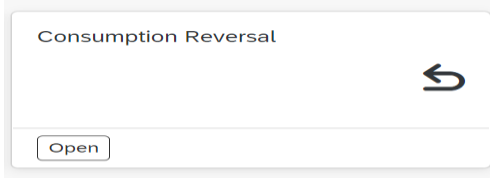


The material documents are created for Production [24] consumption.

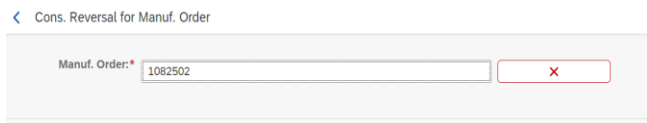


#### 5.2. Consumption Reversal Application

The user navigates to the Consumption Reversal tile.



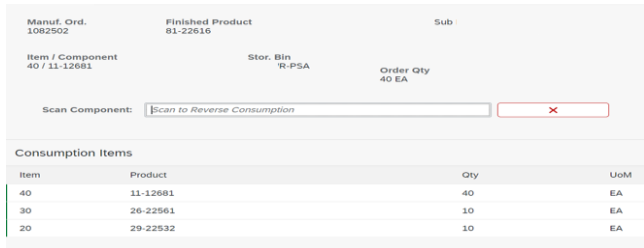
Provides the order number and then executes.



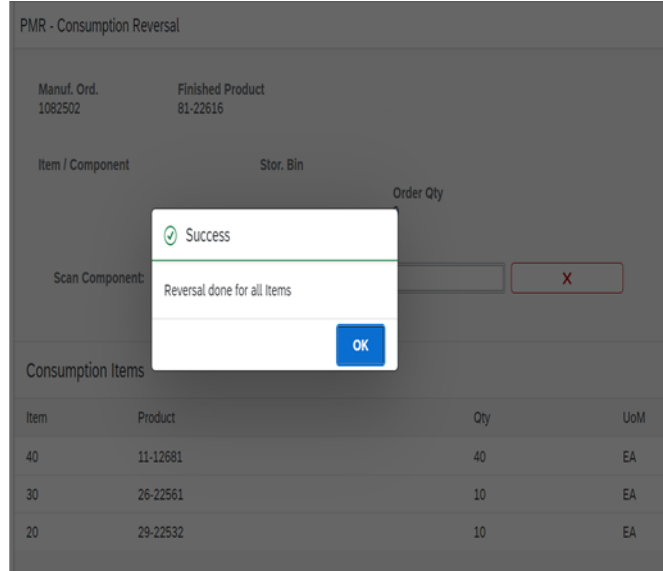
All the details of the product and the components are displayed.

As shown below, the user can scan and execute the components one or more times.

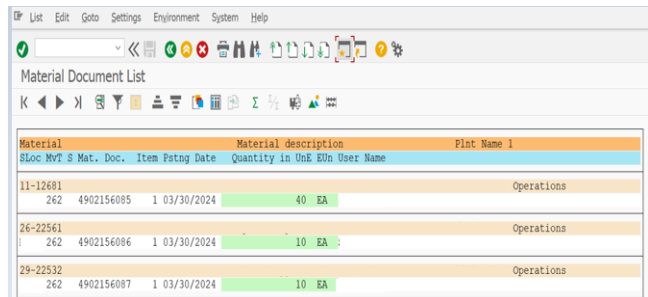
This feature confirms all the components in one step, reducing the user's processing time compared to the standard process.



The “Reversal done for all Items” message will be displayed.



The material documents [25] are created for Production consumption reversal.



## 6. Results

### 6.1. Production Consumption

Yearly Revenue (\$ Billions)	No of Production Consumptions per year	No of steps in standard SAP to consume	No of the steps in the Mobility Application to consume	The total number of steps was reduced	Time (in Minutes) to perform each step (Avg)	Total time in hours saved in year = (The total number of steps was reduced * Time in Minutes to perform each step (Avg) * No of Production Consumptions per year)/60
\$1.2	10500	15	4	11	1	1925
\$1.7	20000	15	4	11	1	3667
\$2.0	27000	15	4	11	1	4950

The Production consumption per year is 20,00 (for the client with an approximate revenue of \$1.7B). Reducing the process steps from 15 to 4 leads will save 11 minutes per production order, for a total time savings of about 3667 hours per year.

The total savings can be estimated based on the resources needed and multiplied by the per-hour rate in USD (Assuming \$30/hrs.), saving the organization about \$110,010 annually.

### 6.2. Production Consumption Reversal

The number of Production consumption Reversals per year is 6000 (For the client with an approximate revenue of \$1.7B). Reducing the process steps from 15 to 4 leads to time savings of about 1100 hours per year.

The total savings can be estimated based on the resources needed and multiplied by the per-hour rate in USD (Assuming \$30/hrs.), saving the organization about \$33,000 annually.

Yearly Revenue (\$ Billions)	No of Production Consumptions Reversal per year	No of steps in standard SAP to consume	No of the steps in the Mobility Application to consume	The total number of steps was reduced	Time (in Minutes) to perform each step (Avg)	Total time in hours saved in year = (The total number of steps was reduced * Time in Minutes to perform each step (Avg) * No of Production Consumptions per year)/60
\$1.2	3500	15	4	11	1	641
\$1.7	6000	15	4	11	1	1100
\$2.0	7800	15	4	11	1	1430

## 7. Conclusion

The world is changing at a faster rate in this new era. With abundant technological advancement, it is keen to leverage the advanced mobility applications compared to the standard complex and time-consuming processes. Mobility application helps reduce the number of steps required to process the production consumption and Consumption reversal by a drastic amount of 15 to only four steps. This leads to savings in cost and time and helps the users to have easy UI accessibility through portable devices within the shop floor.

The Mobility application for Production order consumption and Reversal helped increase process execution efficiency and significantly reduce the required time compared with standard SAP processes. Saving every second

became a crucial requirement in every organization due to the supply chain disruption caused by the COVID-19 pandemic.

The mobility solution usage helps reduce external costs, such as shipping, handling, customs duties, and fuel, as the Production orders are processed at a faster rate in fewer steps than the standard process, helping to release the components required for the finished product from the staging area leading to accommodating more goods to ship and lesser amount of time needed to accommodate them in the staging area as they can be consumed at a faster rate.

Overall, the new application empowers users to overcome complex processes and navigate to the more straightforward steps with a User-friendly UI and portability. This saves the organization time, effort, and cost.

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