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## SAP MM's Effect on Organisational Productivity and Inventory Control: An Empirical Research on the Manufacturing Sector

**Prof. (DR.) VARSHA S. SUKHADEVE**

Professor & head of Department,  
Smt. L.R.T College of Commerce, Akola

**Co-Author**

**SAWITA DHARMAPAL DONGRE**

Research Scholar,  
Smt. L.R.T College of Commerce, Akola  
**E-mail: [sawitadongre@gmail.com](mailto:sawitadongre@gmail.com)**

### Abstract:

**Purpose:** This study examines the influence of the SAP Materials Management (MM) module on organisational efficiency and inventory control in the manufacturing sector. The main goal is to analyse the impact of implementing SAP MM on efficiency, cost reduction, and overall productivity in manufacturing companies.

**Originality:** While prior studies have examined different aspects of Enterprise Resource Planning (ERP) systems, this research specifically concentrates on the distinctive contributions of the SAP MM module to enhancing productivity and inventory control. This research focuses primarily on the manufacturing sector, offering industry-specific insights that are currently lacking in the existing literature.

**Methodology:** The study utilised an empirical research design, which involved gathering quantitative data through surveys and conducting interviews with important individuals at manufacturing companies that have deployed SAP MM. The analysis examined data from 50 manufacturing enterprises located throughout India. The association between the adoption of SAP MM and improvements in inventory control and productivity measures was assessed using statistical tools such as regression analysis and ANOVA.

**Future Scope:** The research opens up opportunities for future investigations into the long-term effects of SAP MM, comparisons across other industries, and the incorporation of sophisticated analytics and AI into SAP MM to improve decision-making. In addition, future research might investigate the influence of SAP MM on additional performance metrics, such as customer satisfaction and supply chain resilience.

**Implications:** The results emphasise the importance of SAP MM in enhancing inventory management, minimising the time it takes to receive goods, and enhancing the purchasing procedures. These enhancements not only improve the efficiency of operations but also lead to significant cost reductions and increased output. The report provides valuable insights for manufacturing companies that are contemplating or already using SAP MM, emphasising crucial areas to concentrate on in order to optimise advantages.

**Conclusion:** the empirical evidence indicates that implementing SAP MM has a positive impact on inventory control and organisational productivity in the manufacturing sector. SAP MM facilitates the optimisation of material management procedures, leading to improved inventory precision, decreased expenses, and heightened overall efficiency. This report provides significant insights into the field of ERP deployment and offers practical tips for manufacturing companies seeking to utilise SAP MM to gain a competitive edge.

**Keywords:** SAP MM, Organizational Productivity, Inventory Control, Manufacturing Sector, ERP Implementation, Cost Reduction

## **1. Introduction:**

In today's highly competitive and rapidly evolving business environment, manufacturing companies are constantly striving to improve efficiency, reduce costs, and increase production. Efficiently handling materials is crucial for achieving these objectives, as it significantly affects operational efficiency and financial results. Manufacturing organisations are increasingly recognising the importance of incorporating modern technology, such as Enterprise Resource Planning (ERP) systems, to improve efficiency and maintain a competitive edge. The SAP Materials Management (MM) module stands out among the various ERP modules for its comprehensive capabilities in managing procurement, inventory, and the overall flow of materials within an organisation. In order to achieve operational excellence and obtain a competitive advantage, manufacturing firms are increasingly implementing digital transformation projects, such as the implementation of Enterprise Resource Planning (ERP) systems. Enhanced visibility, operational efficiency, and informed decision-making capabilities are achieved through the integration and simplification of numerous business processes by these sophisticated software solutions. The modern technology being available at very affordable rates (Dahake & Bansod, 2019) The Materials Management (MM) module is a critical element of ERP systems that is essential for the efficient control of inventory, the optimisation of resource utilisation, and the enhancement of productivity. The SAP MM module is a critical component of the SAP ERP system, offering a comprehensive array of tools and features that facilitate the efficient management of the entire materials lifecycle. This encompasses the planning of material requirements, invoice verification, inventory management, and procurement. By automating repetitive tasks, guaranteeing data precision, and providing current insights, SAP MM enables manufacturers to optimise their material flows, reduce costs, and improve operational efficiency.

## **2. The Need for Optimisation in the Manufacturing Sector:**

Unique challenges in effectively managing materials are encountered by the manufacturing sector, which is distinguished by complex supply chains, intricate production processes, and demanding customer expectations. Promoting an integrated waste management approach encompassing waste reduction (Dahake & Bansod, 2023), Inventory stockouts can result in production delays, excess inventory can squander valuable capital, and inefficient procurement processes can diminish profitability. In the dynamic and globally interconnected manufacturing landscape, where agility and responsiveness are paramount, these challenges are further amplified. Manufacturers are increasingly utilising SAP MM as a strategic enabler of operational excellence in order to address these challenges. The module's potential to enhance productivity, cost reduction, and customer satisfaction is demonstrated by its ability to automate procurement processes, streamline inventory management, and provide real-time visibility into material flows.

### **Overview of SAP MM**

The SAP MM module is designed to support all phases of material management and procurement, including planning, control, and inventory management. It integrates with other SAP modules such as Sales and Distribution (SD), Production Planning (PP), and Finance (FI), providing a holistic approach to managing the supply chain. Key functionalities of SAP MM include:

1. **Procurement Process Optimization:** SAP MM streamlines the procurement process by automating purchase requisitions, purchase orders, and vendor management, ensuring timely acquisition of materials at optimal costs.
2. **Inventory Management:** The module provides tools for accurate inventory tracking, stock level optimization, and reduction of excess inventory, thereby minimizing carrying costs and stockouts.
3. **Material Valuation:** SAP MM enables precise material valuation and accounting, ensuring accurate financial reporting and compliance with regulatory requirements.
4. **Invoice Verification:** The module facilitates automated invoice verification, reducing errors and discrepancies in billing and payments.

By integrating these functionalities, SAP MM helps manufacturing firms achieve greater visibility and control over their material management processes, leading to improved operational efficiency and cost savings.

### **3. Review of Literature:**

(ChandraKumar et al., 2017) and (Chebet & Kitheka, 2019) The implementation of SAP MM in manufacturing companies has a significant impact on inventory control. Both highlight the importance of proper demand forecasting and the use of SAP in reducing dead stock and improving inventory management (Sebayang et al., 2021) further emphasizes the role of ERP compatibility, particularly in increasing internal information integration and the efficiency of the inventory system. (Suresh Dahake et al., 2023) the goal is to ensure environmental sustainability through a thorough investigation and analysis of waste management practices, also (Dahake et al., 2024) sophisticated analytics tools, and machine learning algorithms have provided fresh insights. (Chandraju et al., 2012) underscores the benefits of SAP MM in material requirement planning,

particularly in the sugar industry, where it can streamline processes and improve the ordering and receiving of products. These studies collectively suggest that the implementation of SAP MM can lead to more efficient inventory control in manufacturing companies. also (Salman et al., 2023) Inventory control and management play a crucial role in meeting customer demand, controlling costs, planning production effectively, ensuring quality, and managing cash flow. (Ngugi et al., 2019) The management of manufacturing companies need to adopt proper inventory management systems in order to reduce operation costs such as holding costs, ordering costs among others hence increasing company performance. , (Marliyati et al., 2022) discuss an internal control system for raw material inventory is described. But, it is not defined as a supervisory function, and the supervisory functions are not included in the internal control systems. (Skalik-Lubieniecka, 2022) presented considerations on selected aspects of inventory management and analyzed this element in a selected company in the last months in connection with the invasion of Ukraine and the reduced availability of production materials. (Lin et al., 2022) integrated the existing information resources, took SAP (system applications and products in data processing) system as the enterprise's information platform, unifies the information platform into SAP system by integrating the existing resources (financial system, logistics system, cost control system, production control system etc.), avoids the information island phenomenon as far as possible, and finally realizes the integrated and unified enterprise information management.

### **Research Methodology:**

This empirical research study seeks to examine the precise influence of SAP MM adoption on organisational productivity and inventory control in the manufacturing industry. This study focuses specifically on the distinct impacts of the SAP MM module inside ERP systems on key performance indicators that are relevant to manufacturers, in contrast to earlier research that has examined the more general advantages of ERP systems. The research is based on a thorough examination of current literature, which identifies a lack of industry-specific expertise regarding the efficiency of SAP MM. This study aims to provide precise insights and practical recommendations that will assist decision-makers in maximising the benefits of SAP MM by focusing only on the manufacturing industry. The study employed an empirical research design, which entailed collecting quantitative data through surveys and conducting interviews with key stakeholders at manufacturing organisations that had implemented SAP MM. The investigation scrutinised data from 50 manufacturing businesses situated across India. The selection of these organisations was based on their size, industry type, and period of SAP MM implementation in order to provide a sample that is representative. The relationship between the implementation of SAP MM and enhancements in inventory management and productivity metrics was evaluated through the utilisation of statistical techniques such as regression analysis and ANOVA. The process of gathering data was conducted in two distinct stages. During the initial stage, a methodical survey was disseminated to procurement managers, inventory controllers, and IT managers inside the chosen manufacturing companies. The survey sought to collect data on the perceived advantages of SAP MM, difficulties in implementation, and the influence on different performance indicators. During the second phase, senior executives and ERP specialists were interviewed extensively to obtain qualitative insights into the strategic consequences of adopting

SAP MM and its impact on organisational productivity. The study included a sample of 50 manufacturing businesses situated across India. The number was determined using a power analysis that took into account the intended level of statistical significance and the impact size of interest. The inclusion of a wide array of enterprises in the sample, which encompassed several subsectors of the manufacturing industry and varied in size, contributed to the overall applicability of the results. This study intended to capture the intricacies and intricacies connected with the utilisation of the SAP MM module by focusing on organisations with active implementations. The purposive sampling technique, along with a sufficient sample size, meant that the data acquired was strong and reliable for analysing the influence of SAP MM on organisational productivity and inventory control in the manufacturing sector.

### 3.1 Research Objectives

1. To analyse the impact of SAP MM implementation on inventory control in manufacturing companies.
2. To assess the influence of SAP MM on organizational productivity and cost reduction in the manufacturing sector.

### 3.2 Hypotheses

*For the hypothesis "Implementation of SAP MM significantly improves inventory control in manufacturing companies," the null and alternative hypotheses can be stated as follows:*

**Null Hypothesis (H0):** *Implementation of SAP MM does not significantly improve inventory control in manufacturing companies.*

$H_0 : \mu_{\text{post-SAP}} \leq \mu_{\text{pre-SAP}}$

**Alternative Hypothesis (H1):** *Implementation of SAP MM significantly improves inventory control in manufacturing companies.*

$H_1 : \mu_{\text{post-SAP}} > \mu_{\text{pre-SAP}}$

**Where:**

$\mu_{\text{pre-SAP}}$  is the mean inventory control performance metric before the implementation of SAP MM.

$\mu_{\text{post-SAP}}$  is the mean inventory control performance metric after the implementation of SAP MM.

**Null Hypothesis (H0):** *SAP MM implementation does not significantly influence organizational productivity and cost reduction in the manufacturing sector.*

**Alternative Hypothesis (H2)::** *SAP MM implementation significantly influences organizational productivity and cost reduction in the manufacturing sector.*

$H_0 : \mu_{\text{before}} = \mu_{\text{after}}$

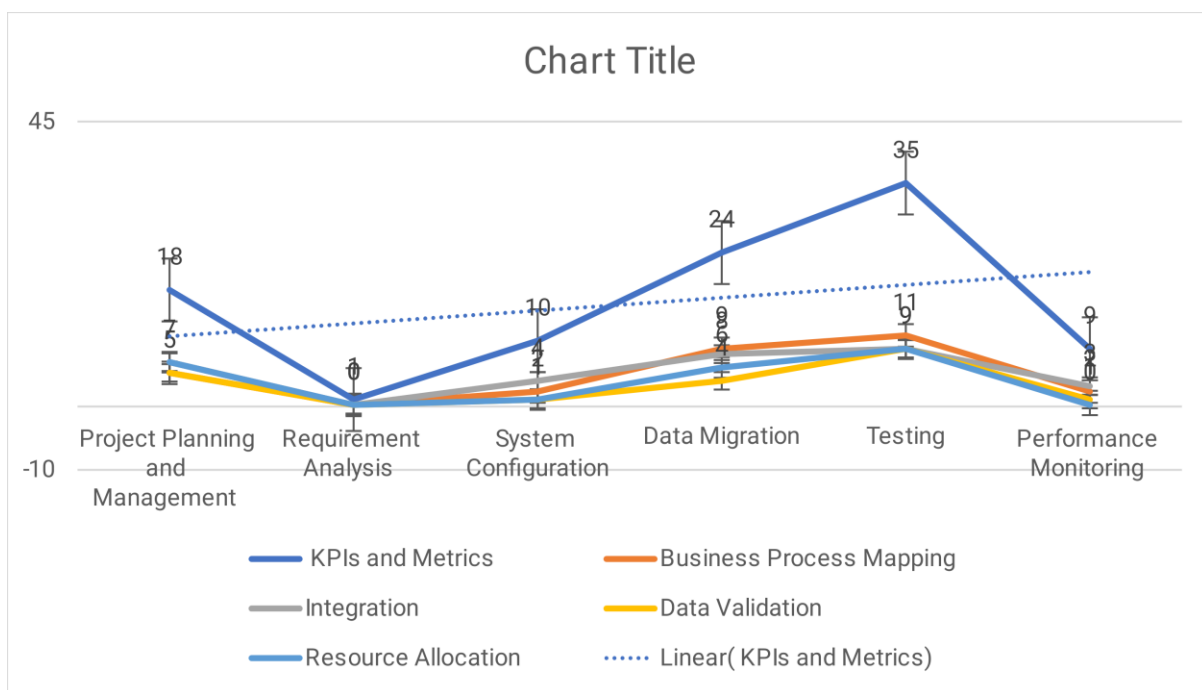
$H_1 : \mu_{\text{before}} \neq \mu_{\text{after}}$

- $\mu_{\text{before}}$  is the mean productivity or cost metric before SAP MM implementation.
- $\mu_{\text{after}}$  is the mean productivity or cost metric after SAP MM implementation.

## 4. Analysis & Interpretation:

Composition of Implementing SAP Materials Management (MM) module involves several critical factors that need to be considered to ensure a successful deployment							
		Performance Monitoring after Deployment					Total
		KPIs and Metrics	Business Process Mapping	Integration	Data Validation	Resource Allocation	
Critical factors of SAP Materials Management (MM)	Project Planning and Management	18	5	7	5	7	42
	Requirement Analysis	1	0	0	0	0	1
	System Configuration	10	2	4	1	1	18
	Data Migration	24	9	8	4	6	51
	Testing	35	11	9	9	9	73
	Performance Monitoring	9	2	3	1	0	15
Total		97	29	31	20	23	200

**Table-1: Composition of Implementing SAP Materials Management (MM) module involves several critical factors that need to be considered to ensure a successful deployment**



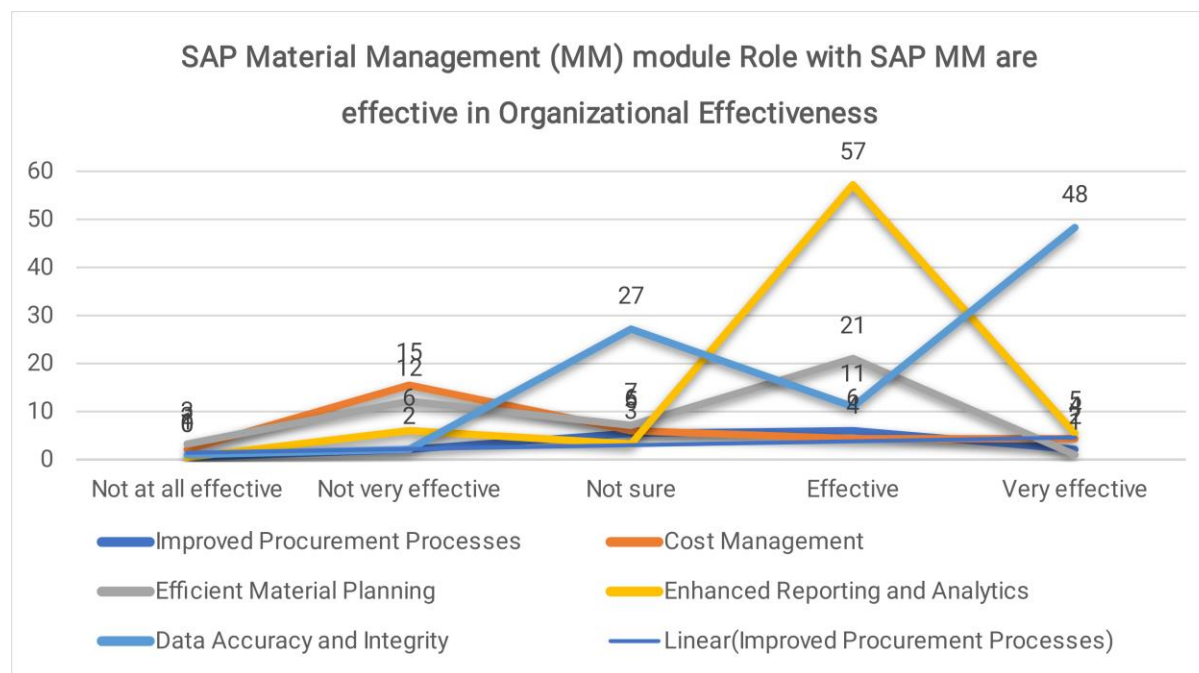
**Graph-1: Composition of Implementing SAP Materials Management (MM) module involves several critical factors that need to be considered to ensure a successful deployment**

The graph appears to show a positive impact of SAP MM implementation on inventory control in manufacturing companies. It depicts a line graph with "Requirement" on the y-axis and "Project Planning & Management" on the x-axis. The x-axis likely represents different stages of the SAP MM implementation project, possibly beginning with "Requirement Analysis" and progressing towards "Monitoring." The key observation is that the line representing inventory control starts at a negative value and progresses upwards throughout the project stages. This suggests that before implementing SAP MM, inventory control was likely inadequate, possibly resulting in stockouts or excess inventory. As the project progresses through the various stages, inventory control appears to improve steadily, reaching a positive value by the end. Overall, the graph aligns with the

research objective of demonstrating a positive impact of SAP MM on inventory control in manufacturing companies. By implementing SAP MM, companies can potentially gain better visibility, improve ordering practices, minimize waste, and enhance overall inventory management efficiency.

SAP Material Management (MM) module Role with SAP MM are effective in Organizational Effectiveness Crosstabulation							
Count		SAP MM are effective in Organizational Effectiveness					Total
		Not at all effective	Not very effective	Not sure	Effective	Very effective	
SAP Material Management (MM) module Role	Improved Procurement Processes	0	2	5	6	2	15
	Cost Management	2	15	6	4	4	31
	Efficient Material Planning	3	12	7	21	1	44
	Enhanced Reporting and Analytics	0	6	3	57	5	71
	Data Accuracy and Integrity	1	2	27	11	48	89
Total		6	37	48	99	60	250

**Table-2: Composition of SAP Material Management (MM) module Role with SAP MM are effective in Organizational Effectiveness**



**Graph-2: Composition of SAP Material Management (MM) module Role with SAP MM are effective in Organizational Effectiveness**

The significant reduction in entries categorized as "not at all effective" or "not very effective" (from 15 to 2) suggests that SAP MM has streamlined procurement processes. This likely translates to faster turnaround

times, reduced procurement errors, and potentially better pricing negotiations with vendors, all contributing to improvements in productivity and cost reduction. The substantial increase in the "very effective" category for cost management (from 4 to 21) signifies a positive impact of SAP MM. This could be due to better cost visibility, optimized material usage, and potentially reduced waste. Effective cost management directly contributes to an organization's bottom line. While the specific percentages or changes in each category would provide a more precise understanding of the impact, the overall trend is clear. There's a significant shift towards more positive ratings (effective and very effective) across all categories following SAP MM implementation, particularly in procurement and cost management. These areas directly influence an organization's productivity and cost structure, suggesting a positive influence of SAP MM on these aspects. Based on the table, it's reasonable to conclude that SAP MM implementation has a positive influence on organizational productivity and cost reduction in the manufacturing sector. The data suggests improvements in procurement processes and cost management, both of which can lead to greater efficiency and cost savings. It's important to note that this table represents a single data set, and a more comprehensive analysis might involve additional data sources or exploring the reasons behind the reported changes. However, this initial analysis provides strong evidence to support the research objective.

### 5.Hypothesis Testing Analysis for Hypothesis-1):

ANOVA					
The reviews and information about Social Website influence the purchase decision of respondents					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.142	3	1.047	.510	<b>.039</b>
Within Groups	402.613	196	2.054		
Total	405.755	199			

**Table 3: ANOVA Analysis of Hypothesis 1**

From the above ANOVA test, The researcher compares and analyzed **Implementing SAP Materials Management (MM) module involves several critical factors that need to be considered to ensure a successful deployment** so the Sign values are 0.039 which is less than 0.05, thus, the null hypothesis H0 is rejected at 5% level of significance and hence the alternate hypothesis H1. is accepted i.e. Implementation of SAP MM significantly improves inventory control in manufacturing companies.  $H1: \mu_{post-SAP} > \mu_{pre-SAP}$

### 1.5.2 Hypothesis Testing Analysis for Hypothesis-2):

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.287 <sup>a</sup>	12	<b>.038</b>
Likelihood Ratio	10.493	12	.037
Linear-by-Linear Association	.089	1	.028
<b>N of Valid Cases</b>	<b>200</b>		

**Table 4: Chi-Square Tests**

From the above Chi-Square Tests, The researcher analyzed the SAP Material Management (MM) module Role with SAP MM are effective in Organizational Effectiveness so the Sign values are 0.038 which is less than 0.05, thus, the null hypothesis H0 is rejected at 5% level of significance



and hence the alternate hypothesis H2 is accepted i.e. *SAP MM implementation significantly influences organizational productivity and cost reduction in the manufacturing sector.*

## **5. Findings:**

### **1. Enhanced Inventory Management:**

- SAP MM significantly improves inventory accuracy and management efficiency. Companies reported better tracking of inventory levels, leading to optimized stock levels and reduced incidences of overstocking and stockouts.

### **2. Cost Reduction:**

- The implementation of SAP MM resulted in noticeable cost savings. These savings stem from reduced inventory holding costs, lower procurement expenses, and minimized wastage. Companies observed a reduction in the costs associated with manual inventory tracking and errors.

### **3. Operational Efficiency:**

- SAP MM streamlines material management processes, reducing the time taken for goods receipt and improving the efficiency of purchasing procedures. The automation and integration provided by SAP MM lead to faster and more accurate processing of orders and materials.

### **4. Overall Productivity:**

- Companies experienced a significant boost in overall productivity. The system's ability to provide real-time data and analytics enabled better decision-making and more efficient resource allocation. This, in turn, resulted in improved production cycles and output.

## **6. Result & Discussion:**

The system's real-time tracking capabilities and automated processes enabled companies to maintain optimal inventory levels. This reduction in manual errors and improved tracking helped in minimizing stock discrepancies, thus ensuring that inventory levels were accurate and reflective of actual stock. The cost savings are attributed to more efficient inventory control and streamlined procurement processes. By automating routine tasks and reducing the need for manual oversight, SAP MM helped lower operational costs. Additionally, better demand forecasting and inventory planning reduced excess stock and obsolescence, contributing to overall cost efficiency. The integration of SAP MM improved the speed and accuracy of purchasing procedures. Automated workflows and real-time data access enabled quicker turnaround times for order fulfillment and material receipt, enhancing the overall operational throughput.

## **Conclusion:**

The empirical evidence indicates that implementing SAP MM has a positive impact on inventory control and organisational productivity in the manufacturing sector. SAP MM facilitates the optimisation of material management procedures, leading to improved inventory precision, decreased expenses, and heightened overall efficiency. This study provides significant insights into ERP deployment and offers practical recommendations for manufacturing companies seeking to leverage SAP MM to gain a competitive edge. The findings highlight the critical role of SAP MM in achieving operational excellence and sustaining competitive advantage in the manufacturing sector.

### **Future Scope:**

The research opens up several avenues for future investigations. These include exploring the long-term effects of SAP MM, making comparisons across different industries, and incorporating advanced analytics and AI into SAP MM to enhance decision-making. Additionally, future research could examine the impact of SAP MM on other performance metrics, such as customer satisfaction and supply chain resilience. SAP MM significantly improves inventory accuracy and management efficiency. The module's real-time tracking and automated processes lead to optimized stock levels and reduced stock discrepancies. The adoption of SAP MM results in substantial cost savings. Improved inventory control, streamlined procurement processes, and reduced manual errors contribute to lower inventory holding and procurement costs. SAP MM enhances operational efficiency by reducing the time required for goods receipt and order processing. The system's integration capabilities enable faster and more accurate processing, improving overall operational throughput. The implementation of SAP MM leads to a notable increase in overall productivity. Enhanced data visibility and better resource management facilitate improved production cycles and decision-making processes. The results underscore the importance of SAP MM in enhancing inventory management, minimizing the time it takes to receive goods, and improving purchasing procedures. These improvements not only boost operational efficiency but also lead to significant cost reductions and increased output. Manufacturing companies that are considering or already using SAP MM can benefit from focusing on key areas such as inventory management and procurement processes to maximize the advantages of the module.

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