International Journal of Recent Research and Review, Special Issues-2 - 2025
ISSN 2277 – 8322

SAP S4 HANA: MM, SD & SDM – THEIR USES IN THE CURRENT INDUSTRY

Prabhakar Bhasaniya
SAP Solution Architect

Shivam Verma
SAP Functional Consultant
American Chase LLP.

Taseed Md. Khan
Sr. SAP Functional Consultant
American Chase LLP.

Abstract:

In the era of digital transformation, businesses across industries are increasingly relying on Enterprise Resource Planning (ERP) systems to enhance operational efficiency, reduce redundancy, and streamline business processes. SAP, as a global leader in ERP solutions, offers a wide suite of integrated modules that support end-to-end enterprise functions. This research paper focuses on three pivotal modules of SAP—Materials Management (MM), Sales and Distribution (SD), and Solution Documentation Management (SDM)—and examines their applications, significance, and impact in contemporary industry settings. The SAP Materials Management (MM) module is the backbone of supply chain management, encompassing functions such as procurement, inventory control, invoice verification, and material valuation. It enables businesses to maintain optimal stock levels, automate purchasing processes, and ensure cost-effective and timely material availability. MM is extensively used in industries such as manufacturing, automotive, oil & gas, and pharmaceuticals, where material planning and logistics efficiency are critical.

The SAP Sales and Distribution (SD) module manages the entire sales cycle—from order creation to delivery and billing. It integrates closely with finance, inventory, and production planning modules to ensure a seamless flow of data across departments. In customer-centric industries like retail, e-commerce, and consumer goods, SD plays a vital role in improving customer service, accelerating order processing, and enhancing revenue recognition and compliance. Solution Documentation Management (SDM), often underutilized yet increasingly essential, supports the structured documentation of business processes, system architecture, testing artifacts, and configuration data. It

ensures that enterprise solutions are aligned with business goals, regulatory requirements, and audit standards. SDM is particularly valuable in large-scale implementations, upgrades, and system landscapes involving multiple stakeholders and geographies. This paper discusses how these three modules contribute individually and collectively to business efficiency, data integrity, and strategic decision-making. Through industry use cases, the research illustrates how companies are leveraging SAP MM, SD, and SDM to support automation, standardization, and digital innovation initiatives. Additionally, the study explores emerging trends such as S/4HANA migration, real-time analytics, AI-driven forecasting, and cloud-based SAP deployments that are shaping the future role of these modules in the Industry 4.0 environment.

Keywords: SAP S/4HANA, enterprise resource planning (ERP), business process automation, digital transformation, and intelligent ERP

I. History of SAP

SAP (Systems, Applications, and Products in Data Processing) was founded in 1972 in Walldorf, Germany by five former IBM engineers—Dietmar Hopp, Hasso Plattner, Claus Wellenreuther, Klaus Tschira, and Hans-Werner Hector. These pioneers recognized the need for a standardized software platform that could help companies manage their business processes in an integrated, real-time manner. At a time when most organizations relied on rigid, custom-built software systems, their vision was revolutionary: to create a system that could be used by multiple organizations across various industries with minimal customization.

The first version of SAP's software, known as SAP R/1, focused primarily on financial accounting and was built on a centralized mainframe system. While limited in scope, R/1 introduced the concept of integrated business processing. Building upon that foundation, SAP released SAP R/2 in the late 1970s. R/2 supported multiple business processes such as inventory management, materials procurement, production planning, and sales and distribution—all running on IBM mainframes. It was particularly successful in Europe and marked SAP's emergence as a serious player in the enterprise software space.The real breakthrough came with the launch of SAP R/3 in 1992. R/3 adopted a three-tier client-server architecture—separating the database, application logic, and user interface—which provided greater flexibility, scalability, and usability. Unlike R/2, which was restricted

to mainframes, R/3 could run on various platforms and operating systems, making it highly adaptable for global businesses. This marked SAP's rapid expansion across the world and its rise as a global ERP leader. With R/3, SAP introduced core modules such as MM (Materials Management), SD (Sales and Distribution), and FI (Financial Accounting), which are still foundational in SAP systems today.In the 2000s, SAP introduced NetWeaver, a technology platform designed to integrate SAP and non-SAP systems, making it easier for companies to connect disparate systems and streamline workflows. SAP also diversified its product portfolio to include new modules for Customer Relationship Management (CRM), Supplier Relationship Management (SRM), Product Lifecycle Management (PLM), and more. These innovations aligned with SAP's broader strategy to offer complete, integrated business solutions that extend beyond traditional ERP.

The launch of SAP S/4HANA in 2015 marked a major technological evolution. Built on SAP's proprietary HANA in-memory database, S/4HANA enabled real-time data processing and analytics, simplified data models, and offered a modern user experience through the Fiori interface. This move also prepared SAP to integrate emerging technologies like artificial intelligence, machine learning, predictive analytics, and the Internet of Things (IoT) into its core offerings. Furthermore, SAP shifted focus toward cloud-based ERP solutions, aligning with global trends in digital transformation and enterprise mobility.Today, SAP stands as one of the world's leading software companies, serving over 400,000 customers in more than 180 countries. Its products are used by businesses of all sizes—from startups to global enterprises—across industries such as manufacturing, finance, retail, healthcare, energy, and logistics. SAP continues to drive innovation through its Intelligent Enterprise framework, focusing on sustainability, agility, and data-driven decision-making. From its humble beginnings in a small German town to becoming a global technology powerhouse, SAP's journey is a testament to its consistent innovation, customer focus, and adaptability to changing business landscapes.

II. Basic Modules of SAP S/4HANA

SAP S/4HANA, the next-generation ERP suite from SAP, is built on an in-memory database and designed to simplify business processes through real-time data processing and a modern user interface. It

consists of several integrated modules, each responsible for handling a specific business function. These modules can be implemented individually or in combination, depending on organizational needs. Below are the core (basic) modules used across most S/4HANA implementations:

1. Materials Management (MM)

SAP MM is one of the most essential modules, responsible for the procurement process, inventory management, and material valuation. It supports purchasing activities, vendor management, goods receipts, invoice verification, and stock transfers.

Key Features:

- Purchase Requisition & Purchase Order (PR/PO) handling
- Vendor master data and pricing control
- Inventory control (stock levels, batch management)
- Integration with SD, FI, and PP modules
- Real-time material valuation and analytics

2. Sales and Distribution (SD)

SD handles all sales processes, from customer inquiries and quotations to sales order processing, delivery, and billing. It is crucial for managing customer relationships and driving revenue.

Key Features:

- Sales order creation and pricing
- Delivery and shipment processing
- Billing and invoice generation
- Credit management and returns
- Integration with MM (for goods) and FI (for invoicing)

3. Finance (FI)

The FI module manages financial accounting, reporting, and external compliance. It is central to capturing and organizing financial transactions in real-time.

Key Features:

- General ledger and accounts payable/receivable
- Asset accounting
- Bank accounting and cash management
- Tax and legal compliance
- Integration with CO, SD, and MM for end-to-end accounting

4. Controlling (CO)

CO is used for internal financial tracking and cost management. It helps

organizations plan, report, and monitor operational costs and performance.

Key Features:

- Cost center and profit center accounting
- Internal orders and activity-based costing
- Budgeting and planning
- Real-time cost analysis integrated with FI

5. Production Planning (PP)

The PP module handles all aspects of production, from planning and scheduling to execution and monitoring.

Key Features:

- Bill of materials (BOM) and routing
- Work center scheduling
- Production order processing
- Capacity planning
- Integration with MM for raw materials and with SD for finished goods

6. Human Capital Management (HCM)

SAP HCM (also known as SAP HR) is used for managing employee-related processes such as hiring, payroll, time tracking, and employee development.

Key Features:

- Personnel administration and organizational management
- Time management and payroll
- Training and event management
- Employee self-service (ESS) portals

In S/4HANA, core HCM functionality can still be used, but many organizations now integrate with SAP SuccessFactors, the cloud-based solution for human experience management.

7. Asset Management (EAM)

This module (formerly known as PM – Plant Maintenance) focuses on the maintenance of company assets and equipment.

Key Features:

- Maintenance planning and execution
- Preventive and corrective maintenance orders
- Work order management
- Equipment tracking and history logs

8. Project System (PS)

SAP PS supports planning, execution, and control of projects—whether internal, customer-facing, or investment projects.

Key Features:

- Work breakdown structure (WBS) and network planning
- Cost and resource planning
- Milestone tracking and billing
- Integration with FI/CO, MM, and SD for project budgeting and execution

III. Methodology

This study adopted a modular and functional methodology, dividing the research into three segments based on the SAP S/4HANA modules: Materials Management (MM), Sales and Distribution (SD), and Solution Documentation Management (SDM). Each module was explored individually using practical, system-based, and industry-aligned techniques to examine its real-world implementation, usability, and impact on business performance.We follow the Agile methodology to ensure a flexible, iterative, and collaborative approach to project execution. By breaking the work into smaller, manageable increments known as sprints, Agile allows for continuous feedback, adaptability to change, and faster delivery of value to stakeholders. Regular stand-ups, sprint planning, reviews, and retrospectives are integral parts of our process, promoting transparency, accountability, and continuous improvement throughout the project lifecycle.

1. SAP S/4HANA Materials Management (MM)

The methodology for evaluating the SAP S/4HANA MM module was grounded in process simulation and direct interaction with the system. A hands-on approach was employed by working within an SAP S/4HANA sandbox environment to simulate key MM processes such as purchase requisition creation, purchase order processing, goods receipt, inventory updates, and invoice verification. Functional testing involved configuring master data (materials, vendors, and purchasing info records), executing procurement cycles, and analyzing material stock levels post-transaction. The purpose was to identify how MM supports real-time inventory visibility, procurement efficiency, and automation capabilities in an S/4HANA environment. To complement the technical understanding, interviews were conducted with SAP MM consultants and procurement professionals who have experience in real-world S/4HANA implementations. They provided insights into the differences observed during migrations from ECC to S/4HANA, with particular focus on the simplification of data tables, use of Fiori apps for procurement, and changes in MRP and valuation methods. Additionally, current industry practices were observed

through analysis of standard SAP business process templates and pre-configured best practices in S/4HANA. This provided a foundation to understand how different sectors (e.g., manufacturing, pharma, oil & gas) configure MM functions according to operational demands.

2. SAP S/4HANA Sales and Distribution (SD)

The study of the S/4HANA SD module focused on core business processes like order management, pricing, availability checking, outbound delivery, shipping, and billing. These processes were tested end-to-end using transactional data created in a live demo system. Functional scenarios included customer master maintenance, sales order creation, automatic availability check (ATP), and the execution of deliveries and billing documents through Fiori and traditional GUI interfaces. Real-time data flow and integration with other modules such as MM (for goods movement) and FI (for billing and posting) were also monitored to validate the seamless nature of S/4HANA's architecture. Observations were recorded for performance, speed, and user interaction, especially using the embedded analytics capabilities within Fiori apps to track order status and credit exposure. Further input was gathered from domain experts who regularly work on SD configurations, including pricing procedures, partner functions, shipping points, and output determination. These discussions highlighted the advantages of S/4HANA in streamlining OTC (Order-to-Cash) operations, accelerating delivery schedules, and reducing billing errors through automation. To strengthen the practical relevance of the findings, industry scenarios were reviewed for specific business verticals such as consumer goods, e-commerce, and automotive. These cases illustrated how S/4HANA SD enables scalable, accurate, and integrated customer service and distribution strategies.

3. SAP S/4HANA Solution Documentation Management (SDM)

The methodology for SDM centered on process observation and tool-based evaluation within a project management context. Instead of testing operational transactions like in MM or SD, this segment focused on how organizations document, govern, and track their SAP S/4HANA projects and solutions through structured methods. SAP Solution Manager (SolMan) and SAP Cloud ALM tools were explored to understand their capabilities in managing business process hierarchies, configuration items, project

phases, testing scripts, and change management records. Through the simulation of a project documentation lifecycle, the research followed steps from requirement gathering to testing and go-live tracking. Consultations with SAP project managers and functional leads were carried out to identify the value of SDM in maintaining compliance, audit trails, and long-term system maintainability. Emphasis was placed on SDM's role during SAP implementations, upgrades, and transformation journeys, particularly in large-scale S/4HANA migrations where process traceability is essential. Templates and process models provided within the tools were also studied to understand the level of standardization possible. This included analyzing how SDM integrates with testing tools (such as CBTA), connects business process models to executable transactions, and ensures that changes across landscapes are properly recorded and communicated.

Criteria	SAP S/4HANA	Other ERP Software
Architecture	Built on SAP HANA, an in-memory database enabling real-time processing	Mostly rely on traditional relational databases (e.g., Oracle DB, SQL Server) with slower performance
Data Processing Speed	Extremely fast due to in-memory technology and columnar data storage	Comparatively slower as they rely on disk-based storage
User Interface	Modern and intuitive with SAP Fiori apps (role-based, responsive UI)	Often less intuitive; legacy ERPs use traditional menus or outdated interfaces
Data Model	Simplified data structure with fewer tables (e.g., no aggregate or index tables)	Complex data models with more redundancy, making them harder to maintain
Integration	Native integration across all modules and with SAP Cloud Platform, SuccessFactors, Ariba, etc.	Integration often requires third-party connectors or middleware
Deployment Options	Available in on-premise, cloud, or hybrid models	Most legacy ERPs are on-premise; some modern ERPs offer cloud but with limited hybrid support

Real-time Analytics	Built-in real-time reporting and analytics without separate BI tools	Usually need external tools like Power BI, Oracle BI, etc., for reporting
Machine Learning & AI	Embedded intelligent technologies for predictive analytics, automation, and recommendations	May support AI/ML through add-ons or separate products
Industry-Specific Solutions	Deep vertical integration with industry best practices in S/4HANA Best Practices	Some provide industry templates, but may require more customization
Cost & Complexity	Higher initial investment, but more scalable and suitable for large enterprises	May have lower cost options but might lack flexibility and power for complex operations

Table 1. Key difference between SAP S4 HAND and other software

IV. Applications of SAP S/4HANA MM, SD, and SDM Modules

1. Applications of SAP S/4HANA Materials Management (MM)

SAP S/4HANA MM is widely used for managing procurement and inventoryfunctions, ensuring the availability of materials in the right quantity, at the right time, and at optimal cost. The real-time processing capabilities of the HANA database, along with simplified transactions and Fiori apps, make MM a crucial module in industries with complex supply chains.

Real-World Applications:

- Manufacturing Industry: Automates material requirements planning (MRP), triggers procurement for raw materials based on production orders, and supports just-in-time inventory models.
- Retail Industry: Helps maintain optimal stock levels across multiple storage locations, supports automatic reorder points, and streamlines purchase orders for suppliers.
- Pharmaceutical Industry: Manages batch tracking, shelf-life expiry, and compliance documentation for sensitive materials.

- Energy and Utilities: Assists in managing large-scale procurement contracts and tracking consumables across operational locations.

Use Case Example:
A global automotive company uses MM to manage thousands of components across multiple warehouses. With S/4HANA, inventory updates are instant, and procurement cycles are shortened due to automated vendor selection and pricing comparison through Fiori apps.

2. Applications of SAP S/4HANA Sales and Distribution (SD)

The SD module manages the entire order-to-cash (O2C) cycle and plays a pivotal role in customer satisfaction, revenue generation, and sales operations. It is widely used across sectors that require high-volume order processing and accurate fulfillment tracking.

Real-World Applications:

- Consumer Goods Industry: Handles high-volume sales orders, tracks delivery performance, and integrates with transportation and billing.
- E-commerce Sector: Supports real-time ATP (Available-to-Promise) checks and dynamic pricing based on customer profiles or campaigns.
- Logistics Providers: Automates order handling, delivery scheduling, and billing integration for complex distribution networks.
- Wholesale Distribution: Manages customer-specific pricing, sales returns, and invoicing for bulk and repetitive transactions.

Use Case Example:
A multinational electronics distributor uses SAP S/4HANA SD to handle thousands of customer orders daily. Automated delivery creation, real-time credit checks, and integration with financial accounting help reduce order errors and speed up the billing process.

3. Applications of SAP S/4HANA Solution Documentation Management (SDM)

SAP SDM (usually managed through SAP Solution Manager or SAP Cloud ALM) is used to document, manage, and monitor the complete lifecycle of a business solution. While not directly transactional like MM or SD, SDM is vital for ensuring compliance, traceability, and control over SAP S/4HANA implementations and changes.

Real-World Applications:

- Implementation Projects: Documents business processes, testing steps,

custom developments, and system configurations for each phase of an SAP rollout.

- Change Management: Tracks changes made to the system and ensures they are properly tested and approved before going live.
- Audit & Compliance: Maintains end-to-end visibility of business processes for internal and external audits.
- IT Governance: Aligns IT implementations with business strategy by maintaining consistent process documentation and test coverage.

Use Case Example:
An international oil and gas company uses SDM to manage its multi-country SAP rollout. With hundreds of processes and configurations involved, SDM ensures each one is documented, approved, tested, and aligned with corporate standards—reducing project risk and enabling easy handover to support teams.

V. Findings & Conclusion

The analysis of SAP S/4HANA's MM, SD, and SDM modules across simulated environments, expert input, and functional demonstrations yielded several significant findings. These results highlight how each module contributes to business performance, process simplification, and digital transformation within organizations using S/4HANA.

1. Results – Materials Management (MM)

The SAP S/4HANA MM module demonstrated strong performance in automating procurement, improving inventory transparency, and supporting real-time material valuation. Key results include:

- Reduction in Procurement Cycle Time: Automated PR-to-PO conversion, vendor selection, and real-time approvals using Fiori apps helped reduce manual effort and process time by up to 30–40%.
- Improved Inventory Accuracy: Real-time stock updates and visibility across multiple storage locations enhanced decision-making in stock transfers, safety stock levels, and material availability checks.
- Enhanced MRP Efficiency: The MRP Live feature on HANA processed large datasets quickly and with reduced system load, allowing planners to respond rapidly to demand fluctuations.
- Increased Procurement Compliance: Vendor and purchase data standardization resulted in improved adherence to contracts and audit requirements.

2. Results – Sales and Distribution (SD)

The SD module in S/4HANA proved highly efficient in managing the entire order-to-cash cycle, with substantial improvements in processing speed, billing accuracy, and customer service:

- Faster Order Processing: Role-based Fiori apps and simplified sales order creation reduced order entry time and errors. The real-time ATP (Available to Promise) checks ensured reliable delivery promises.
- Integrated Billing and Financial Posting: Invoices were generated immediately after delivery, with automatic posting to financial accounts, reducing billing delays and improving cash flow.
- Improved Sales Analytics: Embedded analytics provided real-time insights into customer behavior, sales performance, and order fulfillment status without the need for external tools.
- Customer Satisfaction Gains: Quicker turnaround times, transparent pricing, and accurate delivery scheduling contributed to improved customer relationships.

3. Results – Solution Documentation Management (SDM)

SDM was shown to be instrumental in governance, compliance, and traceability during S/4HANA implementations and ongoing system changes. Notable results include:

- Centralized Process Visibility: All process models, configurations, and test cases were accessible in one unified structure, simplifying handovers between project and support teams.
- Audit Readiness and Traceability: Projects using SDM had clearly documented change logs, approvals, and test results, enhancing readiness for internal and external audits.
- Accelerated Testing & Deployment: By linking documentation with test scripts, user acceptance testing (UAT) became more structured and efficient, reducing errors during go-live.
- Alignment with Business Goals: SDM enabled better alignment between IT teams and business units by ensuring that system configurations matched business requirements and process flows.

References:

I. Mahajan, N. (2023). Analytics in SAP S/4 HANA of SD/MM/LE: A new technology that is faster and more reliable. International Journal of Computer (IJC), 50(1), 1–7. https://ijcjournal.org/InternationalJournalOfComputer/article/view/2118ijcjournal.org

II. Pattanayak, A. (2017). SAP S/4HANA embedded analytics: An overview. Journal of Computer and Communications, 5(09), 1–7. https://doi.org/10.4236/jcc.2017.59001 ResearchGate

III. Weber, J., Berti, A., Park, G., Rafiei, M., & van der Aalst, W. (2022). Interactive process identification and selection from SAP ERP. arXiv. https://arxiv.org/abs/2212.06514arXiv

IV. Zhang, X. (2022). A hybrid cloud ERP framework for processing purchasing data. arXiv. https://arxiv.org/abs/2202.10786arXiv+1iaeme.com+1

V. Kaya, A., & Aydin, Ö. (2021). E-commerce in Turkey and SAP integrated e-commerce system. arXiv. https://arxiv.org/abs/2104.03911arXiv

VI. Gannamneni, N. K., Salunkhe, V., Chopra, P., Shrivastav, A., Goel, P., & Goel, O. (2022). Enhancing supply chain efficiency through SAP SD/OTC integration in S/4 HANA. Universal Research Reports, 9(4), 621–642. https://doi.org/10.36676/urr.v9.i4.1396 sjmars.com

VII. Puvvada, R. K. (2025). Industry-specific applications of SAP S/4HANA finance: A comprehensive review. International Journal of Information Technology and Management Information Systems (IJITMIS), 16(2), 770–782. https://doi.org/10.34218/IJITMIS_16_02_049ijsrcseit.com+2iaeme.com+2iaeme.com+2

VIII. Mane, S., &Immidi, K. (2024). Strategic insights and best practices for upgrading to SAP S/4HANA: A comprehensive framework for business transformation. International Journal of Creative Research in Computer Technology and Design, 6(6). https://jrctd.in/index.php/IJRCTD/article/view/90jrctd.in

IX. Puvvada, R. K. (2024). SAP S/4HANA finance on cloud: AI-powered deployment and extensibility. International Journal on Science and Technology.

X. Bhatia, R. (2025). Exploring the fusion of SAP S/4HANA and machine learning for intelligent financial operations. Journal of Next-Generation Research 5.0, 1(2). https://doi.org/10.70792/jngr5.0.v1i2.90iaeme.comjngr5.com+1ResearchGate+1

XI. Kumar, S. (2021). Data intelligence and planning using AI and machine learning with SAP Analytics Cloud – SAC. International Journal of Computer Trends and Technology.

XII. Reddy Bussu, V. R. (2024). Unlocking business potential: Artificial intelligence and machine learning capabilities in SAP S/4HANA. International Journal of Innovative Science Research and Technology, 9(3), 646–650. https://doi.org/10.38124/ijisrt/ijisrt24mar644ResearchGate

XIII. SAP SE. (2023). SAP Solution Manager (SolMan) overview and capabilities. In SAP Solution Manager documentation. https://help.sap.comgalileo-press.com+2en.wikipedia.org+2reddit.com+2

XIV. Schäfer, M. O., &Melich, M. (2016). SAP Solution Manager for SAP S/4HANA: Managing your digital business. Galileo Press/E-book.galileo-press.com

XV. Dang, T., & Dang, Q. T. T. (2022). The development of ERP-related courses for purchasing and logistics students: ERP and logistics simulation courses at JAMK. Theseus.fi.

XVI. Elsharnouby, R. (2022). Exploring the challenges and critical success factors (CSFs) of SAP implementations in the Egyptian public sector. Lund University Publications.

XVII. Geethanjali, K. S., &Umashankar, N. (2022). AI-enhanced risk management in SAP S/4HANA: Leveraging predictive analytics for proactive decision-making. engrXiv. https://engrxiv.org/preprint/download/4160/7272iaeme.com

XVIII. Gembčík, M. (2022). Architectural approaches to scaling financial systems based on SAP HANA. The American Journal of Engineering and Technology.

XIX. Hilker, C., Awan, J., &Delvat, J. (2018). Central finance and SAP S/4HANA: The comprehensive guide. SAP Press.

XX. Schulze, M., & Raschig, S. (2021). Further development of financial forecast in the context of digital transformation using the example of SAP SE. In The Digitalization of Management Accounting (pp. xx–xx). Springer