SAP S/4HANA Supply Chain Planning and Manufacturing

Explore digital transformation using SAP IBP and SAP S/4HANA

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To every reader who finds a part of themselves within these chapters

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  A proven ability to work cross-functionally and build strong client relationships through clear communication and a pragmatic approach.

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Preface

This book will provide an insight into SAP S/4HANA Manufacturing, SAP Integrated Business Planning (IBP) and Digital Manufacturing cloud and also talks about AI, ML, robotic automations in the area. All these tools are an outcome of SAP's journey through lessons learnt in the last 25 years.

This book will start with exploring the concepts in planning and manufacturing, then how to implement these tools as SAP IBP and SAP S/4HANA manufacturing. We will focus on what are the key innovations in Planning and Manufacturing in HANA. In order to make the reader understand why SAP keeps on improvising SAP solutions in the planning and manufacturing area, we will provide the big picture that an industry went through, and SAP's solution had a shortfall to achieve that. That gap again generates lessons learnt for SAP. So, SAP will bring that feature in the next product.

Furthermore, we will deep dive into features and functionalities of current Planning solutions like SAP IBP as well as the manufacturing process that SAP S/4 HANA offers. Followed by a consulting approach. We will discuss the challenges faced in these areas and the best possible solution to address them.

The last section of the book will be the near future of SAP's offering of cloud tools in planning and manufacturing areas. This section will also talk about what parameters are most impacting in deciding to implement these cloud tools. The cherry on the top will be that we will bring Artificial Intelligence and Machine Learning capabilities in these tools with the client's perspective.

Also, readers will find a brief history of SAP's journey providing solutions in supply chain planning and manufacturing to reach the destination of SAP S/4HANA. A reader, if they wish to start a career in SAP consulting, or even started, will find it useful to prepare their own pitch when they encounter a real-life problem and to solve that within the SAP framework. In simple terms, this book will answer the question: why SAP IBP, Or Why S/4HANA, Or why cloud tools OR how to implement them.

Chapter 1: Exploring Planning and Manufacturing in S/4HANA – This chapter introduces our readers to the new age solution of SAP by explaining the innovative way of planning and manufacturing in IBP and S/4HANA (Covering the planners to adopt the new way of planning and consultants to implement the solutions in SAP IBP and SAP S/4HANA). It covers present supply chain challenges and opportunities for new global organizations

using the latest planning tools like SAP IBP and Digital Manufacturing and to achieve value realization.

Chapter 2: Uncovering Inter-connected Business Process through SAP S/4HANA – Business is an accumulation of inter-connected and interdependent defined processes that work together as a whole to fulfill the purpose of the business. We will discuss core business processes in this chapter, which are addressed by SAP S/4HANA. Furthermore, we will deep dive into the inter-dependency of these processes to serve the objective of integration and covering end-to-end business processes, as well as we will highlight the system architecture of SAP S/4HANA for these processes.

Chapter 3: SAP S/4HANA Planning and Manufacturing Capabilities – The chapter explains about the innovations in SAP S/4HANA brought from the well accepted solutions like SAP APO, which combines sophisticated and intelligent planning algorithms, object-oriented data structures, and memory-resident optimization databases to address complex planning problems and optimize the best possible solution. Also, we will talk about how modules of SAP S/4HANA and key functionalities changed the planning world and how these functionalities are connected to the digital supply chain.

Chapter 4: Getting Started with SAP Integrated Business Planning – The chapter provides an overview of SAP IBP and describes detailed instructions for using the SAP IBP system to manage the organization's supply chain planning. SAP IBP is powered by SAP HANA in-memory technology, the cloud-based solution combines capabilities for sales and operations, supply and demand planning, inventory optimization, and Demand Driven MRP. It takes advantage of powerful supply chain analytics, what-if simulations, alerts, and much more.

Chapter 5: Implementing and Configuring SAP IBP - This chapter will get into the details of the SAP IBP system configuration for all the modules and their associated components. In this chapter, we will illustrate modeling tasks and concepts with examples. It will be easier for readers to follow the examples as they have been based on the current industry problems and how implementation in SAP IBP can solve them.

Chapter 6: Getting Started with SAP S/4HANA Manufacturing – This chapter explains SAP S/4HANA Manufacturing solutions, which provide a gateway to manufacturers while they can provide everyone with the right solution set that would cater to the requirements of the new-age customers. SAP S/4HANA can provide everyone with the most targeted one-stop solution, which would include manufacturing execution, enterprise planning, along with other top-notch services. And how it can enhance the manufacturing processes involved in digitization.

Chapter 7: Configuring SAP S/4HANA Manufacturing – The chapter explains how to set up or configure manufacturing processes in an SAP S/4HANA system. The set-up process starts with the configuration of the SAP system and then maintaining respective master data. The sequence will be master data set-up, then process flow-wise required configuration. It will give a proper understanding of configurations required for the process rather than providing end-to-end configuration ad hoc, helping readers to focus more on SAP S/4HANA. Furthermore, we will highlight the functionalities that originated from SAP ECC and still exist in the SAP S/4HANA system.

Chapter 8: Understanding SAP Digital Manufacturing Cloud – SAP Digital Manufacturing Cloud (SAP DMC) is a cloud-based Manufacturing Execution System (MES) designed to provide the link between production and business in supply chain management. SAP DMC provides global visibility across all plants by connecting top floor business systems to shop floor equipment. The chapter provides details about the features of SAP DMC, how it can be utilized by the organizations, and the benefits and innovations in the space.

Chapter 9: SAP S/4HANA Advance Planning: aATP and ePPDS – This chapter explains the advance planning in SAP S/4HANA, focusing on advance Available To Promise (aATP) for order fulfillment and production, embedded Production Planning and Detailed Scheduling (ePPDS) focusing on constraints based planning to run. The chapter will also explain how these newly introduced modules are integrated with other core modules of SAP S/4HANA or the outside tools.

Chapter 10: Implementing S/4HANA ePPDS and aATP – This chapter explains configuring SAP S/4HANA Embedded Production Planning and Detailed Scheduling (ePPDS) and Advance Available to Promise (aATP). In this section of the book, we will talk about the configuration activities referring to the S/4HANA system. We will cover the basic configuration required to activate and operate the embedded PPDS and Advance ATP within the SAP S/4HANA system.

Chapter 11: SAP S/4HANA Advance Manufacturing Features – This chapter will guide the readers on how to transact to SAP S/4HANA advanced manufacturing features such as predictive MRP, demand-driven MRP, MRP Live, and so on. We picked these features from the latest innovations done by SAP in the manufacturing area. Furthermore, we believe that a detailed step-by-step execution guide is a necessity for developing an understanding of how these innovations work. As SAP is introducing the features with every release, readers and consultants have to skill-up their knowledge, the book will provide guidance on the concept which can be explored further.

Chapter 12: Implementation Methodologies, Assessments, and Tools – Addressing the need to adopt technology transformation, digitization, and changing customer behavior, this chapter talks about how to select the planning tool, implementation approach, timelines by conducting the assessment and so on. SAP is well equipped to optimize organizations' supply chain planning and manufacturing processes and try to address challenges. We will talk about how to guide clients to adopt implementation methodologies which will be the best fit for the needs.

Chapter 13: Data Integration with SAP IBP and SAP S/4HANA Manufacturing – This chapter explains the integration of supply chain planning and manufacturing, and how SAP IBP and SAP S/4HANA manufacturing are connected with the various tools and provide integration from the shop floor to the top floor. This chapter explains organizations' scenarios about integrating SAP and non-SAP data with the SAP planning and manufacturing systems. We will also cover the selection of the right tools for the batch jobs driven or real-time data integration between SAP S/4HANA and DMC along with setting up tools for bi-directional data flow.

Chapter 14: AI, ML, Analytics, and Robotics Process Automation – In today's competitive market, organizations are working in an increasingly complex world disrupted by new-age digital technologies. Agile market and dynamic internal and external supply chain challenges force organizations to rebuild their existing supply chains supported by digitally enabled intelligent supply chains. This chapter explains the intelligence that SAP can bring in planning and manufacturing. It also explains the adoption of these new technologies.

Chapter 15: SAP Best Practices – This chapter covers the SAP best solutions for industry-specific end-to-end planning and manufacturing solutions and benefits by citing a few use cases. We will describe real-world examples and industry challenges to showcase the value proposition of implementing supply chain planning and manufacturing solutions. SAP S/4HANA is possibly worthwhile, or now, we can say, a mandatory investment to address the current industry challenges. It also explains how to combine business process engineering and system-led design process, rapid deployment using predefined best practices made available by SAP.

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Exploring Planning and Manufacturing in S/4HANA

Introduction

As the world is exploring options for adopting Digital Supply Chain and Manufacturing, this chapter describes how the SAP S/4HANA is supporting the digital economy to expand its wings for new standards in supply chain planning and manufacturing. This chapter also describes how SAP, with an innovative mindset, helps organizations to meet global challenges and have agile and resilient end-to-end supply chain solutions.

Structure

This book is structured to help the readers understand about the following topics:

- Evolution of Supply Chain Planning and manufacturing in SAP S/4HANA
- Supply chain planning and manufacturing challenges and complexities and how SAP is addressing these challenges
- SAP S/4HANA integration with subsequent modules such as procurement, asset management, or other cloud components like Ariba and so on
- SAP applications—Planning
    - SAP IBP
    - SAP S/4HANA embedded PPDS (ePPDS)
    - SAP S/4HANA advance ATP (aATP)

- SAP S/4HANA applications—manufacturing
  - SAP S/4 MRP Live
  - SAP digital manufacturing
  - Digital shop floor
- Configuring and implementing SAP S/4HANA solutions in planning and manufacturing
- Adopting intelligence using AI/ML and IOT
- User case and SAP best practices

Objectives

In this chapter, we will learn about SAP with an innovative mindset, which helps organizations to meet global challenges and have agile and resilient end-to-end supply chain solutions.

SAP S/4HANA for Industry 4.0

What is the "Fourth Industrial Revolution?" Whether my organization ready for the changes? What to adopt and how to adopt? Across the organization, these questions are arising, and business and IT jointly explore ways to start and adopt new ways of planning and manufacturing.

Industry 4.0, which revolutionizes the automation, monitoring, and analysis of supply chain planning and manufacturing through smart technologies, is powered by the **Internet of Things** (**IoT**) and analytics as robotic automation to control operations such as machinery, robots, tracking and tracing, building scenarios using what-if analysis, and so on. Industry 4.0 makes all connected things in the organization "intelligent"—from intelligent planning, intelligent manufacturing, and factories to intelligent warehousing and logistics. Industry 4.0 cannot work on its own; in fact, it requires an ecosystem right from the backend systems, which acts as a backbone of the entire intelligent supply chain management. SAP as **Enterprise Resource Planning** (**ERP**) helps organizations to achieve their objectives by utilizing the capabilities of S/4HANA as core and integrating it with components such as SAP **Integrated Business Planning** (**IBP**), **Digital Manufacturing Cloud** (**DMC**), and so on. Here in this book, we will try to learn about the functionalities and features of these components and how they can help you to make a decision to implement it in your organization or to enhance your knowledge as a Solution architect or functional consultant.

SAP S/4HANA acts as a digital core, centralizing core processes and critical competencies. It is a single holistic solution that covers planning, manufacturing execution, and service, and it simplifies the management of digital assets. IoT-enabled intelligence can be customized for specific requirements while keeping track of inventory and sales. With end-to-end visibility, SAP S/4HANA delivers efficiency and transparency and lowers operating costs.

This chapter will provide you with the background of the SAP S/4HANA suite, along with the different applications and functionalities it offers across its solution offerings. We will start

with the background and then move forward to the fundamentals of SAP S/4HANA along with its inter and intra-modular integration. The next part will introduce industry challenges that make SAP solutions worthy in the supply chain planning and manufacturing domain. We will provide a brief introduction to SAP cloud solutions and on-premises solutions with insights into the technology transformation.

Before we start discussing about technology transformation through SAP, let us consider the fact that Industry 4.0 will enable all machines or assets to access with internet. Thus, it can collect and transfer data to a monitoring application. Now, if we plan to put it in an on-premises data center, then it will be a mammoth because application development will require a data center, and integration stacks will require another data center. This will make the upliftment journey to Industry 4.0 standard very hard. This limitation can easily be overcome by cloud platforms as they offer application development and Integration stack. So, let us quickly understand how to make a cloud journey.

Cloud adoption

Business houses are moving from on-premises data centers to private cloud and now to public cloud. Although SAP has published a detailed list of standard services included with the RISE with SAP transformation, it is highly recommended that the business must plan for additional services, specifically around cloud adoption, application management, security, and digital enablement. This includes the following points:

- Business Process Transformation or program management Transformation such as Suite on HANA or SAP S/4HANA conversion and its impacts on the integrated applications which also requires architecture changes.
- Consolidated view of combined management for all business applications and services, including RISE with SAP-enabled services.
- SAP S/4HANA application functionality and configuration management, transports management, integrations setup, certificates management, data archiving management, architecting, management, and maintenance.
- Advanced database management and backup strategies. Also, the availability of the database due to multi-location and multi-time zone access is required.
- SAP Security management, including Fiori front-end, roles, and profiles management.
- Intelligent enterprise or digitally connected equipment.

SAP adoption process

Adopting SAP S/4HANA in the cloud incorporates and addresses most of the methodologies and phases within the Cloud Adoption Framework, as described in the diagram, *Figure 1.1*. Distinct constraints within each phase will require actions specific to SAP migration. The following is the framework for SAP cloud adoption:

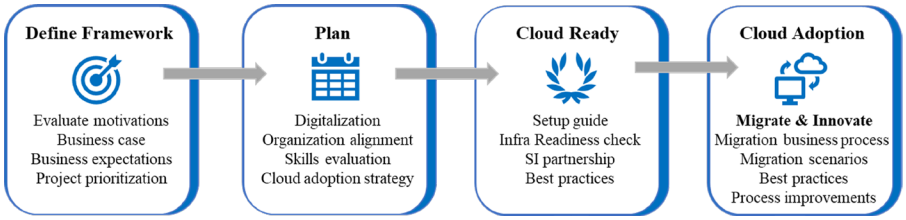

***Figure 1.1**: Cloud adoption process*

Finally, plan for appropriate mitigation strategies for RISE with SAP, migration, and post-go-live support with all stakeholders involved—SAP as a product owner, internal business, and IT users to assess capabilities around the overall transformation path, as well as third-party application providers and managed services partners.

Evolution of SAP S/4HANA

SAP S/4HANA was first introduced on February 3, 2012. It was a core ERP with mobility-powered reporting for near real-time reporting. The next year, SAP S/4HANA powered all ERP solutions by merging **Online Analytical Processing** (**OLAP**) and **Online Transactional Processing** (**OLTP**). This made the SAP S/4HANA unique even 10 years down the line. After the biggest innovation in the database, SAP S/4HANA introduced us to application-based innovations. Simple Finance and Simple Logistics are two major innovations introduced in 2014. These two innovations established the main pillar of SAP S/4HANA—Single Source of Truth. In 2015, SAP S/4HANA came with cloud solutions. Since these both stacks had several releases on product innovations. SAP introduced predictive analysis in 2016, and in early 2017, it introduced industry-specific solutions. The journey of SAP S/4HANA since its introduction is described as follows:

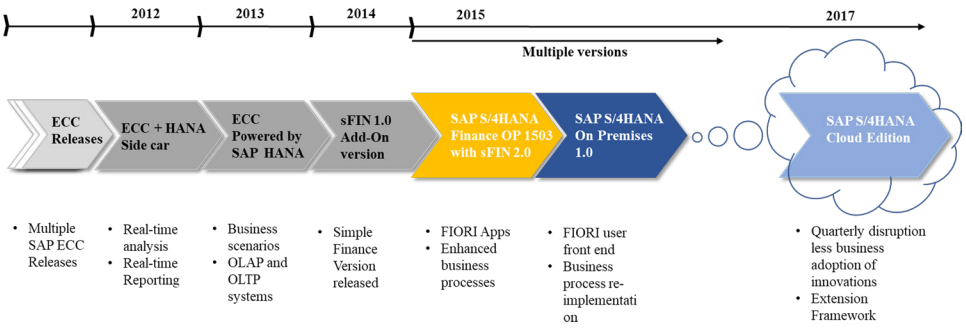

***Figure 1.2**: SAP S/4HANA evolution*

Why SAP S/4HANA

SAP S/4HANA comes with two editions: an on-premises edition and a cloud edition. On-premises edition is configurable and customizable at full scale, whereas the cloud edition is

majorly configurable and very less customizable. However, the **Enterprise Core Component** (**ECC**) is the fundamental layer of both types of editions.

To understand the SAP S/4HANA concept, we must investigate its evolution journey. It is evident that SAP has faced a certain challenge in scaling the older version of SAP ECC, so they came up with the new idea of SAP S/4HANA. We can take four pointers that SAP ECC could not provide, and eventually, SAP S/4HANA was introduced. These are as follows:

Computing capability of a database

SAP S/4HANA is the name of the application, whereas HANA is the name of the database. SAP ECC is mainly deployed on Oracle or the Sy-Base database. These databases have lots of advantages, but they are not capable of database-level computation. So, the HANA database has this key feature of database-level computation. For example, **Core Data Services** (**CDS**) views of reporting and MRP Live calculations are done at the HANA database level, not in the application layer. This has made user data management time while reporting or MRP batch job processing decreased to a great extent.

The other most important feature of the HANA database is embedded analytics powered by in-memory computing for real-time reporting and timely decision-making or even predictive decision-making.

Compressive data modeling

SAP ECC database tables are of three types. These are header tables, linking tables, and Item tables. All these tables have key fields as an example of **Bill of Materials** (**BOM**) tables, the field STLNR (BOM Number) is present in Header Table STKO, linking table STAS and Item Table STOP. It is present in the material, plant, and BOM linking table MAST. So, the repetition of information is evident in this model. While developing the SAP S/4HANA suite, SAP addressed this issue and created flat database tables like MATDOC or ACDOCA. These tables contain all data in a single record and offer a more compressed database.

Web-based or mobility-oriented user experience

SAP signature theme and its GUI are all based on standard desktops or laptops. However, the industry challenges are more on near real-time actions based; hence, SAP came up with Fiori Apps with SAP S/4HANA solution offering. Imagine a company would like to capture, report, and analyze data on a near real-time basis. This makes SAP Fiori provide Apps that are User requirements based. The key Fiori offerings are Transactional Apps for data capture, Factsheet/Lighthouse Apps for Reporting, and Analytical for data visualization. SAP Fiori is now an embedded functionality; hence, analytical Fiori Apps are readily available for users.

Adopting Cloud solutions

Software as a Service (**SaaS**) products are the new horizon of the ERP world, and scalability is of utmost importance for a sustainable business. SAP S/4HANA comes with cloud solutions,