

Integration of

SAP PRESS

Materials Management with
Financial Accounting in SAP

- ▶ Learn about the integration points between Financial Accounting and Materials Management in SAP ERP
- ▶ Discover how to integrate Materials Management with Financial Accounting processes
- ▶ Explore real-world examples and troubleshooting tips throughout

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Preface

The link between Materials Management and Financial Accounting is important. For all procurement, inventory, and invoice verification processes that Materials Management helps keep track of, the account postings are often the reasons, the result, and the guiding principles to those actions. As a consultant, super-user, project manager, or solution architect who understands the dependency of Materials Management and Financial Accounting, you will have a better understanding of the SAP system, and can provide far more efficient and effective solutions.

The integration of Materials Management and SAP ERP Financials is a topic of significant relevance to companies that are looking to create a smooth and efficient procurement process. So, integrating Materials Management and Financial Accounting correctly is quite important. And, building a flexible, integrated Materials Management solution set allows your business to grow and maintain the SAP systems with less component reengineering as you grow, saving resources and time.

This is a practical book that teaches you about the integration of Materials Management and Financial Accounting in SAP ERP. This book explores the relationship between Materials Management in SAP ERP (which we'll mainly refer to as Materials Management throughout this book) and SAP ERP Financials Financial Accounting (which we'll refer to as Financial Accounting for short) both at the functional and technical level. It's primarily aimed at Materials Management consultants who are looking for knowledge on integration issues. However, the book addresses other audiences as well. It explains the business concepts to the layman in the functional basis sections. From there, functional design is discussed for consultants who need to develop a better understanding of the ins and outs of Materials Management. The checkpoint and real-time issues sections provide super users, team managers, project managers, solution architects, and other decision-makers with practical, hands-on information. In addition, the technical elements sections are provided for technical and techno-functional consultants. Finally, the troubleshooting tips are provided for consultants performing support, maintenance, and troubleshooting work. These topics are often interwoven with each other and should be studied as a whole.

With this book we aim to fill the gap of knowledge that exists today regarding the integration between Materials Management and Financial Accounting in SAP ERP. In addition, this book discusses the functionality and technicalities of the system, so that you can develop a thorough understanding of the subject. For this book, we've gathered scattered bits and pieces of knowledge gained from years of experience in the industry, compiled it, and made it useful and applicable to the study of these integration topics – both in terms of functionalities and technicalities.

In **Chapter 1**, you'll be introduced to the concepts of business and learn about the purpose and scope of the book. **Chapter 2**, Overview of SAP ERP, is an introduction to finance, logistics, and human resources. It describes the organization of the core components of SAP within business, and SAP's evolution of tools.

In **Chapter 3**, you'll explore the elements of Materials Management in SAP ERP, Financial Accounting, and the relationship between them. You'll also be introduced to various troubleshooting techniques. **Chapter 4**, Basics of Configuration and the Processes in Procurement, covers the purpose of purchasing and its integration with Financial Accounting, and provides an introduction to the aspects of Customizing.

Chapter 5, Procurement of Stock and Consumable Materials, describes the various functionalities, configuration, and technical aspects of the procurement of stock and consumable materials. **Chapter 6** focuses on the condition technique and price determination in purchasing documents, and also discuss the basics of material price changes.

Chapter 7, Balance Sheet Valuation, teaches you about the various balance sheet valuation procedures such as LIFO and FIFO in the context of accounting principles, such as the principle of conservatism and the regulatory principles Generally Accepted Accounting Principles (GAAP) and International Financial Reporting Standards (IFRS). **Chapter 8** discusses material price changes and the various account postings associated with them.

In **Chapter 9**, Accounts Payable Invoice from Materials Management, you'll learn about the various functional aspects and technicalities of invoice verification. Pay special attention to this chapter, because there's a lot of interaction between Materials Management and Financial Accounting in this process. **Chapter 10** takes the concept of invoice verification further still and helps you understand variances and blocking of invoices.

In **Chapter 11**, you'll learn about valuation and account determination in SAP ERP. You'll also learn about the various kinds of automatic settlements. In addition, topics such as messages in Logistics Invoice Verification (LIV), credit memos, returns, reversals, and GR/IR clearing accounts are covered in this chapter. Finally, we'll summarize all of the chapters in the final chapter, **Chapter 12**. In addition, you'll find information on Financial Accounting validations, substitutions, and enhancements in **Appendix A**.

I hope this book helps you understand the integration between Materials Management and Financial Accounting. I also hope that you'll be able to use the knowledge you gain from the book to assess the risks, benefits, realization, and compliance related to integration, and that you'll be able to apply your knowledge to help make the processes at your company more efficient.

SAP ERP itself does not need an introduction within business communities. The introduction in this chapter will instead provide a glimpse into the general concept of ERP, its integration within business, as well as the definition of the scope of the book.

1 Introduction

Before diving deeply into the concept of SAP ERP, this chapter provides a brief discussion on how it benefits basic business purposes. We'll then proceed to explain how and to what extent SAP ERP can help you optimize business processes and what benefits and values it may bring in to businesses as a whole. Finally, we'll describe the purpose and scope of this book.

1.1 Business

The purpose or objective of any business is to produce something of a higher value than that invested in producing it. Therefore, generally speaking, the purpose of business is profit. The economic definition of profit is the difference between revenue and the opportunity cost of all resources used to produce the items sold. Thus, we have two important factors that affect profit:

- ▶ Revenue
- ▶ Expenses

To maximize profit, you need to maximize revenue and minimize expenses. It's important to realize that there's a subtle difference between these two components. While you can have direct control over your expenses, you can only influence revenue; you do not have direct control over it.

Nevertheless, the fact that businesses have direct control over expenses has resulted in the evolution of application software specifically for business enterprises. This software is known as Enterprise Resource Planning (ERP) software, and we'll look at it in detail next.

1.2 Enterprise Resource Planning

ERP software is used to plan resources within an enterprise in order to achieve the goals of the business. As an application system that supports logistics, manufacturing, and finance, tight integration is needed among the SAP components related to these business areas. When companies first make the high-level decision to implement ERP, it is so their profit can be maximized without risking future revenue; applying this decision along the business's objectives is referred to as *optimization*. The goal of SAP ERP is to optimize processes and resources within your business.

Let's try to understand the meaning of optimization with the help of an example.

Optimization

The expenses in your enterprise can be on human resources (operational), on buying equipment (capital), and on loans and bonds (financial). You can maximize your profit by reducing the salary you pay to your human resources. However, by doing so, you are at the same time reducing the buying capacity of the people who will directly or indirectly pay for the products you produce at your enterprise. Or, you might consider reducing the amount spent on equipment and its maintenance but a high rate of depreciation of these assets will incur expenditures too quickly in future.

There is one more important element missing from the above example: Operational cost is not only about the salary of the employees, it is also about the efficiency of the processes involved. Therefore, optimization is all about coordination and balance between operational, capital, and financial expenses around business processes. This is what we call *value creation* and is the concept central to modern businesses.

In summary, ERP focuses on optimizing business processes, which results in qualified control over the expenses of an enterprise. The goal of this book is to focus on the relationship between procurement and finance. Therefore, we will very briefly discuss their relationship from the point of view of business and ERP.

1.3 Procurement and Finance

As we discussed in the previous sections, businesses tend to keep control over their expenses with financial objectives in mind. In terms of ERP in general, businesses also have financial objectives in mind. In this case, however, objectives are

achieved by optimizing the business processes involved and SAP ERP software in particular helps businesses realize their business objectives on the technical level. The functionalities in procurement, which are the focus of this book, will be studied with respect to integration with finance.

Figure 1.1 shows the various components of Procurement and Logistics Execution and Financials within SAP ERP. In this book, we will explore the relationship between Procurement and Financial Accounting.

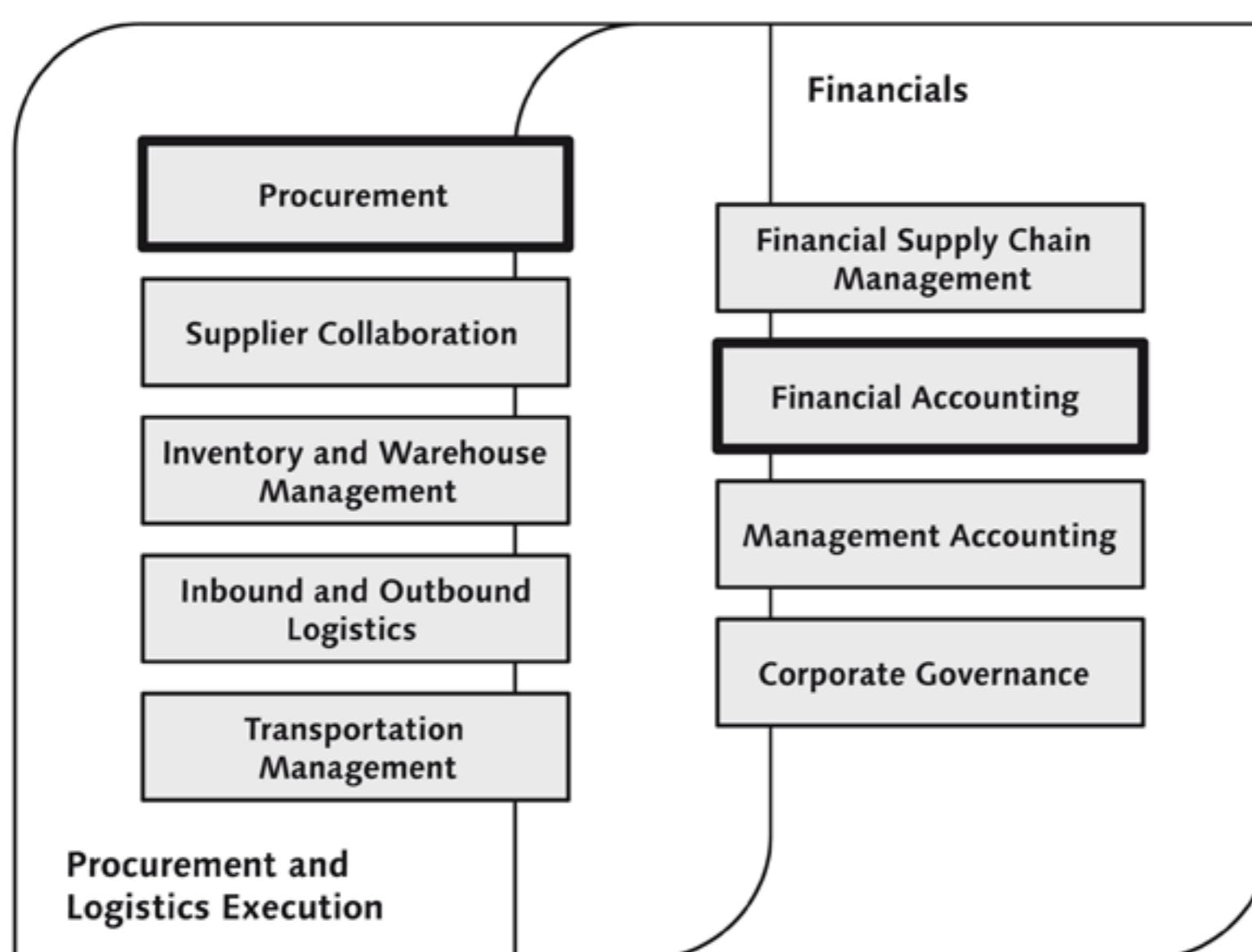


Figure 1.1 Integration of Procurement and Finance within SAP ERP

As you can see, there are procurement processes and finance processes, both with their own set of logistics, operational, and legal constraints. SAP ERP integrates them for the optimization of end-to-end business processes, combining both.

We don't expect you to get a complete idea of this integration with such a brief and generic description. However, you might now have a high level understanding of the integration and interaction between procurement and finance. The key to achieving your business objectives lies in understanding and utilizing this integration in the best possible way. This book aims to help you with this process.

1.4 Purpose of this Book

SAP ERP is composed of various components and functionalities. The functionality that addresses procurement is Materials Management; the component that addresses finance is SAP ERP Financials.

This book will describe the design features of Materials Management in SAP ERP and its integration with SAP ERP Financials. We'll start with a functional process description and then explore the underlying technical design. You'll develop a better understanding of the subject and the product. This book serves to fill the gap between the available theoretical knowledge and the practical requirements of consulting regarding the integration of procurement and finance within SAP ERP.

When we talk about procurement and finance, we are referring to the applications built from the coding blocks at the technical level. A black-and-white distinction between them is not possible until we analyze these coding blocks. Thus, the practical requirements of consulting, as far as the integration between procurement and finance is concerned, are based on both functional and technical aspects. Unfortunately, consultants are often either functional or technical. Therefore, there is often a lack of coordination regarding ownership/responsibility when it comes to integration issues.

On a technical level, the procurement coding block gets the information from procurement and passes it to the finance coding block, which may also do the same in reverse. If, in a given situation, the procurement consultant can identify that the procurement coding block picked the wrong information or if the coding block picks the correct information but nonetheless passes the wrong information, there is a problem that needs to be analyzed in procurement. This is also true for finance.

This book is meant to provide you with insight into technical aspects along with aspects of functional requirements and design. The idea is to solidify the ownership and responsibility associated with the elements of integration between procurement and finance.

Now that we've covered the purpose of the book and you understand what you're getting into, let's discuss the book's scope.

1.5 Scope of the Book

This book serves as a guide for both functional and technical consultants by providing clarity on the technical integration of Materials Management and Financial Accounting in SAP ERP. We will focus on the functional treatment of Materials Management and have divided each topic in each chapter under the following sub-topics:

- ▶ Functional Basis
- ▶ SAP Functional Design
- ▶ Checkpoints and Real-Time Issues
- ▶ Technical Elements
- ▶ Troubleshooting Tips

Each topic follows the same flow unless it is necessary to either introduce new topics or omit topics.

1.6 Summary

In this chapter, we reviewed the basics of ERP and provided an overview of what financials and procurement means for the business.

In the next chapter, we'll discuss SAP ERP in more depth, so that you will have a better understanding of what procurement with SAP entails and how the different functionalities and components of SAP ERP can enhance your business.

Clarity of vision and depth of understanding can be enhanced by a bird's eye view of SAP ERP, focused and magnified on the subject of interest. In our case, we will focus on Materials Management and its integration with Financial Accounting.

2 Overview of SAP ERP

This chapter provides an introduction to Financials, Logistics, and Human Resources. These are considered the core components of the SAP ERP. You'll learn about the organization of the core components within business, and the evolution of SAP tools.

As discussed in the previous chapter, the objective of ERP is to optimize business processes to keep control over expenses. From the design point of view, this means that ERP focuses on the components within the boundary of an enterprise. In other words, the approach of ERP is enterprise-centric.

In this chapter, you'll learn about the major building blocks of SAP ERP, with a special focus on Materials Management. We'll also explain the integration of Materials Management within the SAP system and identify the resources in the study of Materials Management.

2.1 The Building Blocks of SAP ERP

Because the building blocks of SAP ERP represent the functionalities, processes, and procedures of an enterprise, they don't vary much from the building blocks of an enterprise.

In Figure 2.1, you can see the building blocks of SAP ERP and those of SAP Enterprise Central Component (ECC). The building blocks of SAP ERP represent the business perspective. The building blocks of the SAP ECC represent the technical perspective. This is also how the documentation is organized in the SAP Library.

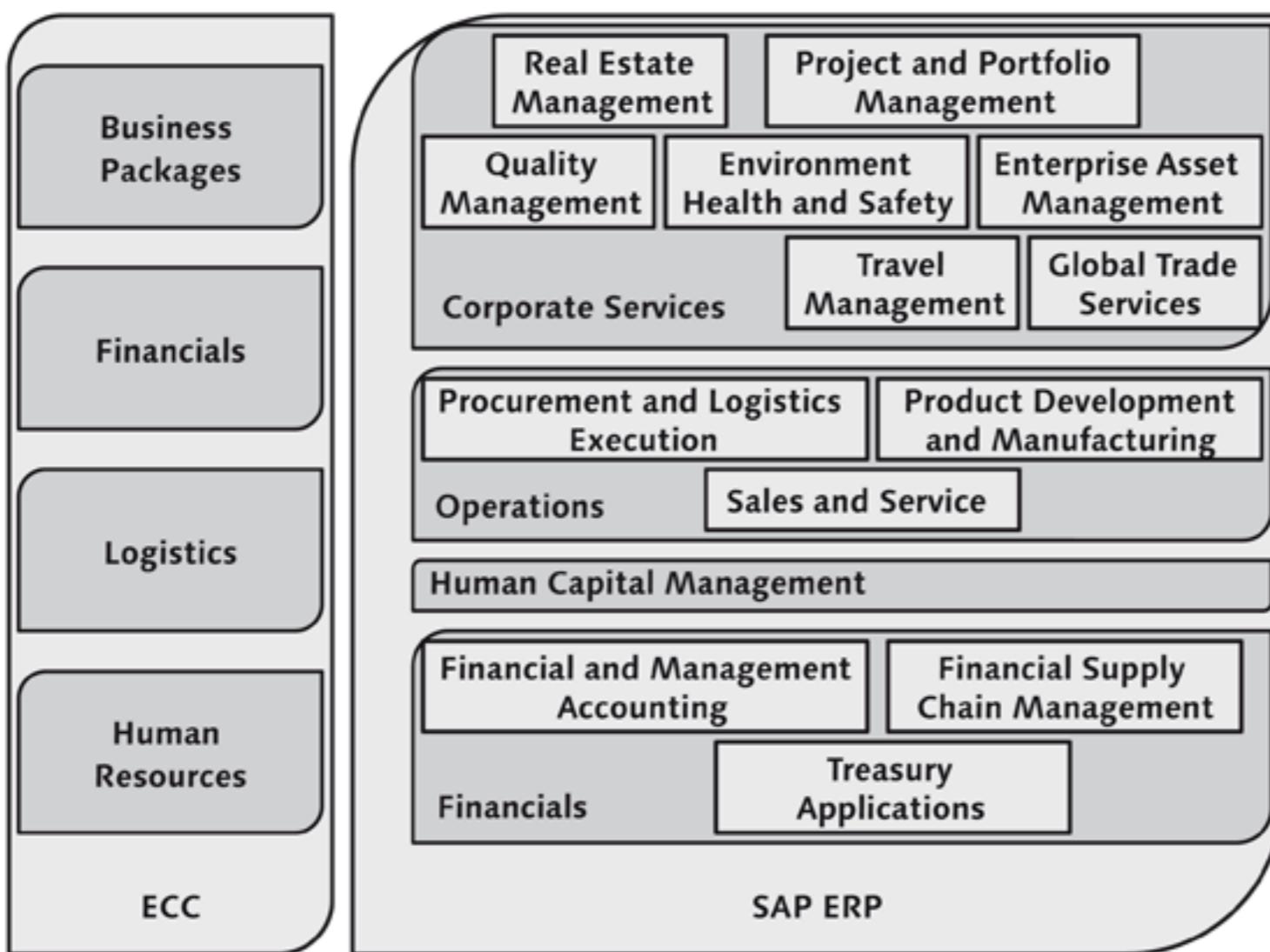


Figure 2.1 Building Blocks of SAP ERP and SAP ECC

The SAP ECC functionally consists of:

- ▶ Financials
- ▶ Logistics
- ▶ Human Resources

The business packages shown in Figure 2.1 refer to the technical aspects of the application components. Let's discuss the functional components of SAP ECC so that you'll have a solid understanding before we move on to the more technical information.

2.1.1 Financials

As you already know, finance is the basic reason, guiding factor, and objective of all business activities. In addition, the finance department also has to meet the standards of legal and corporate governance, risk, and compliance. With so many functions to execute, SAP ERP Financials is subdivided into various components and subcomponents. A few of them are as follows:

- ▶ Financial Accounting
- ▶ Financial Supply Chain Management

- ▶ Banking
- ▶ Controlling
- ▶ Investment Management
- ▶ Enterprise Controlling
- ▶ Project System

Throughout this book, our focus will be on the integration between Materials Management and SAP ERP Financials Financial Accounting. However, we'll also cover a few aspects of integration with SAP ERP Financials Controlling. The other components of SAP ERP Financials will be explained as and when required with respect to Materials Management.

Although SAP ERP Financials is the core of any business process, you need Logistics in SAP ERP and SAP ERP Human Capital Management (SAP ERP HCM) to achieve the business objectives.

Therefore, let's move on to explain the logistics functionalities in SAP ERP in the next section.

2.1.2 Logistics

Logistics in SAP ERP deals with the movement of goods and services across the supply chain. It comprises planning, procurement, transportation, quality checks, maintenance, manufacturing, distribution, sales, and global trade. For smooth execution of so many functions, SAP has further divided the logistics tools into various functionalities and components.

Although we will mostly on Materials Management, in addition to Materials Management, a few other components are listed here to present the bigger picture:

- ▶ Materials Management
- ▶ Logistics General
- ▶ Product Lifecycle Management
- ▶ Sales and Distribution
- ▶ Logistics Execution
- ▶ Quality Management
- ▶ Plant Maintenance
- ▶ Production Planning

Materials Management is our primary focus in this book, and we'll cover it more detail in the subsequent sections.

Before we proceed with Materials Management, however, we will quickly take a look at Human Resources within SAP.

2.1.3 Human Resources

For the execution of logistics processes, and thus for meeting financial objectives, you need human resources. It executes the administrative and strategic function of linking talented people with organizational success. The human resources application in SAP is called SAP ERP Human Capital Management (SAP ERP HCM), and is comprised of the following components:

- ▶ Personnel Management
- ▶ Talent Management
- ▶ Personnel Time Management
- ▶ Payroll
- ▶ Training and Event Management

You won't see much of the SAP ERP HCM integration with Materials Management in SAP ERP. However, you should know the various touch points.

The hiring of employees on an ad-hoc basis can be represented as a contract or purchase order in Materials Management, which we'll discuss in detail in Chapters 4 and 5. Submitted timesheets can also be replicated as a release order created against a contract.

Now that you have an idea of the various applications and components within SAP ECC, we will focus our attention on the different functionalities of Materials Management in SAP ERP.

2.1.4 Materials Management

Materials Management is functionality within SAP ERP Operations, and is designed to cover the entire procure-to-pay process. The series of procedures that cover the procure-to-pay process within Materials Management is called the *procurement cycle*. The procurement cycle for stock material and the materials that are stored in stock may vary from those for services. Unless otherwise stated, the procurement cycle refers to the one for stock. Figure 2.1 represents the procure-to-pay processes

in a procurement cycle. It starts with the determination of requirements and ends with invoice verification in Materials Management. SAP ERP Financials Financial Accounting then takes over payment processing.

The SAP internal document that is created and stored in the system for the determination of requirements is called the *purchase requisition*. As shown in the Figure 2.2, the first step can be executed by all departments. The process then continues in Materials Management where steps 2, 3, 4, and 5 are executed in the Purchasing functionality of Materials Management. The goods receipt is performed in the Inventory Management functionality. After invoice verification, the payment is processed in SAP ERP Financials Financial Accounting. We'll discuss the procurement cycle in more detail in later chapters.

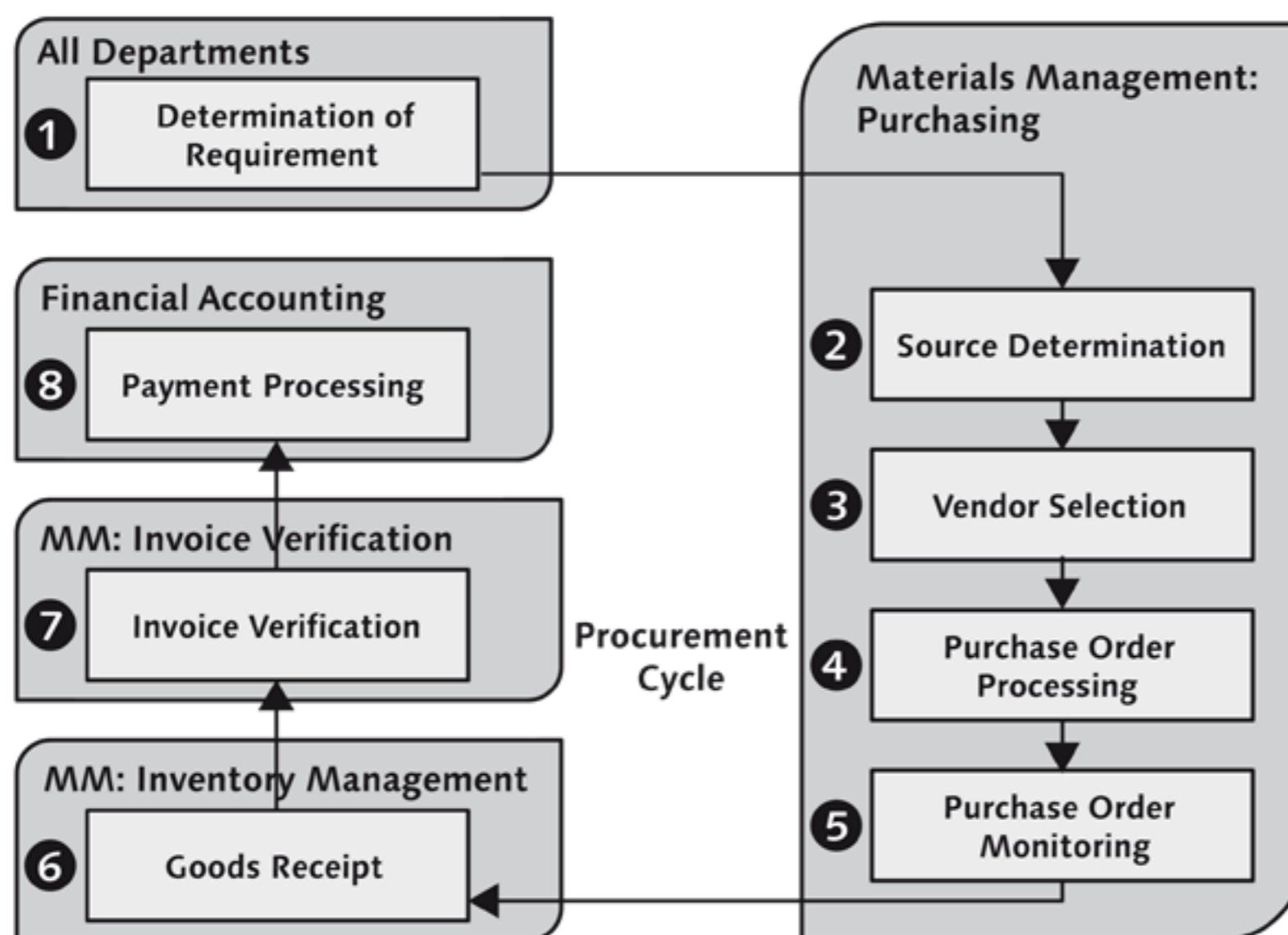


Figure 2.2 Procurement Cycle in Materials Management

The procurement cycle represents the set of business processes that need to be carried out in the Materials Management functionality of SAP ERP. From the process point of view, depending on the requirements, Materials Management integrates with many other components and applications.

Let's now move on to the integration of Materials Management.

2.2 Integration of Materials Management in SAP ERP

As we discussed in the previous sections, the strength and quality of SAP ERP lies in its tight integration among its various components—functional and technical. SAP has carefully designed the integration of Materials Management with other components.

Materials Management integrates with almost all components and has wide coverage within SAP ERP. It may relate to the following components and functionalities. (Many of the terms used here will be explained in detail as the book progresses.)

► **Sales and Distribution**

Sales requirements can be passed to purchasing in Materials Management, in the form of purchase requisitions.

► **Production Planning**

You can generate requirements as a result of Production Planning processes, in the form of purchase requisitions that can then be converted to purchase orders.

► **Quality Management**

While creating a purchase order, you can indicate whether a line item is subject to quality checks. At the time of goods receipt, the purchase order needs to be cleared by quality control before being posted to unrestricted use stock.

► **Logistics Execution**

You can create an inbound delivery against a purchase order when a vendor informs you of shipment. You then receive goods against the inbound delivery.

► **Human Capital Management**

When you hire an employee on a contract basis, you can represent this as a contract in Purchasing. Timesheets can then be replicated as purchase orders against the contract, thereby consuming it. Payment will be made against the invoices entered for timesheet purchase orders.

► **Financial Accounting**

Here, integration begins with the vendor master that stores financial accounting as well as purchasing data. The purchase order to the vendor uses purchasing data, whereas its financial accounting data is used at the time of invoicing. The account postings can be performed at the time of goods receipt when the accounting aspects of the materials or services in the purchase order are taken into consideration. Again, the accounting documents are posted at the time of invoice posting, which takes into consideration the accounting aspects of the

materials or services, previously posted accounting documents, and the accounting data in the vendor master.

► **Controlling**

You will get a glimpse into the integration of Materials Management with cost accounting (Controlling) for the materials intended for direct consumption and services, because these can be directly assigned to a cost center or production order.

Note that this list of Materials Management integration options is not exhaustive. It does, however, give you an idea of its integration with other components or functionalities. A complete list and exhaustive discussion is a subject in itself, and is therefore beyond the scope of this book.

Now that you have an idea of various important interfaces, let's move on to learning how you need to analyze issues related to Materials Management and what resources are available to you.

2.3 Analysis and Resources for Materials Management

Having developed a good understanding regarding SAP ERP and Materials Management, let's now analyze Materials Management from inside SAP ERP.

Generally speaking, there are three components that help with learning any software within SAP ERP:

- SAP Easy Access
- SAP Customizing
- SAP Library

Although the analysis is generic in nature, in the following sections, we will base it on Materials Management in SAP ERP, to increase your understanding.

Types of Data in SAP ERP

At the micro level or the technical level as we may choose to say, the design of an SAP ERP application is based on data and its organization. The SAP system organizes data into the following types:

- Authorization data
- Master data

- ▶ Transaction data
- ▶ Customizing data

Authorization data is about the user master record and the data related to its authorization.

Master data is stored centrally because it is frequently used across components and stays in the system for a long time. It serves as an aid to data entry during transactions. For instance, the data from the material master relevant in a particular context may be pulled by simply entering the material number. While creating a purchase order, data such as unit of measure, order unit, purchasing group, material group, purchase order text, and so on can be pulled from the material master.

Transaction data is stored from documents that are created as a result of application transactions.

Customizing data shows the Customizing settings and decides the look, feel, and functionalities available to transactions.

It's important to remember that everything is done through transactions; therefore, all of this data can be maintained using SAP Easy Access.

2.3.1 SAP Easy Access

SAP Easy Access is the first point of entry into the SAP system and appears as a stacked menu in the navigation path, as shown in the Figure 2.3.

All kinds of data can be maintained using SAP Easy Access. To simplify things, we are focusing on Materials Management and are thus not interested in authorization data at the moment. In addition, we'll hold off on discussing SAP Customizing for now, although it's accessible via SAP Easy Access using the menu path **TOOLS • CUSTOMIZING • IMG • EXECUTE PROJECT**.

Generally speaking, SAP Easy Access is used to maintain master data and execute transactions to post application transaction documents such as purchase orders, material documents during goods receipt, and logistics invoice verification documents during invoice verification.

Let's move on to Customizing for Materials Management in SAP ERP.

2.3.2 SAP Customizing

Customizing in the SAP system is a means to control the look, feel, and functionalities associated with a transaction. Some of the settings that are fundamental to the operation of SAP ERP are hard-coded but options exist for customizing

most functionalities. SAP ERP is highly respected for the decisions that have been made in terms of which functionalities are hard coded and which can be flexibly customized.

The Transaction code for the SAP Customizing menu for Materials Management is SPRO, as shown in Figure 2.4.

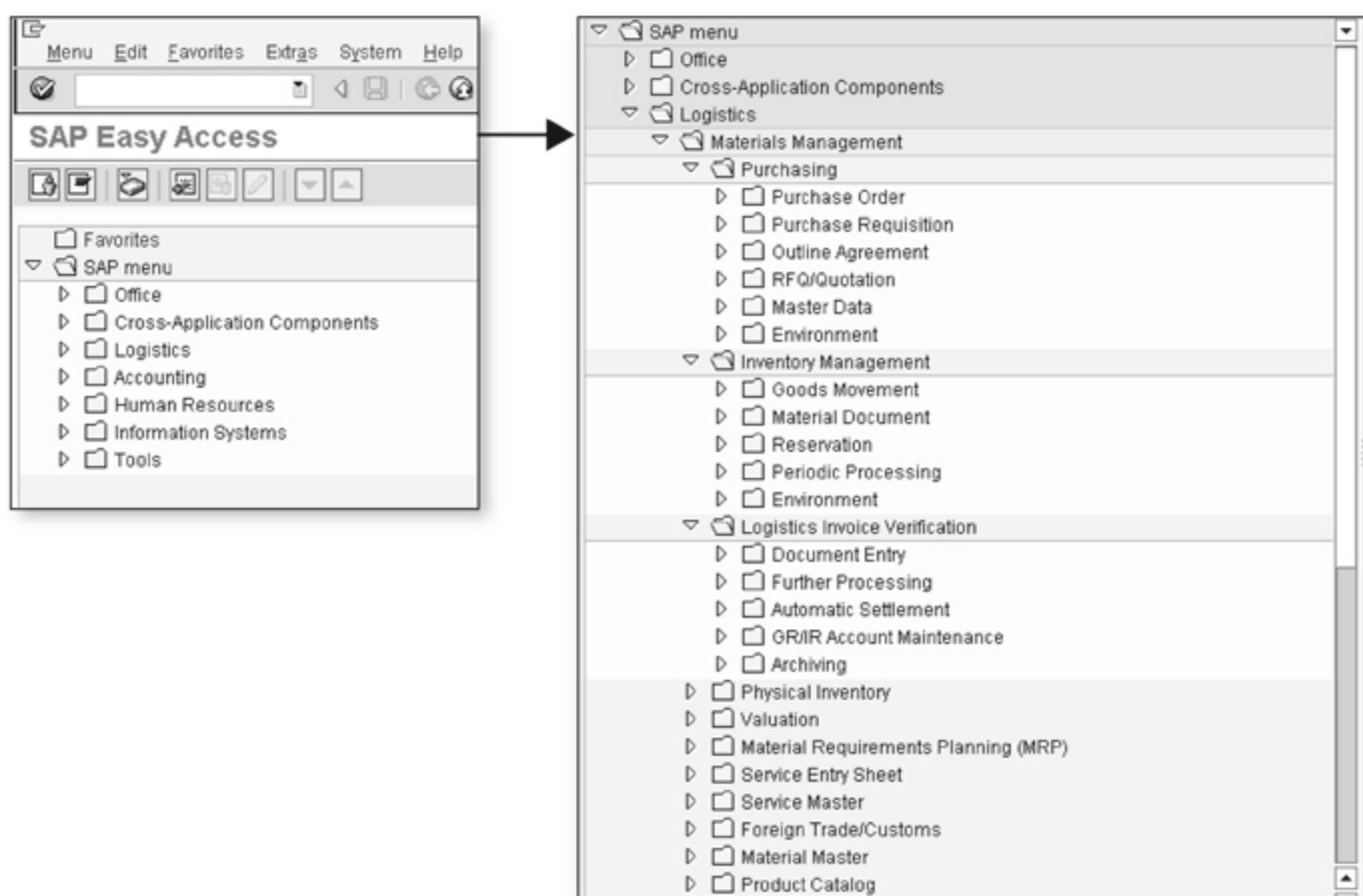


Figure 2.3 SAP Easy Access

As you can see in Figure 2.4, each category in Materials Management has a large Customizing scope, as indicated by the number of options available beneath each category. These Customizing transactions are designed in two ways: transaction codes and maintenance views.

Transaction Codes

Some of the Customizing options can be accessed via transaction codes. Therefore, you don't need to each time drill down to the relevant option using Customizing Transaction SPRO. However, you must remember that transaction codes have not been allocated to all Customizing screens.

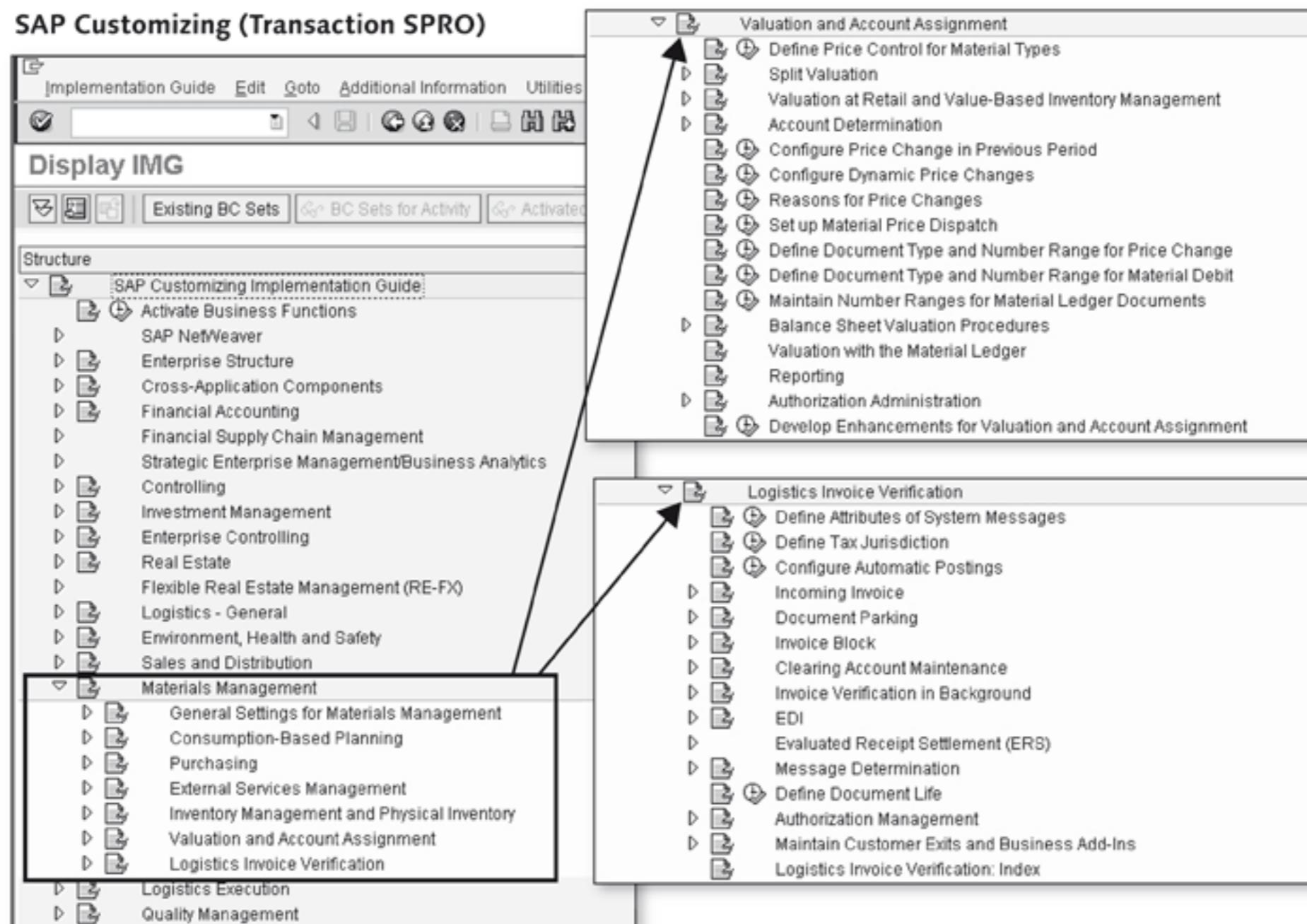


Figure 2.4 SAP Customizing for Materials Management

Maintenance Views

Not all options for Customizing have been designed with transaction codes; some were designed with the help of maintenance views. However, the transaction codes might not have been assigned to these views. You can display and maintain views using Transaction SM30.

How do I know whether a transaction code has been allocated to a Customizing path?

When you are in the SAP Reference IMG of Transaction SPRO, follow the path ADDITIONAL INFORMATION • ADDITIONAL INFORMATION • DISPLAY KEY • DOCUMENT. This displays the column Additional Information, which contains a string such as SIMG_CFMENUOL-MWOMWB, for example. Try the last four letters of the string as a transaction code (in this example, OMWB) to check whether a transaction code exists. If nothing happens, it is likely that only the view was created for it. See Figure 2.5 for more information.

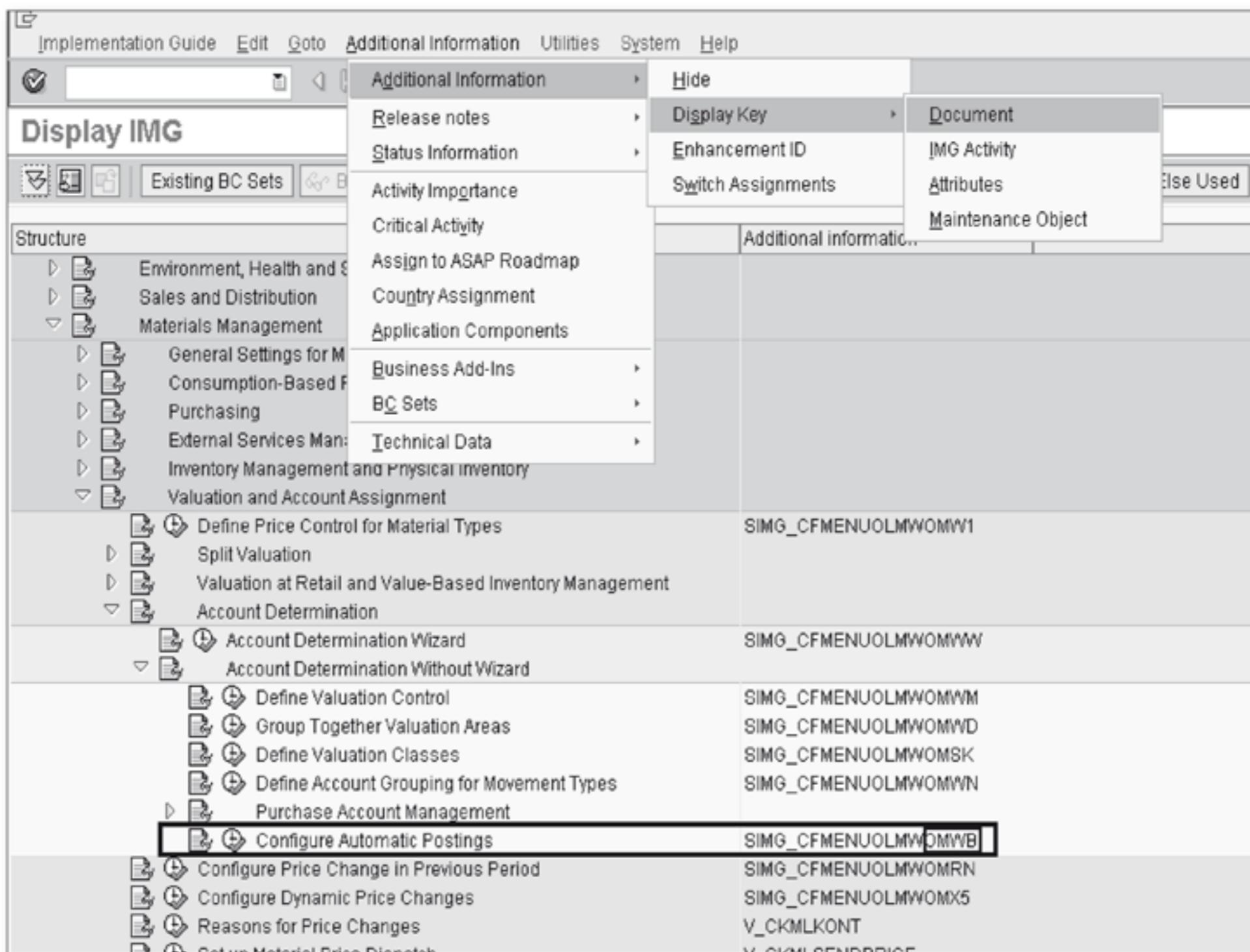


Figure 2.5 Checking for the Transaction Code in the Customizing Menu

You can display the documentation for transaction codes by clicking on the page icon left of the Customizing option. However, this documentation is only for Customizing. For documentation related to the transaction itself, you need to refer to the SAP Library, which we'll discuss next.

2.3.3 SAP Library

The SAP Library is the SAP online documentation, free to all without any restriction of access. You will find it at <http://help.sap.com/>. Figure 2.6 provides the relevant sequence of steps for accessing the SAP Library for Materials Management.

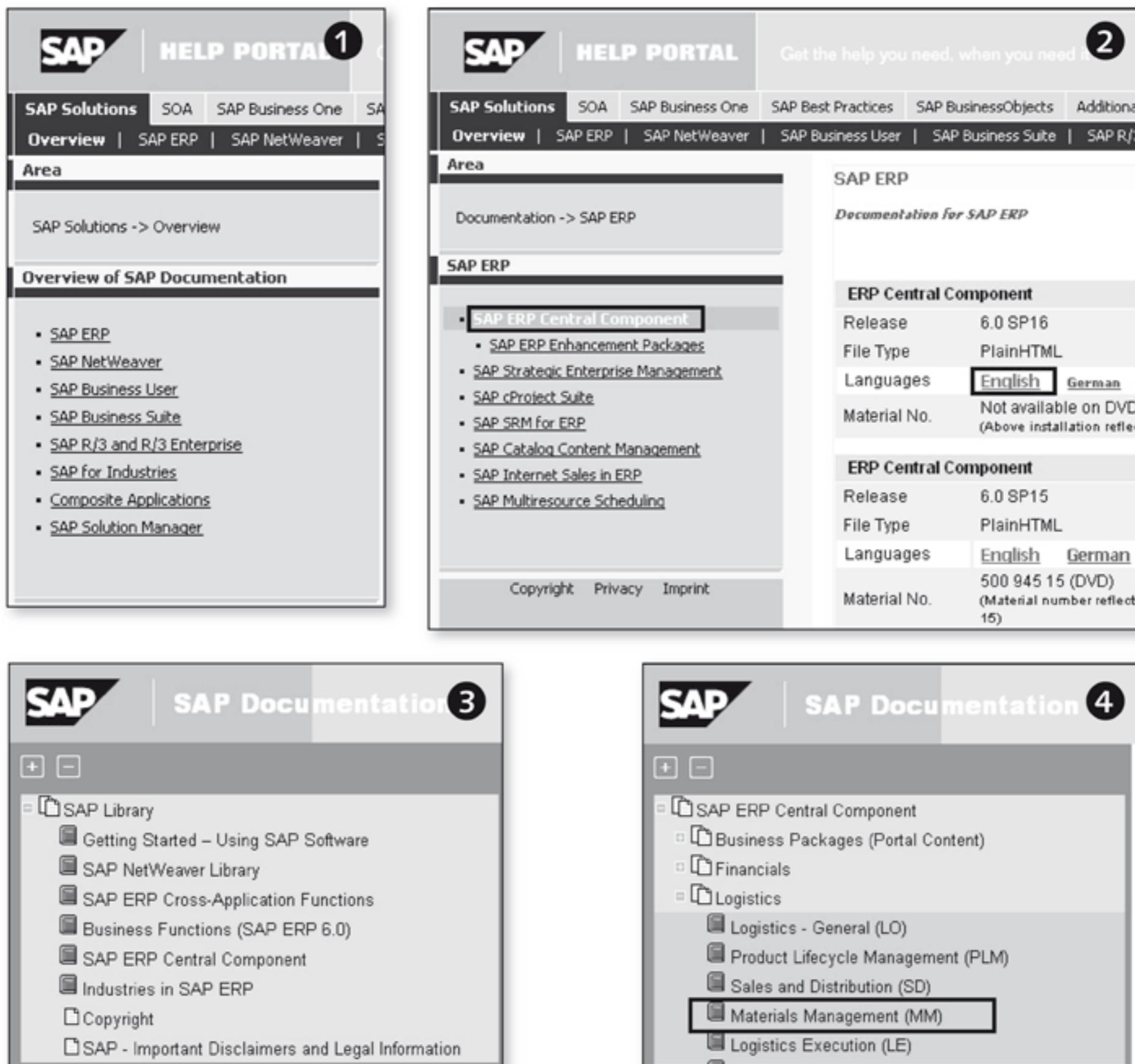


Figure 2.6 Steps to Access the SAP Library for Materials Management

Unfortunately, SAP can change the menus in the portal without notice. But, this gives you a good idea of how to access the SAP Library even if the menus have changed slightly.

SAP provides exhaustive help on all of its software. From the menu that appears in Step 4 of Figure 2.6, you can access all of the documentation related to Materials Management transactions.

You need to use all of the menus in SAP Easy Access, SAP Customizing, and the SAP Library to ascertain the entire scope and functionalities for your subject of interest. As already mentioned, SAP Easy Access consists primarily of transactions for business users, SAP Customizing consists of transactions for consultants, and

the SAP Library contains extensive documentation of each product and its processes. Aside from the differences that are fundamental to their definition, the overall structure of each generally remains the same.

Problem-solving approach for support consultants

Support consultants work on systems that have already been configured and streamlined for various functionalities. Thus, if you're a support consultant, you must first refer to the SAP Library if you have difficulties understanding certain system behavior. You can then recheck the relevant application transactions using SAP Easy Access. Finally, you can use SAP Customizing (Transaction SPRO) to check the Customizing settings to explain system behavior. In summary, the sequence of analysis for support consultants is as follows: SAP Library • SAP Easy Access • SAP Customizing.

Problem-solving approach for implementation consultants

Implementation consultants work on systems that need to be configured and streamlined for various functionalities, depending on business requirements. Thus, if you're an implementation consultant, you must first refer to the SAP Library to learn about the scope of the relevant transactions. You can then access SAP BEST PRACTICES AT <http://help.sap.com/>. When you have a clear understanding of what you are going to implement (business blueprint document), you should focus on the configuration in SAP Customizing (build phase). You should then test the functionalities you have configured using the transaction codes in SAP Easy Access. In summary, the sequence of approach for implementation consultants is as follows: SAP Library • SAP Best Practices • SAP Customizing • SAP Easy Access.

So far, we've assumed a standard SAP implementation, which might not be the case all of the time. You may also come across system behavior that is not in accordance with the documentation. In addition, there might also be bugs for which fixes have not yet been provided. SAP provides an online portal called SAP Service Marketplace for all cases in which you either need active involvement from SAP or a recent update.

2.3.4 SAP Service Marketplace

You can access the SAP Service Marketplace by going to <http://service.sap.com/>. SAP Service Marketplace acts as a point of entry for customer-based support offerings from SAP and looks as shown in Figure 2.7. It serves customer requirements that may not be delivered as part of the standard solution. Let's discuss some of the resources available in SAP Service Marketplace in greater detail.

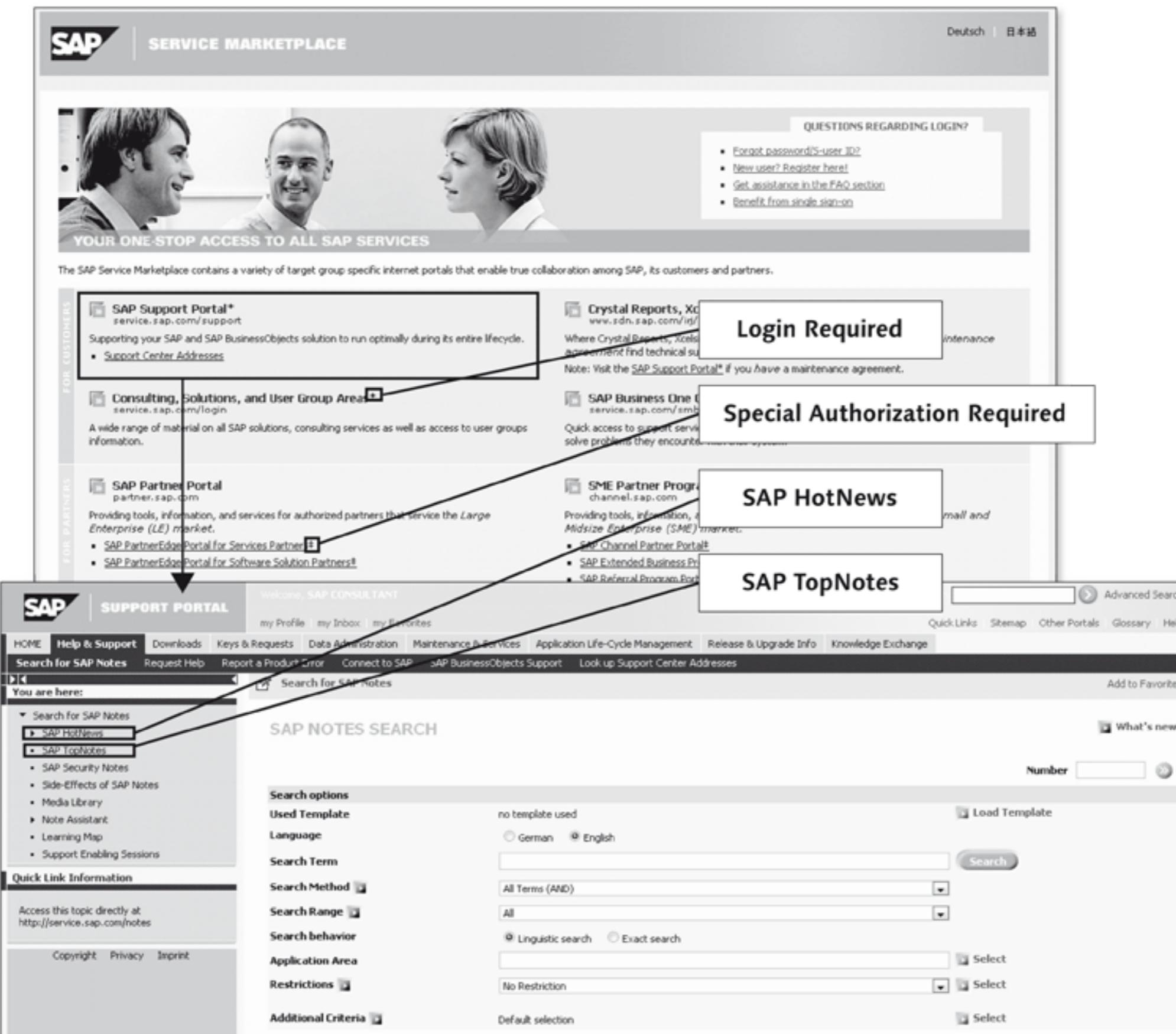


Figure 2.7 SAP Service Marketplace and SAP Support Portal

SAP Customer Notes

SAP Customer Notes was previously called SAP OSS Notes. SAP doesn't make changes to the documentation it has delivered in the SAP Library (URL <http://help.sap.com/>). Any changes in system behavior, including program corrections, consulting, Customizing, documentation errors, modifications, upgrade information, workarounds for missing functionality, and so on are delivered with the help of SAP Customer Notes. It's estimated that more than 500,000 SAP Customer Notes exist and new ones are added every day.

SAP Customer Messages

SAP Customer Messages are used to report product errors and having these errors corrected by SAP. They were previously known as SAP OSS Messages. They require user authorization and are covered by 17% of the license fee you pay to SAP. Every reply you receive from SAP is considered a seal of authenticity.

SAP HotNews

SAP HotNews are priority 1 (very high priority) SAP Customer Notes. They tell you how to resolve problems that can cause the SAP system to shut down or lose data. If such problems affect you, you must ensure that you comply with these SAP Notes.

SAP TopNotes

SAP TopNotes are the most important SAP Customer Notes that resulted in the successful resolution of SAP Customer Messages. The ten most successful notes are selected on a monthly basis in a semi-automatic process.

SAP Developer Network

SAP Developer Network (SDN) is located at <http://sdn.sap.com/>, and is an active online network that offers deep technical content and expertise for SAP developers, analysts, consultants, and administrators on SAP NetWeaver. Business Process Expert (BPX) is a similar community that can be accessed from the same URL. SAP customers and SAP internal experts participate in it; however, you do not need to be an SAP customer to access SDN or BPX.

When you join SDN, you'll have access to technical articles, white papers, and how-to guides, as well as some 200 moderated forums, expert blogs, software downloads, extensive eLearning materials, and a Wiki that supports open communication. As a member, the more you participate and contribute, the more you get in return through the contributor recognition program. With a few exceptions, you have similar access to resources in BPX.

You now know about the various resources available from the SAP Service Marketplace, which you can use during your day-to-day work.

2.4 Summary

In this chapter, we provided a bird's eye view of the various application components in the building blocks of SAP ERP. We set our focus on Materials Management and its integration to various other components and functionalities. In addition, you learned about the different ways to analyze Materials Management functionality in SAP ERP and detailed some of the useful resources to make your life as a consultant easier.

In the next chapter, we will narrow our scope to learning about the relationship between and the integration of Materials Management and SAP ERP Financials.

The main reason why we classify application software as ERP is the integration of its various components and applications. Troubleshooting should then be based on the understanding of these relationships and not rely on a hit-or-miss methodology.

3 Overview of the Materials Management and Financials Relationship

In this chapter, we'll look at the relationship between Materials Management and Financial Accounting and Controlling in SAP ERP. Generally speaking, business is about keeping track of various procedures in an attempt to optimize profit. Often referred to as the bottom line, the net profit is calculated by subtracting a company's total expenses from total revenue. The net profit in an enterprise can either be improved by increasing revenues or decreasing expenses. We aim for both using SAP ERP; however, the latter is more pronounced for Materials Management. Materials Management in SAP ERP is designed with financial objectives in mind and is highly integrated with Financial Accounting at every stage, both functionally and technically.

In the second part of this chapter, you'll learn about troubleshooting. At the business level, troubleshooting skills act like insurance for the smooth operation of your SAP system. Unfortunately, it isn't possible to provide an exhaustive approach to troubleshooting, mostly because you probably don't want to waste your time learning something you might never encounter. So, we'll focus on the fundamental aspects of troubleshooting, with guidelines to extend your skills further. You should gain specific expertise through experience by applying these basic principles.

If you can understand the integration between Materials Management and Financial Accounting in SAP ERP, you'll definitely be able to contribute to the bottom-line of your enterprise effectively. Your troubleshooting skills will serve as insurance for the smooth operation of the system.

The enterprise structure of your business is portrayed in the SAP system as various organizational units within finance, logistics, and human resources. Aside from defining, organizing, and providing clarity about the business process flow, a key aspect of the enterprise structure is to ensure valuation and account determination. Valuation is about assigning values to materials or inventory transactions. It determines the manner in which material transactions need to be recorded in Financial Accounting. We'll talk about the enterprise structure in more detail in Chapter 4. But for now, Figure 3.1 illustrates the levels of valuation and account assignment within Materials Management.

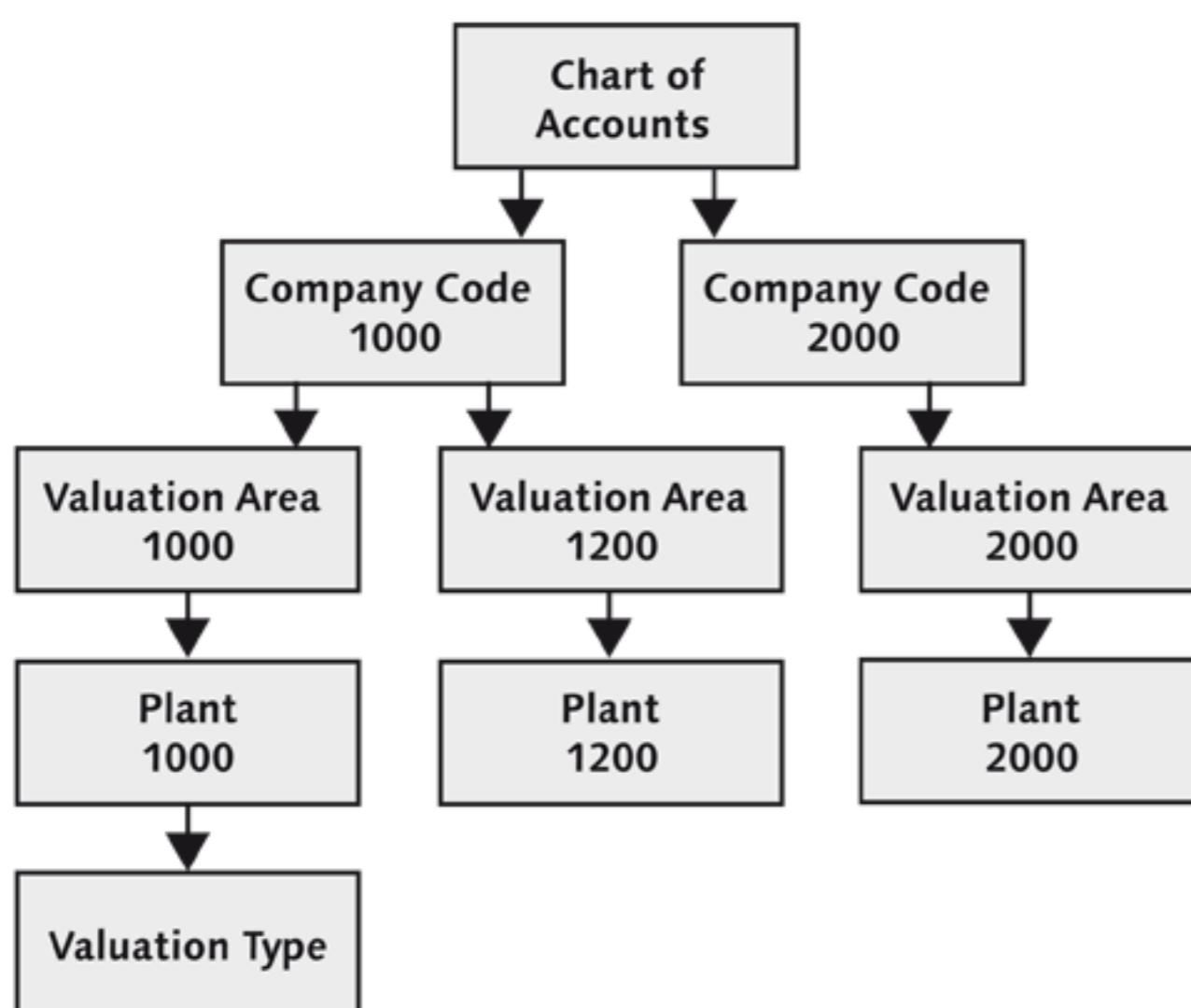


Figure 3.1 Levels of Valuation and Account Determination in Materials Management

The chart of accounts provides a framework for recording values to ensure an orderly rendering of accounting data. The G/L accounts it contains can be used by one or more company codes.

The company code is the smallest organizational unit for which a complete self-contained set of accounts can be drawn up for purposes of external reporting.

The valuation area represents the valuation level and determines the level for the material valuation, which can be either plant or company code. However, the standard method is to value materials at the plant level. Thus, the plant becomes the valuation area. Valuation at the plant level is mandatory if you want to use either of the Production Planning or Product Cost Accounting components, or if your

system is a retail system. The choice of valuation level is a fundamental setting in the SAP system and affects the following:

- ▶ Valuation price in the material master record
- ▶ G/L accounts in which the stocks are managed
 - ▶ With company code as the valuation area, all of the plant stocks of a material are managed in a common stock account for the company code
 - ▶ With plant as the valuation area, you can have separate account determination for each material for every plant
- ▶ G/L accounts to which the transactions are posted in Materials Management

Within Logistics, the plant is an organizational unit used to represent an enterprise from the perspective of production, procurement, maintenance, and materials planning.

The valuation type represents the criteria for the split valuation of a material. In split valuation, you can distinguish between partial stocks of a material, according to certain criteria, and value them separately. Typically, organizations like to track material costs, for example, for new, used, or repaired stock. The Valuation Type field on the material master allows you to track this stock separately, and specify what type of stock is being moved or purchased, and charge appropriately. The valuation type may be based on:

- ▶ Procurement – Whether manufactured in-house or externally
- ▶ Origin – Takes into account from where the material has been procured
- ▶ Status – Whether new, used, repaired, and so on

In the following sections, we'll explain the elements of Materials Management and Financial Accounting and Controlling from the point of view of valuation and account determination, and we'll explore the relationship between these elements. We'll then extend the concepts further, to understand the finer points of functional and technical troubleshooting.

3.1 Elements of Materials Management

Materials Management in SAP ERP Operations includes of the following functionalities:

- ▶ Consumption-based planning
- ▶ Purchasing

- ▶ External services management
- ▶ Inventory management
- ▶ Material valuation
- ▶ Logistics invoice verification
- ▶ Goods receipt/invoice receipt (GR/IR) account maintenance

You'll be introduced to each of these tools as we progress through the book. However, our core focus will be on exploring the relationship and integration between Materials Management and Financial Accounting. While some of the topics will be covered in detail, and the analysis will be from both the functional and technical perspectives, others – such as consumption-based planning and the information system – might not be touched on at all. Our focus will generally be on topics that add high value to the study of the integration of Materials Management with Financial Accounting.

We'll discuss the important elements of Materials Management that interact with Financial Accounting and Controlling in the following sections.

3.1.1 Purchasing

The main tasks of Purchasing within Materials Management include:

- ▶ External procurement of materials and services
- ▶ Determination of possible sources of supply
- ▶ Monitoring deliveries

In line with the document concept in the SAP system, the document captures information required for the transaction, as well as about its integration with and dependencies on other SAP ERP components. Purchasing is well-integrated with Financial Accounting and Controlling.

Controlling Commitments Management enables you to enter and analyze commitments at an early stage, and thus to account for them in Controlling. The Commitments Management component in SAP ERP Financials Controlling comes into the picture when purchase requisitions and purchase orders are created. Purchase orders or purchase requisitions lead to financial commitments with varying degrees of obligation. Commitments reserve funds for costs that will be incurred at a future date. Therefore, commitments must be included in funds monitoring. This

is possibly the initial interaction of Materials Management with Controlling and points to the fact that the enterprise structure for Materials Management, Financial Accounting, and Controlling must be set in the SAP system prior to starting the transactions in Materials Management. Figure 3.2 shows the process of updating Purchasing commitments and its impact on Financial Accounting, Controlling, and Funds Management.

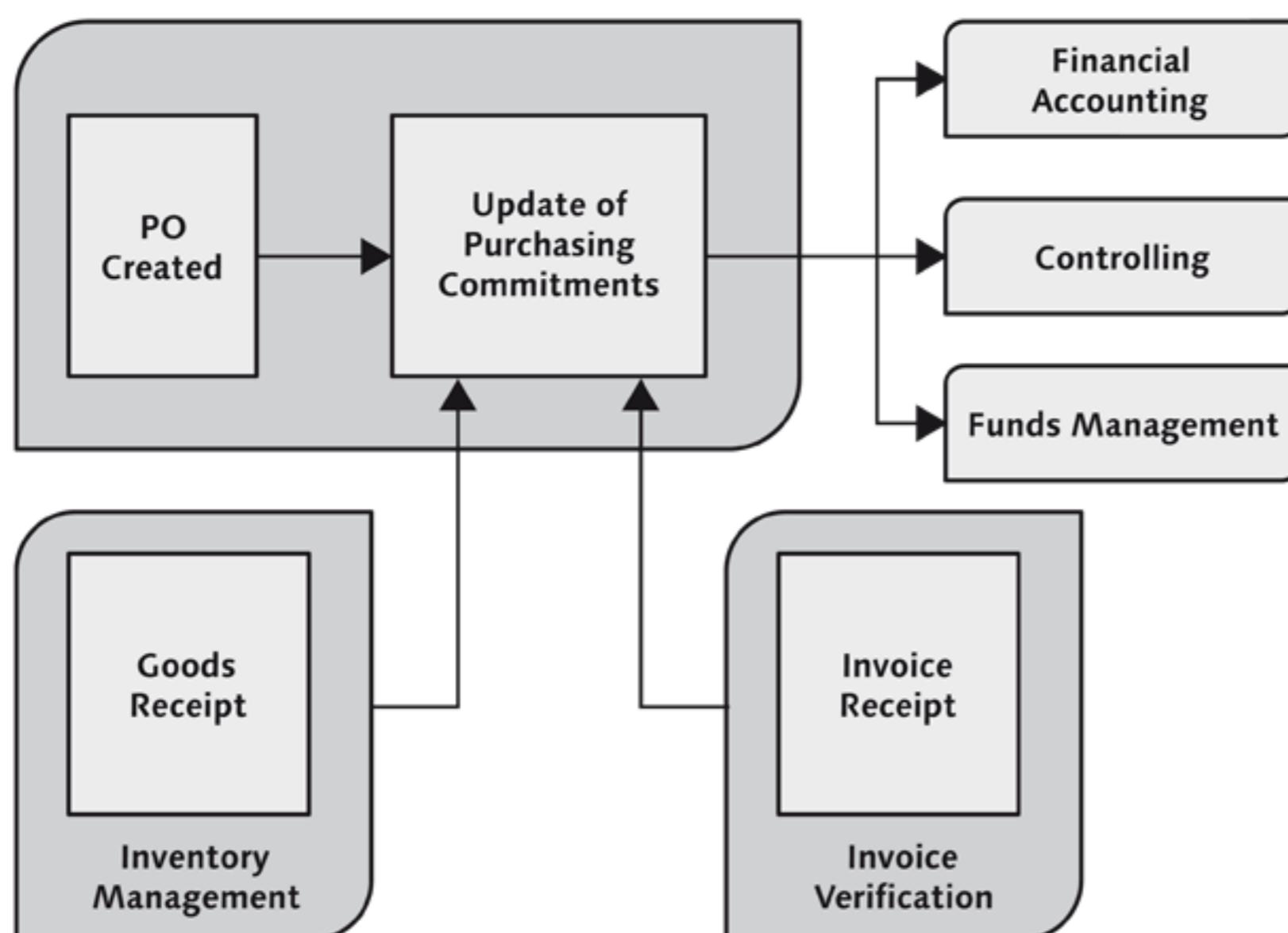


Figure 3.2 Process for Updating Purchase Commitments and Its Impact on Financial Accounting, Controlling, and Funds Management

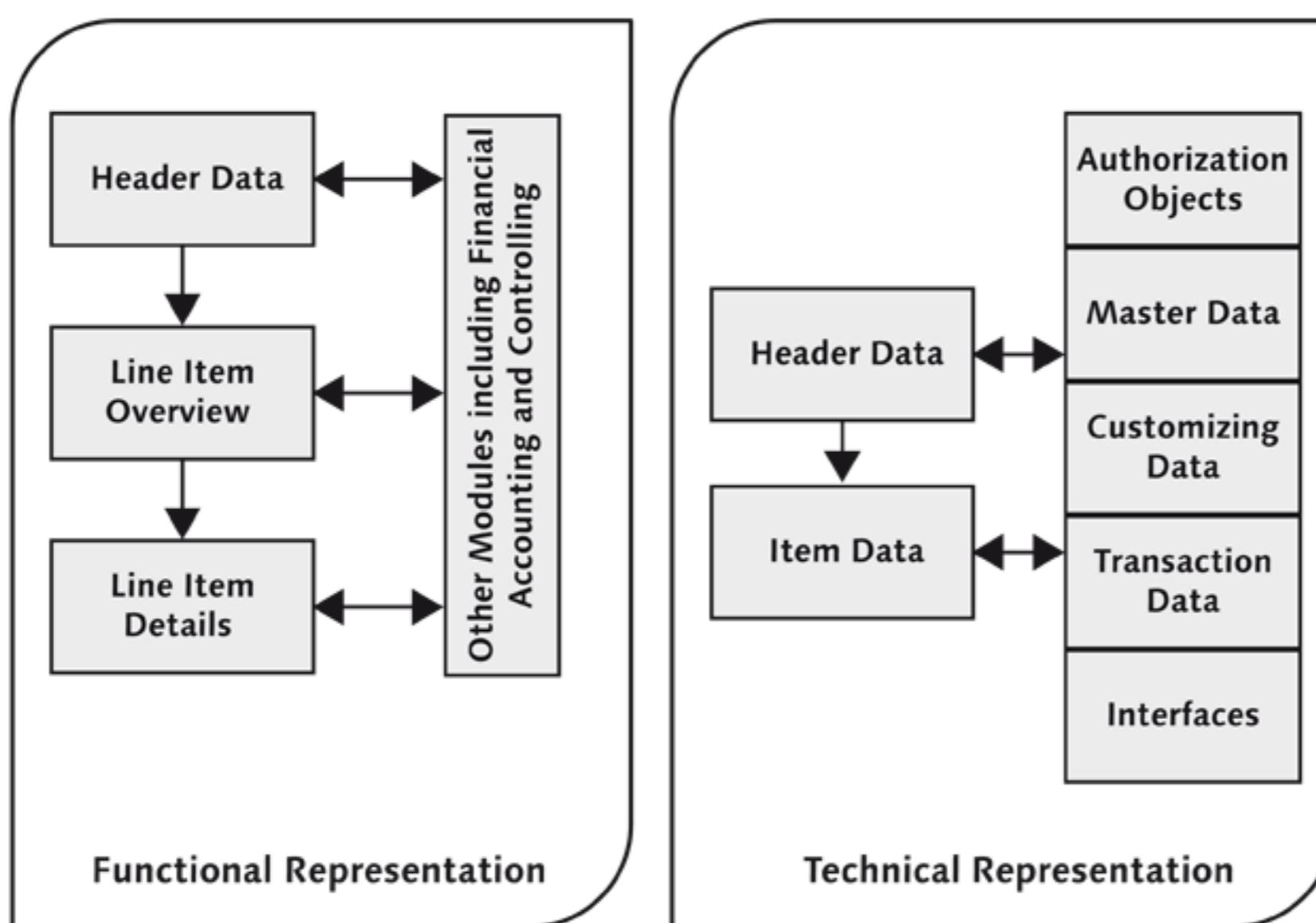
As you can see in Figure 3.2, the system updates the purchasing commitments when the goods receipt is posted in Inventory Management or when the invoice receipt is posted in Invoice Verification. The values in Financial Accounting, Controlling, and Funds Management are updated as a result.

Various departments can create requisitions for procuring materials or services and are processed further by Materials Management in SAP ERP Operations. These purchase requisitions can then be converted into a purchase order, which is legal and binding for your organization and the respective vendor. A purchase order generally contains the information outlined in Table 3.1.

Question	Elements in Purchasing
What needs to be procured?	Material or Services
How much?	Quantity/Value
At what price?	Price
When?	Delivery Date
From whom?	Vendor/Source of Supply
Who is procuring materials/services?	Purchasing Group
Which organizational unit is legally responsible for procurement?	Purchasing Organization

Table 3.1 Information Contained in a Purchasing Document

Additional information is captured for each element in Purchasing. However, it makes sense to take a look at the functional and technical representation of data within Purchasing, as shown in Figure 3.3.

**Figure 3.3** Functional and Technical Representation of Data in Purchasing

From the functional point of view, the screen in a Purchasing transaction, such as purchase order, is divided into three parts: header data, line item overview, and line item details. However, from the technical point of view, the data is stored in various database tables, for example the header and item tables.

Table 3.2 lists the important fields in the header and item tables for purchase orders. Although we are explaining this in the context of purchase orders, the same table is also used to store data from requests for quotations, contracts, and scheduling agreements. Our example provides a good overview for understanding the concept of how data is stored in the SAP system.

Header Data (Table EKKO)	
Field Name	Description
LIFNR	Vendor
EKORG	Purchasing Organization
EKGRP	Purchasing Group
BUKRS	Company Code
ZTERM	Terms of Payment
WAERS	Currency
WKURS	Exchange Rate
BEDAT	Document Date
AEDAT	Created on
ERNAM	Created by
KALSM	Pricing Procedure

Item Data: Purchasing (Table EKPO)	
EBELN	Purchasing Document
EBELP	Item
MATNR	Material
BUKRS	Company Code
WERKS	Plant
LGORT	Storage Location
MATKL	Material Group
INFNR	Info Record
MENGE	Purchase Order Quantity
MEINS	Order Unit
BPRME	Order Price Unit
NETPR	Net Price

Table 3.2 Important Fields in the Header and Line Item tables of a Purchase Order

SAP stores data in various fields of the database tables. During a transaction, the data is read from the different database tables. The transaction is then processed with the help of this data and data you enter manually. Finally, after execution, the transaction data is again stored in the database tables.

3.1.2 Inventory Management

Inventory Management addresses the management of material stock on a quantity and value basis. In this book, we'll focus on material stock management on a value basis and the corresponding accounting documents.

Whenever you create a material master record, you must assign it to a material type. The material type is a grouping of materials with certain basic attributes such as raw materials, semi-finished products, or finished products.

The main tasks of Inventory Management include:

- ▶ Management of material stock on a quantity and value basis
- ▶ Planning, entry, and documentation of all goods movement
- ▶ Carrying out physical inventory

Because we're focusing on the Financial Accounting and Controlling interface in this book, the management of material stock on a value basis is especially important for us. The material type decides the quantity and/or value update for the material. In addition, goods receipts can either be valued or non-valuated. By indicating a non-valuated goods receipt in a purchase order, you tell the system that the accounting document shouldn't be created at the time of goods receipt. Table 3.3 summarizes the combination of settings in the material type and purchase order and their impact on Inventory Management.

For the purpose of valuation and account assignment, the data maintained in the purchasing document – along with the data in the material master – determines the account postings in Inventory Management to a certain extent.

The system first creates a material document in Inventory Management and then creates a Financial Accounting document as a follow-on document. However, the Financial Accounting document may not be created if there is no change in valuation as a result of the transaction. For example, if you indicate in the purchase order that the goods receipt is non-valuated, the system doesn't create an accounting document at the time of goods receipt.

Settings in Material Type	Type of Goods Receipt during PO	Impact on the Accounting Document and the Material Master during Goods Receipt
► Value Update ► Quantity Update	GR Valuated	► Accounting document created ► Material master updated for value and quantity
► Value Update ► No quantity update	GR Valuated	► Accounting document created ► Material master updated for value
► No Value Update ► No quantity update	GR Valuated	► Accounting document created ► Material master not updated for value and quantity
► No Value Update ► Quantity Update	GR Valuated	► Accounting document created ► Material master updated for quantity
► Value Update ► Quantity Update	GR Non-Valuated	► No accounting document created ► Material master updated for value and quantity
► Value Update ► No quantity update	GR Non-Valuated	► No accounting document created ► Material master updated for value
► No Value Update ► No quantity update	GR Non-Valuated	► No accounting document created ► Material master not updated for value and quantity
► No Value Update ► Quantity Update	GR Non-Valuated	► No accounting document created ► Material master updated for quantity

Table 3.3 Impact of Material Type and GR Non-Valuated Indicator in Inventory Management

3.1.3 Material Valuation

Material valuation is fundamental to the integration of Materials Management, Financial Accounting, and Controlling because it's about assigning values to materials. It determines the manner in which material transactions need to be recorded in Financial Accounting and Controlling.

Material valuation includes the following tasks:

- Adjusting material prices to market prices
- Performing revaluations
- Executing balance sheet valuations

Stock value is calculated using the following formula:

$$\text{Stock Value} = \text{Stock Quantity} * \text{Material Price}$$

The system settings (valuation area, types of goods movement relevant for valuation, and account determination during the transaction) – along with the material master record – are taken into account during material valuation.

The following elements impact the valuation of materials:

- ▶ Valuation area
- ▶ Valuation class
- ▶ Valuation category
- ▶ Valuation type
- ▶ Material type
- ▶ Movement type

We'll discuss these elements in more detail in Section 3.3, and again in Chapter 6.

3.1.4 Logistics Invoice Verification

Materials Management has the most visible interaction with SAP ERP Financials Financial Accounting and Controlling during logistics invoice verification (LIV). The procurement cycle in Materials Management ends at LIV. From there, Financial Accounting takes over for processing payments.

When you post an invoice, the system creates a LIV document and may create one or more Financial Accounting documents as follow-on documents. Note that payments in Financial Accounting are made against these accounting documents and not against the LIV document.

You can process an invoice in various ways in LIV, but the objective remains the same: payment to the vendor on the basis of the generated accounting documents. An invoice can be processed in the following ways within LIV:

- ▶ Online Invoice Verification
 - ▶ With reference to the purchase order
 - ▶ Without reference to the purchase order
- ▶ Invoice Parking
- ▶ Invoice Verification in Background

- ▶ Automatic Settlements
 - ▶ Evaluated Receipt Settlement
 - ▶ Consignment and Pipeline Settlement
 - ▶ Invoicing Plan Settlement
 - ▶ Revaluation
- ▶ Invoices received via EDI

We'll explain the various terms such as Invoice Parking, Evaluated Receipt Settlement, and Invoicing Plan Settlement later in the book.

3.1.5 GR/IR Account Maintenance

Materials Management transactions for the goods receipt and invoice receipt are linked to each other from the accounting perspective with the help of a GR/IR clearing account. For a purchase order, the difference in quantity between the goods receipt and the invoice receipt may result in a balance on the GR/IR clearing account. This needs to be cleared on a periodic basis, because it portrays the picture from the point of view of quantity invoiced against quantity goods received for purchase orders. For more information on GR/IR clearing accounts, see Chapter 11.

The concept of clearing accounts

Business processes can be distributed into smaller steps as long as you ensure appropriate links between them. The Logistics links can be viewed in the purchase order history, which provides details on the transactions that have been executed with reference to the purchase order.

The question is: How do you ensure the accounting links?

The links in Financial Accounting are maintained using the concept of the clearing account. While one transaction may make a credit posting to the clearing account, another transaction may make a debit posting to the same account, ensuring the integration between the transactions from the Financial Accounting point of view.

The GR/IR clearing account is maintained according to quantity. Thus, this account is posted at the time of GR, based on the quantity of the material goods received. The same GR/IR clearing account is then cleared at the time of invoice postings that are also based on the quantity of material invoiced. If the quantities during GR and IR are the same, there should be a zero balance in this account. You can refer to Chapter 11 for more detail.

3.2 Elements of Financial Accounting

Financial Accounting consists of the following components

- ▶ General Ledger (G/L) (SAP General Ledger or Classic General Ledger)
- ▶ Accounts Payable (AP)
- ▶ Accounts Receivable (AR)
- ▶ Bank Accounting (BL)
- ▶ Asset Accounting (AA)
- ▶ Funds Management (FM)
- ▶ Travel Management (TV)
- ▶ Special Purpose Ledger (SL)

We'll now briefly describe the components that typically impact Materials Management.

3.2.1 General Ledger

SAP G/L serves as a complete record of all business transactions and provides a comprehensive picture of external accounting, along with accounts.

SAP G/L helps achieve the following:

- ▶ It makes postings to subledger and reconciliation accounts automatically and simultaneously. A subledger is used for tracking individual items and transactions separate from the SAP G/L. Subledgers may exist for, but are not limited to, AR, AP, Inventory and Fixed Assets, and so on. Without a subledger, individual customers or inventory items would require their own G/L code making the G/L unnecessarily large.
- ▶ It updates G/L and cost accounting elements simultaneously.
- ▶ It performs evaluation and reporting of accounting data in real time.

3.2.2 Accounts Payable

The AP component deals with all payments that have to be made to vendors. Therefore, the transactions originate mostly from Materials Management. However, there can be invoices that originate in SAP ERP Financials Financial Accounting. For invoice postings, cash management gets the data, which in turn helps optimize liquidity planning.

The payment program within SAP ERP helps make payments to vendors, using a wide variety of payment methods (checks, transfers, data medium exchange on disk, and Electronic Data Interchange [EDI]).

3.2.3 Asset Accounting

The Asset Accounting component within SAP ERP servers as a subsidiary ledger to the SAP G/L and is used for managing and supervising fixed assets.

You need to take the following points into account for asset accounting integration with Materials Management:

- If you want to carry out account assignment to assets when creating purchase orders, purchase requisitions, and outline agreements, the account entered in Financial Accounting for acquisition and production costs must be assigned to a field status group that allows entries in the field group's asset number/sub-number, transaction type, and quantity, as shown in Figure 3.4.

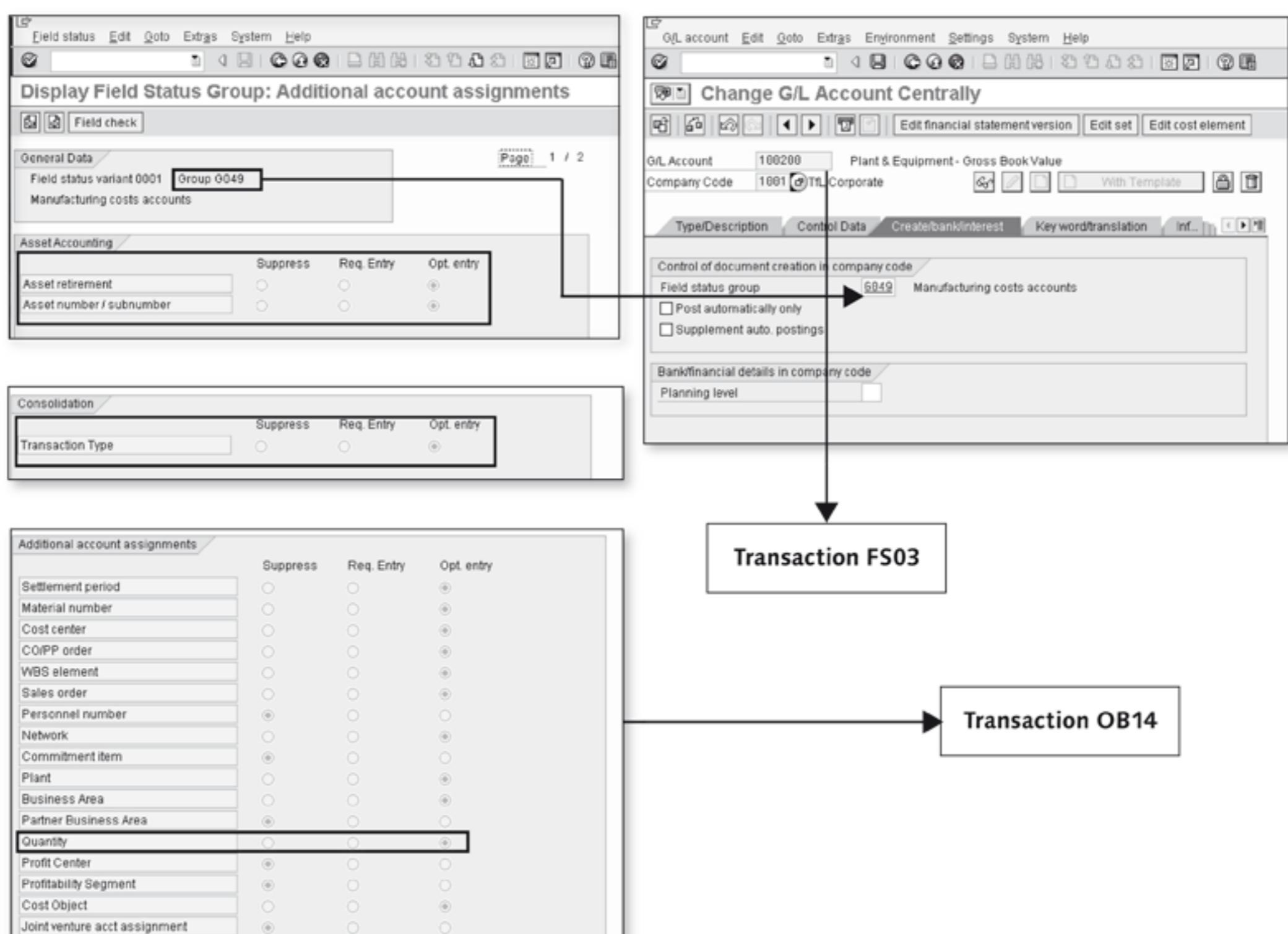


Figure 3.4 Field Status Group for Asset Accounting

Should you post valued goods receipts or non-valuated goods receipts for fixed assets?

The start of capitalization is typically determined by the start-up date of the fixed asset under commercial law. For the majority of fixed assets, start-up takes place directly after the goods receipt. Therefore, you should post valued goods receipts.

- ▶ Whether a valued or non-valuated goods receipt is used is decided at the time of the purchase order. If the goods receipt is non-valuated, capitalization doesn't take place until the invoice is created. If the invoice receipt is posted before the goods receipt, the invoice amount – after deducting taxes and cash discounts – is capitalized to the asset.
- ▶ If the invoice receipt is posted after the goods receipt, the difference between the invoice amount (without tax and cash discounts) and the posted value of goods is capitalized, as long as the goods receipt was valued. For an invoice receipt after a non-valuated goods receipt, the total invoice amount (without tax and cash discounts) is capitalized.

3.3 Relationship between the Elements of Materials Management and Financial Accounting and Controlling

In this section, we'll revisit the elements explained in the previous sections and explore the relationships and connections between them. We'll focus on the process flow for Materials Management and explore the relationship with Financial Accounting and Controlling as encountered during the process flow.

3.3.1 Commitments in Procurement

Commitments Management deals with the early recording and analysis of a contractual or scheduled commitment that isn't yet reflected in Financial Accounting but that will lead to actual expenditures in the future.

Commitments are used as a means to reserve funds for costs that will be incurred at a future date. Purchase requisitions or purchase orders result in a financial commitment, to a varying degree of obligation.

The creation of purchasing documents in Materials Management builds the commitment in Controlling, which may be updated when the relevant accounting documents are posted in Financial Accounting, corresponding to later transactions in Materials Management.

Commitments Management is activated under the Customizing path **IMG • CONTROLLING • COST CENTER ACCOUNTING • COMMITMENTS AND FUNDS COMMITMENT • ACTIVATE COMMITMENTS MANAGEMENT**.

Commitments in procurement can be created as a result of creating purchase requisitions and purchase orders. The commitments in purchase requisitions may be reduced if the purchase order is created with reference to it. Similarly, the goods receipt and the invoice receipt reduces the commitments for purchase orders.

Table 3.4 illustrates an example of the commitments for purchase requisitions. The data relevant for creating purchase requisitions (document name: PReq) commitments is as follows:

- ▶ The value of the purchase requisition
- ▶ Planned delivery date
- ▶ Account assignment

Document	Transaction	Commitment
PReq	5 pc@150 USD/pc	750 (5*150)
Purchase order from previous PReq	3 pc@200 USD/pc	600 (3*200)
Reduction in PReq commitment		450 (3*150)
PReq commitment remaining		300 (750-450)

Table 3.4 Commitments for Purchase Requisitions

The creation and reduction of purchase order commitments is affected by the following data:

- ▶ Purchase order value
- ▶ Delivery date
- ▶ Account assignment

Table 3.5 illustrates an example of the commitments for a purchase order issued against an internal order. Internal orders are normally used to plan, collect, and settle the costs of internal jobs and tasks.

Step Nr.	Business Transaction	Actual	Commitment	Assigned (Actual + Commitment)
1	Purchase order for 3 pc@150 USD/pc + 15 shipping charges		465	465
2	GR for 2 pc.	310	155	465
3	IR for 3 pc@200 USD/pc	410	205	615
4	GR of 1 pc	615		615
5	IR for freight: 18	618		618

Table 3.5 Commitments for Purchase Orders

The following tips will give you an idea about the calculation:

$$\begin{aligned}3 * 150 + 15 &= 465 \\2 * 150 + 15 * 2 / 3 &= 310 \\310 + 2 * (200 - 150) &= 410 \\155 + 1 * (200 - 150) &= 205\end{aligned}$$

Value-based commitment

Transactions in Materials Management such as purchasing, inventory management, and invoice verification can be updated in Funds Management. The commitment for the individual transactions can be managed either on the basis of value or quantity.

The Customizing setting for the unit of measure determines whether the commitment is value-based or quantity-based. However, note that purchase requisitions are always reduced by quantity.

If you mark the checkbox Value-Based Commt under the Customizing path **IMG • SAP NETWEAVER • GENERAL SETTINGS • CHECK UNITS OF MEASUREMENT**, the commitments are value-based. Otherwise, quantity-based commitment applies. Figure 3.5 shows the Customizing setting for this.

If the Value-based Commt indicator isn't checked in the unit of measure, quantity-based commitment applies.

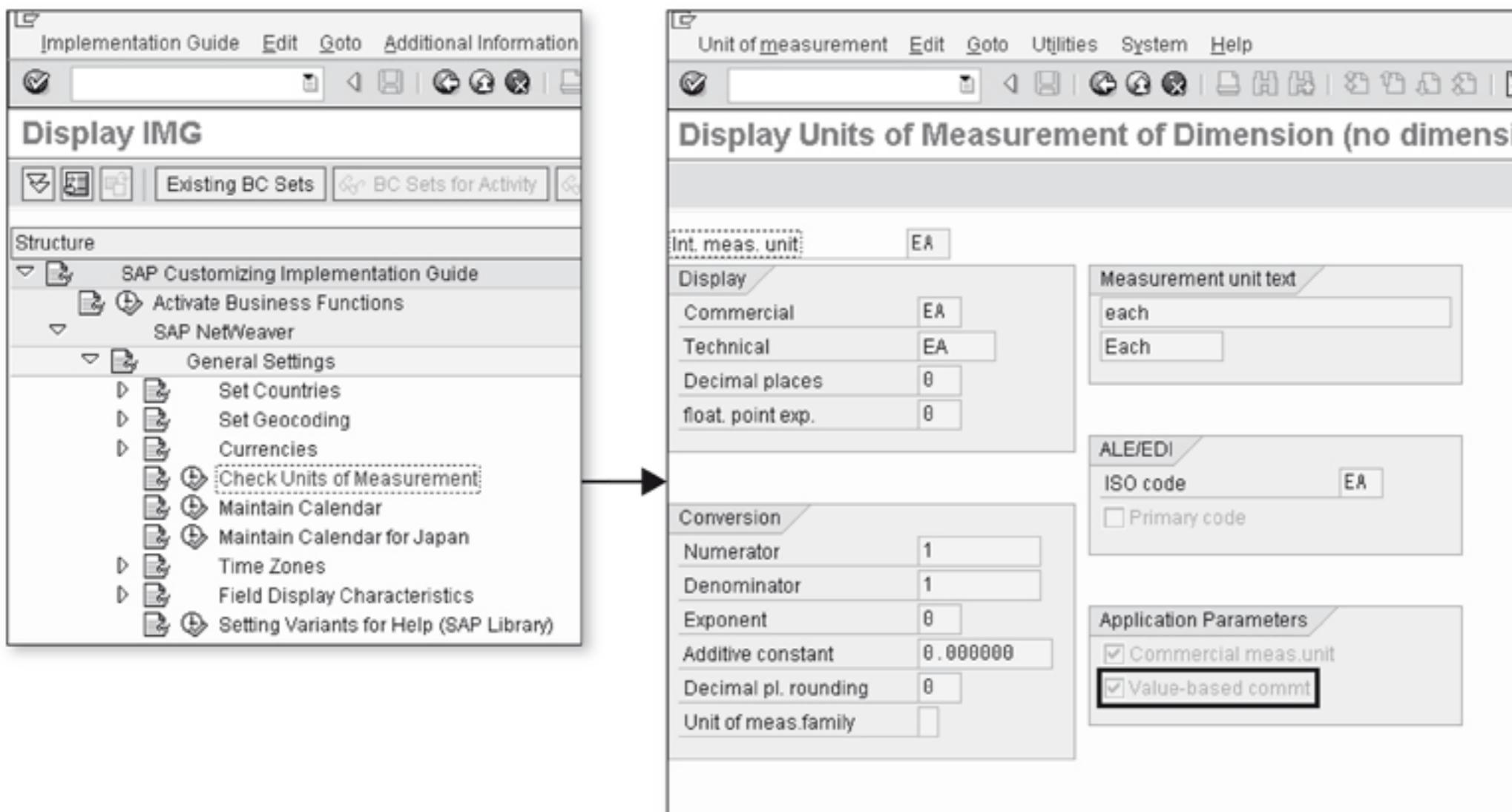


Figure 3.5 Setting For Value-Based Commitment in Customizing

3.3.2 Elements of Financial Accounting and Controlling in a Purchase Order

A purchase order is the legal document issued to the vendor for the procurement of materials or services. Because the goods receipts and the invoices are entered in the SAP system with reference to the purchase orders, they contain the information required for GR and IR.

Table 3.6 contains a list of important fields in the purchase order and their impact on Financial Accounting and Controlling

Field	Relation to Financial Accounting and Controlling
Vendor	Vendor reconciliation account and subledger account is used during IR posting.
Terms of Payment	Provides for a cash discount in percent, which may impact posting during net and gross for the document types in IR.
Currency/Exchange Rate	The exchange rate differences account or price differences account may be posted to during GR and IR.
Company Code	Pulls the chart of accounts and thus the relevant G/L accounts for the postings at GR and IR.

Table 3.6 Important Fields in a Purchase Order and Their Impact on Financial Accounting and Controlling

Field	Relation to Financial Accounting and Controlling
Plant	Generally, the plant is the valuation area. Thus, the material may be valued differently in various plants. The stock coverage in the plant is checked at IR.
Account Assignment	Indicates whether account assignment can be determined automatically or has to be entered manually.
Material	Informs about value/quantity update, price control, valuation price, and valuation class required for the determination of the G/L accounts during postings. Stock coverage is also checked for material at the time of IR.
Unit	Determines whether the commitment should be value-based or quantity-based.
Quantity/Price	Updates commitment and valuation data, and determines the amount to be posted at the time of GR/IR.
GR non valued	Indicates whether to create accounting documents at the time of GR.
Delivery Completed	May reduce purchase order commitments to zero.
GR based IV	Impacts the way in which the GR/IR clearing account is posted.
Final Invoice	May reduce purchase order commitments to zero.

Table 3.6 Important Fields in a Purchase Order and Their Impact on Financial Accounting and Controlling (Cont.)

3.3.3 Accounting Documents for Goods Receipt

The accounting documents may or may not be created at the time of goods receipt, depending on whether the GR is valued or not. However, the account postings during GR depend on the values maintained in the purchase order, the valuation data in the material master, and the movement type used.

The system creates the accounting document for Inventory Management as shown in Figure 3.6.

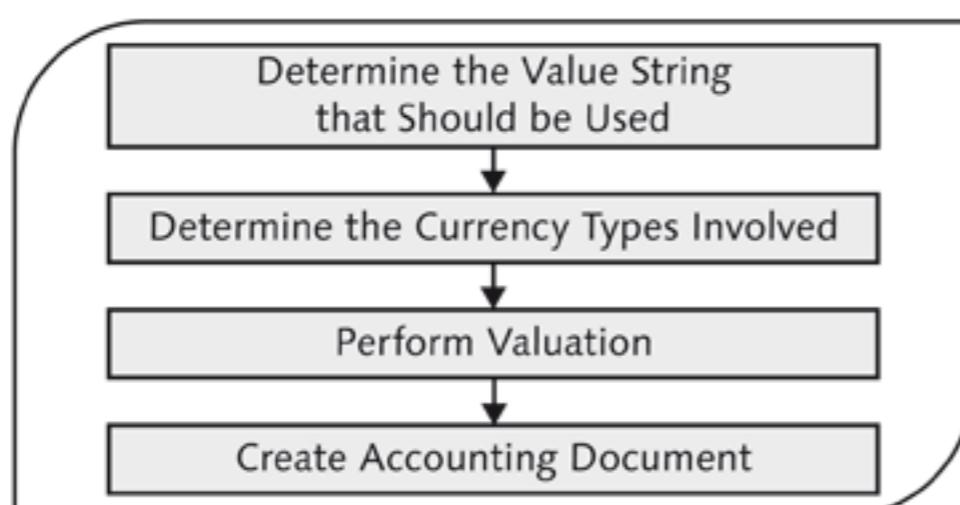


Figure 3.6 Sequence of Events for Creating an Accounting Document in Inventory Management

3.3.4 Accounting Documents for Invoices

The accounting documents are created when an invoice is posted. The system uses the history of the documents already posted, Customizing entries, master data, and manually entered data to create the accounting documents at the time of IR, as shown in Figure 3.7.

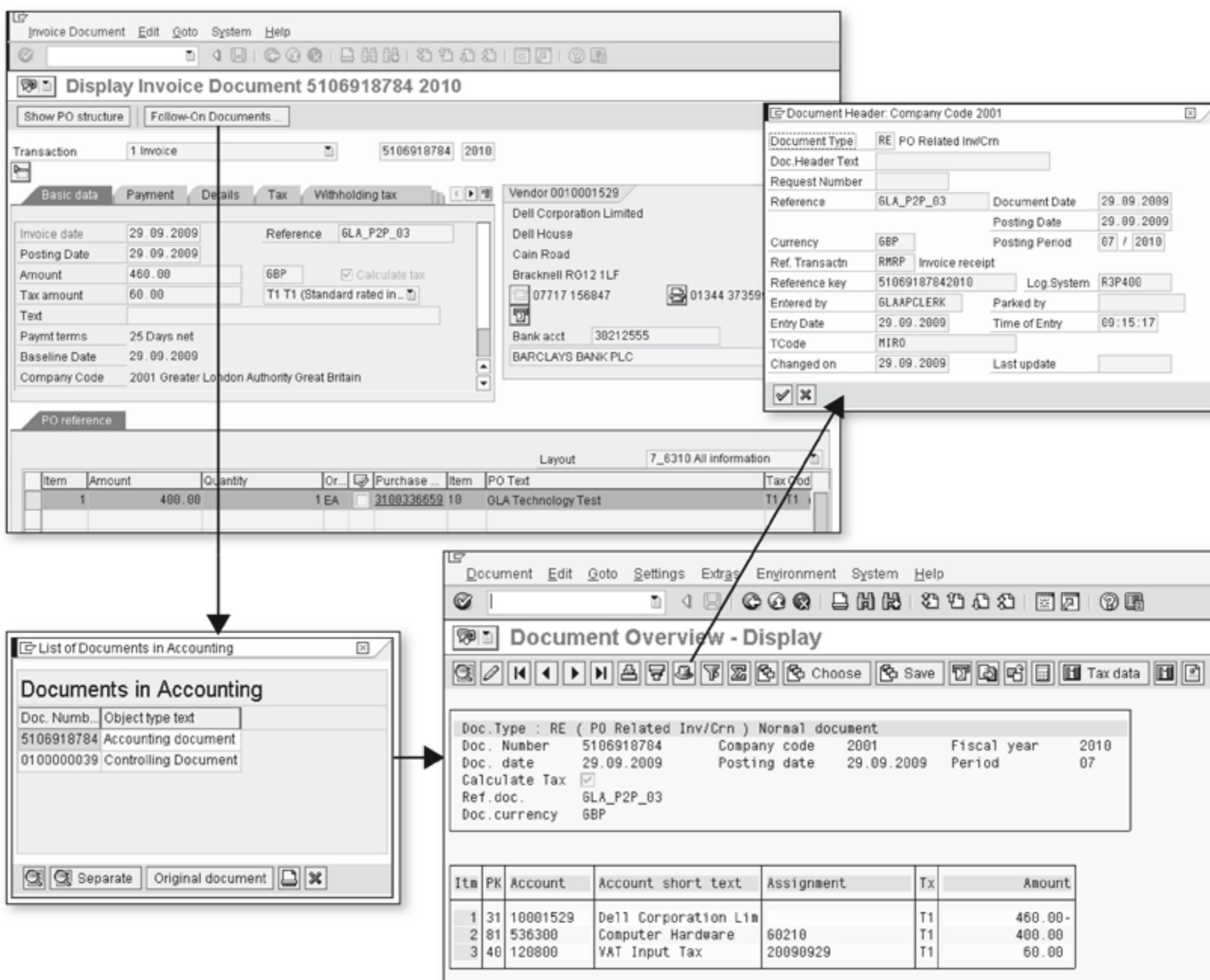


Figure 3.7 Accounting Document and Its Header for an Invoice

The accounting document is created as a follow-on document to the logistics invoice verification document.

Why does the system show a reconciliation account number during simulation and the vendor number on posting the invoice?

The vendor number is treated as the SAP G/L account number for invoice posting. The system posts both to the reconciliation account number maintained in the vendor master and to the vendor number. Each invoice posting results in the following:

- ▶ Total liabilities for all vendors (reconciliation account)
- ▶ Total liabilities per vendor (subledger accounting)

During simulation, the reconciliation account that is maintained in the vendor master is displayed. However, when you post the document, it's posted to both accounts, as shown in Figure 3.8.

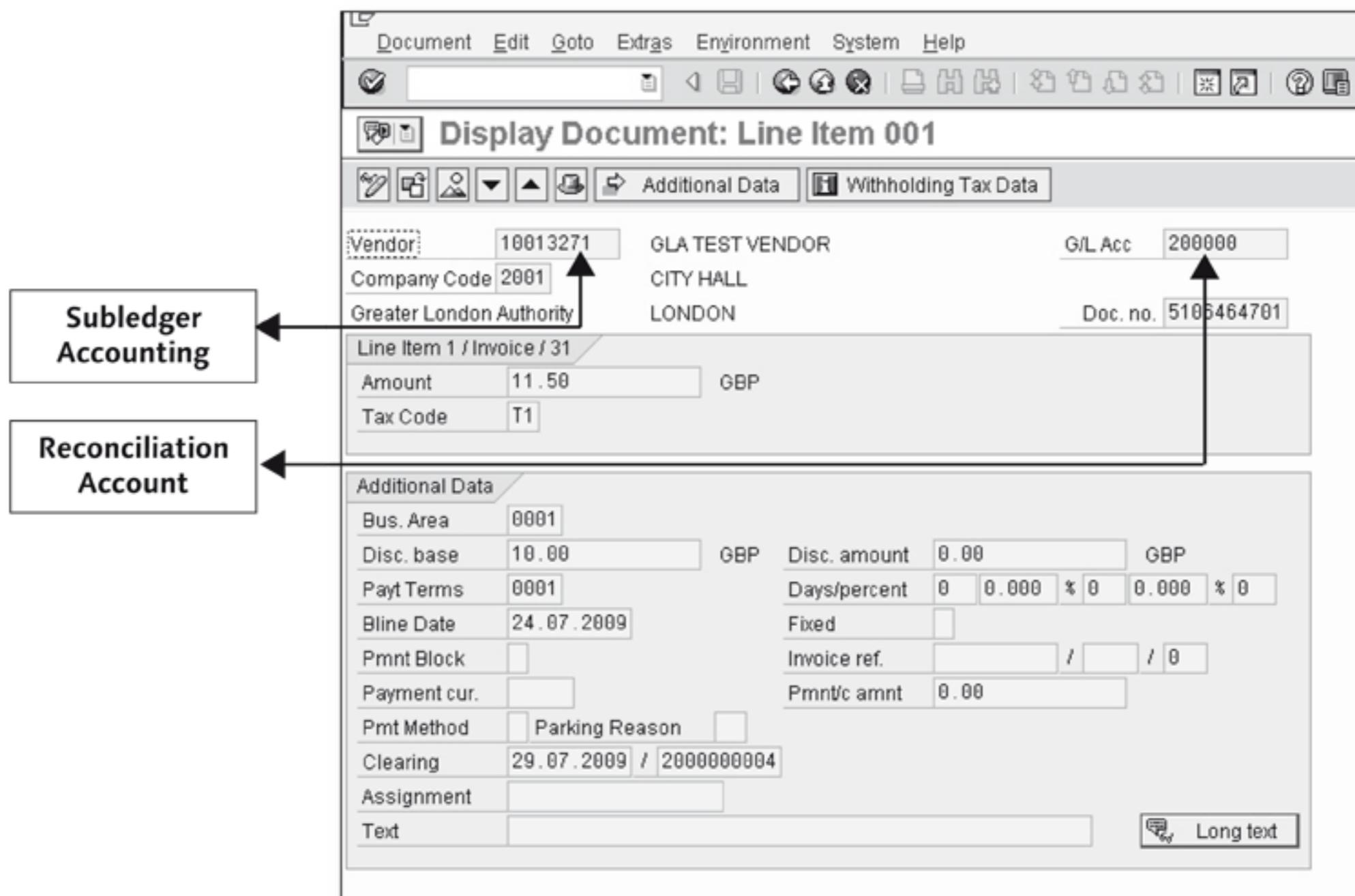


Figure 3.8 Subledger and Reconciliation Account for a Posted Invoice

3.4 Troubleshooting Techniques

Troubleshooting often refers to searching the cause of unexpected behavior during a transaction. Therefore, an understanding of all of the options available, along with the expected behavior, can minimize the effort required and the time spent during troubleshooting. However, undoubtedly, there's no substitute to comprehensive learning. The comprehensive learning refers to the information contained within SAP library, SAP Customer notes, SAP Customizing documentation, and SAP search help.

Still, troubleshooting may not be as easy as it sounds, especially for the Materials Management Financial Accounting interface, because data is used from two different components. In general, a certain amount of technical understanding is very helpful in troubleshooting. Therefore, in the next section, we'll discuss the program flow and the data flow during transactions.

At this stage, we think it's appropriate to introduce you to these technical elements, which will help you in troubleshooting, technical analysis, and debugging. You'll also learn how to debug in both the regular screen as well as in the pop-up window.

3.4.1 Introduction to Technical Elements

In this section, we'll discuss a generic program and data flow within SAP. We'll keep it as simple as possible, so as not to get lost in the ABAP code. Figure 3.9 illustrates the interaction of a user with the program elements when a transaction is posted.

In step 1, the system receives the request from the user. Because the user interacts with the screen, the actions he takes such as entering data manually, clicking on buttons, or clicking on `Enter` on the keyboard may trigger events.

In step 2, the system accesses the database tables and in step 3, it processes this data in the program and updates certain database tables with the transaction data.

Finally, in steps 4 and 5, the system informs the user about the success of the transaction, along with the document number.

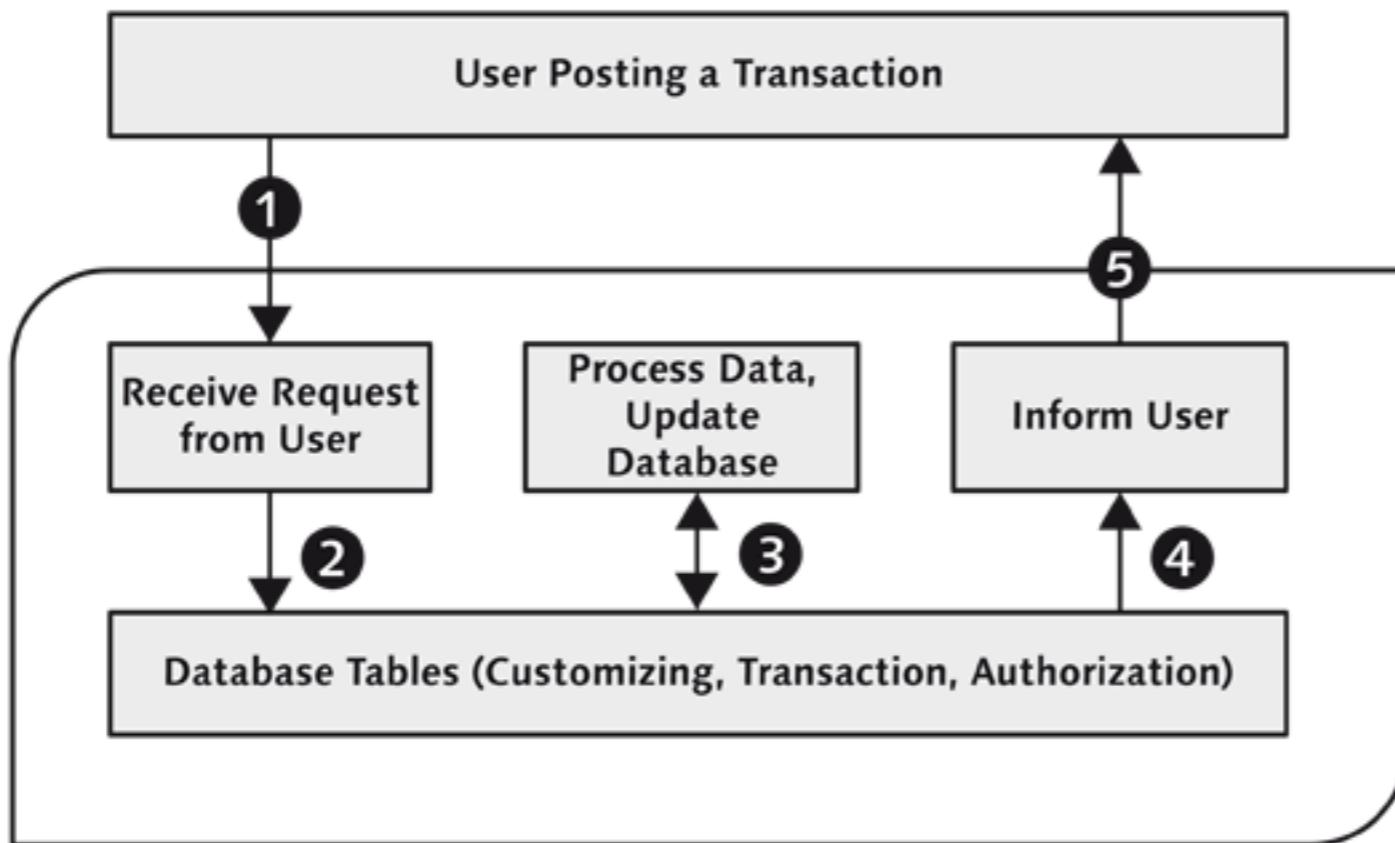


Figure 3.9 Program Flow When A User Posts a Transaction

For the model in Figure 3.9, two elements are of vital importance:

- ▶ Processing program at runtime
- ▶ Data stored in the database tables

The technical elements can be viewed in the Object Navigator (Transaction SE80). Additionally, you can use Transaction SE38 for viewing the programs and Transactions SE11, SE16, SE16N for displaying the contents of the database tables.

The contents of the database tables often provide much information about the transaction. For example, Table EKPO, which stores the line items of purchase orders, contains the field PSTYP. PSTYP = 1 refers to a blanket purchase order and PSTYP = 9 refers to a service purchase order. For a service purchase order, the field EKPO-PACKNO is populated and is the key for service database tables.

You can get the technical field name of a particular field from the **F1** help, as shown in Figure 3.10.

You may check the contents of the table if you have the table category set as transparent table. With this approach, troubleshooting boils down to the analysis and comparison of data across various database tables. Refer to Appendix B for a list of database tables.

During runtime, the processing program may provide additional information and raise exceptions with the help of various messages. The most common message types include error, warning, and information. You can display the message long text by clicking on it. Each message in SAP can be identified uniquely by a code

that consists of the message type and a three-digit message number (i.e., XX nnn or XXnnn). This number is present at the top of long text for every message and can be found in Transaction SE91.

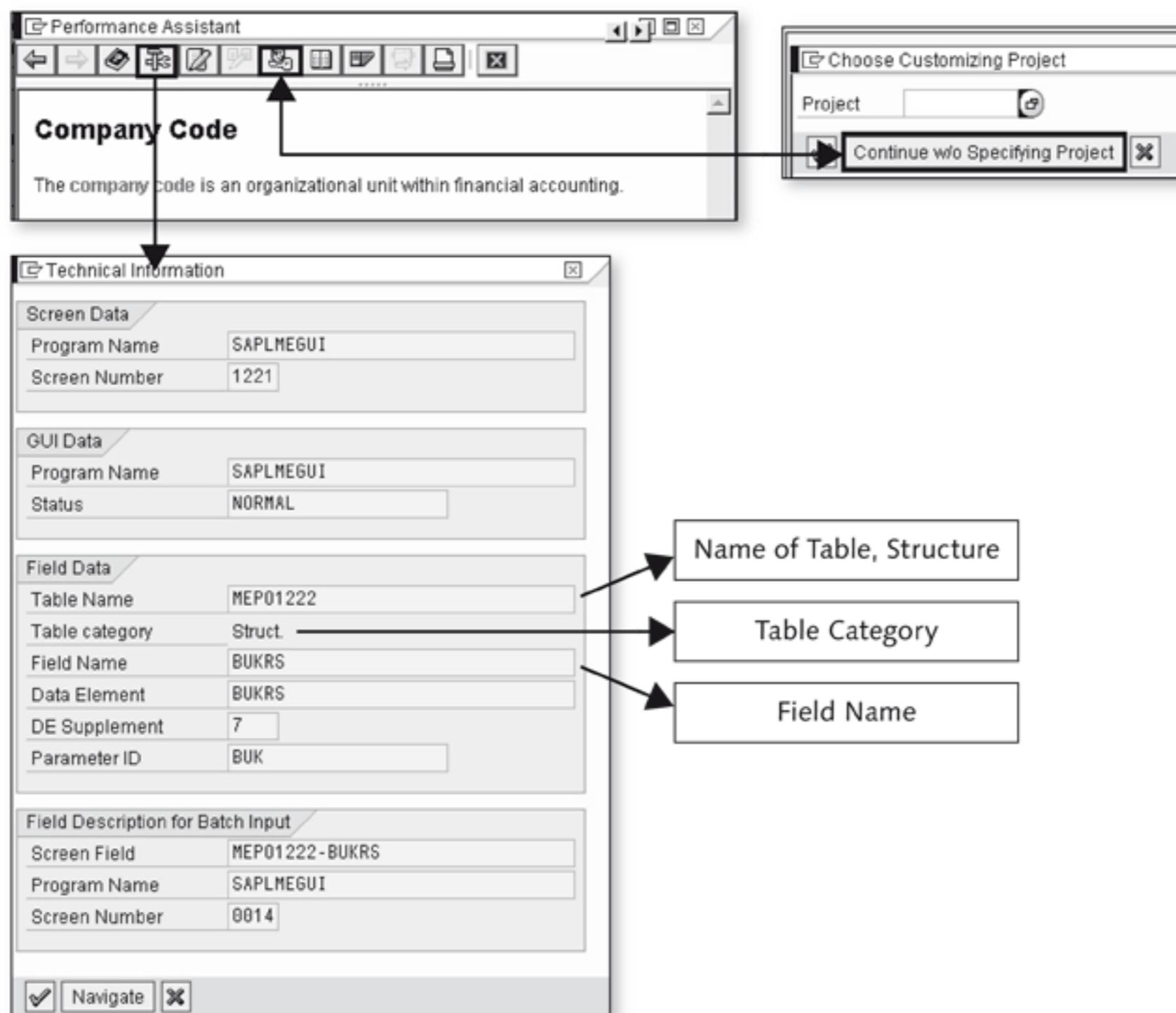


Figure 3.10 Technical Info and Drilldown to Customizing from the F1 Help

3.4.2 The Troubleshooting Approach

When you encounter unexpected behavior, you should proceed in the following manner and sequence:

- ▶ Try to reenter the transaction, if possible, because the system isn't able to distinguish between manual entries and suggested values.
- ▶ Analyze the functional validity of the transaction. Most of the time, the system issues messages that are self-explanatory.
- ▶ Check the master data, if relevant to the issue.
- ▶ Check the relevant Customizing settings.

- ▶ Check the previous transactions, if relevant. Many times it helps to sort the previous transactions in chronological order and then analyze the issue.

3.4.3 The Technical Analysis

You often come across scenarios where everything used to work perfectly fine but incorrect data is now being picked up during a similar process. For such cases, post the document, if possible; then, compare the field values in the database tables with those of the previously posted documents. Because all of the data is captured by the database tables and stored in them, it will be helpful if you compare the data in the same database tables in both cases. You must then search for the fields in which the value varies in both cases. A sensible assessment should provide you with a good idea of the difference in the field values. You can then analyze whether those fields were supposed to be populated through Customizing, master data maintenance, or transaction data.

From the Materials Management/Financial Accounting integration point of view, sometimes it proves helpful to analyze the accounting documents rather than the material document, because the data is exchanged between the Materials Management and Financial Accounting interfaces.

3.4.4 Debugging

Just like you can run a continuous video in snapshot mode for a kind of frame-by-frame replay, you can run transactions in the SAP system in steps rather than continuously. This process is known as debugging, which we'll discuss next.

The first step in debugging is to start the debugger. From there, we'll briefly outline the various options you have available to you during debugging.

Starting the Debugger

- ▶ To start the debugger, enter "/h" in the command field. Pressing `Enter` starts the debugger immediately; therefore, you can start it from whatever point you wish during the course of the transaction.
- ▶ Enter "/h" in the Command field to also debug system programs.
- ▶ Go to the menu path **SYSTEM • UTILITIES**.

The steps to debug the pop-up window are illustrated in Figure 3.11.

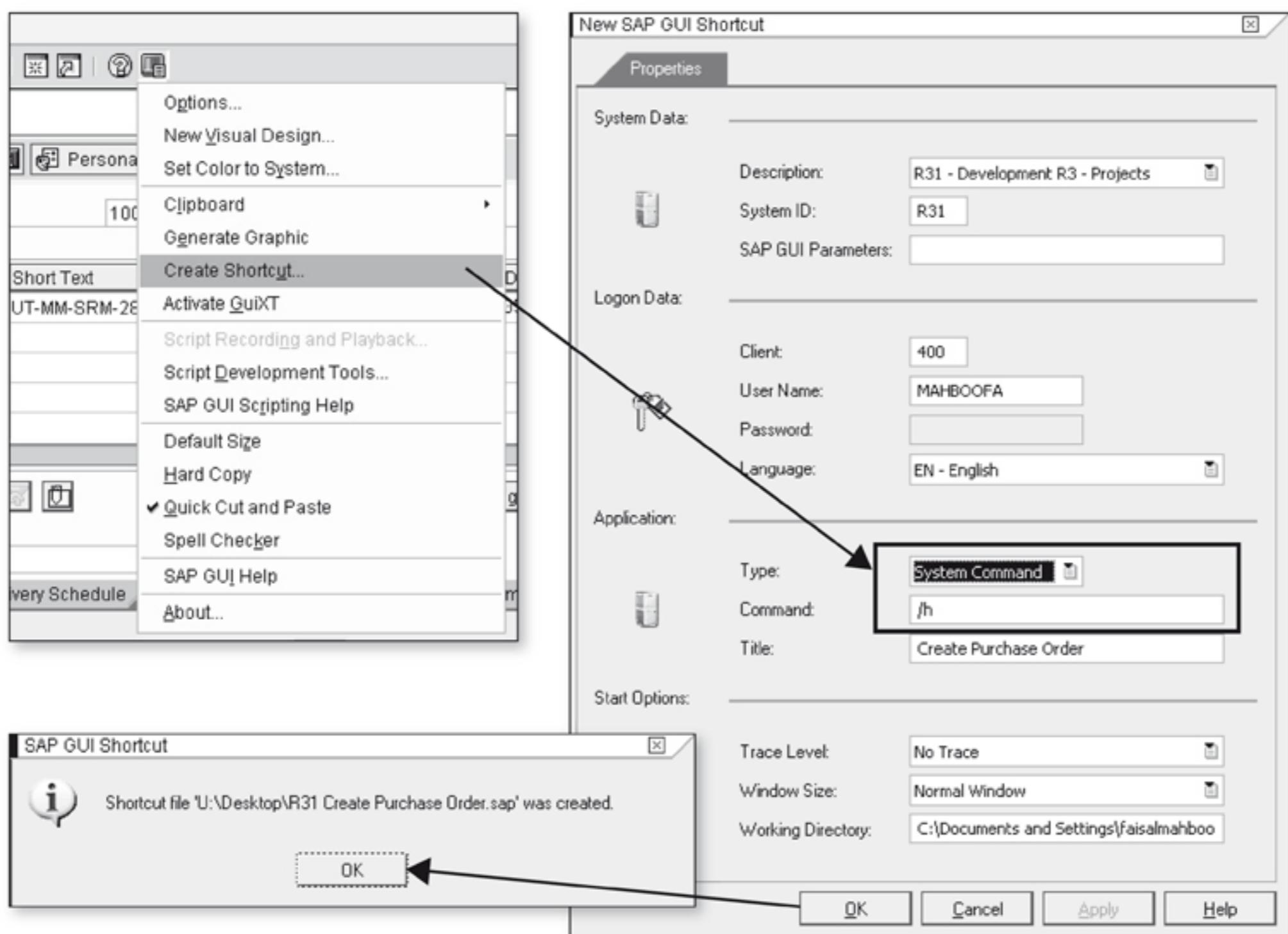


Figure 3.11 Debugging the Pop-Up Window

You can then drag and drop the created shortcut into the pop-up window to start debugging.

Debugging Options

Debugging is generally a matter of practice. However, the job becomes simplified if you know about the different functionalities in debugging. Figure 3.12 shows a generic debugging screen, which you reach when you start the debugger. As explained before, the debugging is switched on by entering /h in the Command field of an SAP window and you can start the debugger from the point you want to analyze the program flow. For instance, if you need to analyze the program in debugging mode from the fourth step of a transaction, you complete the transaction through the third step, enter "/h" in the Command field, and then execute the fourth step.

Break points are used to execute the code until that point and watchpoints are used to compare the data.

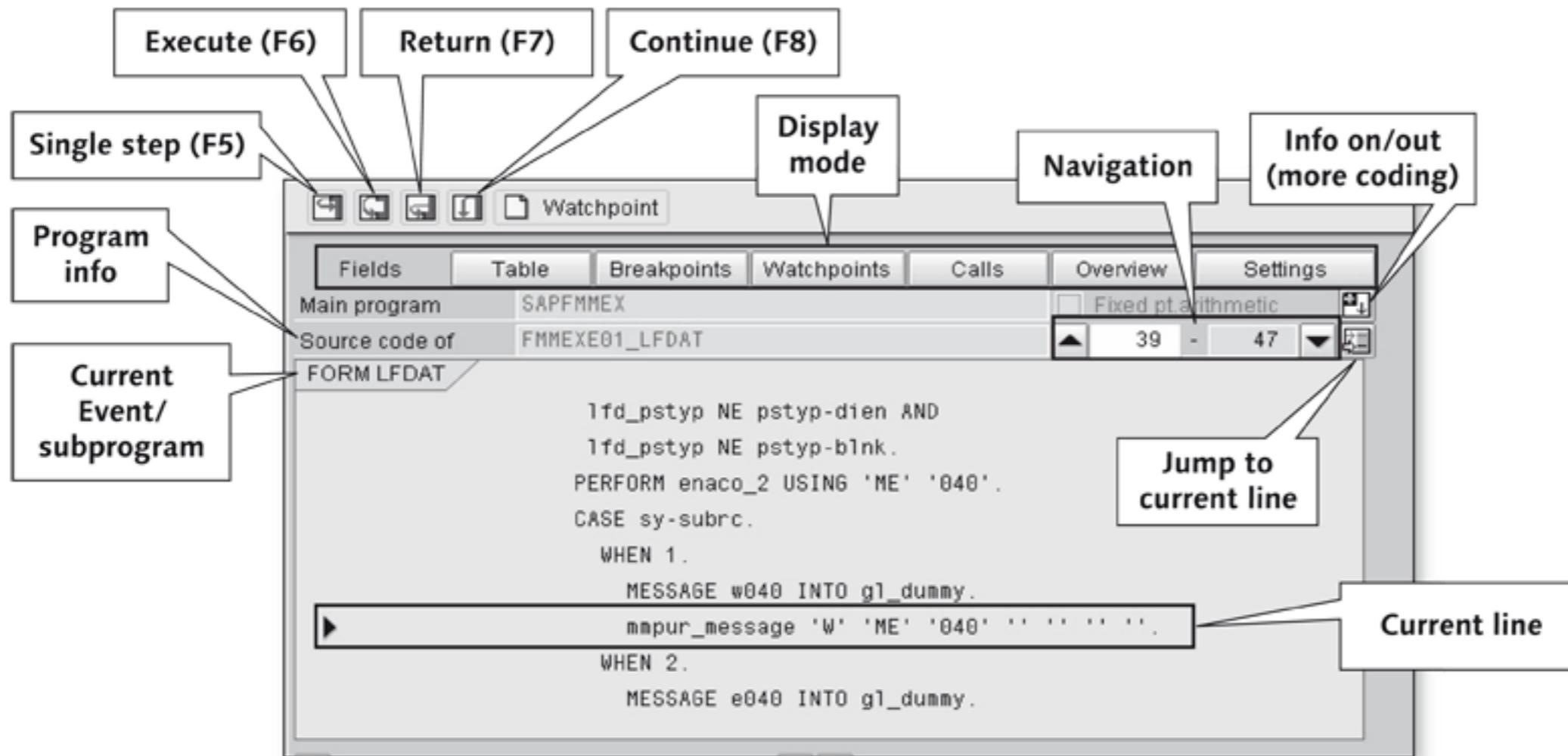


Figure 3.12 Debugging Screen

This technique of troubleshooting is particularly useful for runtime program analysis such as for error messages in a transaction. The following example helps illustrate this.

Error message in ME21N: Please enter either material or short text

Click on the message to get the message number. It's MEPO052. Now, proceed as follows:

- ▶ Execute the transaction until just before the point where you get the error message.
- ▶ Enter "/h" in the Command field to enter debugging.
- ▶ Press **F5** until the Watchpoints button appears in the application toolbar.
- ▶ Click on the Watchpoints button.
- ▶ Enter "sy-msgno" in the Field Name field, "=" in the Relational Operator field, and "052" in the Comp. Field/Value field. Press **Enter**.
- ▶ Press **F8**.
- ▶ The program stops at the next point.

```

IF ekpo-ematr EQ space AND ekpo-txzo1 EQ space.
* material number or short text is required!
MESSAGE e052(mepo).
ENDIF.

```

- ▶ You might either get an idea about the problem at this point, or you can check the meaning of the fields in Table EKPO

3.5 Summary

In this chapter, we analyzed the elements of Materials Management from the point of view of purchasing, inventory management, material valuation, logistics invoice verification, and GR/IR clearing accounts. We also looked at the various elements of Financial Accounting such as SAP G/L, Accounts Payable, and Asset Accounting. From there, we went on to explore the relationship between various elements of Materials Management transactions and Financial Accounting and Controlling. You should now have a good general understanding of the various elements of Materials Management and Financial Accounting and how they depend on each other.

In the later part of the chapter, we analyzed troubleshooting techniques for functional as well as technical approaches. We then went on to explain the basic functionalities in debugging, with the help of an example.

In the next chapter, we'll describe the enterprise structure as maintained in Customizing for Materials Management and Financial Accounting. We'll also discuss the basics of procurement processes and various documents used in Materials Management.

A large portion of Materials Management is initiated and represented by the processes in procurement. The system is configured with the goal of representing these processes.

4 Basics of Configuration and the Processes in Procurement

In this chapter, we'll demonstrate and explain the most important elements of the configuration steps that decide the integration of Materials Management with SAP ERP Financials Financial Accounting.

Later in this chapter, you'll learn about the various kinds of master data used in procurement and the different application transactions that correspond to procurement.

The understanding you will develop in this chapter will help you represent the procurement processes in the SAP system for your business. You will also learn about the different types of master data you need in the SAP system and the various documents that make use of this master data.

4.1 Enterprise Structure

An enterprise is made up of people and departments. Its structure represents the people within different departments that are a part of the reporting hierarchy. In an SAP system, the enterprise is represented differently, on the basis of various operations such as Materials Management, Sales and Distribution, Financial Accounting, Human Resources, and so on. We then pursue the integration of these components and in this book, will talk about them as and when required. The representation of an enterprise structure for business into SAP ERP is the first step towards realizing real-time business scenarios. If you examine an enterprise's building blocks for the purpose of analysis, you see that it's made up of organizational units and the relationships among them.

Customizing is used to configure business functionalities in the SAP system. The same is true for the enterprise structure, which is represented with the help of the following two Customizing options:

- ▶ Definition
- ▶ Assignment

As you can see in Figure 4.1, both options are present for all of the components that require organizational units specific to them. The enterprise structure shows the interdependence of the organizational units on one another and the organizational units of one component may be used in another to define its own enterprise structure. For instance, Materials Management uses the company code from Financial Accounting, the plant from Logistics – General, and the purchase organization and storage location from Materials Management to define its enterprise structure. We'll describe the enterprise structures of Materials Management and Financial Accounting later in this chapter.

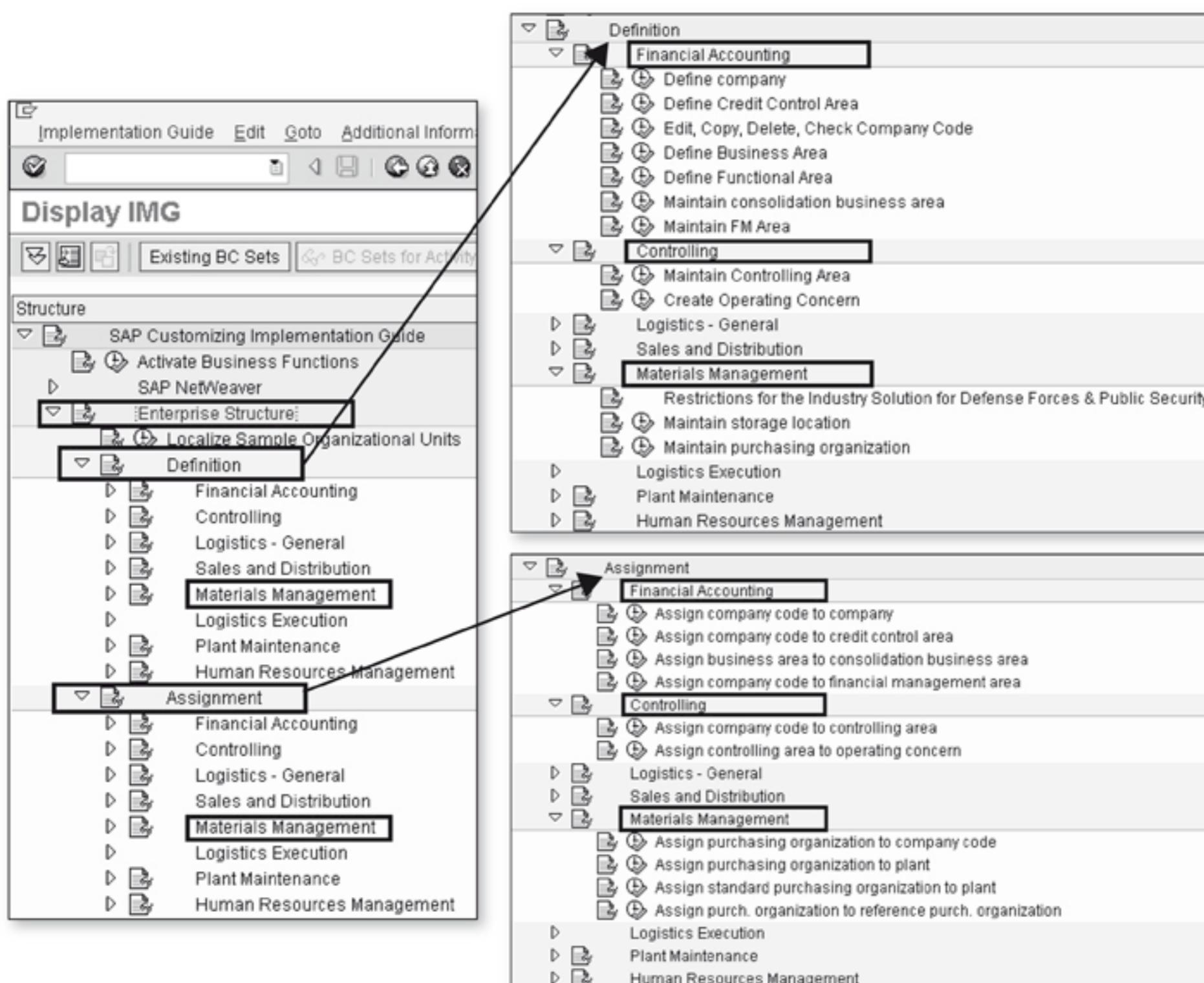


Figure 4.1 Definition and Assignment of Organizational Units in Customizing

The decision on which organizational units to create is a fundamental step in your project. When you have decided on an organizational structure, it's not easy to change it.

Not all of the application components are included in the enterprise structure. Why?

You'll find that not all of the application components are included in the ENTERPRISE STRUCTURE in Customizing. The only components included are those that require the organizational units specific to them. Quality Management, Production Planning, Project System, and so on use the organizational units from other SAP software, for example. Therefore, they don't appear under DEFINITION or ASSIGNMENT under the ENTERPRISE STRUCTURE.

Now that you know that the enterprise structure is used in Customizing to portray and configure the specific structure of your business, let's move on to the definition and assignment, to help you understand how it's represented within the SAP system.

4.1.1 Definition

You define various organizational units the under the Division section in Customizing (Transaction SPRO) menu path: SAP IMG • ENTERPRISE STRUCTURE • DEFINITION. In most cases, you'll find an SAP standard organizational unit already defined. It's advisable to first come up with the structure and naming convention on paper and then create new organizational units by copying those delivered in the SAP standard. The definition is kept simple and generally represents a code with a text description.

Because our focus in this entire book is Materials Management and Financial Accounting, let's take a quick look at some of the important organizational units from these areas that help in defining the enterprise structure in Materials Management and Financial Accounting.

Client

The client is a commercial organizational unit in the SAP ERP system, with its own data, master records, and set of tables. From a business perspective, the client forms a corporate group.

From the technical point of view, is the client is a three-character key you enter along with the user id and the password when you log into the system. At this time, the client along with the user id decides the following:

- ▶ User master data such as parameters, authorizations, and user groups
- ▶ Customizing data such as organizational units, assignments, and document types
- ▶ Application data such as business transaction data and material master data

Because the client is decided at the time of logging into the system, you'll notice that in Materials Management or Financial Accounting, it doesn't appear as an option in the enterprise structure in Customizing (Transaction Code SPRO).

Let's move on to define the various organizational units used in the enterprise structure of Materials Management and Financial Accounting.

Company

The company is an organizational unit in accounting that represents the business organization that acts as an internal trading partner and facilitates inter-company transactions.

Company Code

The company code is the smallest legal organizational unit that represents an accounting unit for which you can have an independent accounting department within external accounting.

It's important to note that the company code has to be a legal entity but the company may or may not be a legal entity.

Company and company code: Points to remember

- ▶ In the SAP system, consolidation functions in Financial Accounting are based on companies.
- ▶ A company can comprise one or more company codes.
- ▶ All company codes for a company must work with the same operational chart of accounts and fiscal year. You assign a chart of accounts to each company code. This chart of accounts is the operational chart of accounts and is used for the daily postings in this company code. This is a list of all SAP G/L accounts used by one or several company codes.
- ▶ The currencies of various company codes of a company can be different.

Business Area

A business area is an organizational unit within accounting that represents a separate area of operations or responsibilities in a business organization. The use of

business area is optional. However, SAP recommends the use of profit center, which helps in segmental reporting.

Functional Area

A functional area is an organizational unit that classifies the expenses of an organization by functions such as administration, sales and distribution, marketing, production, research and development, and so on. The classification takes place to meet the needs of cost of sales accounting.

Financial Management Area

The financial management area, also called the FM area, is an organizational unit within accounting that structures the business organization from the perspective of Cash Budget Management and Funds Management.

Controlling Area

The controlling area is an organizational unit in accounting used to subdivide the business organization from a cost accounting standpoint. A controlling area may be assigned to one or more company codes in a 1:1 or 1:n relationship.

Operating Concern

The operating concern is an organizational unit in accounting that structures the enterprise from the point of view of Profitability Analysis, based on the cost of sales accounting method.

Plant

The plant is an organizational unit used to divide an enterprise according to production, procurement, maintenance, and materials planning. It's the place where materials are produced or goods and services are provided.

The valuation level determines the level at which material stocks are valued. You may choose either plant or company code as the valuation level. Your choice of valuation level affects the following:

- ▶ Maintenance of the material master record.
- ▶ How accounting data is maintained. In this case, it is maintained for each plant or for each company code in the material master depending on the valuation level.

- ▶ The SAP G/L in which material stocks are managed.
- ▶ How account determination is defined. In this case, if the material stocks are valued at the company code level, all of the plant stocks for a material are managed in a joint stock for each company code. If material stocks are valued at the plant level, the material stock for each plant can be managed in different accounts. Thus, you can define separate account determination for each plant.
- ▶ The SAP G/L to which transactions are posted in Materials Management.

Depending on whether the valuation is at the plant level, there is a separate account determination for each plant.

If the plant is chosen as the valuation level, you can define material prices for each plant. In addition, each plant can have its own account determination.

Switching the valuation level

The valuation level or the valuation area determines the level at which material stocks are valued. This can be either the plant or the company code level. The valuation area is hidden within the Materials Management component.

This is one of the fundamental settings for materials valuation and should be set carefully as it's not possible in the standard to switch the valuation level from plant to company code or vice versa.

For switching the valuation level, you must ensure the following:

- ▶ An assignment of plant to company code isn't present.
- ▶ Entries don't exist in Table T001K.
- ▶ If materials already exist, all stocks must be cleared and posted again after the conversion.
- ▶ The valuation data of the materials (Table MBEW at the valuation area level) must be converted.
- ▶ You may have to adjust the account determination for all accounts that depend on valuation area and valuation classes. Valuation classes represent the assignment of a material to a group of SAP G/L accounts. This is explained in detail later in the book.
- ▶ You may have to adjust the assignment of business areas per valuation area, division, and so on.

Storage Location

The storage location is an organizational unit that allows the differentiation of material stocks within a plant. Inventory management on a quantity basis is carried out at the storage location level in the plant.

Purchasing Organization

A purchasing organization is an organizational level that negotiates conditions of purchase with vendors for one or more plants. It's legally responsible for completing purchasing contracts.

Now that you have a fair amount of information about defining various organizational units for Materials Management and Financial Accounting, we'll continue to explaining the significance of the assignment of these organizational units.

4.1.2 Assignment

The framework of an enterprise for processing business transactions is realized by linking organizational units. The assignment in Customizing provides a set of options available for portraying your enterprise in SAP. It serves the purpose of creating references between the organizational units you have defined.

The organizational units from other components can be used during assignment. For instance, only the purchasing organization belongs to Materials Management, however, the following options are present for assignment under the menu path SAP IMG • ENTERPRISE STRUCTURE • ASSIGNMENT • MATERIALS MANAGEMENT:

- ▶ ASSIGN PURCHASING ORGANIZATION TO COMPANY CODE
- ▶ ASSIGN PURCHASING ORGANIZATION TO PLANT
- ▶ ASSIGN STANDARD PURCHASING ORGANIZATION TO PLANT
- ▶ ASSIGN PURCH. ORGANIZATION TO REFERENCE PURCH. ORGANIZATION

Table 4.1 provides the technical details for the definition and assignment for Materials Management, Financial Accounting, and Controlling in Customizing.

Menu Path	Table/View	Transaction
(All of the menu paths listed are found under SAP IMG • ENTERPRISE STRUCTURE)		
DEFINITION • MATERIALS MANAGEMENT • MAINTAIN STORAGE LOCATION	► T001L/V_T001L ► TWLAD/V_TWLA	OX09
DEFINITION • MATERIALS MANAGEMENT • MAINTAIN PURCHASING ORGANIZATION	T024E/V_T024E	OX08
DEFINITION • LOGISTICS – GENERAL • DEFINE VALUATION LEVEL	TCURM	OX14

Table 4.1 Menu Path and the Technical Elements of the Enterprise Structure for Materials Management, Logistics – General, Financial Accounting, and Controlling

Menu Path	Table/View	Transaction
DEFINITION • LOGISTICS – GENERAL • DEFINE, COPY, DELETE, CHECK PLANT	► T001W/V_T001W ► T005 (T/S/U/G/E/H/F) ► T002 (T) ► TFACD (T)	OX10 (Only for defining the plant organizational unit)
DEFINITION • FINANCIAL ACCOUNTING • DEFINE COMPANY	T880/V_T880	OX15
DEFINITION • FINANCIAL ACCOUNTING • DEFINE CREDIT CONTROL AREA	T014/V_T014	OB45
DEFINITION • FINANCIAL ACCOUNTING • EDIT, COPY, DELETE, CHECK COMPANY CODE	T001/V_T001	OX02
DEFINITION • FINANCIAL ACCOUNTING • DEFINE BUSINESS AREA	TGSB/V_TGSB	OX03
DEFINITION • FINANCIAL ACCOUNTING • DEFINE FUNCTIONAL AREA	TFKB/V_TFKB	OKBD
DEFINITION • FINANCIAL ACCOUNTING • MAINTAIN FM AREA	FM01/V_FM01_A	OF01
DEFINITION • CONTROLLING • MAINTAIN CONTROLLING AREA	TKA01/V_TKA01_GD	OX06 (Maintain controlling area)
DEFINITION • CONTROLLING • CREATE OPERATING CONCERN	TKEB/V_TKEB2	KEP8
ASSIGNMENT • MATERIALS MANAGEMENT • ASSIGN PURCHASING ORGANIZATION TO COMPANY CODE	► T024E/ V_T024E_ASSIGN ► T001 ► TASSIGN_MM_EKORG ► T000	OX01
ASSIGNMENT • MATERIALS MANAGEMENT • ASSIGN PURCHASING ORGANIZATION TO PLANT	► T024W/W_T024W_ASSIGN ► T000 ► T001W ► T024E ► TASSIG_MM_WERKS	OX17

Table 4.1 Menu Path and the Technical Elements of the Enterprise Structure for Materials Management, Logistics – General, Financial Accounting, and Controlling (Cont.)

Menu Path	Table/View	Transaction
ASSIGNMENT • MATERIALS MANAGEMENT • ASSIGN STANDARD PURCHASING ORGANIZATION TO PLANT	T001W/V_001W_E	OMKI
ASSIGNMENT • MATERIALS MANAGEMENT • ASSIGN PURCH. ORGANIZATION TO REFERENCE PURCH. ORGANIZATION	► T024Z/V_T024Z ► T024E	OMKJ
ASSIGNMENT • LOGISTICS – GENERAL • ASSIGN PLANT TO COMPANY CODE	► T001K/V_T001K_ ASSIGN ► T001 ► TASSIGN_MM_ T001W ► T001W ► T001W_EXT	OX18
ASSIGNMENT • FINANCIAL ACCOUNTING • ASSIGN COMPANY CODE TO COMPANY	T001/V_001_Y	OX16
ASSIGNMENT • FINANCIAL ACCOUNTING • ASSIGN COMPANY CODE TO CREDIT CONTROL AREA	T001/V_001_X	OB38
ASSIGNMENT • FINANCIAL ACCOUNTING • ASSIGN BUSINESS AREA TO CONSOLIDATION BUSINESS AREA	► TGSB/V_GSB_A ► TGSBK ► TGSBL	OBB6
ASSIGNMENT • FINANCIAL ACCOUNTING • ASSIGN COMPANY CODE TO FINANCIAL MANAGEMENT AREA	► T001/V_T001_FM ► FM01 ► FM01T	OF18
ASSIGNMENT • CONTROLLING • ASSIGN COMPANY CODE TO CONTROLLING AREA	► TKA01/V_TKA01_GD ► TKA02/V_TKA02 ► T001	OX19
ASSIGNMENT • CONTROLLING • ASSIGN CONTROLLING AREA TO OPERATING CONCERN	TKA01/ V_TKA01_ER	KEKK

Table 4.1 Menu Path and the Technical Elements of the Enterprise Structure for Materials Management, Logistics – General, Financial Accounting, and Controlling (Cont.)

As we discussed in the previous chapter, a transaction code might not be available for each menu path in Customizing. The maintenance views and the tables therefore represent the technical elements of such menu paths in Customizing.

In this section, you learned only about the options available for assignment in Customizing. However, to understand how these options impact the enterprise structure, we'll describe the Materials Management and Financial Accounting enterprise structures in the following sections.

4.1.3 Materials Management Enterprise Structure

The enterprise structure in Materials Management in SAP ERP consists of the organizational units from Financial Accounting, Logistics – General, and Materials Management, and the relationships between them.

Figure 4.2 shows a typical Materials Management enterprise structure.

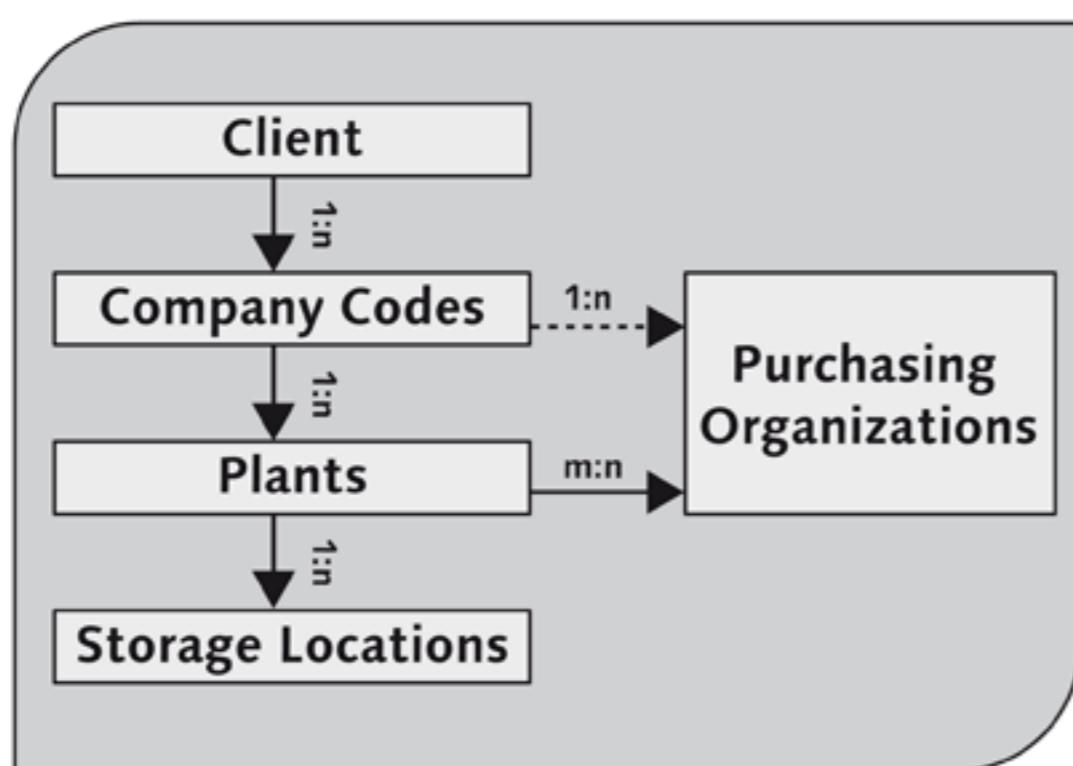


Figure 4.2 Enterprise Structure in Materials Management in SAP ERP

As shown in Figure 4.2, there is 1:n (one to many) relationship between client and company codes, company codes and plants, and plants and storage locations. This means that there can be multiple company codes per client, multiple plants per company code, and so on. The client is decided when you log into the system; therefore, there is only one client for an enterprise structure.

The relationship between company codes and purchase organizations is 1:n and is illustrated in Figure 4.2 by broken lines in the arrow. It means the relationship may not exist, depending on your choice of cross-company code procurement. The relationship between plants and purchase organizations is many to many.

The enterprise structure in Materials Management is quite simple, except for the relationship between purchasing organizations and company codes and plants. It provides added flexibility in configuring real time procurement scenarios. Different

options exist for organizing purchasing within your company, as you can see in Table 4.2. In this example, we have the purchase organizations A, B, 0001, and C100. The company code is 1000 and the plants are 1000 and 1100. In addition, plants 1000 and 1100 are assigned to company code 1000 and plants 2000 and 3000 are assigned to company codes 2000 and 3000 respectively.

Scenario	Purchasing Organizations (A, B, 0001, C100)	Purchasing Organization Assignment to Company Code (1000, 2000, 3000)	Purchasing Organization Assignment to Plants (1000, 1100)	Plant Assignment to Company Code
Plant-specific purchasing organization	A	1000	1000	1000
	B	1000	1100	1000
Cross-plant purchasing organization	0001	1000	1000	1000
	0001	1000	1100	1000
Cross-company code purchasing organization	C100		1000	1000
	C100		2000	2000
	C100		3000	3000

Table 4.2 Different Procurement Scenarios in an Enterprise

As you can see, for configuring the plant-specific purchasing scenario, purchasing organizations A and B are assigned to company code 1000 and plants 1000 and 1100 respectively, which belong to company code 1000.

For configuring the cross-plant procurement scenario, the same purchasing organization 0001 is assigned to company code 1000 and plants 1000 and 1100 belonging to company code 1000.

For configuring purchasing on a cross-company-code basis, the same purchasing organization C100 is assigned to plants 1000, 2000, and 3000 belonging to company codes 1000, 2000, and 3000 respectively. In this case, the purchasing organization isn't assigned to the company code; therefore, you'll find that the column for the purchase organization to company code assignment is blank in Table 4.2.

You should now understand the enterprise structure for Materials Management, as well as the different procurement scenarios possible for its representation in

the SAP system. Let's now take a look at the enterprise structure of Financial Accounting.

4.1.4 Financial Accounting Enterprise Structure

The SAP ERP Financials component includes other components capable of carrying out an organization's complete financial and management accounting processes. SAP ERP Financials Financial Accounting provides information on your company's financial position to external entities such as government regulators and shareholders. SAP ERP Financials Controlling provides internal stakeholders with information necessary for financial decision-making such as that related to overhead and cost of goods. Together, they deliver a complete picture of the overall financial status of your organization and can be integrated with other SAP ERP components to provide real-time cost, revenue, and planning data. Both have their own organizational structures.

Although a full-fledged discussion of Financial Accounting and Controlling is beyond the scope of this book, we'll briefly describe the essential elements of the organizational structures for both of these components and subcomponents, as shown in Figure 4.3.

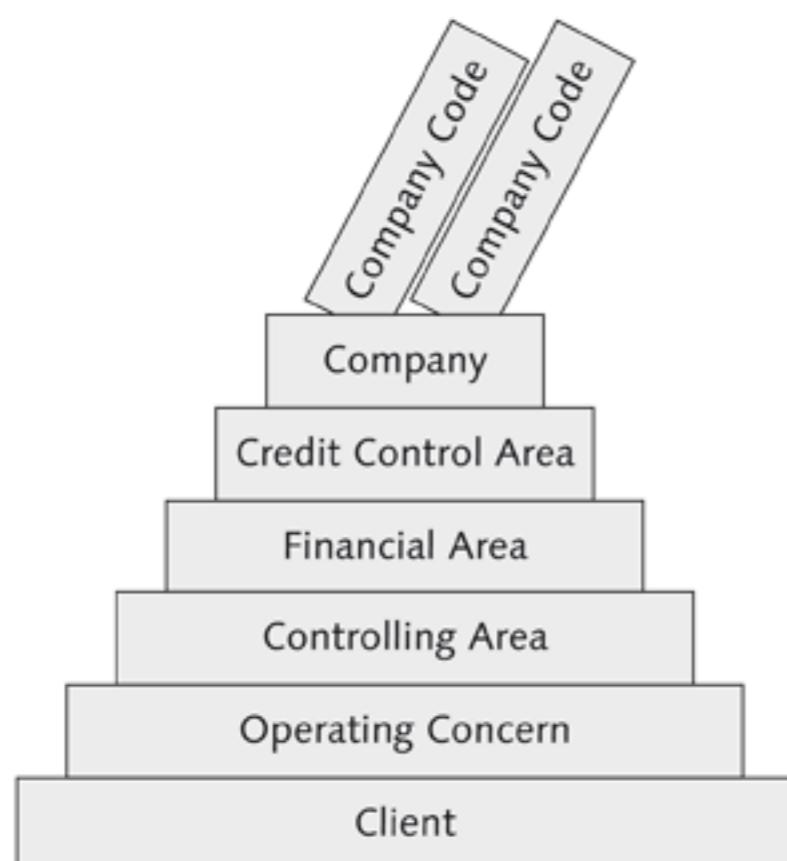


Figure 4.3 Organizational Structure for Financial Accounting and Controlling

Figure 4.3 doesn't represent the assignments in Customizing precisely. Instead, it's meant to provide you with an overview and should help you develop an

understanding of the way various organizational units in Financial Accounting and Controlling can be visualized.

The controlling area and the operating concern belong to Controlling, whereas the credit control area, company, and company code belong to Financial Accounting. Financial management area (FM area) is also called financial area. It's taken into account in Cash Budget Management and Funds Management and has its assignment in the corresponding components.

The controlling area is used for the purposes of reporting. It's an organizational unit within a company, used to represent a closed system for cost accounting purposes. A company code is assigned to one controlling area, but a controlling area can have more than one company code assigned to it.

The company code is the most important organizational unit for Financial Accounting. All other subcomponents connect to Financial Accounting by assigning their organizational units to the company code.

You have so far learned about the various organizational units and their relationship in Materials Management and Financial Accounting and Controlling, used to realize the enterprise structure. The objective of setting up an enterprise structure is to establish a framework for processing different business transactions. Having set up the enterprise structure, we're now ready to take a look at the various processes in procurement.

4.2 Processes in Procurement

The processes in procurement are optimized to meet financial objectives. At a lower level, these objectives may either be about complying with the principles of external accounting or about providing information for management decision-making in Controlling. Of course, the business objective is to make the materials/services available at the planned date and at the best possible price.

Materials can be procured in your company through various channels such as external vendors or other branches of your company. The departments that are involved are purchasing, inventory management, and invoice verification. SAP has knit together operational requirements with financial objectives using documents. The various documents created in Purchasing, Inventory Management, and Invoice Verification reflect the integration and configuration flexibility of Materials Management and Financial Accounting.

The following are impacts when you create a document:

- ▶ Manual entries
- ▶ Master data
- ▶ User controls

As shown in Figure 4.4, the elements listed here result in the documents in procurement.

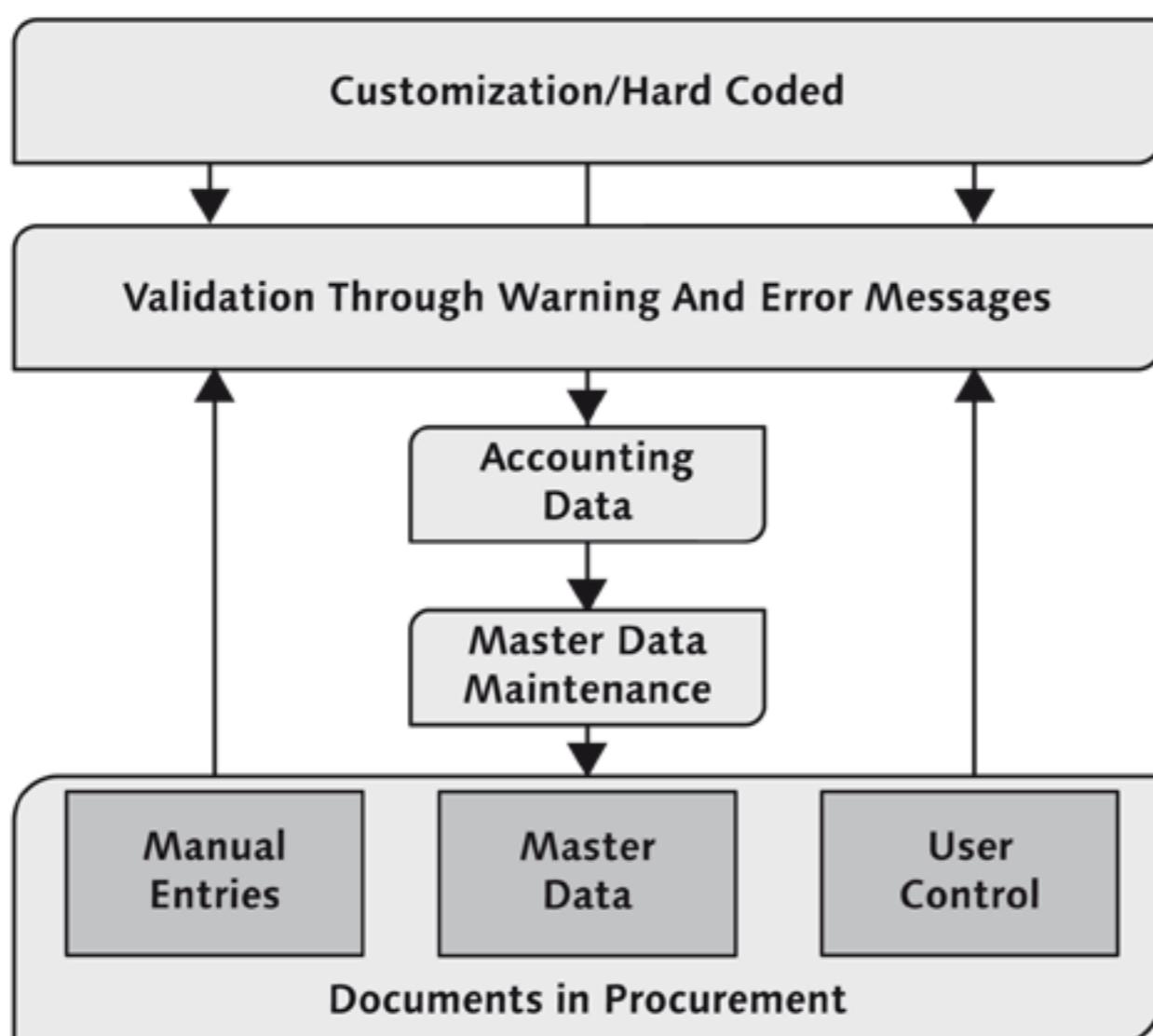


Figure 4.4 Points of Interaction in the System for the Documents in Procurement

An application transaction results in application document(s) in SAP ERP. We'll explain the master data and the various documents in procurement later in this chapter. Still, it will be helpful to understand Figure 4.4 in the context of purchase orders.

You enter a purchase order in Transaction ME21N and make manual entries, for example, company code, purchasing organization, and purchasing group. The system validates these entries with the help of the enterprise structure maintained in Customizing, other Customizing settings under Materials Management, and the elements hard coded in ABAP. The system may then issue a warning or error message, if required. Vendor master and material master is generally the master data from which other information is obtained during purchase order processing.

After the various default values have been assigned, you may still have the ability to overwrite them. Then, depending on the settings in Customizing and the underlying ABAP code, the system again determines whether a warning or error message is issued.

One of the most important features of master data is to maintain the accounting information. It's not possible to execute transactions in procurement without having knowledge about accounting. We'll discuss master data in more detail later in the chapter.

Although we have described Figure 4.4 for a purchase order, is the process applies to almost all of the application transactions.

Technical naming convention in procurement

► Reports

RMnnnnnnn

Example:

RM08RL80 (correct)

MM70AMRA (wrong: not recognizable as a report)

► Includes of the main programs SAPMMxyz and SAPLMxyz

MMxyzinn Module includes

LMxyzinn Function group includes

'xyz' is defined in the main program. The variable 'inn' differentiates among the following type of includes:

TOP = data declaration

Inn = PAI modules

Onn = PBO modules

Fnn = form routines

► Function modules

MMPUR_<object>_<verb>

Example:

MMPUR_INVOICE_CREATE (correct)

MMPUR_DISPLAY_INVOICE (wrong: object after verb)

► Form routines

<object>_<verb>

Example:

PO_ITEM_DATA_FILL (correct)

CHECK_BETRAG (wrong: mixed languages, object after verb)

► Data declaration

Internal tables T_, LT_ (L=Local)

Structures S_, LS_ (L=Local)

Fields F_, LF_ (L=Local)

Parameters in reports PA_

Select options in reports SO_

Ranges in Reports RA_

Constants C_<field name>_<field content or short text>

► Data import/export

IM_ Import

EX_ Export

CH_ Exchange

IMT_ Import of tables

EXT_ Export of tables

CHT_ Exchange of tables under the interface tables

Now that you know the points of interaction in the system during the processes in procurement, we can outline the sequence of steps on which the external procurement in Materials Management is based.

4.2.1 Procurement Cycle

External procurement in Materials Management centers around a general cycle of activities called the procurement cycle. Figure 4.5 represents a typical procurement cycle. It comprises a series of eight functional steps, which replicate the procure-to-pay scenario in Materials Management. We'll briefly describe each step.

Determination of Requirements

Either individual user departments determine materials requirements manually or Materials Planning and Control determines them automatically. The determination of requirements in the SAP system is represented by the creation of a purchase requisition. The purchase requisition is an internal purchasing document used to

notify the responsible department about material/service requirements. In the SAP system, the purchase requisition can keep track of the status; that is, whether it has been processed to a purchase order.

Source Determination

As you can see in Figure 4.5, source determination is carried out within Purchasing in Materials Management. The Purchasing component helps you identify potential sources of supply, again based on past orders and existing longer-term purchase agreements. This speeds the process of creating requests for quotation (RFQs), which can be sent to vendors electronically via SAP EDI, if desired.

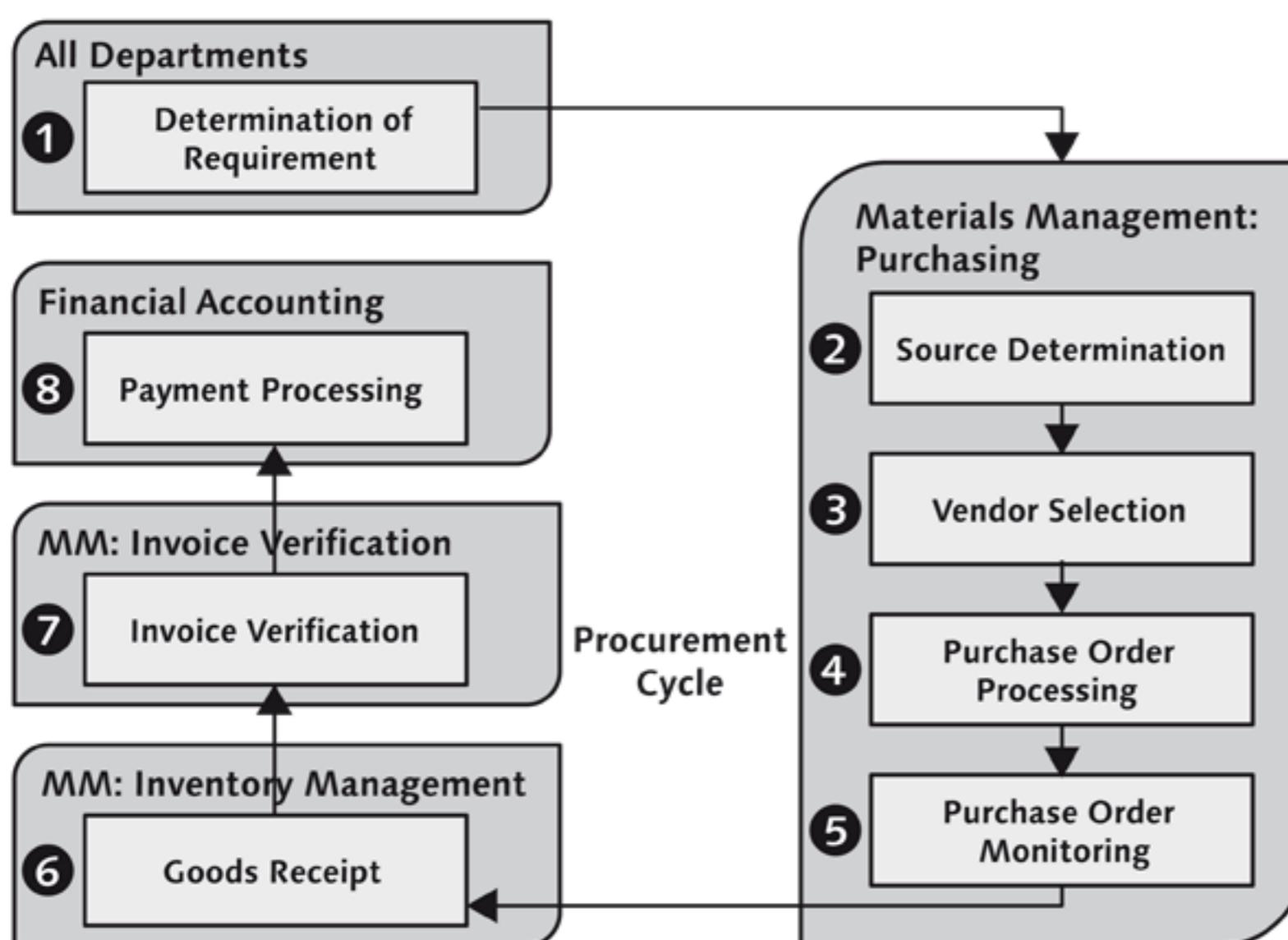


Figure 4.5 Procurement Cycle for Materials

Vendor Selection

Vendors reply to the RFQ with their quotation. In the SAP system, the RFQ and quotation are the same document. The system simplifies the selection of vendors by making price comparisons between the various quotations. You can also configure the system to send rejection letters automatically.

Purchase Order Processing

The purchase order is a legal and formal document with a set of requests and/or instructions to vendors to supply certain materials or render certain services. You can create a purchase order from the purchase requisition or the quotation.

Purchase Order Monitoring

The system may automatically generate reminders or expeditors at predefined intervals of reminder periods you have specified. You can also receive a real-time status of all purchase requisitions, quotations, and purchase orders.

Goods Receipt Examples

You can post a goods receipt in Inventory Management when you receive the materials against the purchase order. The purchase order history is updated accordingly. You can limit the over- and underdelivery of ordered goods by specifying permissible tolerances at the time of the purchase order. For instance, if a purchase order is created for 100 pieces of a material, the overdelivery tolerance may be 10%, and the underdelivery tolerance may be 20%. In this case, the standard system issues an error message for goods receipt of more than 110 pieces and a warning message for the goods receipt of fewer than 80 pieces. You can configure these messages as error or warning messages as per your requirement. The valued goods receipt results in the creation of an accounting document.

Invoice Verification

The system suggests the amount and the quantity based on the purchase order and the goods receipt. The terminology of a three-way and two-way match is also in use in the industry, although it's not documented officially by SAP. A three-way match is the matching of values between the three documents purchase order, goods receipt document (material document), and invoice receipt document. A two-way match involves just the purchase order and the invoice receipt. Nonetheless, in both the cases, it has to be verified against the invoice you receive from the vendor. You can configure tolerances to block deviating invoices for payment. In addition to the other tolerances, during invoice verification, the system can check for a mismatch between the quantity at the time of goods receipt and that at the time of invoice verification. It can also check for a mismatch between the price in the purchase order and that at the time of invoice verification.

Payment Processing

The payment program in Financial Accounting can make payment against the accounting documents created as a result of invoice verification. In turn, the accounting documents are updated with the clearing document number and the clearing date.

The procurement cycle terminates in Financial Accounting. Thus, it cannot be completed unless the appropriate accounting information is present for each step.

Procurement cycle for external services

The procurement cycle for external services varies slightly from that for materials, as follows:

- ▶ The automatic generation of purchase requisitions doesn't occur in Materials Planning but either in Plant Maintenance or Project Systems.
- ▶ There may be a bid invitation instead of an RFQ. An RFQ is an invitation extended to a vendor by a purchasing organization to submit a quotation (bid) for the supply of materials or performance of services.
- ▶ The goods receipt isn't posted manually. Instead, the service entry sheet is posted and service acceptance is made in Transaction ML81N. This creates a corresponding goods receipt document automatically.

Now that you understand the procurement cycle for materials, we'll move ahead to describing the following types of procurement:

- ▶ Procurement of stock material
- ▶ Procurement of consumable materials
- ▶ Procurement of services

We distinguish between these types of procurement because of the way in which the accounting information needs to be handled.

4.2.2 Procurement of Stock Material

The materials that are kept in storage following a goods receipt are referred to as *stock materials*. The stock on hand is updated by the receipt or issue of goods in the storage location. They're managed on a value and quantity basis in Inventory Management.

As indicated earlier, the procurement of stock material categorizes the way in which the accounting information is passed during procurement. The material

master record is maintained for stock materials. The references to the accounting information are maintained in the Accounting view of the material master. This accounting information, along with the Customizing settings, determines the SAP G/L Accounts to be used at the time of goods receipt and invoice verification account postings. Because the material master is the key to accounting information, the account determination for stock material is automatic.

4.2.3 Procurement of Consumable Materials

The materials that are procured directly for an account assignment object and aren't managed on a value basis in Inventory Management are referred to as *consumable materials*. Account assignment objects can be objects such as cost centers, internal orders, projects, or business processes to which costs or quantities are posted in Controlling. Consumable materials are assumed to have been consumed the moment they're received. For example, they may represent materials such as office supplies that are procured directly for the respective cost centers.

Consumable materials may or may not have a material master record. Nonetheless, a manual account assignment is mandatory. Because the material master for consumable materials doesn't contain accounting information, it has to be manually entered at the time of creation of a procurement document, for example, a purchase order. The consumable materials debit has different account assignment objects depending on the account assignment category. Following are the account assignment categories that can be used:

- ▶ A: Asset
- ▶ K: Cost center
- ▶ P: Project
- ▶ F: Order
- ▶ C: Sales order

The system tries to derive the SAP G/L account for consumption from the account assignment information you enter during the creation of a purchase requisition or purchase order. For example, you have to enter the SAP G/L account number manually when you use the account assignment object K, as shown in Figure 4.6. On the other hand, the system derives the SAP G/L account number from the asset number you enter when you use the account assignment object A.

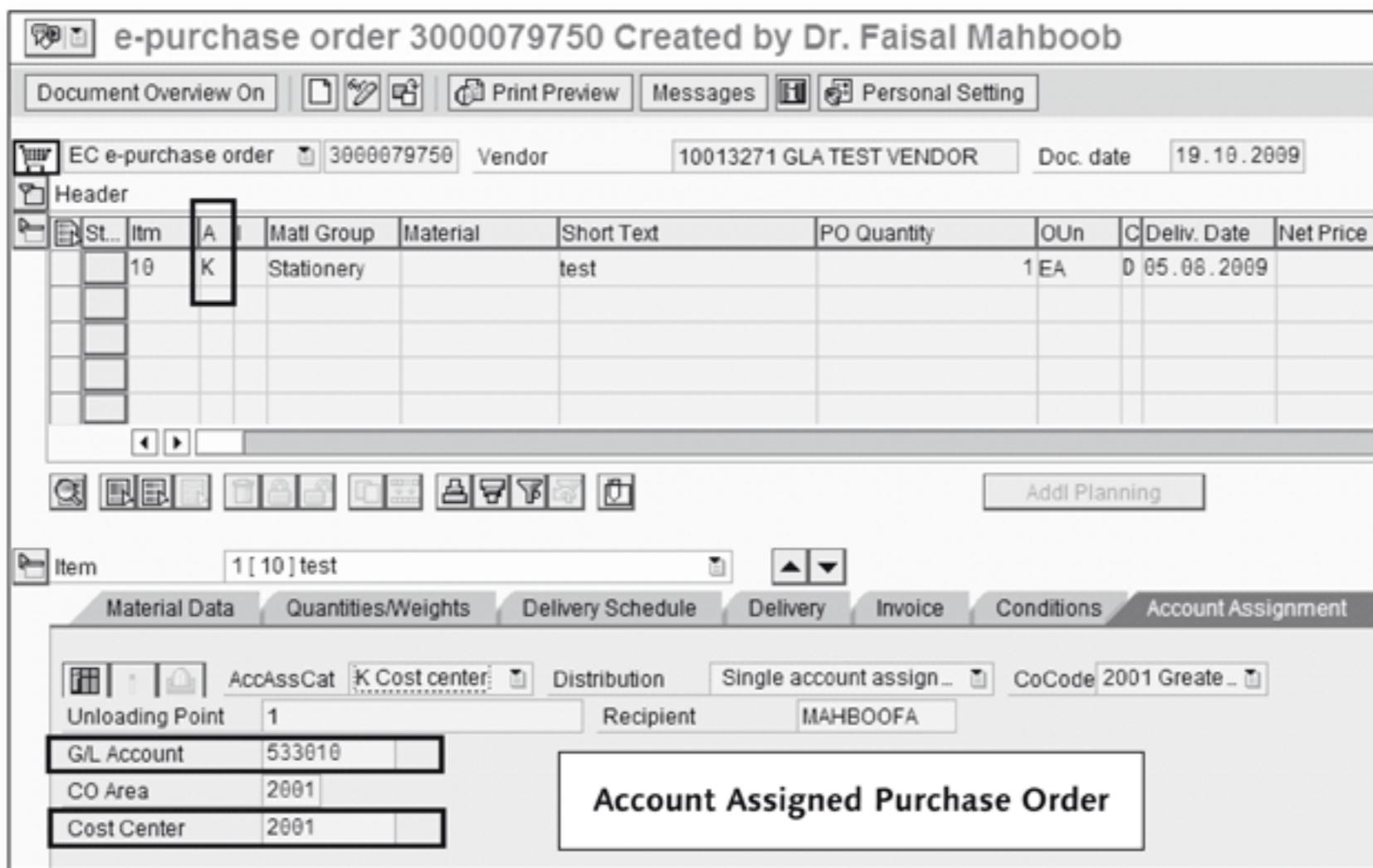


Figure 4.6 Purchase Order for Account Assignment K

Table 4.3 provides a comparison between the procurement of stock materials and that of consumable materials.

Stock Material	Consumable Material
Entry of material number is required	Entry of material number isn't required but possible
Account assignment category is left blank	Account assignment category is mandatory
Posting to stock account	Posting to consumption account
Quantity, value, and consumption are updated in the material master record	Quantity and consumption may be updated but the value isn't updated
Moving average price is adjusted	Value isn't updated

Table 4.3 Procurement of Stock Material versus Consumable Material

4.2.4 Procurement of External Services

The basic steps involved in the procurement of services are as shown in Figure 4.7. The requirements can be determined by all of the departments, just like the procurement of materials. In addition, purchase requisitions can be created and passed to Materials Management from Plant Maintenance or Project System.

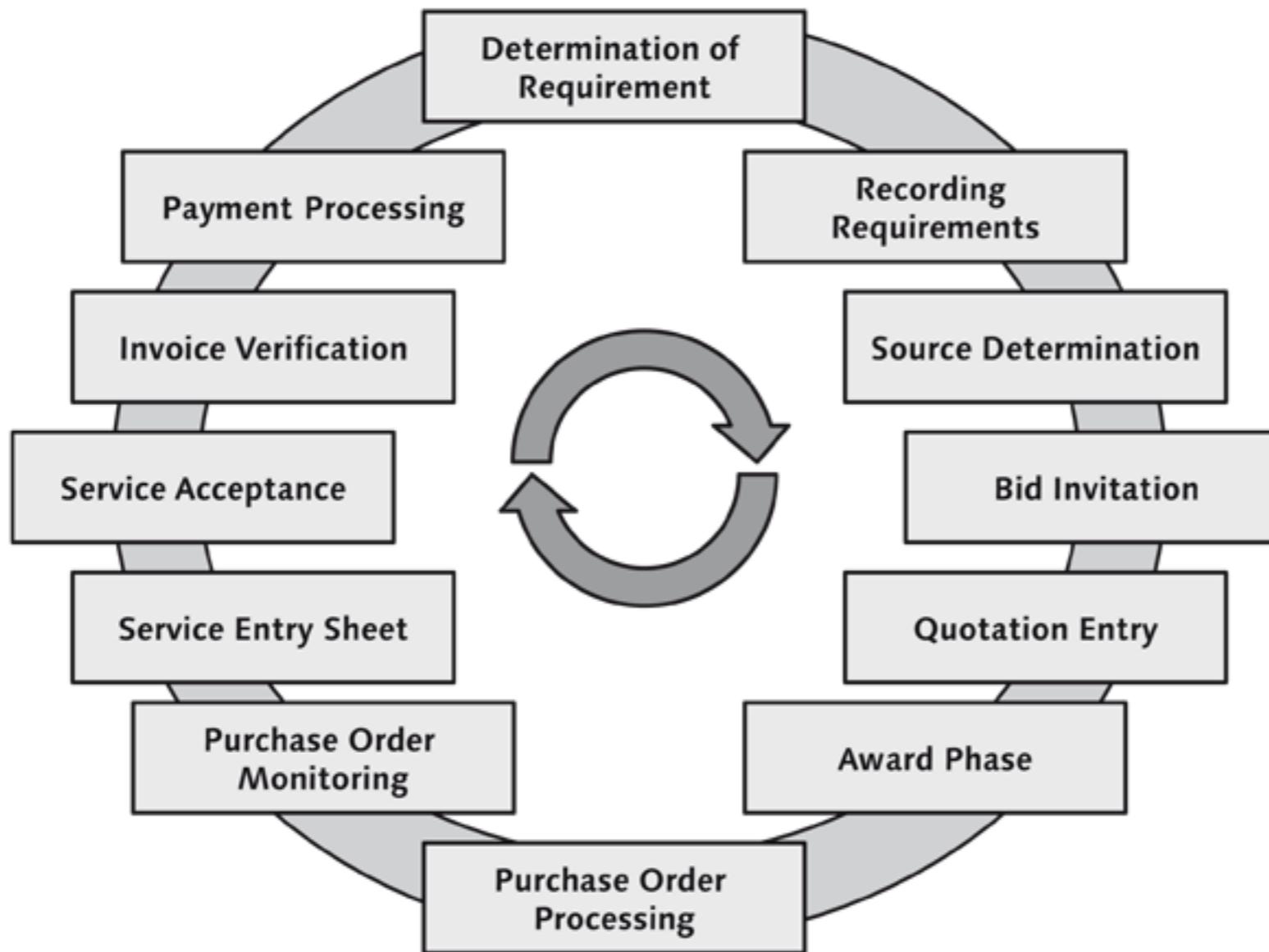


Figure 4.7 Steps in the Procurement of External Services

The procurement of external services involves the following steps:

- ▶ Determination of requirements
- ▶ Recording of requirements
- ▶ Determination of possible sources
- ▶ Bid invitation procedure
- ▶ Entry of data from quotations submitted by bidders
- ▶ Comparison of quotations
- ▶ Award phase (order placement)
- ▶ Monitoring of purchase orders
- ▶ Entry of services actually performed
- ▶ Acceptance of services performed
- ▶ Verification of invoices for services

Due to the nature of procurement, external services are handled under a different functionality of Materials Management called External Services Management. We'll discuss this in more detail in the next chapter.

So far, we've discussed the enterprise structure and the processes in procurement with very little emphasis on the actual application transactions. Master data serves as an entry aid for the application transactions in procurement. We'll take a closer look at this in the next section.

4.3 Master Data

Data records that are stored in the database for a long period of time are called master data. They're stored centrally and used and processed on a cross-application basis, thus avoiding redundancy.

The material master and the vendor master are the most important master data in procurement. Among others, they serve the following fundamental purposes:

- ▶ Entry aid to default in relevant data during procurement transactions
- ▶ Provision of accounting information during procurement transactions, which helps with automatic account determination

Let's now look at the material master and the vendor master in more detail.

4.3.1 Material Master

The material master is your company's main source of material-specific data and contains descriptions of all materials your enterprise procures, produces, and keeps in stock. Because it can be used by all of the areas such as Purchasing, Inventory Management, Materials Planning, and Invoice Verification, the data in the material master is subdivided into various views, including the following:

- ▶ Purchasing data for ordering
- ▶ Inventory management data for posting goods movements and managing physical inventory
- ▶ Accounting data for material valuation
- ▶ Material requirements planning (MRP) data for material requirements planning

Furthermore, material master data is organized based on organizational units such as client/company code, plant, and storage location. It decides whether the material master should store different values of a particular organizational unit.

Figure 4.8 represents some of the views in the material master, along with possible organizational units.

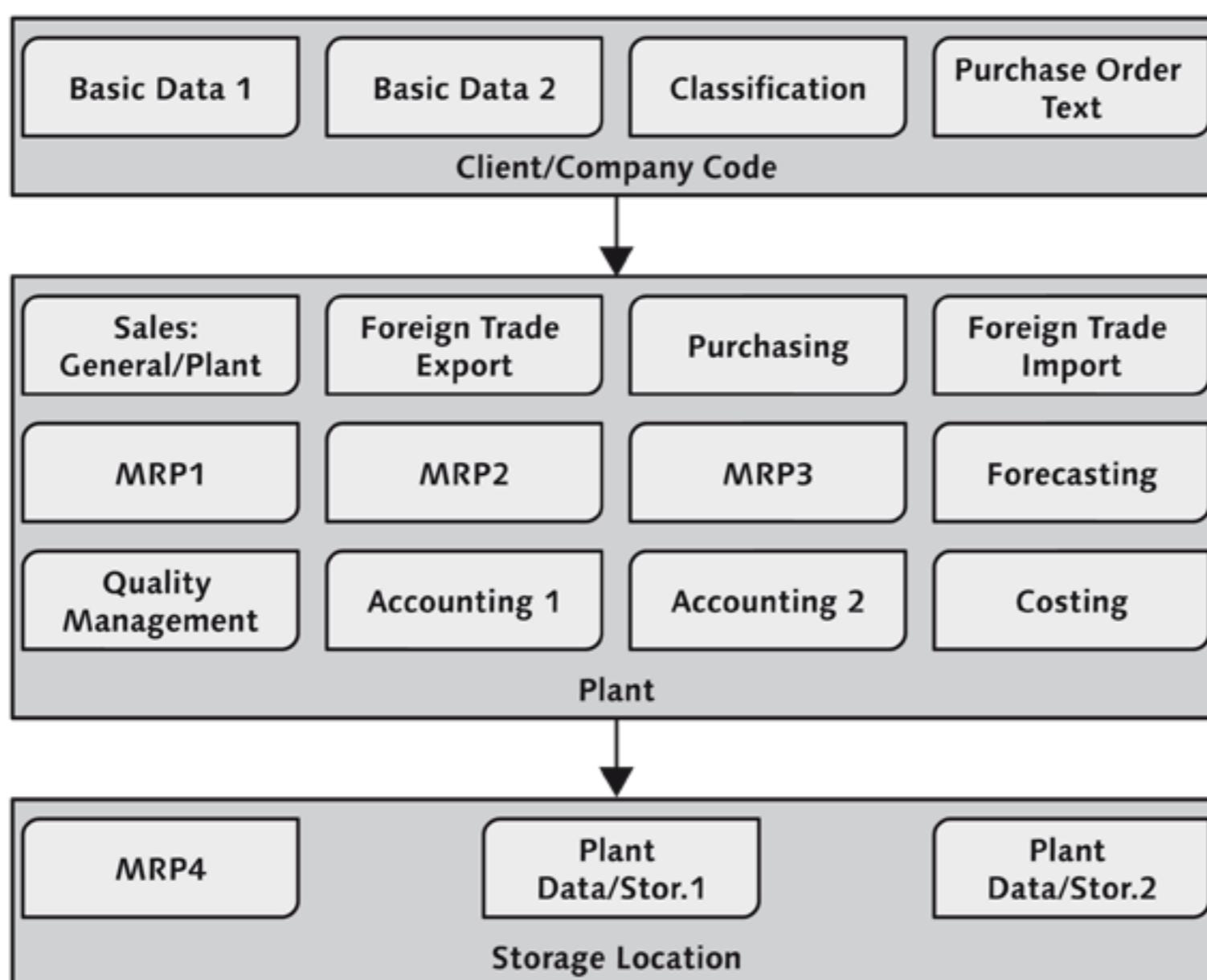


Figure 4.8 Organization of Material Master Data

In the different views – such as Basic Data 1, Purchasing, MRP4, and so on –you can store various fields. The views are organized according to the organizational units client/company code, plant, and storage location. The views maintained at the client/company code level, for example, are valid for all of the plants and storage locations. From the organizational structure in Materials Management, you already know that plants are assigned to the company code and storage locations are assigned to plants. In Figure 4.8, this is indicated by the arrows.

In addition, you can configure each view and the fields of the material master in Customizing under the menu path SAP IMG • LOGISTICS – GENERAL • MATERIAL MASTER.

In Table 4.4, you'll find a list of important database tables for the material master.

Table	Description	Key Fields
MARA	General data	MANDT, MATNR
MAKT	Descriptions	M, SPRAS
MARM	Units of measure	M, LRMEI
MSTA	Status information	M, STATM, ZHLER
MEAN	Internal article numbers (EAN)	M, MEINH, LFNUM
MAMT	Texts per unit of measure	M, SPRAS, MEINH, MTXID, LFDNR
MOFF	Outstanding material master records	G
MARC	Plant data	M, WERKS
MARD	Storage location data	M, WERKS, LGORT
MKOL	Vendor consignment stock	M, P, LIFNR
MSKA	Sales order stock	M, P, VBELN, POSNR
MSKU	Customer consignment stock	M, P, KUNNR
MSLB	Subcontract stock with vendor	M, P, LIFNR
MVKE	Sales data	M, VKORG, VTWEG
MLAN	Tax classification	M, ALAND
MAEX	Export control file 1	M, ALAND, GEGRU
MAPE	Export control file 2	M, WERKS, GZOLX
MBEW	Valuation or accounting data	M, BWKEY, BWTAR
MYMS	LIFO-relevant materials	M, MYKEY
MLGN	Warehouse data	M, LGNUM
MLGT	Storage type data	M, LGNUM, LGTYP
MVER	Consumption data	M, WERKS, GJAHR, PERKS, ZAHLR
MAPR	Forecast data	MANDT, WERKS, MATNR
MKAL	Production versions of material	M, WERKS, VERID
QMAT	Inspection type data	MANDT, ART, MATNR, WERKS

Legend:

M is MANDT + MATNR (client + material number) and forms the primary key for most of the database tables

P is WERKS + LGORT + CHARG + SOBKZ (plant + storage location + batch + special stock indicator)

G represents more than 5 fields. MOFF records represent missing views of material

Table 4.4 The Database Tables for the Material Master and Their Key Fields

When you create a material master, the information may be stored in the database tables mentioned in Table 4.4, depending on the views you maintain. During transactions, the system takes the values from these tables to validate the entries and default in certain data.

The material master is created with the help of Transaction MM01, as shown in Figure 4.9.

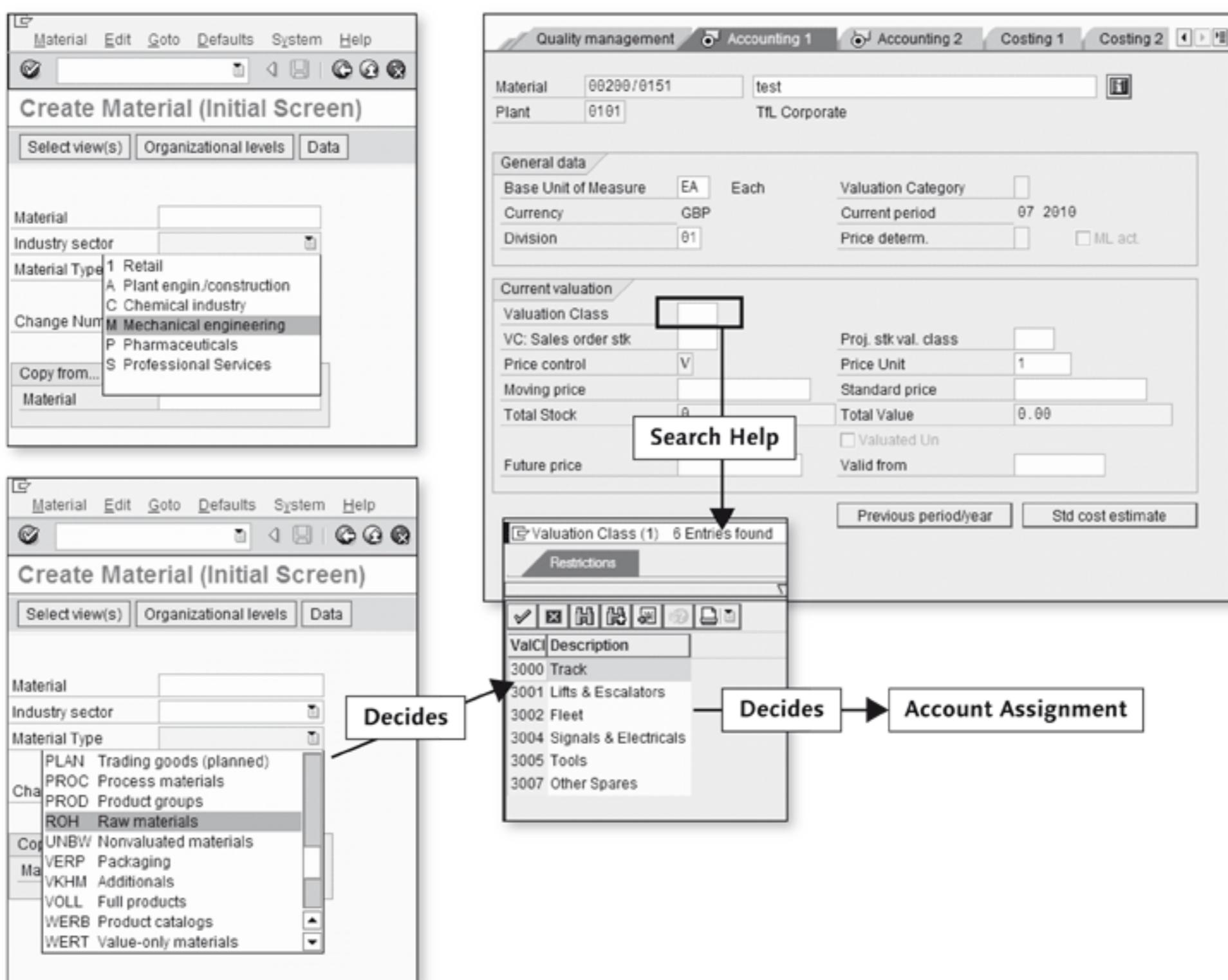


Figure 4.9 Accounting View in the Creation of Material Master

In this transaction, you have to enter the Material number, depending on whether the number range assignment is internal or external. You also have to enter the Industry Sector, which determines the screen sequence and field selection. Among other things, Material Type decides the valuation classes that will be available in the F4 Help of the Accounting 1 view. Along with other factors, the Valuation Class entry determines the account assignment. In Chapter 11, you'll learn about valuation classes in detail.

We'll now take a detailed look at the vendor master.

4.3.2 Vendor Master

A vendor can have various functions in its interaction with your company. For example, during the procurement transaction, the vendor is first the order recipient, then the supplier of goods, then the invoicing party, and finally, the payee. Whatever partner roles the vendor adopts, it falls under the purview of either purchasing or accounting. The vendor master is therefore maintained by purchasing and accounting. You use partner functions to define the rights and responsibilities of each business partner in a business transaction. For example, vendors can adopt various roles during procurement such as alternative payee, ordering address, invoice presenter, vendor, and goods supplier. You must maintain purchasing and accounting data for entering invoices in the system before you can order from a vendor.

The vendor master is divided into three areas:

- ▶ General Data
- ▶ Company Code Data
- ▶ Purchasing Organization Data

The transaction codes for representing the vendor master have been designed accordingly. In addition, a similar strategy is used for the database tables. Figure 4.10 shows the different transaction codes for creating and displaying the vendor master.

The same design is also reflected in the database tables for the vendor master (where the data is stored), as shown in Table 4.5.

Area	Database Table	Description	Key Fields
General Data	LFA1	Vendor master (General Data section)	MANDT, LIFNR
Purchasing Organization Data	LFM1	Vendor master (Purchasing Organization Data section)	MANDT, LIFNR, EKORG
Company Code Data	LFB1	Vendor master (Company Code section)	MANDT, LIFNR, BUKRS

Table 4.5 Various Database Tables for the Vendor Master

As shown in Figure 4.10, the screens are limited by transaction codes. This makes the concept of authorization very convenient.

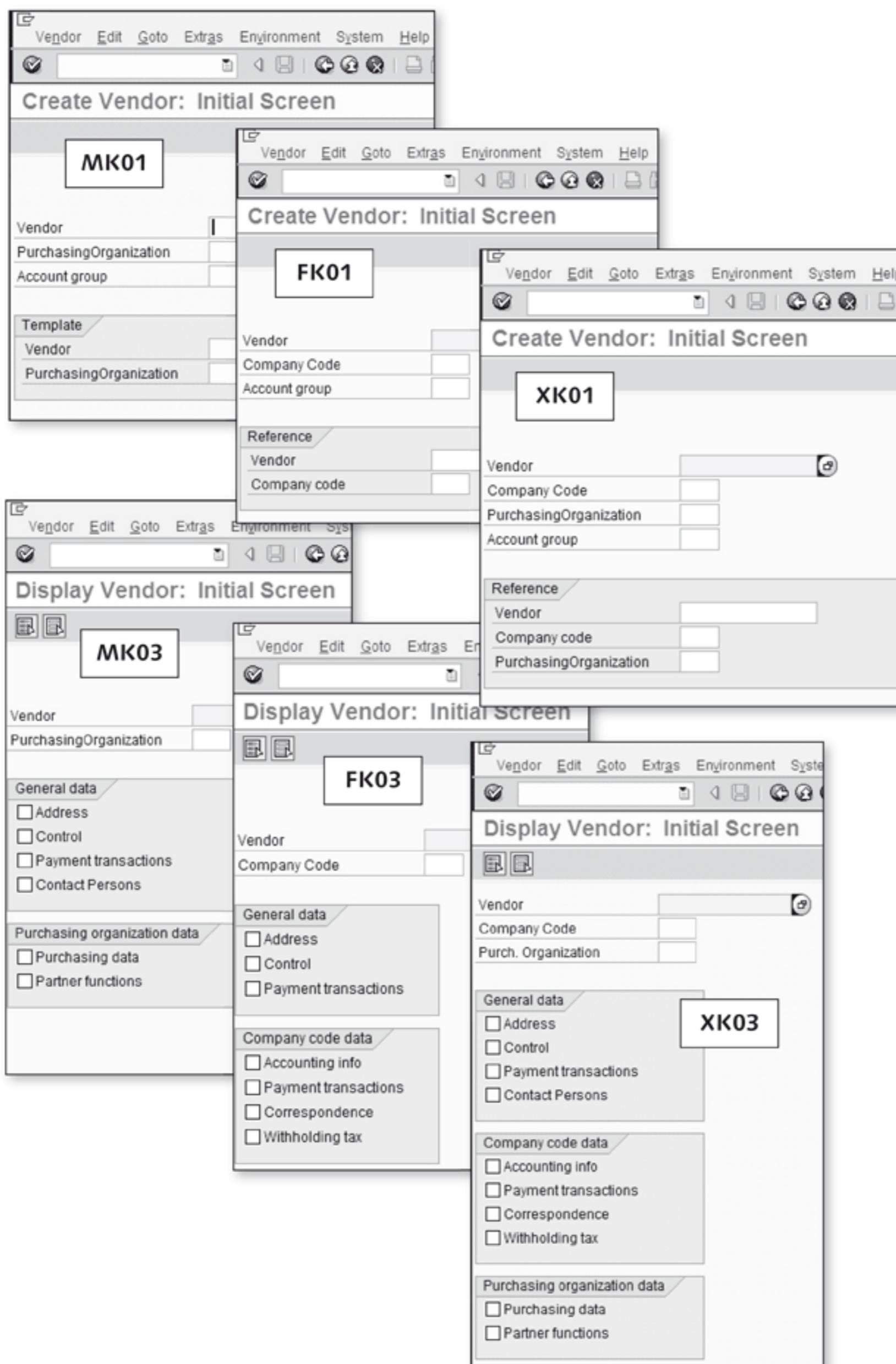


Figure 4.10 Transactions for Creating and Displaying Vendors

As you can see in Figure 4.10, you need to enter the Account Group for whichever transaction code you use for creating the vendor master. The account group has control functions and determines the following:

- ▶ Vendor number assignment and number range
- ▶ Whether the vendor is a one-time vendor
- ▶ The partner determination schema

Vendor in accounting

The vendor number is stored as the vendor's account number by Financial Accounting. It means that a vendor has the same account number in all company codes. The vendor number is also used as the subledger number in Financial Accounting. In addition, when you create the vendor master, the system asks for the reconciliation account number.

There are generally two types of liabilities at the time of invoice verification:

- ▶ Total liabilities for all vendors (reconciliation account)
- ▶ Total liabilities per vendor (subledger accounting)

From the accounting perspective, the vendor master contains the following data:

- ▶ Reconciliation account number
- ▶ Vendor account number
- ▶ Tax numbers
- ▶ Bank details
- ▶ Payment methods
- ▶ Terms of payment

Now that you learned about master data – such as the material master and the vendor master, which can be stored and used on a cross-application basis – we'll provide you with a brief overview of the application-specific master data in purchasing. We'll not be covering this in detail, because our focus is the interface related to finance.

4.3.3 Master Data in Purchasing

In addition to being supported by vendor and material master data, purchasing is also supported in its daily work by the following types of master data:

- ▶ Purchasing info record
- ▶ Source list
- ▶ Quota arrangement

- ▶ Time-dependent conditions
- ▶ Vendor evaluation

Purchasing Info Record

The purchasing info record (also called info record) represents the vendor-material relationship. You can store data for a particular material (e.g., delivery time and purchase price) on a vendor basis in info records.

Source List

The possible sources of supply for a material over a given period of time are specified in the source list.

Quota Arrangement

A quota arrangement is a mechanism for determining the source of supply to which a material requirement is assigned. Automatic allocation of the total requirement of a material over a period among a number of different sources of supply is possible through a quota arrangement.

Time-Dependent Conditions

Time-dependent conditions are defined centrally, are valid for a certain period of time, and determine the value of purchase orders. They're used as the basis for calculating the effective price. You'll learn more about conditions in Chapter 6.

Vendor Evaluation

Vendor evaluation constitutes a basis for vendor selection. It's the process of analyzing and assessing the performance of your external suppliers. Vendors are awarded scores for a number of different criteria and vendors' overall scores can be used to determine whether they're retained in or eliminated from your vendor base.

So far, we've discussed the processes in procurement and the various related master data. The goal was to give you a better understanding of the requirements, constraints, flexibility, and flow of documents in procurement. Next, we'll take a close look at the documents in procurement.

4.4 Documents in Procurement

We'll briefly describe the functional and the technical aspects of the various documents in procurement. Our analysis would mostly be based on accounting point of view.

4.4.1 Purchase Requisition

A purchase requisition is a request or instruction to purchasing to procure a certain quantity of a material or a service so that it's available at a certain point in time.

Purchase requisitions may be created manually or automatically via some other SAP application such as Consumption-based Planning, Production Planning, Plant Maintenance, or Project System.

Figure 4.11 shows the screen for creating a purchase requisition for account assignment category K (cost center).

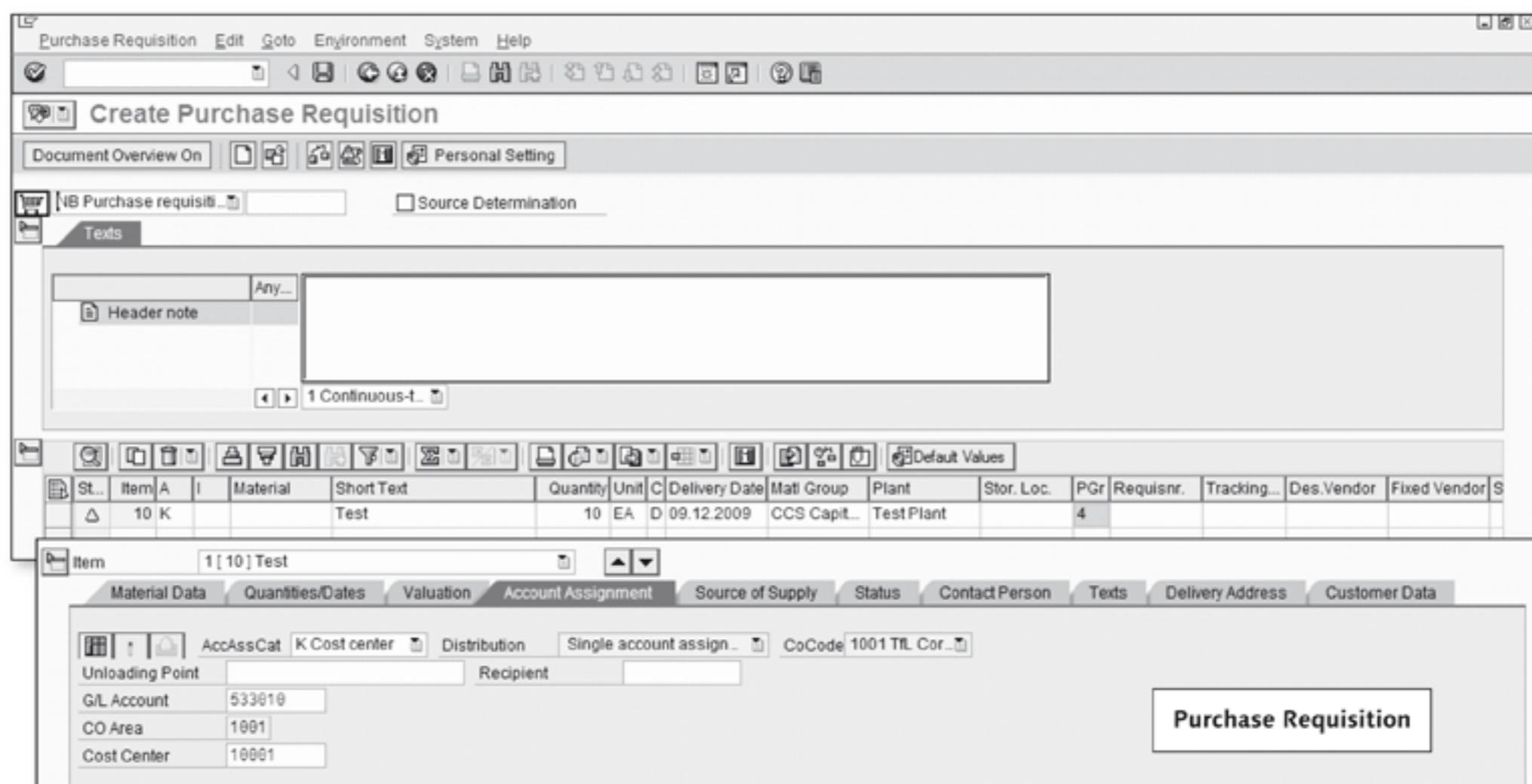


Figure 4.11 Transaction to Create a Purchase Requisition

Because we didn't use stock material in Figure 4.11, the Account Assignment tab appeared and we had to maintain the Cost Center and the G/L Account manually. The Financial Accounting and Controlling elements that are derived from the values we entered have been outlined in Table 4.6.

Field	Relationship with Financial Accounting/Controlling
Plant	The plant is either the valuation area or the company code. A unique company code is determined from a plant.
Unit	The unit decides whether the commitment is value-based or quantity-based, using the Customizing path IMG • SAP NETWEAVER • GENERAL SETTINGS • CHECK UNITS OF MEASUREMENT
Account Assignment Category	Based on the account assignment category, you enter the cost element (Cost Center in our case) along with the corresponding G/L Account number

Table 4.6 Elements of Financial Accounting/Controlling in a Purchase Requisition

If we use stock material for creating a purchase requisition, the system uses the Accounting 1 data from the material master to determine the accounting details automatically.

The important technical elements of a purchase requisition are shown in Table 4.7.

Technical Element	Value	Description
Transaction	ME51N/ME52N/ME53N	Create/Change/Display PReq.
Program	RM_MEREQ_GUI	Report
Table	EBAN	Purchase Requisition
Table	EBKN	Purchase Requisition Account Assignment

Table 4.7 Technical Elements of a Purchase Requisition

After this functional and the technical description of a purchase requisition, we'll now move forward to RFQs and quotations.

4.4.2 Request for Quotation and Quotation

An RFQ is an invitation extended to a vendor by a purchasing organization to submit a quotation (bid) for the supply of materials or performance of services. In the SAP system, the RFQ and the quotation are the same document. Prices and conditions quoted by vendors are entered in the original RFQ.

Figure 4.12 shows the screen for creating an RFQ and quotation.

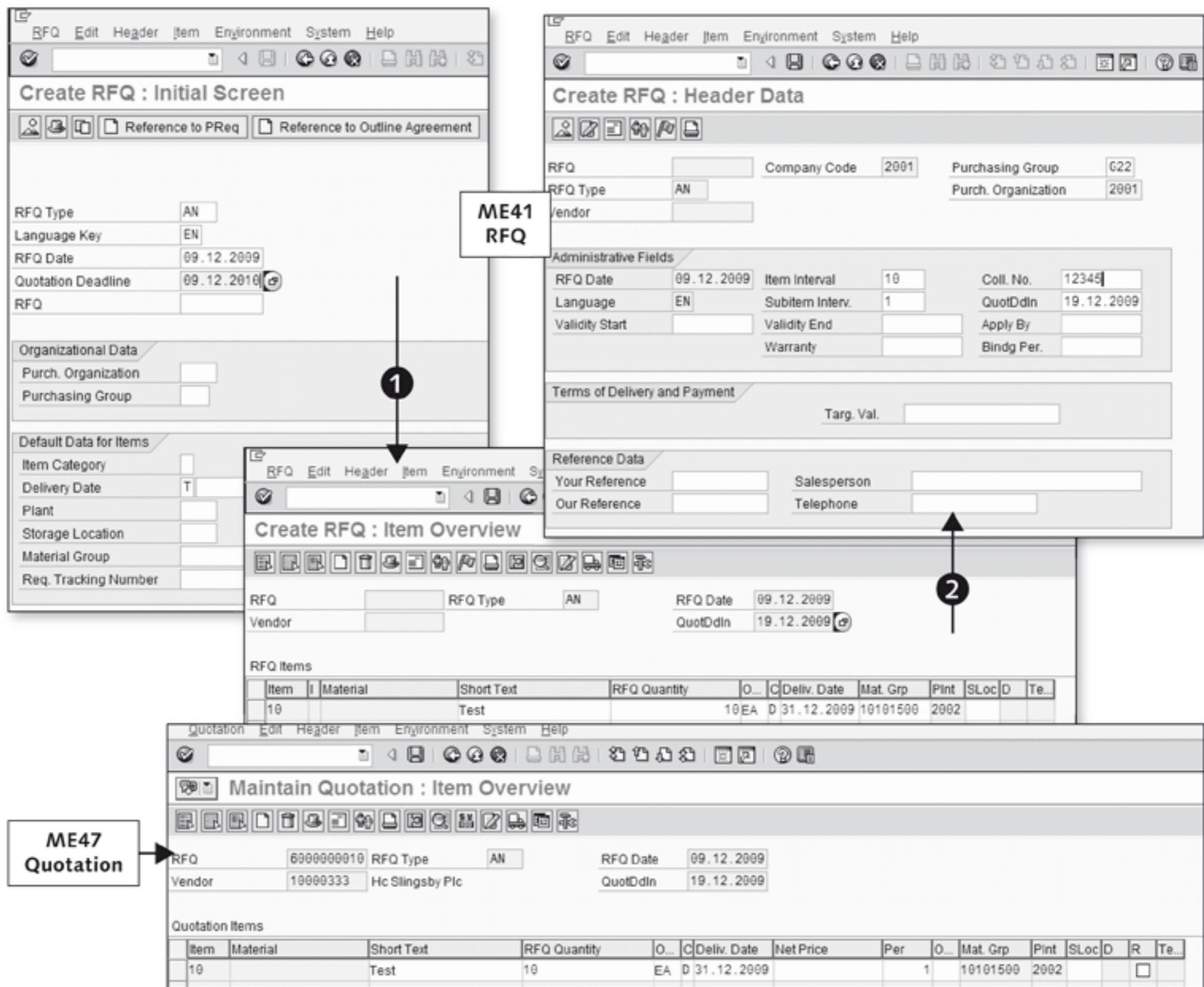


Figure 4.12 Screens for Creating an RFQ and Maintaining a Quotation

While creating an RFQ, the screens Header Data and Item Overview can be maintained in any order.

The important technical elements of an RFQ and quotation are shown in Table 4.8.

Technical Element	Value	Description
Transaction	ME41/ME42/ME43	Create/Change/Display RFQ
Transaction	ME47/ME48/ME49	Maintain/Display/Price Comparison of Quotation
Program	SAPMM06E	Module Pool
Table	EKKO	Purchasing Document Header
Table	EKPO	Purchasing Document Item

Table 4.8 Technical Elements of an RFQ

The RFQ and quotation are found in the same table as purchase orders; therefore, not all of the database tables have been mentioned in Table 4.8.

We'll now take a look at one of most important documents in procurement – the purchase order.

4.4.3 Purchase Orders

Purchase orders are formal requests or instructions from a purchasing organization to a vendor or a plant to supply or provide a certain quantity of goods or services at or by a certain point in time. A purchase order is one of the most important documents in Materials Management.

The system provides a great deal of flexibility and a great number of options during the creation of a purchase order. Figure 4.13 shows the screen for creating a purchase order.

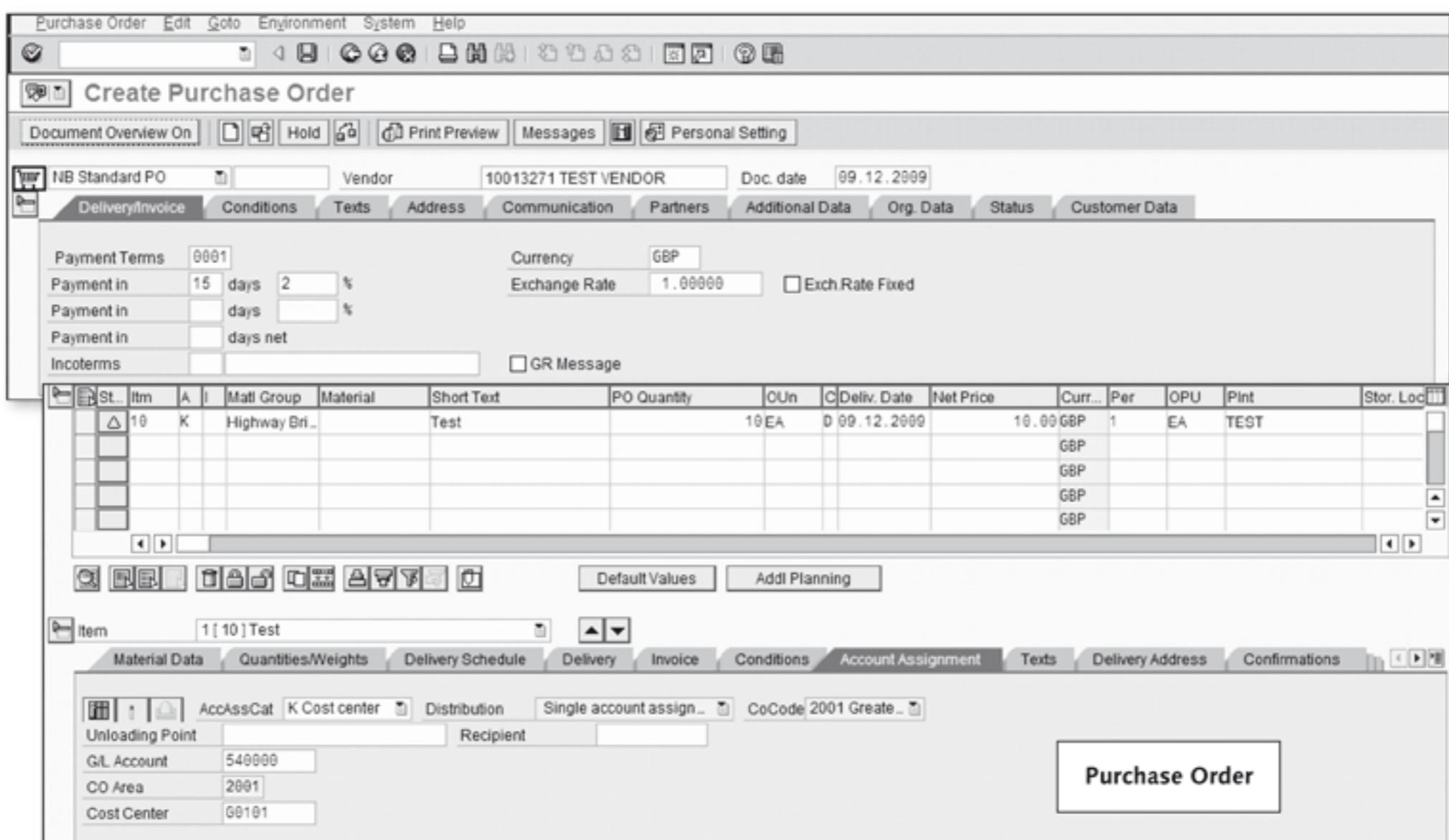


Figure 4.13 Transaction to Create a Purchase Order

The purchase order screen has three segments: header data, item overview, and item detail. The elements of Financial Accounting/Controlling are summarized in Table 4.9.

Field	Relationship with Financial Accounting/Controlling
Vendor	Determines the SAP G/L account that is used during invoice verification. Payment Terms, Payment, and Currency are defaulted in from the vendor master.
Plant	The plant is either the valuation area or the company code. A unique company code is determined from a plant.
Unit	The unit decides whether the commitment is value-based or quantity-based, using the Customizing path IMG • SAP NETWEAVER • GENERAL SETTINGS • CHECK UNITS OF MEASUREMENT
Account Assignment Category	Based on the account assignment category, you enter the cost element (Cost Center in our case), along with the corresponding G/L Account number

Table 4.9 Elements of Financial Accounting/Controlling in a Purchase Order

Table 4.9 represents the case of a purchase order with account assignment. If you use stock material for creating the purchase order, the system uses the Accounting 1 data from the material master to determine the accounting details automatically.

The important technical elements of the purchase order are outlined in Table 4.10.

Technical Element	Value	Description
Transaction	ME21N/ME22N/ME23N	Create/Change/Display purchase order
Program	SAPMM06E	Module Pool
Table	EKKO	Purchasing Document Header
Table	EKPO	Purchasing Document Item

Table 4.10 Technical Elements of a Purchase Order

The system allocates a purchase order number to you when you save or hold the purchase order. The data you enter manually, as well as the data that's defaulted into the transaction automatically, is stored in various database tables. Because purchase orders are the key to learning about Materials Management, we'll take a detailed look at the fields of the various database tables involved.

Although we'll discuss contract and scheduling agreement delivery schedule later in the chapter, we'll provide a generic description of the database tables involved during various transactions in Table 4.11.

Table	Description	Purchase Order	RFQ	Contract	Delivery Schedule	Step
EKKO	Header	M	M	M	M	1
EKPO	Item	M(X1)	M	M	M	2
EKET	Schedule Line	M	M	N(X2)	S(X3)	3
EKKN	Account Assignment	A	N(X4)	A	A	4
NAST	Output Message	A	A	A	A	5
KONV	Document Conditions	A	A	N	A	6
Dependent Table	Time-Dependent Condition	N	A	A	A	7
EKPA	Partners	A	A	A	A	8
Dependent Table	Service Data	A	A	A	N	9
EIKP	Import Data Header	A	A	A	A	10
EIPO	Import Data Item	A	N	N	A	10
RESB	Subcontracting Component	A	N	N	A	11
Dependent Table	Text (Header/Item)	A	A	A	A	12
Dependent Table	Change Documents	A	A	A	A	13
EKPV	Delivery Data	A	N	N	A	14
VETVG	Shipping Index	A	N	N	A	14
EKUB	STO Index	A	N	N	A	15
EKBE	Purchase order History	A	N	N	A	16
EKBZ	Purchase order History (Delivery Cost)	A	N	N	A	17
EKES	Confirmations/Shipping Notification	A	N	N	A	18
EKAB	Contract History	N	N	A	N	19

Legend

M = Mandatory

N = Not allowed

A = Allowed

S = Special case

Table 4.11 The Database Tables for Various Procurement Documents

- ▶ EKKO contains information about the document type, the vendor/supplying plant and other information valid for all items of the document.
- ▶ EKPO contains information about what is ordered at which price; you can order material (with or without material number) or services. A document may contain line items ranging from 1 to 99999.
- ▶ EKET contains the desired delivery date and the quantity you ordered for each delivery date. Each item may contain schedule lines ranging from 1 to 9999.
- ▶ EKKN stores account assignment data. You need to enter the account assignment data when the material to be ordered isn't a stock material. This data is directly used at the time of goods receipt and invoice receipt to create the accounting documents. Up to 99 account assignments can be entered for one item. If you have more than one account assignment, the valued goods receipt can't be posted, meaning that no accounting documents can be created. The entries in table EKKN are updated when EKPO-KNTTP isn't equal to space and EKPO-KZVBR isn't equal to U.
- ▶ Normally, every document needs an output message record to send the information to the vendor. The determination of output message records is customizable. In addition, for some processes you don't need information flow (e.g., stock transport orders). In Materials Management Purchasing, the term message is used in the context of communication between a buying purchasing organization and its vendors. A *message* is a document in output format, allowing transmission of the information contained therein to vendors via various media.
- ▶ The ordered items in a procurement document may contain conditions for goods that are not free of cost. You can identify such items by the following fields:
 - ▶ EKPO-REPOS ne space or EKPO-XCONDITIONS ne space
The following items may contain conditions (e.g., delivery costs):
 - ▶ EKPO-REPOS eq space and EKPO-PSTYP eq 7 (stock transport order)
The difference between document conditions and time-dependent conditions will be explained in Chapter 6. If it's possible to switch between them, this is governed by EKKO-STAKO, which is populated from the table field T161-STAKO (document type). The document conditions are linked to the purchasing document through EKKO-KNUMV; time-dependent conditions through various Axxx condition table entries.

- ▶ Partners are used to store information about the sender of the invoice, the supplier of the goods, or a different address to which the purchase order should be sent. The determination of partners and the options for maintaining them in the document is governed by a partner scheme stored in T161 (document type).
- ▶ Whether an item contains service data is determined by the item category (EKPO-PSTYP). Service data and limits are necessary when EKPO-PSTYP = 1 (blanket purchase order) or EKPO-PSTYP = 9 (service). The service data is linked to the purchase order item through EKPO-PACKNO, which acts like a key for the service database tables.
- ▶ Import data is necessary if the vendor belongs to country different from that of the receiving plant. Depending on the company code you can decide whether the import data screens should never be processed, or processed every time, for every import, or only if it's an import inside the EU (T001-IMPDA). The import data is linked to the purchasing data through the field EKKO-EXNUM, which is the key field in Tables EIKP and EIPO.
- ▶ Subcontracting components are necessary when an item is of category subcontracting (EKPO-PSTYP = 3). Different components are stored for each schedule line. RESB is linked with EKET through the field EKET-RSNUM, and re-linked via RESB-EBELN, RESB-EBELP, and RESB-ETENR. Subcontracting is explained in detail in the Chapter 5.
- ▶ Texts are possible at the header and item level. They're stored in database tables STXH and STXL with TDOBJECT = EKKO for the header texts and TDOBJECT = EKPO for the item texts.
- ▶ Change documents are created if you create or change a document. There are different types of change documents, as follows:
 - ▶ Insert or delete a record (e.g., item, schedule line, account assignment data)
 - ▶ Change a record

Change document

Change documents are stored in tables CDHDR and CDPOS. A change document item with a new and old value is created for each field of the record that is changed. However, the data element of the change document needs to be switched on in DDIC for it to be recorded during the creation of the change document.

In addition, a change document doesn't exist for all database tables. You will find all change documents for one of the procurement documents mentioned in Table 4.11 when you perform a search with OBJECTCLAS = EINKBELEG and OBJECTID = EKKO-EBELN.

- ▶ EKPV and VETVG are updated for all items that need a delivery through the Logistics Execution Shipping (LES) application. This is the case for stock transport orders (EKKO-RESWK ne space) and return items (EKPO-RETPO ne space and EKPO-LFRET ne space). LES shipping is only possible if the item has a material master. Most of the data of EKPV is derived via function module SD_TRANSFERDATA_DETERMINE. EKPV-LEDAT is populated with the lowest shipping date of all open schedule lines. The shipping date is determined through function module ME_CALCULATE_LEDAT. VETVG is used from LES to create the deliveries and is calculated as the minimum of EKPV-LEDAT of all items of the document. However if VETVG-LEDAT is 0, the record will be deleted.
- ▶ EKUB is stored for stock transport orders (EKKO-RESWK ne space). The index is used in MRP to display and calculate the requirements in the delivering plant (EKKO-RESWK). EKUB is deleted (regularly) to save performance in ATP checks if an item is no longer open. A stock transport order is a purchase order created specifically for the transfer of stock from one storage location to another. Unlike standard purchase orders, which are sent to vendors, stock transport orders are sent to a plant.
- ▶ One EKBE record is created for every GR, IR, delivery, goods issue, service entry, or down payment you post against a purchase order or the delivery schedule.
- ▶ One EKBZ record is created for every delivery cost condition at the time of GR and IR. For delivery costs, you have to maintain an additional invoice item.
- ▶ In EKES, information about confirmations and shipping notifications is stored. Both of these documents are from the vendor to confirm the delivery date and the quantity of the ordered materials. The values in Table EKES provide up-to-date information about the material flow in ATP/MRP. The system checks the values in Table EKET after checking the values in Table EKES.
- ▶ A record in Table EKAB is created each time you create a purchase order or a scheduling agreement delivery schedule. A *scheduling agreement* is a form of outline purchase agreement under which materials are procured on predetermined dates within a certain time period. The delivery schedule is issued against the scheduling agreement and can replace a large number of discrete purchase orders. EKAB contains information about the open quantity of a contract item, as follows:

- ▶ X1: In Transaction ME21N, it's possible to hold a purchase order without any item.
- ▶ X2: A solution is available for IS-Retail to allow schedule lines in contracts. This is governed by the table field T161-KOETT. This cannot be maintained in Customizing.
- ▶ X3: Schedule lines form the core of a scheduling agreement delivery schedule. However, you can't maintain schedule lines when you create/change a scheduling agreement delivery schedule. You can only maintain them later in a separate transaction (ME38). There might be performance issues if Table EKET contains a particularly large number of entries. Therefore, an option exists to aggregate the records in Table EKET and save the original entries in database Table EKETH. This option is used exclusively for scheduling agreement delivery schedules.
- ▶ X4: The account assignment information isn't stored in the RFQ, even if the RFQ in question is created with reference to an account assigned purchase requisition. When the quotation is converted to a purchase order, the system may take the accounting data from the corresponding purchase requisition.

We'll provide you with more information on the various database tables and their fields in the next chapter.

We'll now take a look at outline purchase agreements.

4.4.4 Outline Purchase Agreements

An outline purchase agreement, or simply outline agreement, is a longer-term agreement between a purchasing organization and a vendor regarding the supply of materials or the performance of services within a certain period according to predefined terms and conditions.

Outline purchase agreements are of the following two types:

- ▶ Contract
- ▶ Scheduling agreement

Contract

A contract is a type of outline agreement against which release orders (releases) can be issued for agreed-on materials or services as and when required during a certain overall time frame.

On the basis of availability in the SAP system, contracts can be divided into:

- ▶ Centrally-agreed contracts
- ▶ Distributed contracts

Centrally Agreed Contracts

You can negotiate more favorable terms of purchase with a high level contract for all of your plants. This may apply to a vendor's entire corporate group. For this, you don't specify a plant in the contract until you create a contract release order against that contract.

Distributed Contract

You can create a contract in one SAP system and distribute it to other independent SAP systems with the help of the application link enabling (ALE) technology.

On the basis of the order type (document type in the SAP system), contracts can be divided into:

Quantity Contracts

You create a quantity contract if you know the quantity of materials/services you would like to procure during the validity period of the contract.

Value Contracts

You create a value contract if you know the value of the materials/services you would like to procure during the validity period of the contract.

The important technical elements of a contract are outlined in Table 4.12.

Technical Element	Value	Description
Transaction	ME31K/ME22K/ME23K	Create/Change/Display Contract
Program	SAPMM06E	Module Pool
Table	EKKO	Purchasing Document Header
Table	EKPO	Purchasing Document Item

Table 4.12 Technical Elements of a Contract

The other type of the outline purchase agreement is the scheduling agreement.

Scheduling Agreement

A scheduling agreement is a longer-term purchase arrangement with a vendor for a specified period and a specified total purchase quantity. You create delivery schedules against the scheduling agreement to communicate delivery dates and the quantities to the vendor.

Procurement using scheduling agreements helps reduce the volume of documents in use because delivery schedules or schedule lines don't constitute separate documents but form a part of the same document.

Based on the method or creation (controlled by the document type in the scheduling agreement), scheduling agreements can be classified into the following:

- ▶ Scheduling agreement with release documentation
- ▶ Scheduling agreement without release documentation

Scheduling Agreement with Release Documentation

For these types of scheduling agreements, the schedule lines aren't communicated to the vendor until you explicitly create a scheduling agreement release. This allows you to display the various releases transmitted to a vendor over a certain time period.

Scheduling Agreement without Release Documentation

For these types of scheduling agreements, the schedule lines are immediately transmitted to the vendor when you save them. There is no release documentation in this case.

The important technical elements of scheduling agreement are outlined in Table 4.13.

Technical Element	Value	Description
Transaction	ME31L/ME22L/ME23L	Create/Change/Display Contract
Transaction	ME84	Create Scheduling Agreement Release
Program	SAPMM06E	Module Pool
Table	EKKO	Purchasing Document Header
Table	EKPO	Purchasing Document Item

Table 4.13 Technical Elements of a Scheduling Agreement

Now that you know about the basic concepts of outline purchase agreements, we'll continue with discussing purchasing info records.

4.4.5 Purchasing Info Records

Master data for procurement stores the data at the purchasing organization or plant level pertaining to a material and vendor. The vendor's current price is stored in the info record.

The important technical elements of a purchasing info record are outlined in Table 4.14.

Technical Element	Value	Description
Transaction	ME11/ME12/ME13	Create/Change/Display Info Record
Program	SAPMM06I	Module Pool
Table	EINA	Purchasing Info Record – General Data
Table	EINE	Purchasing Info Record – Purchasing Organization Data
Table	EIPA	Order Price History, Info Record

Table 4.14 Technical Elements of a Purchasing Info Record

After this overview of the various documents in procurement, we'll now summarize what you've learned so far.

4.5 Summary

In this chapter, you learned about the definition of various elements of the enterprise structure and their assignment in Customizing. From there, we discussed the details to define the enterprise structure of Materials Management and SAP ERP Financials Financial Accounting. The various processes in procurement including the procurement cycle, procurement of stock material, procurement of consumable materials, and procurement of external services were demonstrated based on our understanding of the enterprise structure. The master data such as material master, vendor master, and various master data in purchasing were explained before discussing the documents in procurement that use them.

In the next chapter, we'll cover the procurement of stock and consumption materials in more detail and from an accounting perspective.

The SAP ERP Financials Financial Accounting interface is the main reason for the differences in the procedures for the procurement of stock materials versus that for consumable materials.

5 Procurement of Stock and Consumable Materials

The main difference between the procurement of stock materials and that of consumable materials lies in the way the account assignment is supplied to the SAP system for the material in question.

In this chapter, you'll learn about the various processes involved in the procurement of stock and consumption materials. The documents you'll come across in this chapter have already been explained in Chapter 4, Basics of Configuration and the Processes in Procurement, but we'll expand the discussion to cover the procurement of services and subcontracting.

To help you understand the content, we've divided each topic in this chapter into a functional basis, the functional design in the SAP system, checkpoints and real-time issues, technical elements, and troubleshooting tips. However, depending on relevance, we'll also introduce new subtopics or omit mentioned topics as needed.

5.1 Procurement of Stock Material

As you already know from the previous chapter, the materials that are kept in storage following a goods receipt are referred to as stock materials.

In this section, we'll outline the various functional possibilities and technical updates during the transactional flow in the procurement of stock materials. In addition, we'll provide some troubleshooting tips at the end to help you apply what you've learned to real-life issues.

5.1.1 Stock Material within Document Flow

In this section, we'll analyze the functional relevance and technical aspects of stock materials.

Functional Basis

You create master data for the stock materials that will be subject to inventory management and valuation. An automatic value and quantity update should occur as a result of the various transactions involved in the document flow.

SAP Functional Design

The material master data with the following features has to be maintained for stock materials:

- ▶ Inventory management on a value and quantity basis
- ▶ Information about automatic account determination
- ▶ Information about the way in which the materials are valued

Inventory management on a value and quantity basis is governed by the material type used to create the material master. Thus, the material master is responsible for determining whether the material is a stock material or a consumption material, as illustrated in Figure 5.1.

As you can see, the material type can be configured to indicate the value and quantity update. In addition, you can also indicate whether there will be a value and quantity update based on the valuation area. Refer to Chapter 3 for more details on valuation areas.

The information on the automatic account determination is contained within the accounting views of the material master. The concept of automatic account determination is that the system doesn't ask you to enter the SAP G/L account manually, but determines the relevant account automatically based on the transaction, Customizing, and values you enter manually during the transaction.

The following elements are used to arrive at the relevant SAP G/L account:

- ▶ Client
- ▶ Chart of accounts
- ▶ Accounting transactions (e.g., BSX, WRX, PRD, GBB, etc.)
- ▶ Valuation modifier also known as valuation grouping code

- ▶ Account modifier also known as general modifier
- ▶ Valuation class

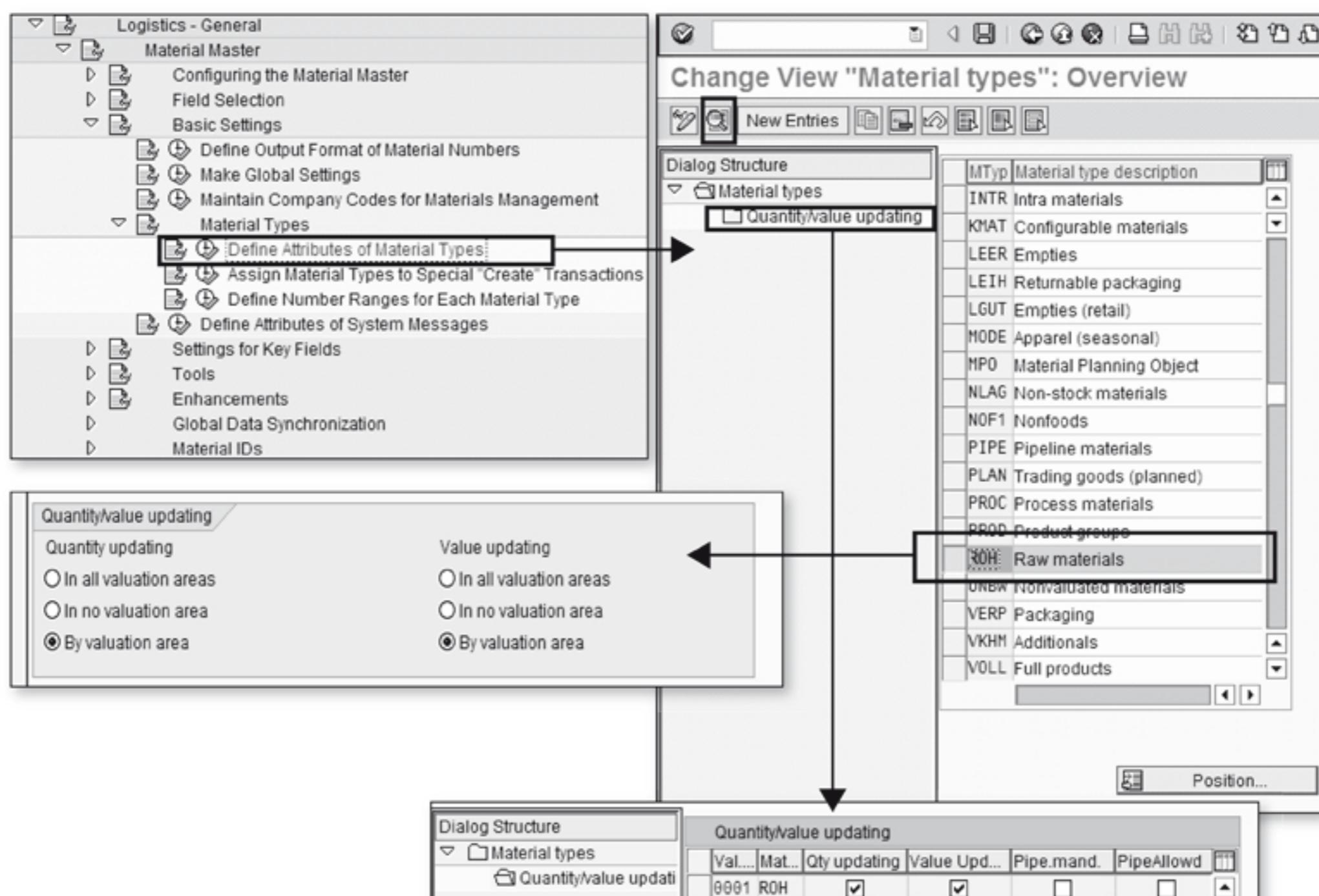


Figure 5.1 Quantity/Value Update for Material Types

These six elements help determine the exact SAP G/L during automatic account determination. We'll discuss each of them in more detail in Chapter 11. For the time being, you need to understand that the material master for the stock material contains the valuation class.

As you can see in Figure 5.2, the valuation class is defined under the Customizing path SAP IMG • MATERIALS MANAGEMENT • VALUATION AND ACCOUNT ASSIGNMENT • ACCOUNT DETERMINATION • ACCOUNT DETERMINATION WITHOUT WIZARD • DEFINE VALUATION CLASSES. The link between the material types and the valuation classes is established under this Customizing path.

The list of valuation classes you maintain under Customizing appears as the **F4** Help in the Accounting 1 view of the material master.

The way in which materials are valued is determined by price control. There are two options for price control in the SAP system:

- ▶ Standard price control (S)
- ▶ Moving average price control (V)

In Figure 5.2, the price control is V. This is the basic information the system requires for the valuation of materials. We'll discuss price control in more detail in Section 5.1.6.

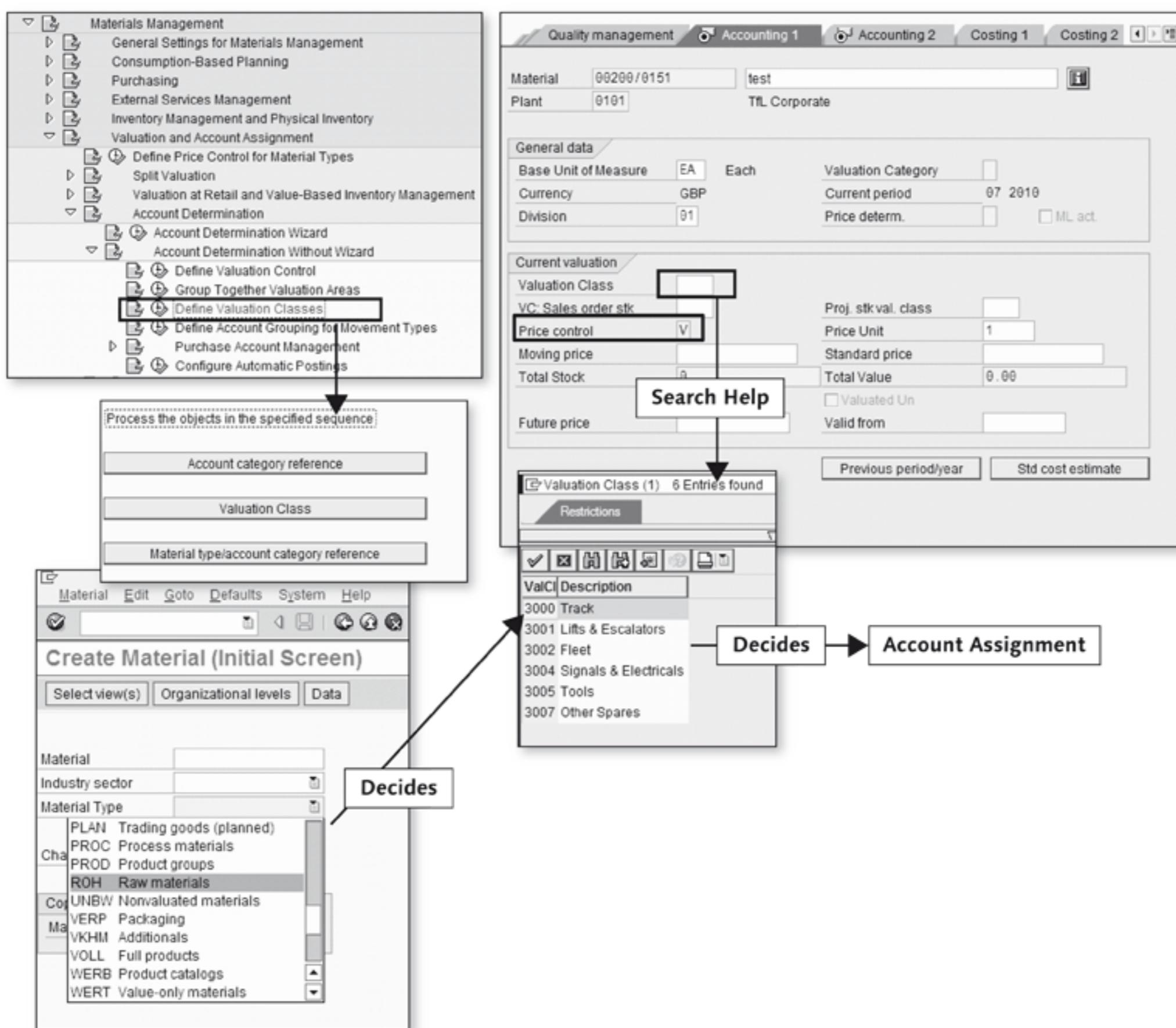


Figure 5.2 Valuation Class and Price Control in the Accounting1 View of the Material Master

Checkpoints and Real-Time Issues

Account determination is automatic for stock materials. If the system requires you to enter the account assignment during the creation of the purchase requisition or the purchase order, it means you aren't working with stock material.

The system keeps updating the moving average price of the stock materials even if the price control is S.

If you want to procure stock material for an account-assigned object, you can do so by entering the account assignment category in the purchase order. In this case, the system asks you to enter the relevant account assignment information, which will then be used for posting the goods receipt.

Technical Elements

The database table MBEW stores the accounting data of the material master related to valuation. Because all of the data is stored in the database tables after the transactions, it makes the analysis quite convenient if you have knowledge about the database tables. The database tables related to stock are listed in the Table 5.1.

Table	Field	Meaning	Valuated in Table	Total in Table	History Table
MARC		Plant data for material			
MARC	UMLMC	Stock in transfer (plant-to-plant)	MBEW		MARCH
MARC	TRAME	Stock in transit	MBEW		MARCH
MARC	GLGMG	Tied empties stock	MBEW		MARCH
MARD		Storage location data for material			
MARD	LABST	Valuated stock with unrestricted use	MBEW		MARDH
MARD	UMLME	Stock in transfer (from one storage location to another)	MBEW		MARDH
MARD	INSME	Stock in quality inspection	MBEW		MARDH
MARD	EINME	Total stock of all restricted batches	MBEW		MARDH
MARD	SPEME	Blocked stock	MBEW		MARDH

Table 5.1 Database Tables and Fields for Stock Materials

Table	Field	Meaning	Valuated in Table	Total in Table	History Table
MARD	RETME	Blocked stock returns			MARDH
MARD	KLABS	Unrestricted-use consignment stock			
MARD	KINSM	Consignment stock in quality inspection			
MARD	KEINM	Restricted-use consignment stock			
MARD	KSPEM	Blocked consignment stock			
MCHB		Batch stock			
MCHB	CLABS	Valuated stock with unrestricted use	MBEW	MARD-LABST	MCHBH
MCHB	CUMLM	Stock in transfer (from one storage location to another)	MBEW	MARD-UMLME	MCHBH
MCHB	CINSM	Stock in quality inspection	MBEW	MARD-INSME	MCHBH
MCHB	CEINM	Total stock of all restricted batches	MBEW	MARD-EINME	MCHBH
MCHB	CSPEM	Blocked stock	MBEW	MARD-SPEME	MCHBH
MCHB	CRETM	Blocked stock returns		MARD-RETME	MCHBH
MSSL		Total special stock with vendor			
MSSL	SLLB	Valuated stock with unrestricted use	MBEW**		
MSSL	SLINS	Stock in quality inspection	MBEW**		
MSSL	SLEIN	Total stock of all restricted batches	MBEW**		
MSLB		Special stock with vendor			
MSLB	LBLAB	Valuated stock with unrestricted use	MBEW	MSSL-SLLAB	MSLBH
MSLB	LBINS	Stock in quality inspection	MBEW	MSSL-SLINS	MSLBH

Table 5.1 Database Tables and Fields for Stock Materials (Cont.)

Table	Field	Meaning	Valuated in Table	Total in Table	History Table
MSLB	LBEIN	Total stock of all restricted batches	MBEW	MSSL-SLEIN	MSLBH
MSKU		Special stock with customer			
MSKU	KULAB	Valuated stock with unrestricted use	MBEW		MSKUH
MSKU	KUINS	Stock in quality inspection	MBEW		MSKUH
MSKU	KUEIN	Total stock of all restricted batches	MBEW		MSKUH
MSSA		Total customer orders on hand			
MSSA	SALAB	Total customer orders on hand	Ebew* MBEW+		
MSSA	SAINS	Stock in quality inspection	Ebew* MBEW+		
MSSA	SASPE	Blocked stock	Ebew* MBEW+		
MSSA	SAEIN	Total stock of all restricted batches	Ebew* MBEW+		
MSSA	SATRA	Stock in transit	Ebew* MBEW+		MSSAH
MSKA		Sales order stock			
MSKA	KALAB	Total customer orders on hand	Ebew* MBEW+	MSSA-SALAB	MSKAH
MSKA	KAINS	Stock in quality inspection	Ebew* MBEW+	MSSA-SAINS	MSKAH
MSKA	KASPE	Blocked stock	Ebew* MBEW+	MSSA-SASPE	MSKAH
MSKA	KAEIN	Total stock of all restricted batches	Ebew* MBEW+	MSSA-SAEIN	MSKAH
MSSQ		Project stock total			
MSSQ	SQLAB	Total customer orders on hand	Qbew* MBEW+		

Table 5.1 Database Tables and Fields for Stock Materials (Cont.)

Table	Field	Meaning	Valuated in Table	Total in Table	History Table
MSSQ	SQINS	Stock in quality inspection	QBEW* MBEW+		
MSSQ	SQSPE	Blocked stock	QBEW* MBEW+		
MSSQ	SQEIN	Total stock of all restricted batches	QBEW* MBEW+		
MSSQ	SQTRA	Stock in transit	QBEW* MBEW+		MSSQH
MSPR		Project stock			
MSPR	PRLAB	Total customer orders on hand	QBEW* MBEW+	MSSQ-SQLAB	MSPRH
MSPR	PRINS	Stock in quality inspection	QBEW* MBEW+	MSSQ-SQINS	MSPRH
MSPR	PRSPE	Blocked stock	QBEW* MBEW+	MSSQ-SQSPE	MSPRH
MSPR	PREIN	Total stock of all restricted batches	QBEW* MBEW+	MSSQ-SQEIN	MSPRH
MKOL		Special stock from vendor			
MKOL	SLABS	Unrestricted-use consignment stock		MARD-KLABS	MKOLH
MKOL	SINSM	Consignment stock in quality inspection		MARD-KINSM	MKOLH
MKOL	SEINM	Restricted-use consignment stock		MARD-KEINM	MKOLH
MKOL	SSPEM	Blocked consignment stock		MARD-KSPEM	MKOLH

Legend:

*MSSA/MSSQ – KZBWS = 'M'

+MSSA/MSSQ – KZBWS = 'A'

**MSSL-XOBEW = 'X' valuated in Table OBEW (only for Japan from version 4.6 on)

Table 5.1 Database Tables and Fields for Stock Materials (Cont.)

The stock material is too generic a topic to provide you with specific troubleshooting tips here. We'll instead indicate them for the various elements in the procurement of stock materials covered in the following sections.

5.1.2 RFQs/Quotations

In this section, we'll analyze the functional relevance and technical aspects of the RFQs and quotations.

Functional Basis

When you're not sure about a price or would like to negotiate the best price for a particular material, you send an RFQ to various vendors. The vendors then respond with a quotation against the RFQ. The quotation contains the prices and conditions for the items requested in the RFQ.

SAP Functional Design

RFQs are created and sent to various vendors if the source of supply can't be determined. Vendors can then reply with a quotation against the RFQ. The RFQ is created with Transaction ME41. The prices and conditions in the quotations sent by vendors are also maintained in the same document. Therefore, the RFQ and the quotation are the same document in the SAP system, as shown in Figure 5.3.

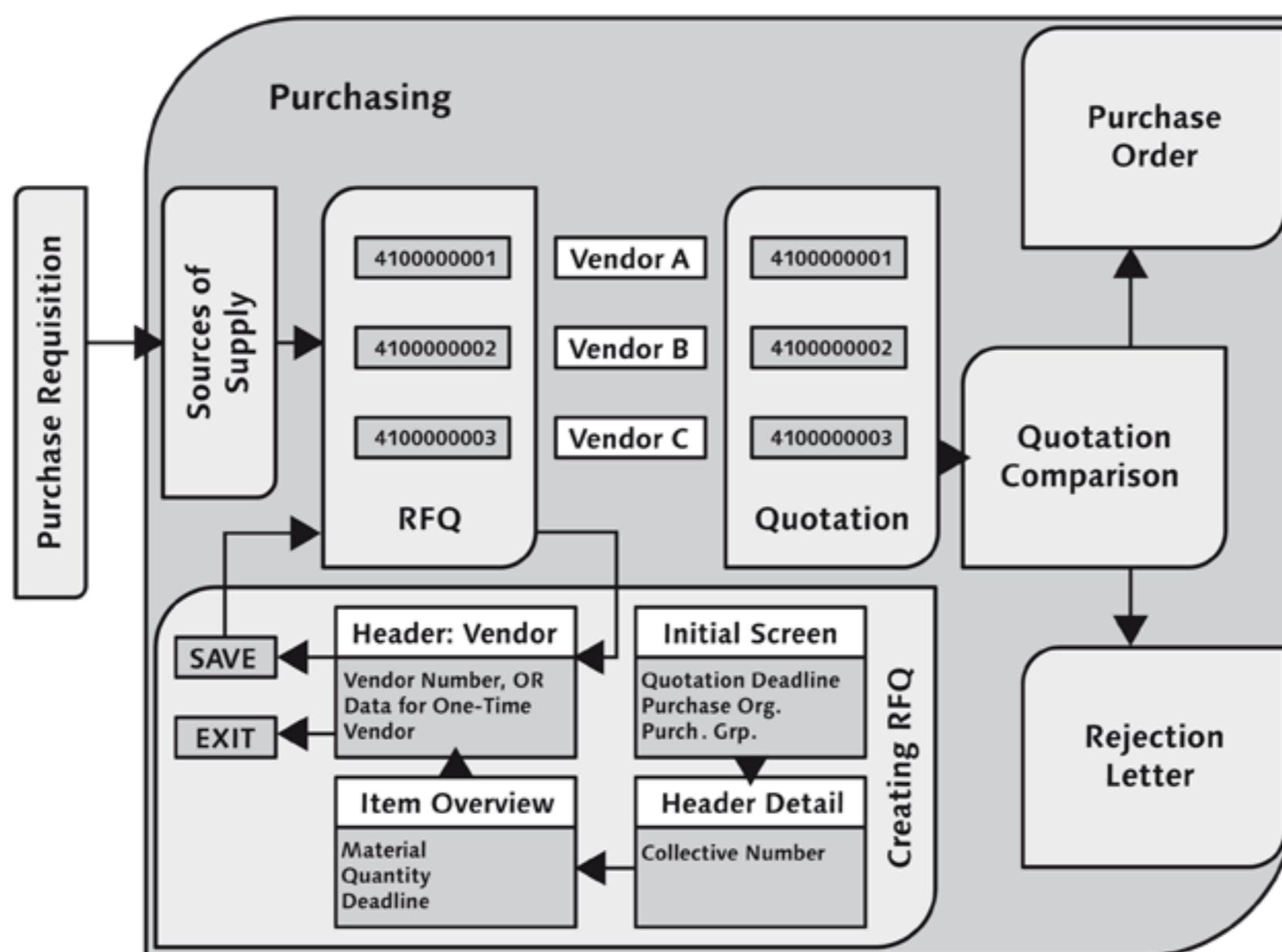


Figure 5.3 RFQ and Quotation in Purchasing

The RFQ can be entered either manually or with reference to the purchase requisition. The transaction for creating an RFQ is ME41. As shown in Figure 5.3, you enter the quotation deadline, purchase organization, and purchasing group in the initial screen of Transaction ME41. You then enter the collective number in the header detail screen. The *collective number* serves the purpose of binding together all of the RFQs sent to the various vendors. In the item overview screen, you enter the materials or services, quantity, and deadline. When you save the document, you need to either enter the vendor number or the vendor address. The system keeps generating an RFQ document number for the various vendors until you exit the transaction.

The vendors then respond with their quotations for prices and conditions, which are maintained in the same document with Transaction ME47. This is shown by the document numbers for the quotation in Figure 5.3. The collective number helps during the quotation comparison in Transaction ME49 by pulling quotations with the same collective number. Finally, the purchase order and the rejection letters can be issued subject to quotation comparison.

Checkpoints and Real-Time Issues

As you have already seen in Figure 5.3, an RFQ can be created with reference to a purchase requisition. The account assignment category (EBAN-KNTTP) in the selection criteria to create an RFQ with reference to a purchase requisition isn't considered. Because, from a business point of view, an RFQ isn't assigned to an account, the checks for account assignment aren't carried out and the system displays a list independent of selection parameter EBAN-KNTTP.

When you create an RFQ (using Transaction ME41) or a contract (Transactions ME31 and ME31K) with item category L (subcontracting) with or without reference, the system terminates with message ME028 'Field Selection PT3A not Defined' (or PT3K). Because no subcontracting is provided in the standard system for RFQ and contract, you can create a field selection key PT3A or PT3K in Customizing by copying from PT0A or PT0K (SAP IMG • MATERIALS MANAGEMENT • PURCHASING • RFQ/QUOTATION • DEFINE SCREEN LAYOUT AT DOCUMENT LEVEL). After this, you can create a subcontracting item. However, no bill of material (BOM) explosion is carried out and no component screen is displayed. BOM explosion means expanding the BOM, that is, defining the parts/components that go into, for example, the assembly of a server, rack, and so on.

Transfer of item text from an info record into an RFQ

The transfer of item texts from an info record into the RFQ isn't currently supported and only works in a few special cases (see SAP Customer Note 53717 for more details). Certain difficulties exist that have so far prevented the development team from providing this functionality, as follows:

1. Copying item texts is carried out when entering a new item in the purchasing document. If the info record is entered as a possible source object in Table T165P (copying options, item texts), the system attempts to read the info record with the key vendor and material. However, the vendor is generally not yet available at this point (this is different from the situation with a purchase order), thus the transfer can't work.
2. If the transfer of item texts is left until the end, that is, after entering the vendor number, the user should not be able to branch to the text screen beforehand, because the texts are only copied later. This is inconvenient and can lead to misunderstandings, because, for example, a danger exists that a text is entered that is transferred later from the info record.
3. If several RFQs are created for several vendors one after another, it's unclear which text is to be used for those text types that specify the info record as the source object in Table T165P. For example, if a text has been entered manually for the first RFQ because the info record purchase order text wasn't available, it isn't known which text should be transferred into the second RFQ: the text from the first RFQ or the info record purchase order text of the second vendor?

Technical Elements and Troubleshooting Tips

At the database level, RFQs are stored in the same database tables in which purchase orders are stored, such as EKKO and EKPO. In addition, the same module pool SAPMM06E is used for creating the document, as shown in Table 5.2.

Type	Technical Element	Description
Module Pool	SAPMM06E	Create RFQ
Internal Table	RFT	Item reference data
FORM	NEUE_POS_ANFRAGE	Create RFQ item
Coding Block	IF RM06E-ANFRP NE 0. PERFORM UEBERNAHME_1_ANFRAGE.	Transfer RFQ data to purchase order item. (From internal Table RFT to EKPO)
Coding Block	IF RM06E-ANFRP NE 0. PERFORM UEBERNAHME_2_ANFRAGE.	Transfer RFQ item data to purchase order item. (Part 2) (From internal Table RFT to EKPO)

Table 5.2 Technical Elements of an RFQ during the Creation of Purchasing Documents

Now that you know about the functional and technical details of RFQs, we can move on to describing the conditions and the calculation schema used in almost all procurement documents.

5.1.3 Conditions and Calculation Schema

In this section, we'll briefly describe conditions and calculation schemas. For a more detailed description of these topics, refer to Chapter 6, *Conditions, Price Determination, and the Basics of Material Price Change*.

Functional Basis

A vendor's price for a material is often made up of different components. Your vendor may offer to sell you a material at a certain price, but additional factors may affect what you pay. Conditions are stipulations agreed on with vendors concerning prices, discounts and surcharges, and so on. These are explained in detail in the next chapter.

SAP Functional Design

Prices, discounts, surcharges, and freight costs are represented in the system as pricing conditions. The conditions are applied to arrive at the net and effective purchase prices in purchase orders. Settings made in Customizing define the details of the conditions and the price determination process.

Conditions can be maintained for the following documents:

- ▶ Quotations
- ▶ Info records
- ▶ Outline agreements
- ▶ Purchase orders

Discounts and surcharges can be of the following types:

- ▶ Percentage, quantity-based, or absolute discounts/surcharges
- ▶ Freight charges
- ▶ Cash discounts
- ▶ End-of-period rebate

The objective of the condition technique and the calculation schema is to differentiate between the following prices:

- ▶ Gross price
- ▶ Net price
- ▶ Effective price

where:

Gross price = Price excluding discounts or surcharges

Net price = Gross price - discount + surcharge + tax

Effective price = Net price +/- delivery cost - cash discount - rebate

In addition to all of the classifications mentioned here, conditions are differentiated according to their validity. The availability of various time-dependent and time-independent conditions are outlined in Table 5.3.

Time-Dependent Condition	Time-Independent Condition
Info Record	Purchase Order
Contract	
Quotation (Default)	Quotation (Customizing)
Scheduling Agreement (Default)	Scheduling Agreement (Customizing)

Table 5.3 Conditions for Various Procurement Documents on the Basis of Validity

The individual conditions are described using condition types. Condition types are defined together with their control parameter in Customizing. Table 5.4 describes the most important standard SAP-delivered condition types.

Condition Type	Description	Control
PB00	Gross Price	<ul style="list-style-type: none"> ▶ Condition Class: Prices ▶ Calculation Type: Quantity-Dependent ▶ Condition Category: Base Price ▶ Access Sequence: Gross Price
FRB1	Freight, Absolute	<ul style="list-style-type: none"> ▶ Condition Class: Discount/Surcharge ▶ Calculation Type: Fixed Amount ▶ Condition Category: Delivery Cost
SKTO	Cash Discount	<ul style="list-style-type: none"> ▶ Condition Class: Discount/Surcharge ▶ Calculation Type: Percentage ▶ Condition Category: Cash Discount

Table 5.4 Condition Types

The calculation schema is the framework for determining the purchase or valuation price. It groups together condition types in a specific order to calculate the net or the effective price.

Figure 5.4 shows a sample price determination process with the help of a calculation schema.

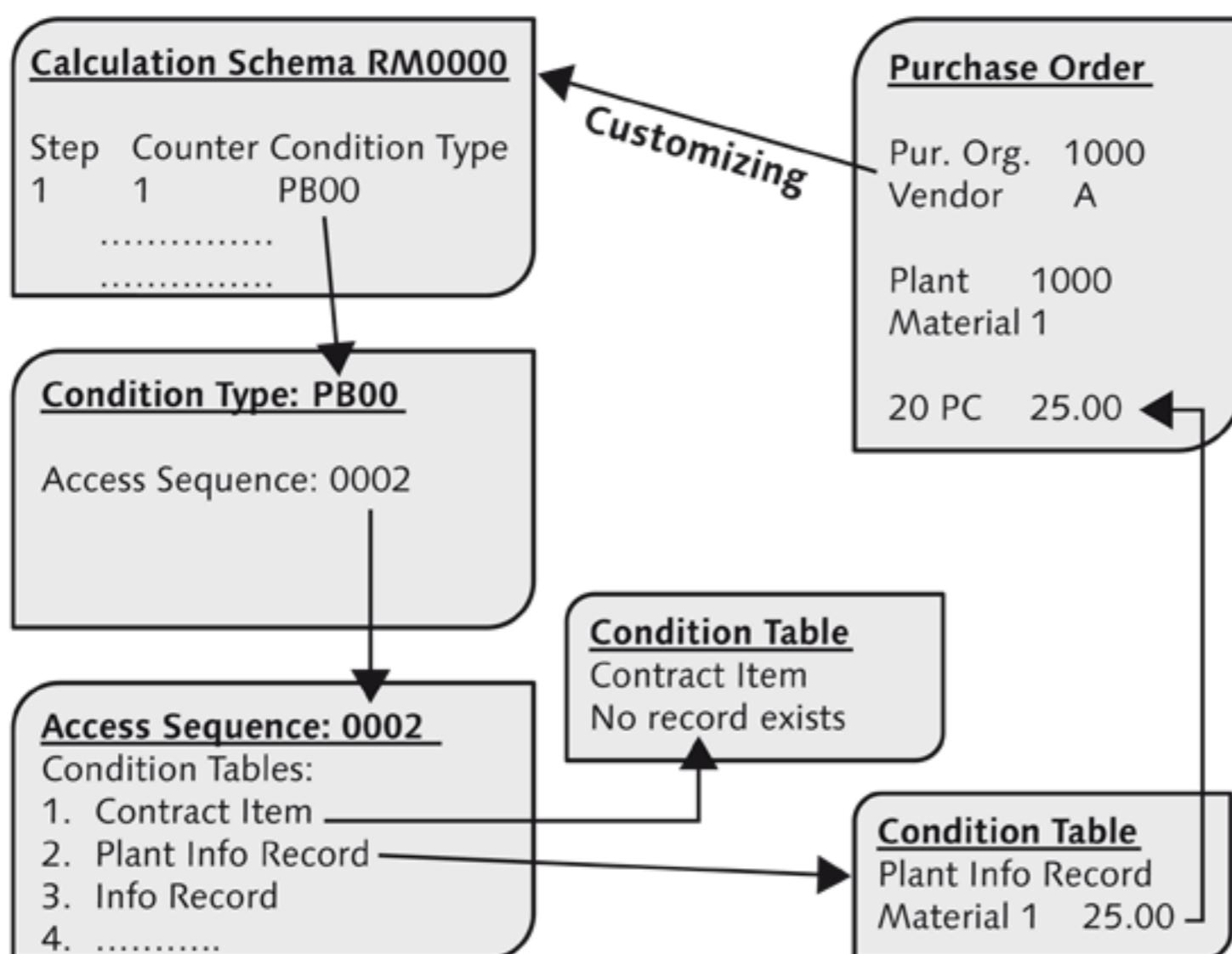


Figure 5.4 Price Determination Process for a Purchase Order

As shown in Figure 5.4, calculation schema RM0000 is determined by the purchase organization and the vendor, with the help of the Customizing setting under the menu path SAP IMG • MATERIALS MANAGEMENT • PURCHASING • CONDITIONS • DEFINE PRICE DETERMINATION PROCESS • DEFINE SCHEMA GROUP.

The way in which the condition type PB00 impacts the price determination is shown in Figure 5.4. Condition type PB00 contains the access sequence 0002, which is a search strategy that enables you to specify the order in which the condition tables should be searched. Now the condition tables store entries as key part and the data part, which is known as the condition record number. Finally, the values corresponding to the condition record number are stored in the transaction tables once you post the PO document. This is how the entries corresponding to

the condition types are searched and then finally stored in the database tables for application transactions.

Checkpoints and Real-Time Issues

To determine the condition types that are used during the creation of a purchasing document, you can go to the condition analysis (by clicking on the Analysis button) on the condition screen. The condition screen displays all conditions for the calculation schema. You can double-click the condition type (or the access) to open the detail screen on the right-hand side. You can then navigate to the technical view (using the View button) for information about the field contents that were used for accessing the condition table.

The system may carry out price determination during the creation of a scheduling agreement if the option Time-Dependent Conditions is deactivated in the Customizing Transaction OMED.

When a scheduling agreement is created with reference to a contract, the conditions that are maintained in the contract aren't transferred to the scheduling agreement; only the net price is copied. For additional information, refer to SAP Customer Note 160630.

Technical Elements

Condition records are stored in the following database tables:

- ▶ KONP (Time-dependent condition)
- ▶ KONH (Header conditions)
- ▶ KONM (Quantity scales)
- ▶ KONW (Value scales)

Troubleshooting Tips

For technical troubleshooting proceed as follows:

- ▶ Access function module PRICING
- ▶ Set the breakpoint at the following point in the code:

```
* no pricing in display mode
ENHANCEMENT-SECTION PRICING_12 SPOTS ES_SAPLV61A.
check comm_head_i-trtyp ne 'A'.    >>>Breakpoint
END-ENHANCEMENT-SECTION.
```

- ▶ View the structures:
 - ▶ KOMK: to see fields passed on for header
 - ▶ KOMP: to see fields passed on for lines
- ▶ These structures are populated by function modules:
 - ▶ ME_FILL_KOMK_PO for KOMK
 - ▶ ME_FILL_KOMP_PO for KOMP
- ▶ Press **Enter** + **F7** to exit the function module PRICING
- ▶ View internal Table TKOMV to display the condition record
- ▶ In addition, always check whether user exits for changing data in the condition-header/item structure are active:
 - ▶ EXIT_SAPLMEKO_001 (ZXM06U14)
 - ▶ EXIT_SAPLMEKO_002 (ZXM06U15)

User exits allow developers to access and modify program components and data objects in the standard SAP system.

Now that you understand conditions and calculation schemas, let's move on to discuss purchasing info records, which are used as purchasing master data to store conditions and suggest prices at the time of purchase order creation.

5.1.4 Purchasing Info Record

In this section, we'll discuss purchasing info records, focusing on the price and condition in the info record.

Functional Basis

When ordering a material, buyers may be interested in knowing the answers to the following questions:

- ▶ Which materials have previously been offered or supplied by a specific vendor?
- ▶ Which vendors have offered or supplied a specific material?

A document containing the relationship between materials and vendors can be quite helpful during purchasing because it may contain the prices and conditions already stipulated by vendors. The purchasing info record is such a document.

SAP Functional Design

The purchasing info record is the master data for procurement that stores the data at the purchasing organization or plant level pertaining to material and vendor. The vendor's current price is stored in the info record.

As you can see in Figure 5.5, you can maintain purchasing info records manually or automatically from quotations, purchase orders, or outline agreements.

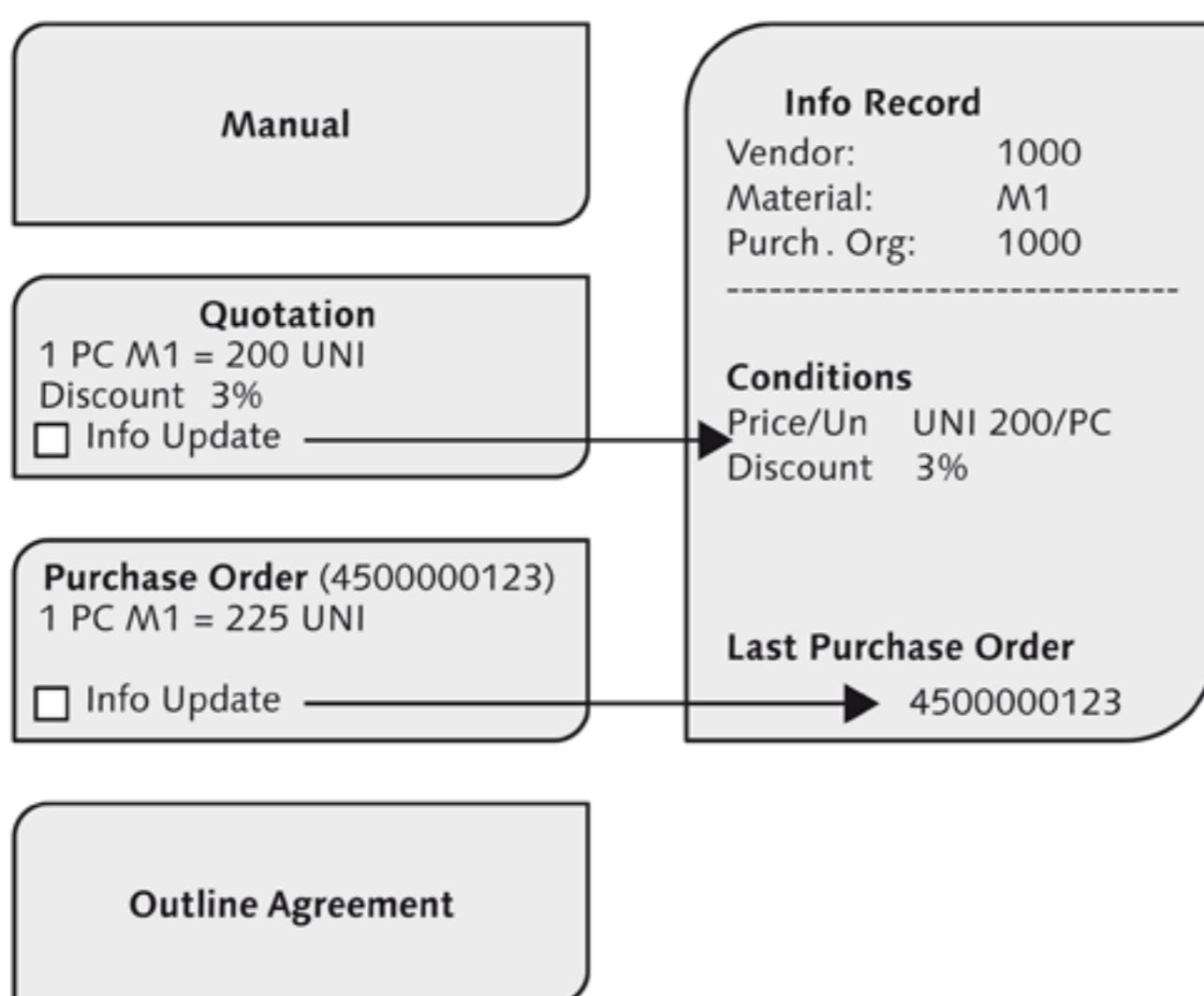


Figure 5.5 Creation of a Purchasing Info Record and its Automatic Update

The Info Update indicator in the quotation or the purchase order helps with updating or creating the info record. As shown in Figure 5.5, the conditions in the info record are updated from the quotation, whereas the last purchase order is updated from the purchase order. This means that the price in the last purchase order isn't stored in the info record and is therefore not suggested as the default price. The last purchase order can also be updated from the contract release order of the contract.

Checkpoints and Real-Time Issues

If the net price for an info record is zero, then the price is taken from the Last Purchase Order field of the info record during the creation of a purchase order.

During the transfer of a purchasing info record via ALE, all of the data except conditions is transferred with the IDocs of message category INFREC. The conditions are transferred with IDocs of message category COND_A.

Update of the last purchase order in an info record

If an info record is locked for processing when a purchase order is created, the system doesn't update the data for the last purchase order in the info record.

Technical Elements and Troubleshooting Tips

The data corresponding to the purchasing info record is stored in the following database tables:

- ▶ EINA (Purchasing info record – general data)
- ▶ EINE (Purchasing info record – purchasing organization data)
- ▶ EIPA (Order price history, info record)

During the creation of the purchase order with module pool SAPMM06E, the info record data is transferred with the following portion of the source code:

```
IF EKKO-LIFNR NE SPACE.  
*-- Infodaten uebernehmen, wenn Material gesetzt -----*  
  IF EKPO-MATNR NE SPACE.  
    PERFORM LESEN_LAGER_INFO USING SPACE. "schon oben gelesen  
    IF *EINA-INFNR NE SPACE.  
      PERFORM UEBERNAHME_INFOSATZ.
```

This transfers the info record data from EINA to EKPO.

Now that you understand the functional and the technical aspects of info records and their update via the other documents in procurement (such as quotation, purchase order, and outline agreements), let's move on to the concepts of stock and valuation already outlined in the Section 5.1.1.

5.1.5 Stock and Valuation

In this section, we'll extend the concept of a valued stock of material already briefly explained in Section 5.1.1. Due to the generic nature of this topic, we won't be dividing it into the subsections functional basis, functional design, and so on.

You can access the stock overview of a material in Transaction MMBE. As shown in Figure 5.6, stock is displayed on a quantity basis for each organizational level.

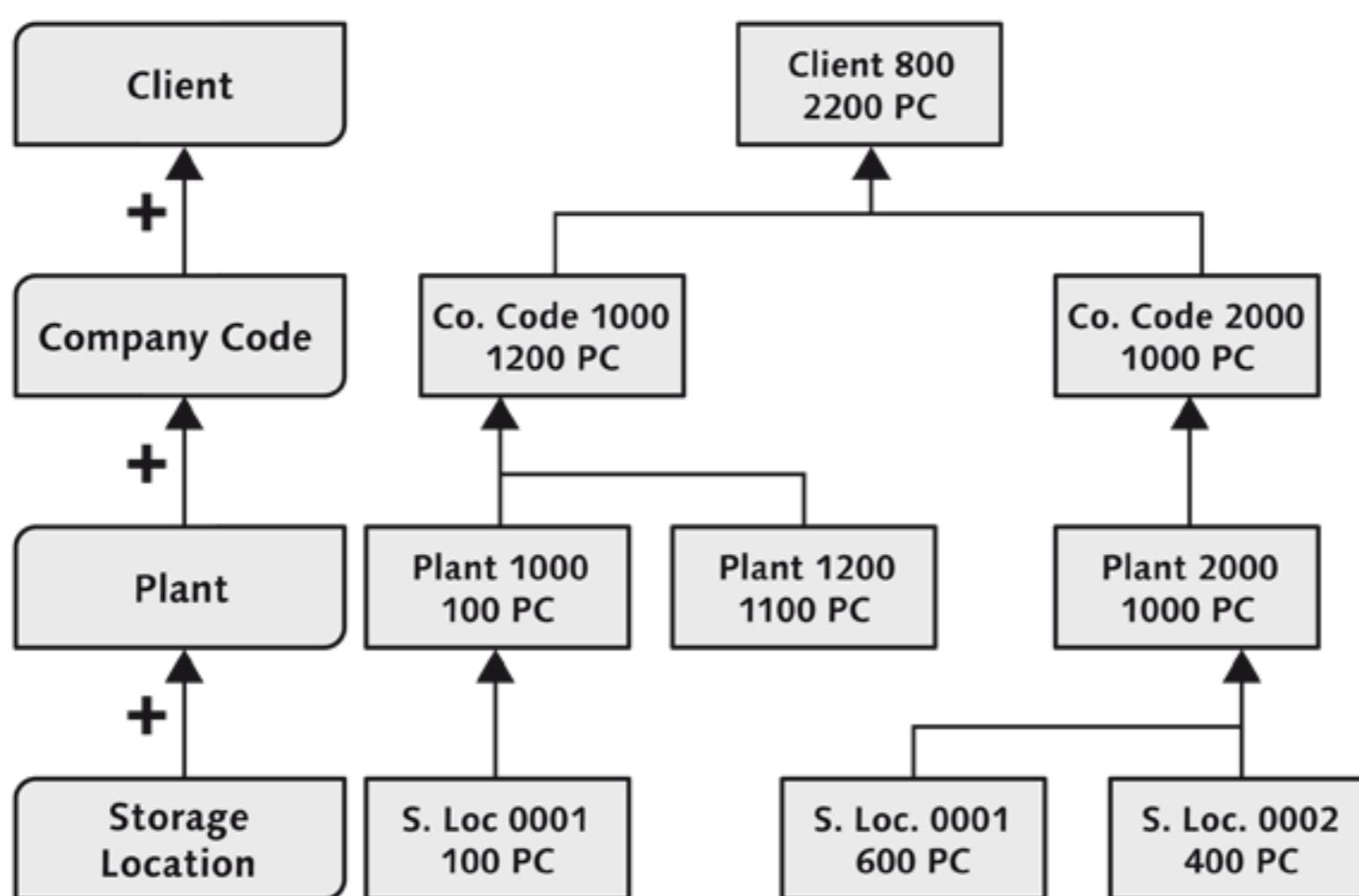


Figure 5.6 Stock Overview

The stock overview is a static display; that is, only the current stock situation is taken into account. You can't see the future planned goods receipts and goods issues in this list. For output purposes, you can configure which stocks are displayed in each column and the order in which they're displayed by going to SAP IMG • MATERIALS MANAGEMENT • INVENTORY MANAGEMENT AND PHYSICAL INVENTORY • REPORTING • DEFINE STOCK LIST DISPLAY.

As we touched on in Chapter 4, the valuation area is the organizational level at which the material is valued. Plant and company code are the two possible options in SAP ERP. This is one of the fundamental decisions made and configured during the initial stage of an SAP implementation, and is very difficult to change later on.

It's best to value materials at the plant level so that you can define different material prices for each plant. In addition, valuation at the plant level is mandatory if you want to use either of the Production Planning or Product Cost Accounting functionalities, or if your system is a retail system. Figure 5.7 shows the area where you need to maintain the valuation area or the valuation level in Customizing.

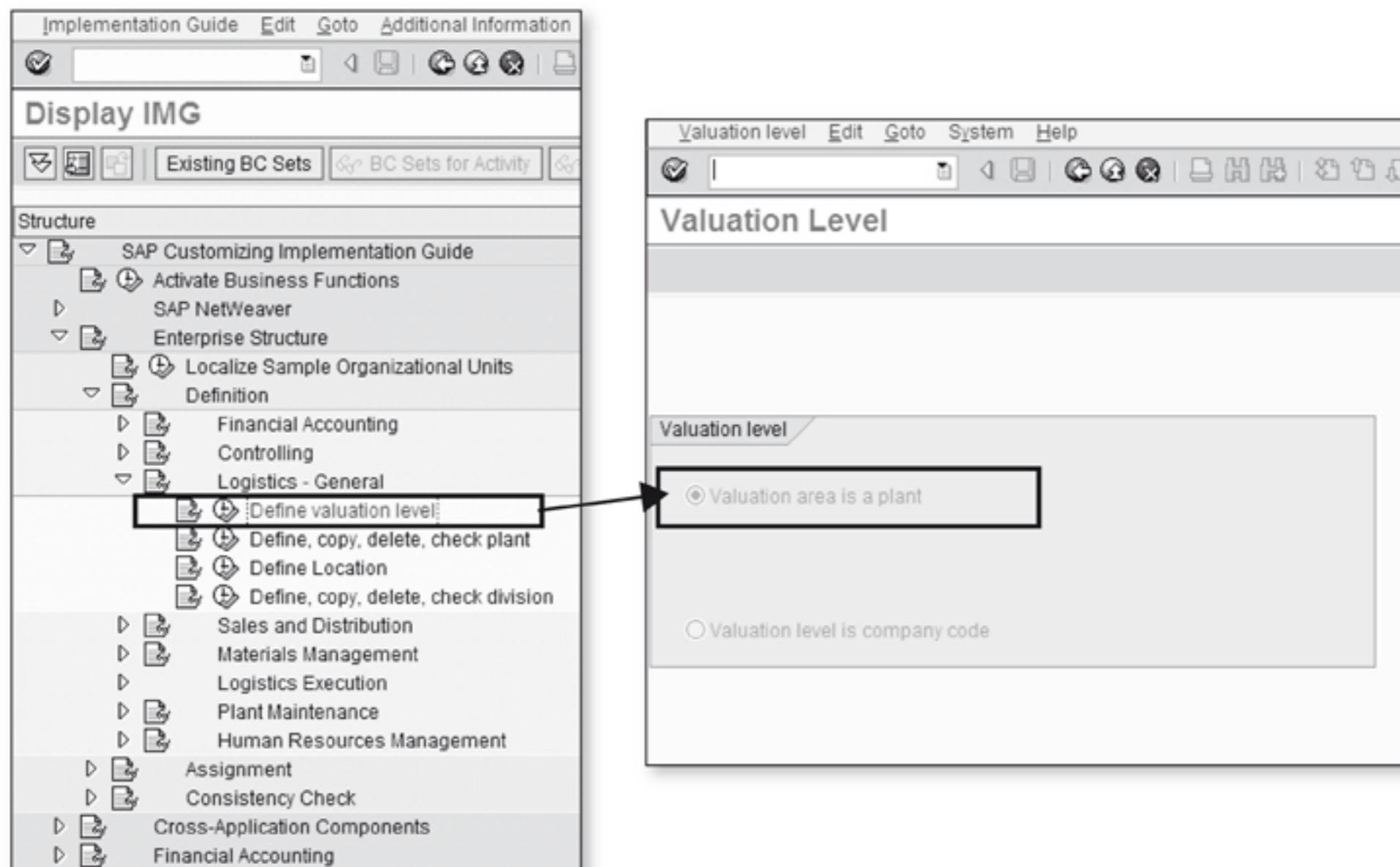


Figure 5.7 Valuation Area or the Valuation Level in Customizing

You now know how to display stock at various organizational units and that the valuation area can be either the plant or the company code. Unless otherwise stated, we'll assume the valuation area as the plant throughout this book.

5.1.6 Material Valuation Procedure

The material valuation depends on the price control you enter in the material master. There are two options for price control in the SAP system:

- ▶ Standard price control (S)
- ▶ Moving average price control (V)

As you can see in Figure 5.8, the price control in our example is V. This is the basic information the system requires for the valuation of materials.

This figure is repeated so that we can further explain the material valuation procedure with respect to price control.

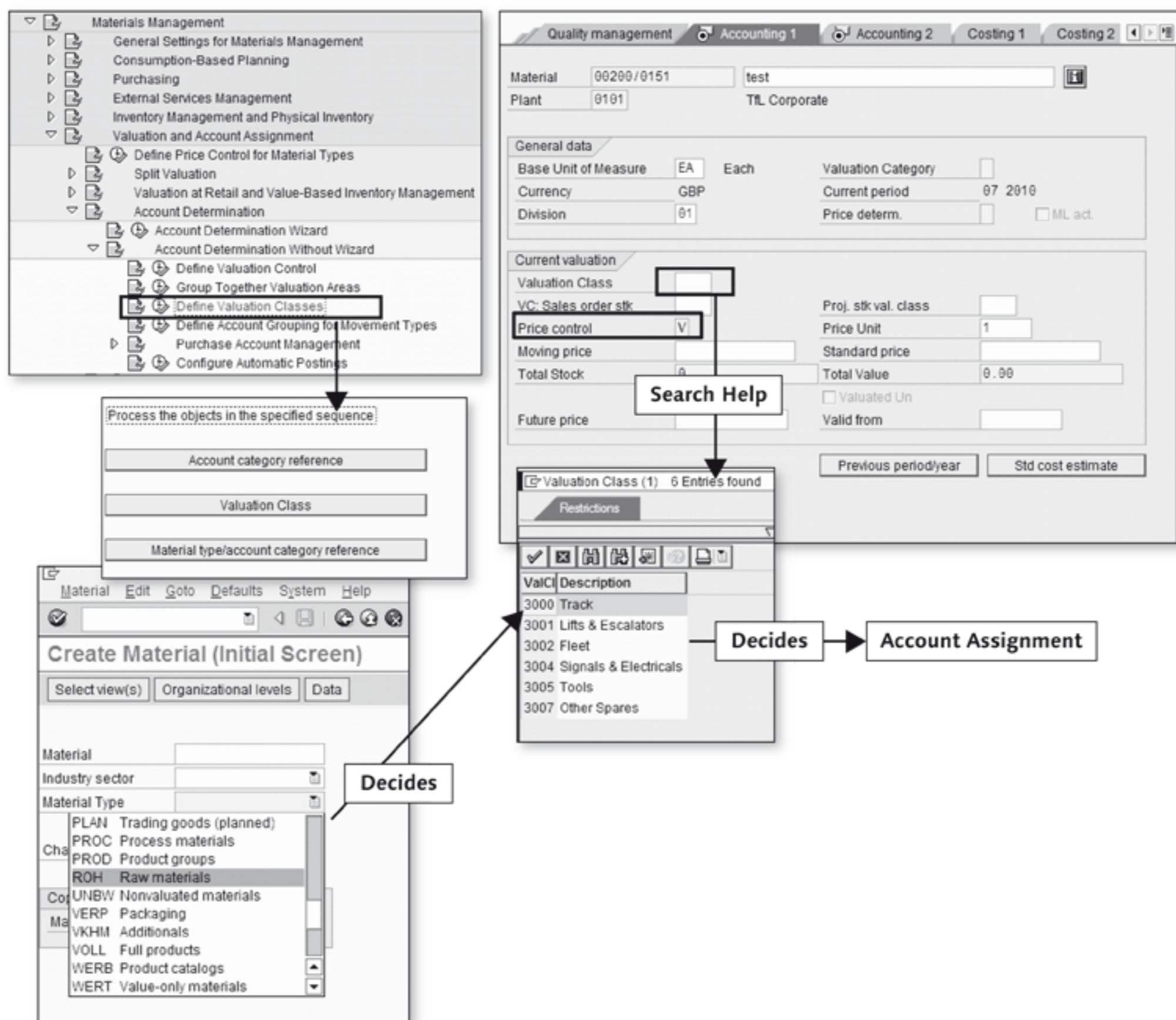


Figure 5.8 Price Control and Valuation Class in the Accounting1 View of the Material Master

Standard Price Control (S)

Materials with the standard price control (S) are valued at a constant price, independent of its value changes due to goods movements and invoices. Although the standard price doesn't change as a result of automatic account postings during goods receipt and invoice verification, it's possible to change the standard price by executing Transaction MR21 in the standard SAP system. It's common practice to change this price at least once a year.

Moving Average Price Control (V)

The value of materials with moving average price (MAP) control is recalculated with every relevant goods movement and invoice entry. The MAP is calculated

by dividing the total value of the material by the total quantity of the material in stock.

Account Postings Due to Price Control

For the standard price control, the system carries out all stock postings at the price defined in the material master. For purchased materials, the variances – if any – are posted to the price difference account.

For MAP control, the system valuates the goods receipts with the purchase order price and goods issues with the current MAP. The system automatically calculates the latter upon every goods movement by dividing the total value by the total stock quantity. Differences between the purchase order price and the invoice are posted directly to the relevant stock account if there is sufficient stock coverage. If there is insufficient stock, the proportionate amount is posted to the price difference account.

Why should the system post to the price difference account during invoice verification for MAP-controlled material?

For MAP-controlled material, the difference between the purchase order price and the invoice price is posted to the stock account. However, if there is insufficient stock of the material, the system posts the difference proportionately into the stock and price difference account corresponding to the stock shortage.

The basic idea of MAP is to pass price fluctuations on to the material value, depending on what you have to pay as a result of the invoice. Imagine a situation where, for example, you have to pass on the price difference of 50 pieces of a material of which you only have five pieces in stock. The result would be an unreal price for those five pieces. Therefore, in SAP ERP, the difference for only the five pieces in stock is passed on, and the difference for the remaining 45 pieces is posted to the price difference account.

From what we have discussed regarding the material valuation procedure and its impact on account postings, you will want to have more visibility and clarity in the context of account postings.

5.1.7 Stock Valuation in Inventory Management and LIV

If we quickly revise the procurement cycle for stock material described in Section 4.2.1, goods receipts are posted in Inventory Management after purchase order processing and monitoring. LIV immediately follows goods receipt.

In this section, we'll focus on sample postings for standard price-controlled material and MAP-controlled materials. We'll discuss the valuation in Inventory Management and LIV in more detail in Chapters 8 and 9 respectively.

In the sample postings mentioned in the following text, we'll compare the valuation data of the material master record against the accounts movement in Financial Accounting.

Sample Posting for Standard Price-Controlled Material

Step	Transaction	Stock	Total Value	S Price	MAP
1	Initial situation	100	200	2.00	2.00
2	GR for PO: 100 pc@2.40/pc	200	400	2.00	2.20
3	IR for PO: 100 pc@2.20/pc	200	400	2.00	2.10

Table 5.5 Valuation Data Update in the Material Master with an S Price

Step	Vendor Account	Stock Account	GR/IR Clearing Account	Income from price differences	Expenditure from price differences
1		200			
2		200	240-		40
3	220-		240	20-	

Table 5.6 Account Postings in Financial Accounting

The steps link Tables 5.5 and 5.6. Initially, there is a quantity of 100 pieces for an S price of 2.00. Therefore, the total value of the stock is 200.

The purchase order is sent to a vendor for 100 pieces at the rate of 2.40 per piece. There is a goods receipt for 100 pieces of the material. The system updates the stock account with the standard price of 2.00; thus, there is a posting of 200. The GR/IR clearing account is posted according to the purchase order price. The difference of 40 goes to the expenditure from the price difference account.

The invoice is then entered for 100 pieces at the rate of 2.20 per piece. At this point, the vendor account is credited by 220. The GR/IR clearing account gets cleared because there is no difference in quantity between the GR and the IR. The remaining amount of 20 is posted as the income from the price differences.

We'll now analyze a similar sample posting for MAP-controlled material.

Sample Posting for MAP Controlled Material

The steps link tables 5.7 and 5.8. Initially, there is a quantity of 100 pieces with a V price of 2.00. Thus, the total value of the stock is 200.

Step	Transaction	Stock	Total Value	S Price	MAP
1	Initial situation	100	200	2.00	2.00
2	GR for PO: 100 pc@2.40/pc	200	440	2.00	2.20
3	IR for PO: 100 pc@2.20/pc	200	420	2.00	2.10

Table 5.7 Valuation Data Update in the Material Master with a V Price

Step	Vendor Account	Stock Account	GR/IR Clearing Account	Income from price differences	Expenditure from price differences
1		200			
2		240	240-		
3	220-	20-	240		

Table 5.8 Account Postings in Financial Accounting

The purchase order is sent to the vendor for 100 pieces at the rate of 2.40 per piece. There is a goods receipt for 100 pieces of the material. Because this is a V-price controlled material, the system updates the stock value, stock account, and GR/IR clearing account with the purchase order price.

The invoice is then entered for 100 pieces at the rate of 2.20 per piece. At this point, the vendor account is credited by 220. The GR/IR clearing account gets cleared because there is no difference in quantity between the GR and the IR. The remaining amount of 20 is posted to the stock account because this is a V price-controlled material.

As we'll discuss further in Chapter 8, the delivery costs can be of two types:

- ▶ Planned delivery cost
- ▶ Unplanned delivery cost

Planned Delivery Cost

When delivery costs are taken into account at the time of purchase order creation, they're known as *planned delivery costs*. They're maintained as a condition in the purchase order, as shown in Figure 5.9.

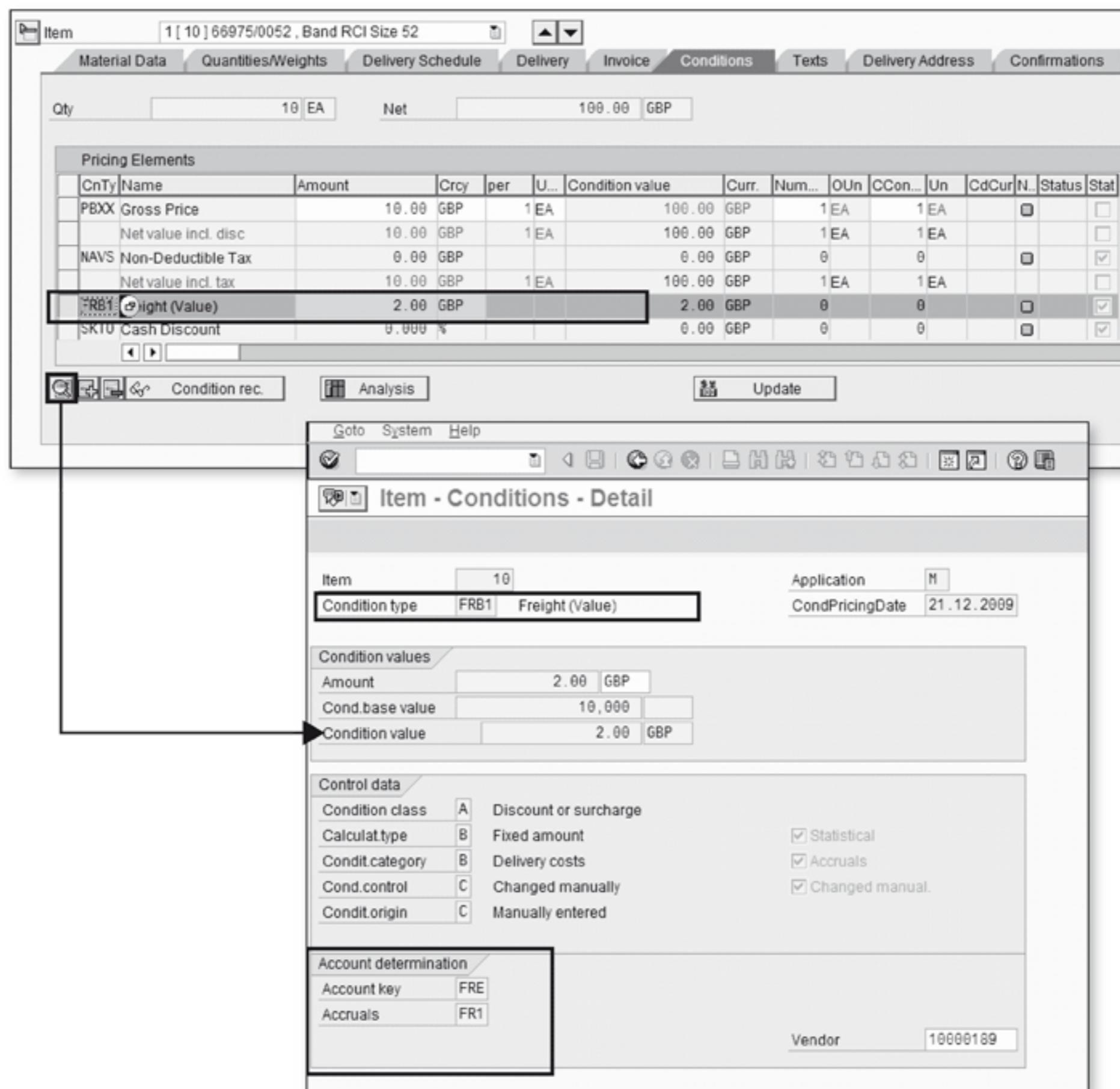


Figure 5.9 Planned Delivery Costs in a Purchase Order

The element of account determination of the planned delivery cost can be displayed by clicking on the magnifying button.

Unplanned Delivery Cost

Unplanned delivery costs are entered at the time of invoice verification. They can either be distributed to the invoice line items or posted to a separate SAP G/L account, depending on the settings in Customizing menu SAP IMG • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • INCOMING INVOICE • CONFIGURE HOW UNPLANNED DELIVERY COSTS ARE POSTED.

SAP design issue with unplanned delivery costs

There are two system features during invoice verification:

- ▶ The unplanned delivery costs distribute to the line items
- ▶ One line item cannot have more than one tax code

Because of these features, the invoice line item tax is applicable to the unplanned delivery costs. The only workaround is to post the unplanned delivery costs to a separate SAP G/L account, in which case the system lets you set the tax corresponding to that SAP G/L account.

You now understand the various elements and functionalities in the procurement of stock materials. We also described the functional design and the technical elements, along with checkpoints and real-time issues for various documents and application transactions.

In the next section, we'll further discuss the various elements in the procurement of consumable materials already discussed in Chapter 4.

5.2 Procurement of Consumable Materials

The materials that are procured directly for an account assignment object and aren't managed on a value basis in Inventory Management are referred to as consumable materials. They're assumed to have been consumed the moment they're received. For example, they may represent materials – such as office supplies – that are procured directly for the respective cost centers. From the accounting perspective, they differ from stock materials in the sense that account assignment has to be entered when ordering consumable materials. They're not managed on a value basis in Inventory Management.

The procurement documents – such as purchase requisitions and purchase orders – have to be created with manual account assignment. Let's analyze this in more detail.

5.2.1 Purchase Requisition and Purchase Order

In this section, we'll review and outline the functional relevance and technical aspects of purchase requisitions and purchase orders for consumable materials.

Functional Basis

Materials for consumption need to be procured against a cost object that will bear the cost of the material in question. A cost object – for example, a cost center – has different types of SAP G/L accounts for various purposes. The person responsible for the cost center needs to decide the appropriate SAP G/L account each time materials for consumption are procured.

SAP Functional Design

The purchase requisition for consumable materials is created in a similar manner as that for stock material, except for the following points:

- ▶ A valuation price cannot be suggested for consumable materials
- ▶ An account assignment has to be entered
- ▶ Account assignment category U (Unknown) is allowed

The valuation price has to be entered manually during the creation of the purchase requisition. Although account assignment category U is allowed in the purchase requisition, it has to be changed into a meaningful account assignment category before the purchase order can be sent to the vendor.

With multiple account assignments, you can distribute the costs for one purchase order item among several cost centers. You can then distribute the costs on a quantity or percentage basis.

Checkpoints and Real-Time Issues

With a multiple account assignment for an order item, when you receive a partial invoice, the invoice amount is distributed between the account assignments in order, on a progressive fill-up basis. In this procedure, account assignment item 1 is completed first, then account assignment item 2, and so on, until the invoice value has been reached.

The Processing Status on the Status tab of the purchase requisition provides information about whether the materials or services have been ordered, not ordered, or requested, or whether the item has been converted into an outline agreement. The Creation indicator on the Contact Person tab indicates how the purchase requisition was created.

Technical Elements and Troubleshooting Tips

The account assignment screens used in purchase orders and purchase requisitions are governed by the function group MEACCTVI.

Important screens are:

- ▶ Screen 1000: Multi account assignment screen
- ▶ Screen 1100: Single account assignment screen
- ▶ Screen 1200: Header screen

The communication with Controlling is carried out by the following MEPO subroutines:

- ▶ MEPO_SINGLE_ACCOUNT_PA1
- ▶ MEPO_SINGLE_ACCOUNT_PA2
- ▶ MEPO_SINGLE_ACCOUNT_PBO

Important function modules are:

- ▶ **ME_ACOUNTING_CHECK:**
The structure COBL is used to call different function modules from other components with the same interface. These function modules – which have to be called – are maintained in Table TRWPR. RWIN_CHECK is used to read this table to find out which components have to be checked. The normal event for checking is CHECKALL. Thus, you read Table TRWPR depending on process BEST for PO and process BANF for Preq with the event CHECKALL and get back a list of function modules. You then loop over this list and call every function module with filled communication structure COBL.
- ▶ **ME_ACCOUNT_ASSIGNMENT:**
You use this function module to derive the G/L account. With this function module, you prepare the data to finally call FM MR_ACCOUNT_ASSIGNMENT. This delivers the correct G/L account, maintained in the automatic G/L account determination in Customizing with Transaction OMWB, under the Customizing menu MATERIAL MANAGEMENT • VALUATION AND ACCOUNT ASSIGNMENT • ACCOUNT DETERMINATION • ACCOUNT DETERMINATION WITHOUT WIZARD • CONFIGURE AUTOMATIC POSTINGS.
- ▶ **ME_ACCOUNTING_TYPE_CHANGE:**
This function module is called when the account assignment category is changed. COBL_REDUCE is an important subroutine. In this subroutine, all

fields that are suppressed by Customizing for the new account assignment category are cleared (see SAP Customer Note 496082, question 20).

Example:

- ▶ Account assignment category K: The field cost center is maintained with 1000
- ▶ Change to account assignment category A for asset
- ▶ Category A has cost center suppressed: cobl_reduce will clear the field

Now that you understand the functional relevance and technical aspects of purchase requisitions and purchase orders for consumable materials, we'll next describe the blanket purchase order in the procurement of consumable materials.

5.2.2 Blanket Purchase Order

In this section, we'll outline the technical and the functional aspects of blanket purchase orders. A blanket purchase order is a long-term commitment to a supplier for material against which short-term releases will be generated to satisfy requirements.

Functional Basis

Many times, the nature of materials or services is such that the cost and administrative effort involved in processing individual purchase orders is too high in relation to their value. In addition, the procurement of these low-value items, such as office supplies, may be of a repetitive nature.

SAP Functional Design

Blanket purchase orders or framework orders are purchase orders with document type FO, with a validity period and limits for the simplified procurement of materials or services where goods receipt or service entry sheets aren't entered. The important characteristics of blanket purchase orders are as follows:

- ▶ New item category B (blanket)
- ▶ New order type FO (at field selection)
- ▶ Validity period in the header of a purchase order
- ▶ Limits in the item
- ▶ No material number
- ▶ No goods receipt or service entry sheet

- ▶ Account assignment type U is allowed
- ▶ Accounting data for the item is suggested in invoices
- ▶ Additional or multiple account assignment is possible for invoice verification
- ▶ Validity period and limit are checked during invoice verification

The creation of a blanket purchase order is shown in Figure 5.10. You need to select document type FO and enter the validity date in the header. In the line item overview, you enter item category B and the account assignment category against which the procurement is to be done. Finally, in the item details screen of the framework order, you need to enter either the limit or the services.

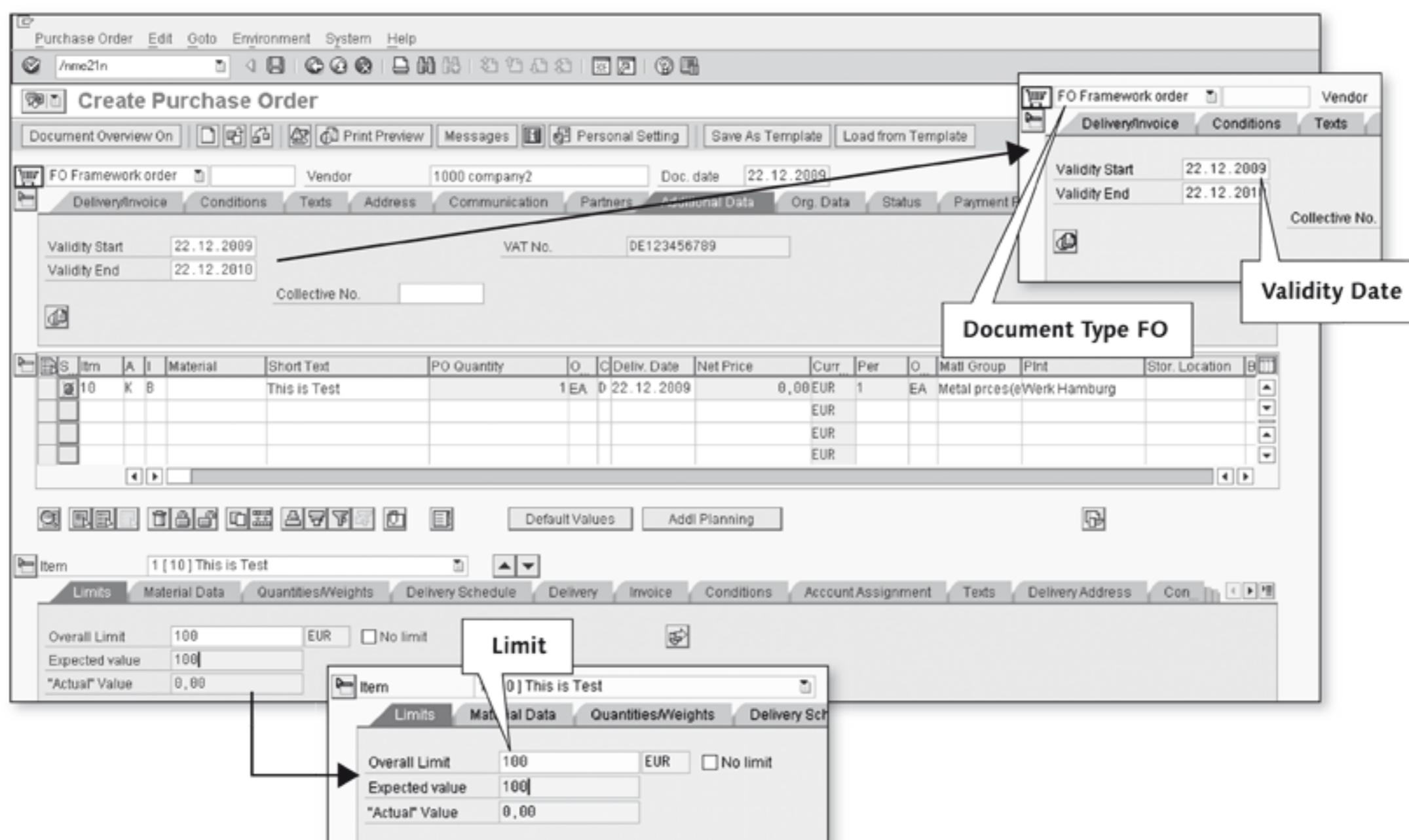


Figure 5.10 Creation of a Blanket Purchase Order

For many enterprises, blanket purchase orders serve as a kind of mini contract for low value items that can be ordered by many projects or cost centers. Using account assignment category U in these cases, the determination of the cost attribution to the relevant cost element can be delayed until the invoice is posted. In addition, blanket purchase orders help keep the procurement procedure simple by eliminating the need for individual purchase orders and goods receipts.

Checkpoints and Real-Time Issue

After you have created a blanket purchase order, the following fields cannot be changed subsequently, for technical reasons:

- ▶ Document type (BSART)
- ▶ Vendor (LIFNR or SUPERFIELD)
- ▶ Document date (BEDAT)
- ▶ Purchasing organization (EKORG)
- ▶ Company code (BUKRS)
- ▶ Language (SPRAS)
- ▶ Item category (EPSTP or PSTYP)
- ▶ Plant (WERKS)

Also, the multiple account assignment screen isn't available for blanket purchase orders.

How to change the account assignment for a blanket purchase order

In a purchase order for services or a blanket purchase order, the specifications on the account assignment don't refer to the item data but to the corresponding service line or the specified limit. To change the account assignment, proceed as follows:

- ▶ Open the purchase order in change mode.
- ▶ Select the Services or Limits tab.
- ▶ Click on the Account Assignment button.

However, if the purchase order history has been created, the system won't let you change the account assignment.

Technical Elements

The technical elements of the framework order are treated just like ordinary purchase orders with document type FO in the header and item category B for the line items.

Troubleshooting Tips

The interface for blanket purchase orders is designed in a manner similar to that for external services. They both behave in a similar way with respect to account assignment.

- ▶ For blanket purchase orders, the field EKPO-PSTYP = 1
- ▶ The field Service Package Number EKPO-PACKNO is populated for blanket purchase orders. You can then check the entries in Table ESLH for the PACKNO.

You now understand the procurement of stock materials as well as the procurement of consumable materials. Next, we'll look at the procurement of external services.

5.3 Procurement of External Services

In this section, we'll describe the procurement of external services with the help of the procurement cycle for external services and the service entry sheet, its acceptance, and invoice verification.

5.3.1 Procurement Cycle for External Services

As already described in Section 4.2.4, the procurement of external services introduces a few steps relevant to services in its procurement cycle. As a reminder, Figure 5.11 shows the typical processes external services procurement.

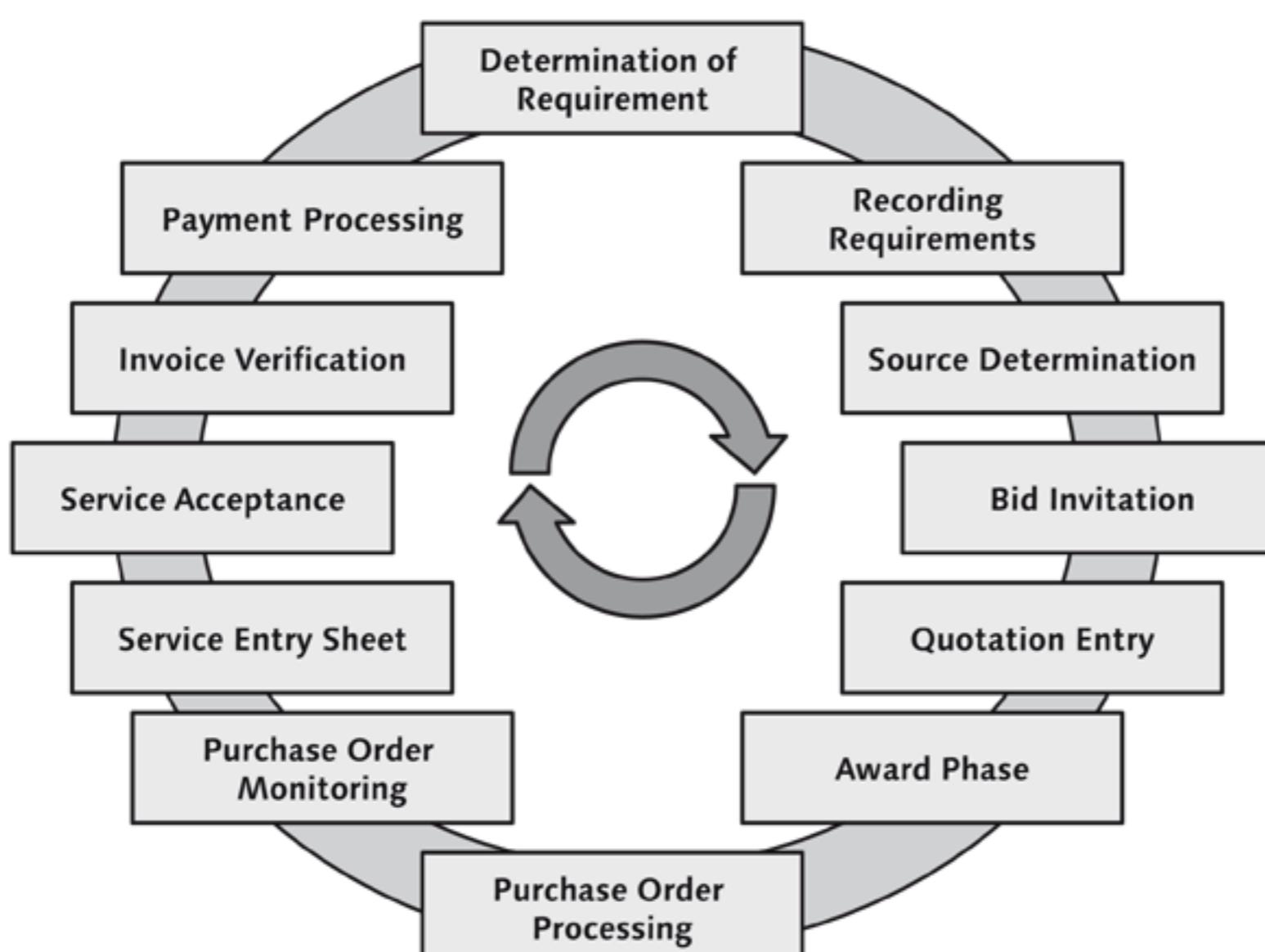


Figure 5.11 Procurement Cycle for External Services

It differs from the procurement cycle of stock materials in that the source is selected and the goods receipt is performed. As you can see in Figure 5.11, the source is determined as a result of the bid invitation. Also, the goods receipt for services isn't performed directly. You enter the service entry sheet in Transaction ML81N and the goods receipt is created automatically from the service entry sheet.

Generally speaking, there are two kinds of services:

► **Planned services**

Planned services are services whose detail is available in advance at the time of creating a purchase order. They have the following properties:

- They're associated with service master (created in Transaction AC03)
- The account assignment during purchase order creation is derived from the service master
- The Service tab in the purchase order should be maintained

► **Unplanned Services**

Unplanned services are services whose detail isn't available in advance at the time of creating a purchase order. They have the following properties:

- They don't have a service master associated with them
- The account assignment has to be entered manually during purchase order creation
- The Limit tab in the purchase order should be maintained

Service Purchase Order

The service purchase order can be created for document type NB, which is used to create standard purchase orders. However, for services, you need to use item category D (Services). You need to take the following into account when you create a service purchase order:

- The over/under delivery tolerances and Unlimited flag from the item detail aren't used for services. To have unlimited service amounts, you need to use the Unlimited flag from the detail screen of the services and/or on the Value Limits tab.
- The Account Assignment tab from the item overview isn't the account assignment screen used for services and/or value limits. These account assignment values are a summary of the services and/or value limits. You cannot change

these values. The Services and Value Limits tabs contain an icon to be used to maintain the account assignment values.

- ▶ On the invoice item Detail tab, it is important to have the GR-based IV flag set in order to enter a service entry sheet. If this flag is set, the GR flag on the Delivery tab must also be set. If these flags aren't set, you won't be able to enter a service entry sheet using ML81N.
- ▶ On the Invoice tab in the item details of the purchase order, the Srv.based IV flag is used by invoicing to determine whether the service quantity will display when entering an invoice.

Returns for the service entry sheet from the time sheet

You can retroactively change a time or quantity in a time sheet that you have already converted into a service entry sheet and immediately have the system generate a new entry sheet using the new data.

When you convert the changed time sheet into external services, the system additionally generates both a service entry sheet with the new data and a service entry sheet in which the original data has been cancelled and the Returns indicator has been set.

You need to consider that a return is only possible if a time sheet is used and converted into external services (CATS/CATM). In addition, the Returns indicator cannot be selected manually but is set by the system when a changed time sheet is converted into external services.

The additionally generated returns sheet cancels the already existing service entry sheet. You can check this in the purchase order history for the underlying purchase order.

To facilitate the use of the returns function for time sheets during the service entry process, you must select the relevant Activation indicator in Customizing for external services management by going to SAP IMG • MATERIALS MANAGEMENT • EXTERNAL SERVICES MANAGEMENT • SOURCE DETERMINATION AND DEFAULT VALUES • FOR CLIENTS.

Technical Elements of Service PO

We'll now discuss the few technical elements relevant for the creation of purchase orders for services.

Whether an item contains service data is governed by the item category (EKPO-PSTYP). The service data or limits are necessary when EKPO-PSTYP = 9. The field PACKNO is populated for the services when you create the purchase order. Table 5.9 lists some of the important function modules/BAPIs used in the creation of a service purchase order.

Function Module	Description
LEISTUNG_READ_0	Read service master
BAPI_SERVICE_CHANGE	BAPI to change a service master record
BAPI_SERVICE_CREATE	Creation of service master record
BAPI_SERVICE_GET_DETAIL	Read detailed data for the service master record
BAPI_SERVICE_GET_LIST	List display for service master records
BAPI_ENTRYSHEET_CHECK	Check service entry sheet
BAPI_ENTRYSHEET_CREATE	Create entry sheet
BAPI_ENTRYSHEET_DELETE	Delete entry sheet
MS_CD_FOR_PACKNO	Read changes to package
MS_CREATE_SERVICE_ENTRY_MULTI	Create service entry sheet with multiple account assignments

Table 5.9 Function Modules and BAPIs for Services

The function modules outlined in Table 5.9 don't comprise an exhaustive list.

You now understand the procurement cycle for services and you learned about the points you must consider during the creation of a service purchase order. After creating the purchase order, you create the service entry sheet, accept it, and post the invoices for the purchase order or service entry sheet. You'll learn about the service entry sheet, its acceptance, and its invoicing in the following section.

5.3.2 Service Entry Sheet, Its Acceptance, and Its Invoicing

In this section, we'll discuss the entry of service entry sheets, the acceptance of service entry sheets, and their invoicing.

Functional Basis

Due to the nature of procurement, there are often time gaps between entering services that have been performed and agreeing to pay for them. This time gap is often more due to reasons of regular procedures than administrative ones. After the performance of services by vendors, businesses generally want to wait a few days before they approve the services in light of detailed documentation of the services performed and then make financial postings corresponding to those services.

SAP Functional Design

The SAP system handles the entry of services in Transaction ML81N (menu path: SAP EASY ACCESS • LOGISTICS • MATERIALS MANAGEMENT • SERVICE ENTRY SHEET • MAINTAIN) in two stages:

- ▶ Entering the service entry sheet
- ▶ Accepting the service entry sheet

Details about the services are held in the service entry sheet in an unapproved state until you accept them. The acceptance of a service entry sheet acts as approval. After acceptance, the goods receipt document is created automatically. The accounting documents are created as follow-on document to the material document, just like with valued materials.

As shown in Figure 5.12, you can create and accept service entry sheets in the same transaction. The status of the acceptance of service is indicated by the color of the light next to it.

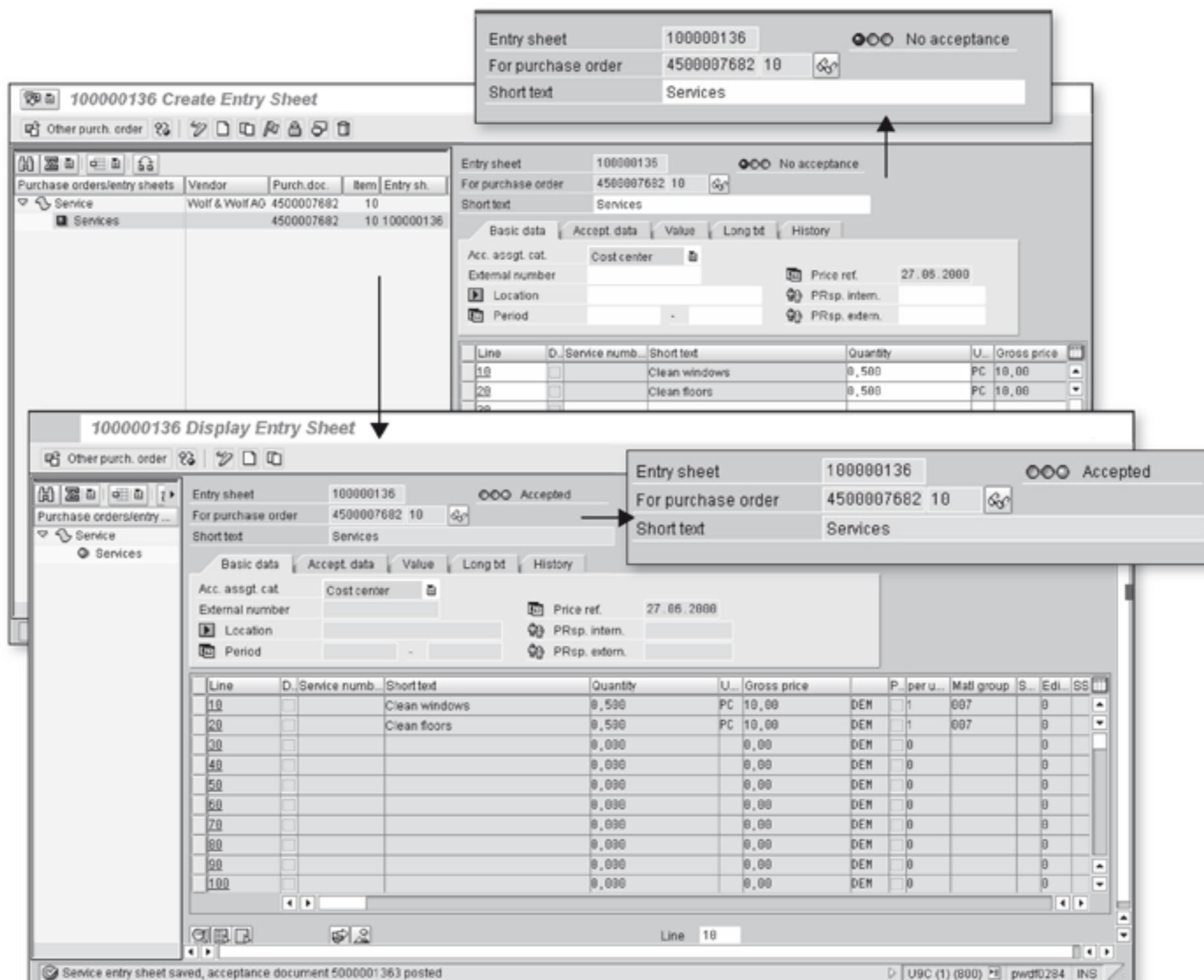


Figure 5.12 Service Entry Sheet Creation and Acceptance

The invoices can then be posted for the service entry sheet, either with reference to the purchase order or the service entry sheet. The invoice is posted just like for other purchase orders, except that the system sets the Final Invoice indicator by default. However, the postings at the time of invoice verification may vary if you choose to post partial invoices. We'll examine a few sample postings for partial invoices corresponding to a service entry sheet.

Example I: Partial invoice without Final Invoice indicator

This example is illustrated in Table 5.10. The Final Invoice indicator isn't set when the invoice for 40 USD is entered. This means that another invoice for 60 USD is expected.

10 Hours @ 10 USD/Hour	Service Acceptance (100 USD)	Invoice for 40 USD	Remarks
Cost Account	100		Final Invoice indicator not set
GR/IR Clearing Account	100–	40	
Vendor Account		40–	

Table 5.10 Partial Invoice without Final Invoice Indicator Set

We'll now look at the postings for a partial invoice with the Final Invoice indicator set.

Example II: Partial invoice with Final Invoice Indicator set

This example is illustrated in Table 5.11. The Final Invoice indicator is set when the invoice for 40 USD is entered. By setting this indicator, you inform the system that you aren't expecting any further invoices. The system thus clears the GR/IR clearing account and the difference passes on to the cost account.

10 Hours @ 10 USD/Hour	Service Acceptance (100 USD)	Invoice for 40 USD	Remarks
Cost Account	100	60–	Final Invoice indicator is set
GR/IR Clearing Account	100–	100	
Vendor Account		40–	

Table 5.11 Partial Invoice with Final Invoice Indicator Set

Now that you have an understanding of the account postings during invoice verification, we'll move on to outline a few examples for invoice reversal.

Example III: Invoice reversal: Case I

This example is illustrated in Table 5.12. The service acceptance is posted for 100 USD. The first invoice for 80 USD is entered into the system without the Final Invoice indicator set, and a second invoice for 50 USD is posted with the Final Invoice indicator set. Because the Final Invoice indicator is set for the second invoice, the system clears the GR/IR clearing account and posts the difference to the cost account. The second invoice is then reversed. As you can see in Table 5.12, this is one instance where the reversal document doesn't look exactly like the invoice document.

10 Hours @ 10 USD/Hour	Service Acceptance (100 USD)	Invoice1 for 80 USD	Invoice2 for 50 USD	Reversal of Invoice2
Final Invoice Indicator		Not set	Set	
Cost Account	100		30	
GR/IR Clearing	100–	80	20	50–
Vendor Account		80–	50–	50

Table 5.12 Invoice Reversal: Example 1

We'll now look at a few more sample postings for invoice reversal.

Example IV: Invoice reversal: Case II

This example is illustrated in Table 5.13, where a service acceptance is posted for 100 USD.

10 Hours @ 10 USD/Hour	Service Acceptance (100 USD)	Invoice1 for 120 USD	Reversal of Invoice1
Final Invoice Indicator		Set	
Cost Account	100	20	20–
GR/IR Clearing	100–	100	100–
Vendor Account		120–	120

Table 5.13 Invoice Reversal: Example 2

The invoice is posted for 120 USD with the Final Invoice indicator set. Because the system doesn't expect additional invoices, it clears the GR/IR clearing account with 100 USD. 120 USD is posted to the vendor account and the difference of 20 USD is posted to the cost account.

Checkpoints and Real-Time Issues

At the time of creating a purchase order, the screen for services takes preference over that for the fields of items that are maintained in both places. For instance, the Unlimited flag next to the Overdelivery and Underdelivery Tolerance options can be maintained from the Details screen of the service. It can't be changed in the purchase order item details. The same is true for the account assignment.

The GR based-IV flag must be set at the time of purchase order creation so that you're able to enter the service entry sheets into the system.

Why is the field selection for price change not available for limits?

Ideally, the field selection should have been present. You might, however, discover that the service purchase order that contains limit doesn't show the Price Change Allowed flag or the Price Percentage flag in the service entry sheet. In addition, in the Customizing transaction for field selection (menu path: SAP IMG • MATERIALS MANAGEMENT • EXTERNAL SERVICES MANAGEMENT • DEFINE SCREEN LAYOUT), the flags might not be present to make field selection visible.

This could be the result of a number of invalid entries in the Customizing list for Transaction ML90. It was delivered incorrectly by SAP ERP for the English language. To solve this problem, you need to implement the report mentioned in SAP Customer Note 932342. It's advisable to consult SAP Active Global Support before implementing this note.

Technical Elements and Troubleshooting Tips

Most of the technical elements and troubleshooting tips regarding services have already been covered. In addition, Table 5.14 lists various enhancements available for services.

User Exit	Description
EXIT_SAPLMLSP_040	Transfer of Data to Details User Screen
EXIT_SAPLMLSP_041	Adoption of Data from User Screen
EXIT_SAPLMLSK_001	Set Account Assignment in Service Line
EXIT_SAPLMLSR_020	Transfer of Data to Entry Sheet User Screen
EXIT_SAPLMLSR_021	Adoption of Data from Entry Sheet User Screen
EXIT_SAPLMLSX_001	Entry Sheet Upload: Set Account Assignment Cat.
EXIT_SAPLMLSL_001	Check Limits in Service Specifications

Table 5.14 User Exit for Services

So far, we've studied the procurement of stock materials, consumable Materials, and external services. There is still another kind of special procurement technique, however, which involves materials as well as services: subcontracting. We'll cover this in the following section.

5.4 Subcontracting

In the SAP system, the term subcontracting describes the process of procuring a material from an external supplier (the subcontractor) who, in turn, requires certain components (provided by either the ordering firm or a third party) to manufacture this material. For example, say that your enterprise manufactures motorcycles but doesn't have the resources to assemble the ignition system. In this case, you can send the parts to a subcontractor to manufacture the ignition system for you. In this section, we'll describe subcontracting in the following areas of Materials Management:

- ▶ Subcontracting in Purchasing
- ▶ Subcontracting in Inventory Management
- ▶ Subcontracting in Logistics Invoice Verification

5.4.1 Subcontracting in Purchasing

Before we proceed to subcontracting in Purchasing, you'll find it handy to understand the bill of materials (BOM).

Bill of materials

A BOM is a list of the components provided to the subcontractor, together with details of the relevant quantities. The quantities may be negative, in case by-products (co-products) are involved. These are products created during the manufacture of the ordered product and that are returned to the ordering firm. The ordered item to which the BOM belongs is sometimes also called an *assembly*.

BOM explosion refers to clicking a button in the Purchasing transactions to pull the components of the BOM.

The purchase order for subcontracting items is entered with the same transaction (ME21N) with item category L. A subcontracting item is denoted by the item

category subcontracting (identifier L, represented internally by the number 3). In the standard SAP system, this item category isn't defined for RFQs or contracts. However, you can also enter subcontracting items in an RFQ or a contract by copying the field selection keys PT0A and/or PTOK to create the keys PT3A and/or PT3K respectively (menu path SAP IMG • MATERIALS MANAGEMENT • PURCHASING • RFQ/ QUOTATION • DEFINE SCREEN LAYOUT AT DOCUMENT LEVEL). In this case, however, no BOM explosion is carried out and no component screen is offered.

In purchase requisitions, the components are assigned to the requisition item, whereas in purchase orders and scheduling agreements, the BOM is attached to the schedule line. That is, different schedule lines for the same item may have different BOMs. This doesn't usually occur in purchase orders, but with long-running scheduling agreements, the BOM may change over the course of time.

The price for a material procured on a subcontracting basis can be stored in a subcontracting info record. In the source determination process for a subcontracting item, only subcontracting info records and subcontracting scheduling agreements are taken into account.

When a subcontracting purchase order is created, the components mentioned in the purchase order are provided to the subcontracting vendor. The amount mentioned on the purchase order isn't for the materials (because the material is being supplied to the subcontracting vendor) but for the services and is taken from the subcontracting info record.

After the creation of the subcontracting purchase order, the next step is to issue the components mentioned in the purchase order to the vendor. This is done in Inventory Management.

5.4.2 Subcontracting in Inventory Management

Subcontracting in Inventory Management is slightly different in the sense that it involves the provision of components to the subcontracting vendor and then the goods receipt for the finished material.

The components at the subcontractor's site are managed in a special stock for the vendor, which you can monitor by evaluation. Goods issues for subcontract orders can be entered in two ways:

- ▶ Goods issue with reference to a purchase order
- ▶ Goods issue entered from the list of all of the materials of a subcontracting vendor (menu path: SAP EASY ACCESS • LOGISTICS • MATERIALS MANAGEMENT • PURCHASING • PURCHASE ORDER • REPORTING • SC STOCKS PER VENDOR)

In the event of a goods receipt against a subcontracting order, the system suggests the components to be booked out with movement type 543. The movement type is a three-digit classification key indicating the type of material movement – for example, goods receipt, goods issue, and so on. The movement type enables the system to find predefined posting rules determining how the accounts of the Financial Accounting system are to be posted and how the stock fields in the material master record are to be updated. For by-products where an inward movement is involved, movement type 545 is suggested. If there is only one delivery schedule line, the suggested (default) quantity is proportional to the goods receipt quantity.

The default quantities can be changed manually prior to posting if the subcontractor has used more or less of the material provided. A subsequent settlement is possible if you would like to make settlements after they've been booked.

After the goods receipt and the settlements (if any), we'll now look at subcontracting in Logistics Invoice Verification.

5.4.3 Subcontracting in Logistics Invoice Verification

Invoice verification for a subcontract item is done in the same way as invoice verification for a standard item. However, the account postings involve lot of other accounts relevant for subcontracting.

We've outlined a sample posting in Table 5.15. For the sake of clarity, we've used abbreviated terms rather than numerical values.

- ▶ Ordered: semi-finished product
- ▶ Component: raw material
- ▶ OP = order price (labor costs)
- ▶ VP = Valuation price raw material
- ▶ Invoice price: IP = OP + Dev (deviation)

SAP G/L Accounts	Goods Receipt	Invoice Receipt
Stock Account for Finished Products	OP + VP	Dev
Stock Account for Raw Materials	VP-	
GR/IR Clearing Account	OP-	OP
Vendor Account		IP-
Cost of Goods Manufacture	(OP + VP)-	Dev-
Consumption Account	VP	
External Labor Account	OP	Dev

Table 5.15 Account Postings for Subcontracting

Because the value of the finished product includes the value of the raw materials plus services, the system posts OP + VP in the stock account for finished products. This is the same cost that's incurred towards the manufacture of the finished product. Therefore, the same value is credited from the cost of goods manufacture account. The other account postings are self-explanatory.

Finally we'll take a look at the few technical elements of subcontracting.

5.4.4 Technical Elements of Subcontracting

Technically, the link between a purchasing document and the BOM is established through the pointer RSNUM in the purchase requisition (Table EBAN) or the delivery schedule line (Table EKET). The components are found in Table RESB, under the reservation number RSNUM and are numbered according to the item number (RSPOS). In turn, the reservation points to the requirement source document via the fields BELN, EBELP, EBELE (schedule line) or BANFN, BNFPO (purchase requisition).

A few other database tables related to subcontracting have been outlined in Table 5.16.

Database Table	Description
MSLB	Special Stocks with Vendor
MAST	Material to BOM Link
STPO	BOM Item
VRSLI	Receipt of Materials from Deliveries

Table 5.16 Additional Tables for Subcontracting

The function group for component processing in Purchasing is EINK (the most important function module is *ME_COMPONENTS_MAINTAIN*). The function modules are invoked from the routines includes MM06BFLB (requisition) or MM06EFLB (purchase order/scheduling agreement) (the most important routine is *MDPM_MAINTAIN*). In each case, the component screen is invoked from the detail screen via the module *CALL_KOMPONENTEN*.

The other important function modules and programs are as follows:

- ▶ FM *ME_READ_COMP_GOODS_ISSUE*: Provision of Components (GI with Ref. to purchase order)
- ▶ FM *ME_READ_COMP_GOODS_RECEIPT*: Suggestion of Components (GR against SC order)
- ▶ Report *RM06ELLB*: SC Stock Monitoring List

5.5 Summary

In this chapter, we analyzed the procurement of stock materials, consumable materials, and services. In addition, we went through the processes involved in subcontracting. You learned about the various functional and technical aspects of the procurement cycle, including its documents such as RFQ/quotation, purchasing info record, purchase requisition, blanket purchase order, and service entry sheet. In addition, you learned about the calculation schema, material valuation procedure, and stock valuation. Finally, we described subcontracting in the context of Purchasing, Inventory Management, and Logistics Invoice Verification. A solid grasp of the information presented in this chapter will enable you to understand the procurement of stock and consumable materials in the SAP system. In addition, the real-time issues and the troubleshooting tips presented in the chapter should help you analyze functional and technical issues in your system.

In the next chapter, we'll discuss the elements of the condition technique and of price determination during various procurement transactions. In addition, we'll cover the basics of material price changes with respect to material valuation and the valuation structure.

The valuation and account postings depend on the prices of materials. So, it's important to understand how the system determines prices and the impact of material price changes on valuation.

6 Conditions, Price Determination, and the Basics of Material Price Changes

In SAP ERP, price determination is carried out with the help of the condition technique. In this chapter, we'll focus on the functional and the technical elements of the condition technique that leads to the price determination of materials during the creation of a purchasing document. Although most of our analysis is based on purchase orders, the condition technique and price determination is similar for other relevant purchasing documents.

Later in this chapter, we'll discuss the basics of material price changes and their impact on valuation. The concept is explained with the help of sample account postings.

6.1 Conditions and Price Determination

In the following sections, we'll describe the various elements of the condition technique and the resulting price determination. This is a method for storing and determining purchase prices for materials

6.1.1 Elements of Condition Techniques

The functional and technical aspects of condition techniques are important because they cater to your purchasing department's need for the method to store and determine the purchase price of materials.

Functional Basis

A vendor's price for a material is often made up of various components. Prices, discounts, surcharges, and freight costs are some of the additional factors that affect what you actually pay towards the procurement of materials. The purchasing department should have a method for storing and determining the purchase prices for materials.

SAP Functional Design

In the SAP system, the condition technique is used to determine the purchase and the valuation price. This technique is based on conditions that are described by condition types, stored in condition records and tables, found using access sequences, and arranged in calculation schemas.

The condition technique is the purchasing department's method for storing and determining purchase prices for materials. We'll now quickly revisit the concept of prices and discounts/surcharges for the price determination process that was already explained in Section 5.1.3.

Gross price = Price excluding any discounts or surcharges

Net price = Gross price - discount + surcharge + tax

Effective price = Net price +/- delivery cost - cash discount - rebate

As shown in Figure 5.4, the calculation schema RM0000 is determined by the purchasing organization and the vendor with the help of the Customizing setting under the menu path SAP IMG • MATERIALS MANAGEMENT • PURCHASING • CONDITIONS • DEFINE PRICE DETERMINATION PROCESS • DEFINE SCHEMA GROUP.

We'll now define the various elements of the condition technique, as shown in Figure 6.1.

Condition Type

Condition types describe the individual pricing elements for the gross price, discounts and surcharges, freight charges, fixed costs, and so on. You may define condition types and their control parameters under the Customizing menu path SAP IMG • MATERIALS MANAGEMENT • PURCHASING • CONDITIONS • DEFINE PRICE DETERMINATION PROCESS • DEFINE CONDITION TYPES. The condition type PB00 is also shown in Figure 6.2.

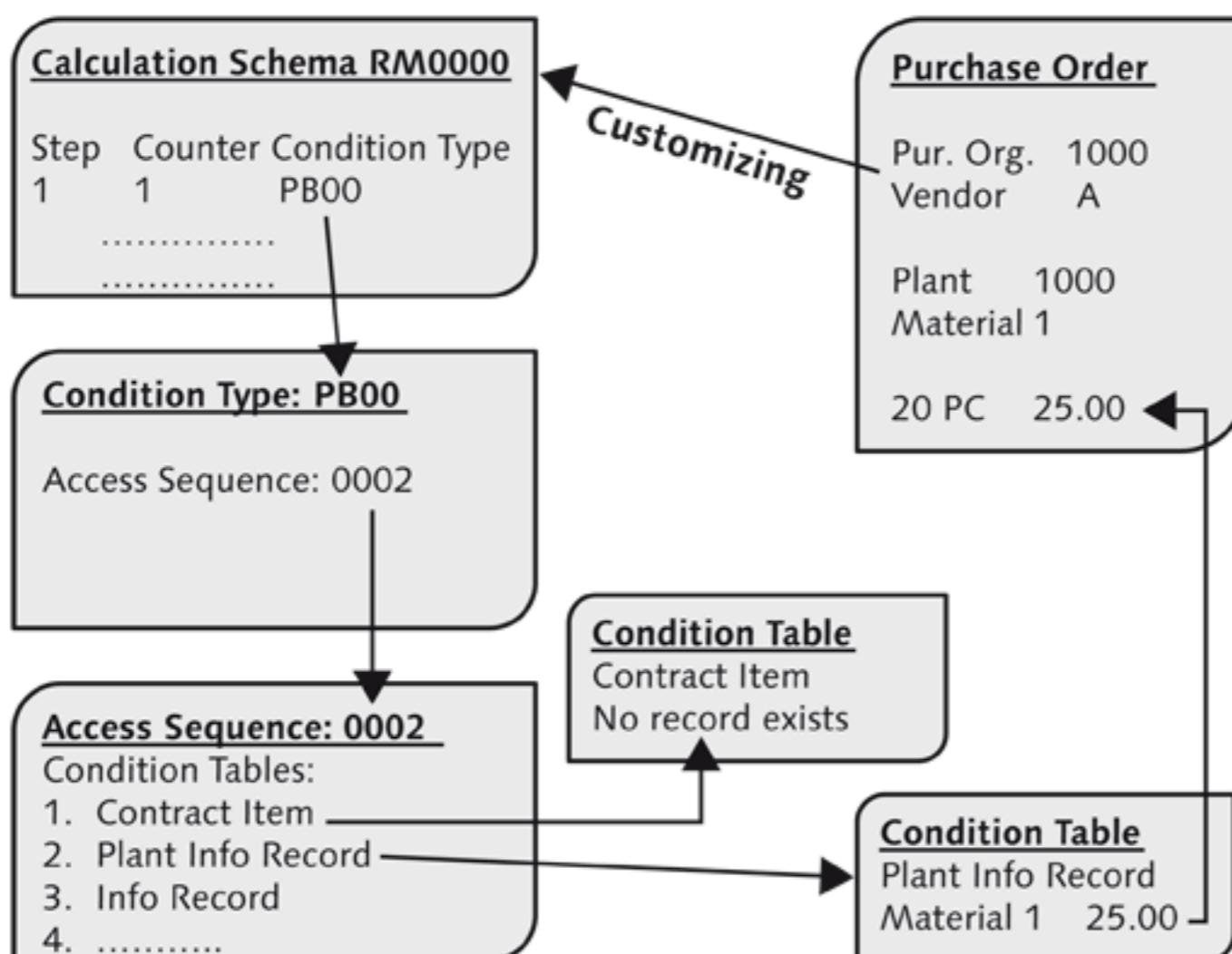


Figure 6.1 Price Determination Process for a Purchase Order

Change View "Conditions: Condition Types": Details

<input type="button" value="New Entries"/>	<input type="button" value="Print"/>	<input type="button" value="Copy"/>	<input type="button" value="Delete"/>	<input type="button" value="Insert"/>	<input type="button" value="Update"/>	<input type="button" value="Exit"/>
Condit. type	PB00	Gross Price	Access seq.	0002	Gross Price	
Control data 1	Access Sequence					Records for access
Cond. class	B	Prices	Plus/minus	<input type="checkbox"/>	positive	a
Calculat.type	C	Quantity				
Cond.category	H	Basic price				
Rounding rule		Commercial				
StrucCond.						
Condition Records						
Group condition						
<input checked="" type="checkbox"/> Group cond.	GrpCond.routine					<input type="checkbox"/>
<input type="checkbox"/> RoundDiffComp						
Changes which can be made						
Manual entries	<input type="checkbox"/>	No limitations	<input checked="" type="checkbox"/> Amount/percent	<input checked="" type="checkbox"/> Qty relation		
<input type="checkbox"/> Header condit.			<input type="checkbox"/> Value	<input type="checkbox"/> Calculat.type		
<input checked="" type="checkbox"/> Item condition	<input type="checkbox"/> Delete					
Master data						
valid from	<input type="checkbox"/>	Today's date	PricingProc	RM0002		
Valid to	<input type="checkbox"/>	31.12.9999	delete fr. DB	Do not delete (set the deletion ...)		
RefConType	<input type="checkbox"/>		<input type="checkbox"/> Condition index			
RefApplicatio	<input type="checkbox"/>					
Validity Period						
Scales						
Scale basis	C	Quantity scale	Scale formula	<input type="checkbox"/>		
Check value	<input type="checkbox"/>	None	Unit of meas.	<input type="checkbox"/>		
Scale type	<input type="checkbox"/>	can be maintained in con				

Figure 6.2 Condition Type PB00

You can specify the access sequence (in this case, 0002) because the condition type has its own validity period.

Condition Records and Condition Tables

You can make prices, surcharges, and discounts dependent on almost all of the fields of a purchasing document. These dependencies are defined with the help of condition tables. In a condition table, you specify the combination of fields for which you can create condition records. Conditions are stored in the system as condition records. Condition tables reference condition records. As shown in Figure 6.3, the condition tables are the database tables, whereas the condition record is the field in the database table for the condition table.

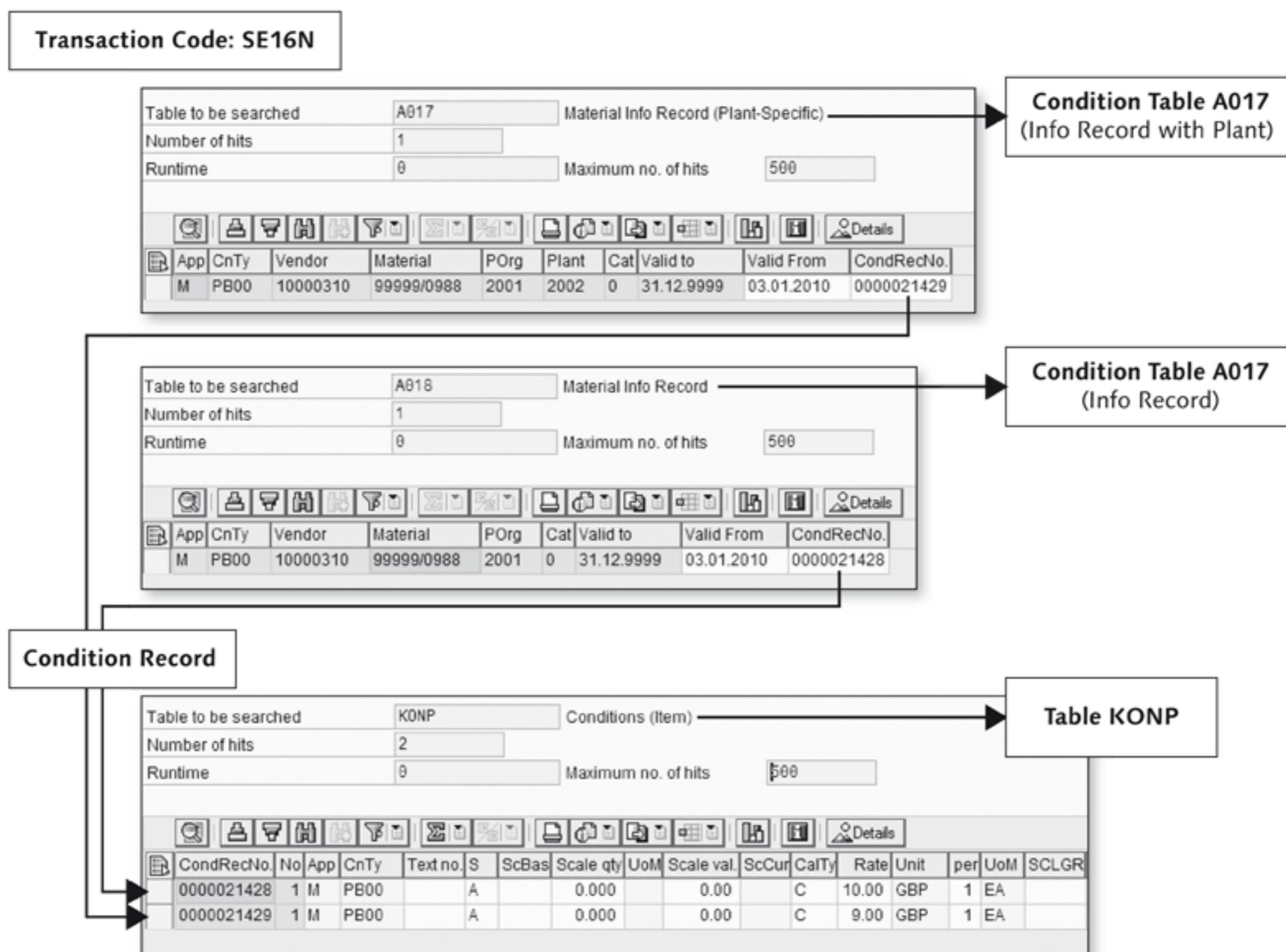


Figure 6.3 Condition Tables and Condition Records (Transaction SE16N)

Condition record 0000021428 is present for condition table A018 and condition record 0000021429 is present for condition table A017. The prices relating to

condition records 0000021428 and 0000021429 may be stored in one of the following database tables:

- ▶ KONP (Time-dependent condition)
- ▶ KONH (Header conditions)
- ▶ KONM (Quantity scales)
- ▶ KONW (Value scales)

In our case, the condition type is PB00, which is a time-dependent condition, as shown in Figure 6.2. Therefore, the prices for condition records 0000021428 and 0000021429 are stored in database table KONP.

Access Sequence

An access sequence is a search strategy that enables you to specify the order in which the condition tables will be searched for the relevant entries. As you can see in Figure 6.3, database table KONP has two rows with the prices 10 GBP and 9 GBP corresponding to condition tables A018 and A017 respectively. Access sequence 0002 is shown in Figure 6.4.

The question is now how the system knows which price to use at the time of creating a purchasing document such as a purchase order? The answer to this question lies in the way the access sequence has been defined. The access sequence defines the order in which the condition tables are taken into account. As shown in Figure 6.4, the entry for A017 comes before that for A018. Therefore, the system tries to search for the plant-specific info record before it searches for the info record without plant. The Exclusive checkbox indicates that the system doesn't search for the next entry if it gets the condition record corresponding to the relevant condition type.

The access sequence is defined under the Customizing menu path SAP IMG • MATERIALS MANAGEMENT • PURCHASING • CONDITIONS • DEFINE PRICE DETERMINATION PROCESS • DEFINE ACCESS SEQUENCE.

Access sequence: Validity period of condition types

You must assign an access sequence to the condition types for which you wish to maintain conditions with their own validity period. You'll notice that no access sequence is assigned to the condition types that don't have a validity period of their own such as those for discounts and surcharges (RA00, RA01, and so on). In the standard, the discounts and surcharges are always maintained simultaneously with the price and are valid for the period of the price.

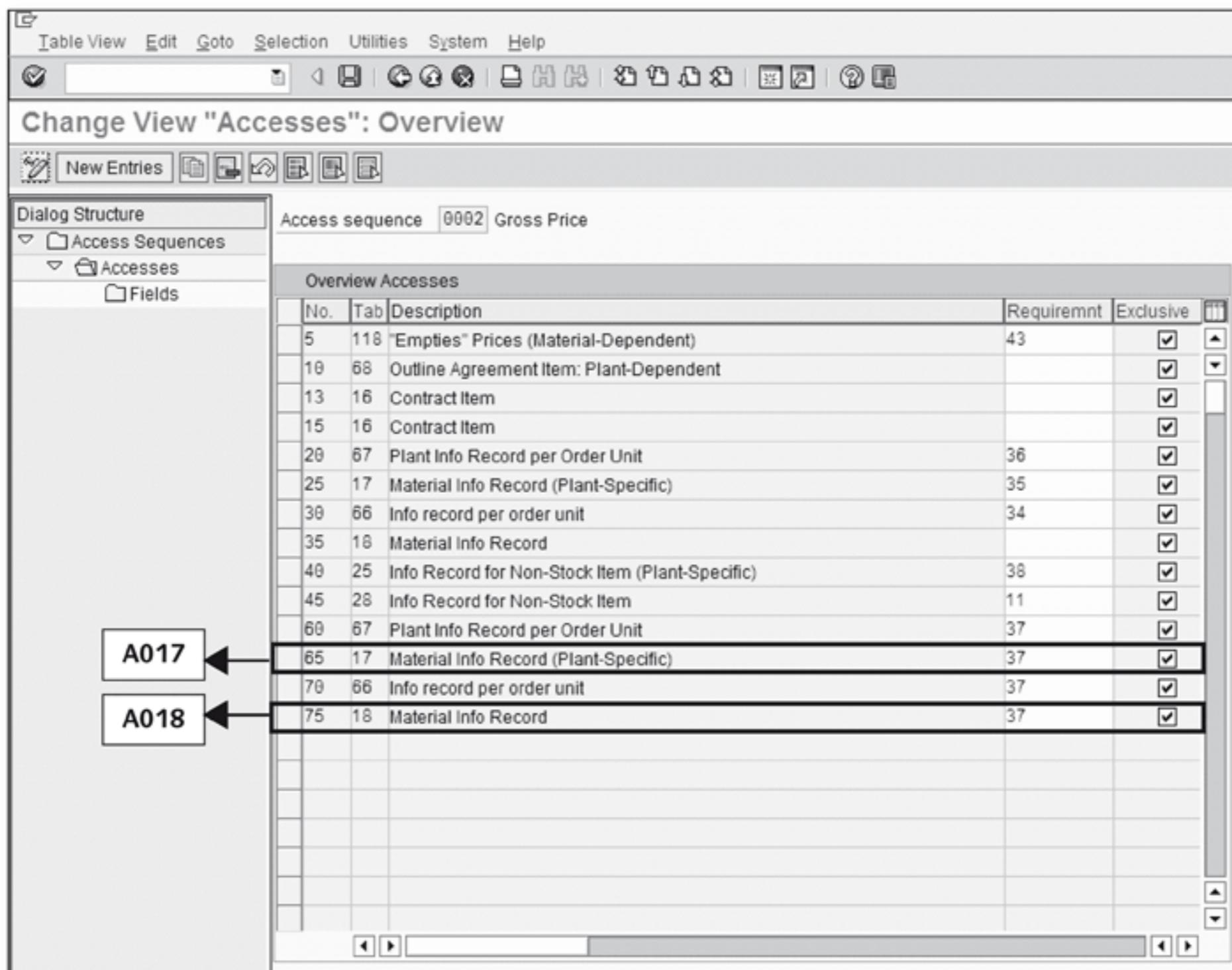


Figure 6.4 Access Sequence 0002

Calculation Schema

The price calculation schema is the framework for determining the purchase or valuation price. Among other things, the calculation schema defines:

- ▶ Permissible condition types
- ▶ Condition types for which the conditions are adopted automatically or manually
- ▶ Condition types for which the net price calculation is applied
- ▶ The order in which the condition types are taken into account in the calculation of the net or effective price
- ▶ Condition types for which subtotals are calculated
- ▶ Requirements that must be satisfied before a certain condition type is taken into account

Figure 6.5 shows calculation schema RM0000, which may also be used for purchase orders. The calculation schema RM0000 for standard purchase orders is determined from the schema group for the purchasing organization and that for the vendor, under the Customizing menu path SAP IMG • MATERIALS MANAGEMENT • PURCHASING • CONDITIONS • DEFINE PRICE DETERMINATION PROCESS • DEFINE SCHEMA DETERMINATION.

The schema group is configured under the Customizing menu path SAP IMG • MATERIALS MANAGEMENT • PURCHASING • CONDITIONS • DEFINE PRICE DETERMINATION PROCESS • DEFINE SCHEMA GROUP. The schema group comprises the purchasing organizations or vendors to which the same calculation schema is to be assigned. The schema group for the purchasing organization is assigned to the purchasing organization under the same menu path; the schema group for the vendor, on the other hand, is assigned to the vendor master.

During the creation of a purchasing document, you can only use the condition types mentioned under the respective calculation schema. In addition, the Manual checkbox decides whether the condition types can be added manually or will be determined automatically at the time of purchasing document creation. The steps and the counters decide the order in which the condition types have to be taken into account. The account key identifies different types of SAP G/L accounts. It enables the system to post amounts to certain types of revenue accounts, for example, to post freight charges to the relevant freight revenue account. The Accrual column identifies various types of SAP G/L accounts for accruals or provisions. For example, with the help of the account key, rebate accruals that are calculated from pricing conditions can be posted to the corresponding account for rebate accruals.

Sequence of condition types

In the calculation schema, the step numbers determine the sequence in which the condition types are taken into account in the calculation of the net or effective price. You must remember that this sequence of condition types cannot be changed even if entered manually in the document. However, you may have different counter numbers for the same step number, to be able to change the sequence of condition types during the creation of a purchasing document.

Now that you know about the functional design for the various elements of condition techniques in the SAP system, we'll move on to discuss the various checkpoints and real-time issues for these.

Checkpoints and Real-Time Issues

You must consider the following checkpoints regarding the various elements of the condition techniques:

- ▶ Even if you're entering condition types manually during the document creation, you can only enter the condition types contained within the calculation schema.
- ▶ You can alter the result of the price determination process in the purchasing document manually.
- ▶ The calculation schemas – such as RM0000 and RM1000 – are predefined in the standard system and shouldn't be changed. You may copy them to the Z-namespace if you need to work with their changed version.

We'll now take a look at some of the real-time issues associated with the calculation schema.

After changing a price via an EDI inbound order response (message ORDRSP), you may find that the net value is incorrect (e.g., duplicated, too large, negative, etc.). This might be due to the incorrect calculation schema RM0000 delivered by SAP in the standard. In Customizing menu path **SAP IMG • MATERIALS MANAGEMENT • PURCHASING • CONDITIONS • DEFINE PRICE DETERMINATION PROCESS • DEFINE CALCULATION SCHEMA**, as seen in Figure 6.5, enter "2" in the Condition Formula for Alternative Calculation Type field (AltCTy) in step 20 (totals row with description: Net Value Incl. Disc.) of calculation schema RM0000.

ME21N: Default price from the material master

The price of the purchase order in Transaction ME21N is taken from the info record and not from the material master. If you don't wish to create an info record or any other time-dependent conditions for the price determination and want to take the material master into account during the creation of the purchase order, you can configure the system in the following manner:

- ▶ Create a new condition type (which could be based on the standard PB00). The new condition type must not have any access sequence assigned to it and it must have condition category G.
- ▶ The calculation schema must have this new condition type as the first condition type (replacing PB00).

The price will be taken from the material master whenever a price is determined based on this calculation schema.

NOTE: If split valuation is used, and a valuation type is changed on the item detail of the purchase order item, a price redetermination must be carried out to make the cost price of the other valuation type effective.

Procedure		RM0000 Purchasing Document (Big)													
Control data															
Reference Step Overview															
Step	Co...	CTyp	Description	Fro	To	Ma...	R...	Stat...	P	SuTot	Reqt	CalTy...	BasTy...	AccK...	Accru...
1	1	PB00	Gross Price						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X	9		
1	2	PBX0	Gross Price						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X	9	5	
2	0	VA00	Variants/Quantity						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
3	0	VA01	Variants %						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
4	0	GAU1	Orignl Price of Gold						<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X		31	
5	0	GAU2	Actual Price of Gold						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X	31	32	32
10	1	RB00	Absolute discount						<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
10	2	RC00	Discount/Quantity						<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
10	3	RA00	Discount % on Net						<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
10	4	RA01	Discount % on Gross	1					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
10	5	HB00	Header Surch.(Value)						<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
10	6	ZB00	Surcharge (Value)						<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
10	7	ZC00	Surcharge/Quantity						<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
10	8	ZA00	Surcharge % on Net						<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
10	9	ZA01	Surcharge % on Gross	1					<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
10	10	HB01	Header Disc.(Value)						<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
10	11	RL01	Vendor Discount %	1					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
10	15	MM00	Minimum Qty (Amount)						<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
10	16	MM01	Minimum Qty (%)	1					<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
10	17	REST	Account Discount %						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X			
17	0	EDI1	Confirmed Price						<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0	53		
19	0	EDI2	Value variance						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		53	40	
20	0		Net value incl. disc.						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	X	7		
21	1	NAVS	Non-Deductible Tax						<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		60		
21	2	NAVM	Non-Deductible Tax						<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		29		
22	0		Net value incl. tax	20	21				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
31	1	FRA1	Freight %	20					<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			FRF	FR1
31	2	FRB1	Freight (Value)	20					<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			FRE	FR1
31	3	FRC1	Freight/Quantity	20					<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			FRE	FR1

Figure 6.5 Calculation Schema RM0000

We'll now take a look at some of the technical elements of price determination.

Technical Elements

The technical elements for price determination give you a clear picture of the data storage and flow during price determination. In addition, they also give you ideas on how to configure and accommodate your own elements of the condition techniques in the price determination. As you can see in Table 6.1, Tables KOMK and KOMP are the communications structures for the access sequences.

KOMK	Header communication structure, populated by the following function modules: ▶ ME_FILL_KOMK_PO ▶ ME_FILL_KOMK_IN
KOMP	Item communication structure, populated by the following function modules: ▶ ME_FILL_KOMP_PO ▶ ME_FILL_KOMP_IN

Table 6.1 Communications Structures for the Access Sequences

KNUMV Field in the purchase order header (EKKO), link to Table KONV

KONV All item conditions, database table

The field KMUNV in the header of the purchase order/scheduling agreements links conditions in Table KONV to the document.

The other important tables are:

Annn Conditions table

KONH Conditions (Header)

KONP Conditions (Item)

KONM Conditions (Quantity scales)

KOMW Conditions (Value scales)

where nnn in Annn indicates the variables. Some of the important condition tables are listed in Table 6.2.

Condition Table	Description
A068	Outline Agreement Item: Plant-Dependent
A016	Contract Item
A067	Plant Info Record per Order Unit
A017	Material Info Record (Plant-Specific)
A066	Info Record per Order Unit
A018	Material Info Record
A025	Info Record for Non-Stock Item (Plant-Specific)
A028	Info Record for Non-Stock Item

Table 6.2 The Condition Tables and their Descriptions

The condition tables are linked to time-dependent condition records by field KNUMH in the corresponding condition table.

These are the various database tables where data is stored and from which data is taken during document creation. These tables and fields provide enough information for analysis and troubleshooting on a technical level.

Troubleshooting Tips

The technical troubleshooting for price determination has already been explained in Section 5.1.3 of the previous chapter. For troubleshooting on a functional basis, you may proceed from the document back to the settings. To determine the calculation schema and condition types used during the creation of a purchasing document, you can go to the condition analysis (by clicking on the Analysis button) on the Condition screen. The condition screen displays all conditions for the calculation schema. You can double-click the condition type (or the access) to open the detail screen on the right side of the screen. From there, you can navigate to the technical view (View button) for information about the field contents that were used for accessing the condition table.

Generally speaking, you should keep Figure 6.1 in mind and drill down backwards to check the Customizing settings and other values used for pulling prices.

You should now have developed a good understanding of the various elements of the condition techniques. Although you now have a fairly good idea of how the price is determined, for example during purchase order creation, we haven't yet explored this completely.

6.1.2 Price Determination

In this section, we'll analyze the price determination process, taking into account the various condition tables.

Functional Basis

The prices and conditions associated with the procurement of a specific material may vary depending on the following:

- ▶ Vendor
- ▶ Purchasing organization
- ▶ Plant

For suggesting an exact price and associated conditions for the procurement of a material, the system should store individual prices depending on these three parameters.

SAP Functional Design

At the time of purchase order creation, the calculation schema is pulled from the schema group maintained in Customizing, which, in turn, depends on the vendor and the purchasing organization.

The prices and conditions for a material are stored in the info record depending on the vendors, purchasing organizations, and/or plants.

Figure 6.1, as discussed earlier, describes the functional design for price determination in the SAP system. The calculation schema that is pulled at the time of purchase order creation depends on the schema group. The schema group for the purchasing organization and the vendor is defined under the Customizing menu path: SAP IMG • MATERIALS MANAGEMENT • PURCHASING • CONDITIONS • DEFINE PRICE DETERMINATION PROCESS • DEFINE SCHEMA GROUP. As shown in Figure 6.6, the schema group for purchasing organizations is assigned to the purchasing organizations in Customizing. However the schema group for the vendors is entered in the vendor master. Thus, the vendor and the purchasing organization used at the time of purchase order creation help in pulling the appropriate calculation schema. Condition type PB00 in calculation schema RM0000 contains access sequence 0002, which helps in determining the price automatically with the help of the condition record in the relevant condition table.

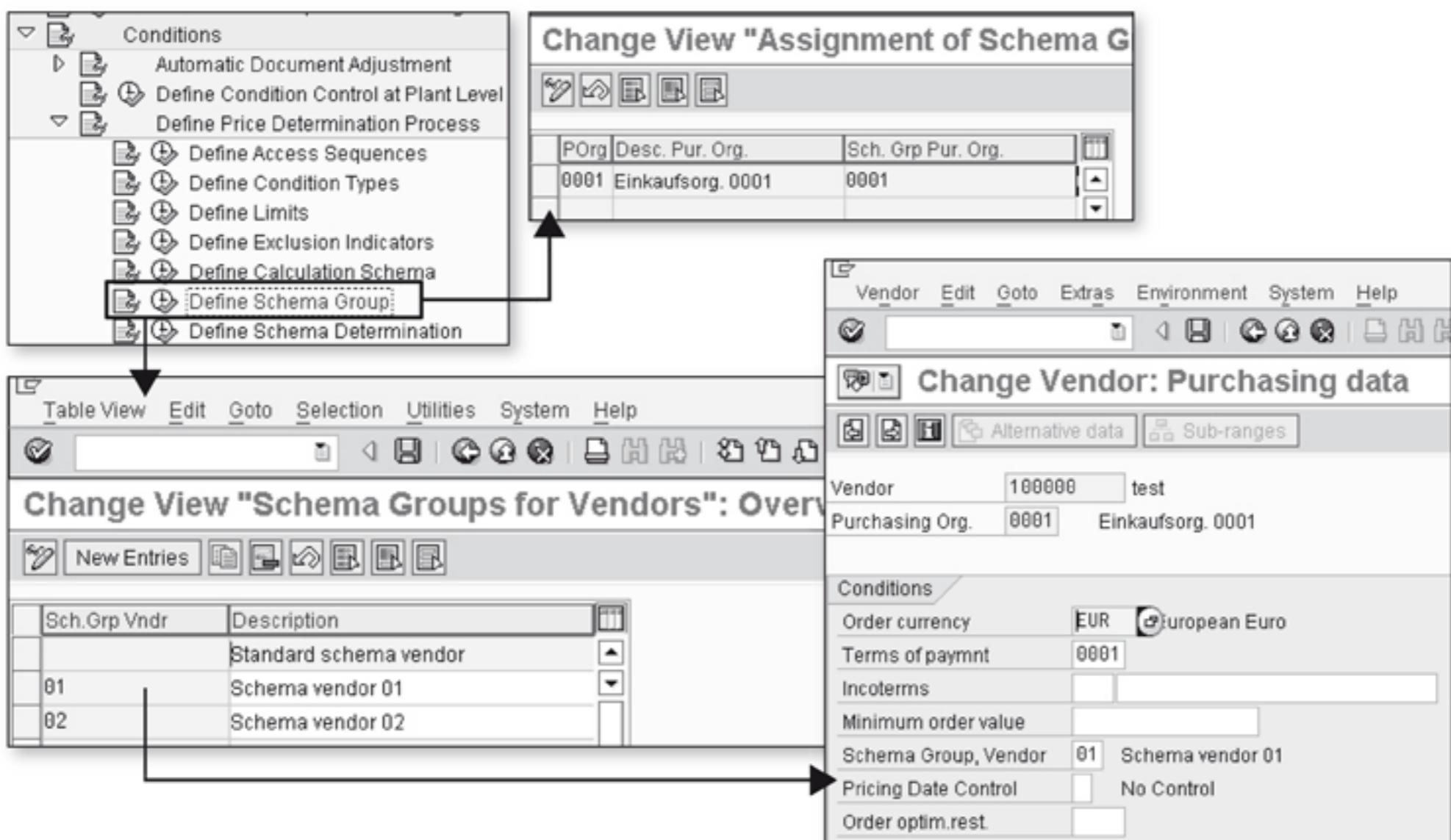


Figure 6.6 Assignment of Schema Group to Purchasing Organization and Vendor

Condition types PB00 and PBXX

The calculation schema RM0000 in Figure 6.5 shows the condition types PB00 and PBXX both with step number 1 and with counter numbers 1 and 2 for PB00 and PBXX respectively.

The main difference between PB00 and PBXX is that PB00 contains access sequence 0002, whereas condition type PBXX doesn't contain an access sequence. This means that if automatic price determination isn't possible with the help of condition type PB00, the system lets you enter the price for condition type PBXX manually.

As shown in Figure 6.7, the condition types for the relevant calculation schema appear on the Conditions tab of the item details for the purchase order.

As you can see in Figure 6.7, the purchase order doesn't have any condition type relevant to discounts and surcharges. The system calculates the net price and the actual price from the gross price in condition type PB00. You can enter the discounts and surcharges for the purchase order by manually adding the condition types and the values corresponding to them. Imagine a situation when you have to enter a freight charge again and again, corresponding to a vendor and material combination for the purchasing organization and plant. In this case, you'll always have to enter this charge manually, during purchase order creation. This can be time-consuming and repetitive.

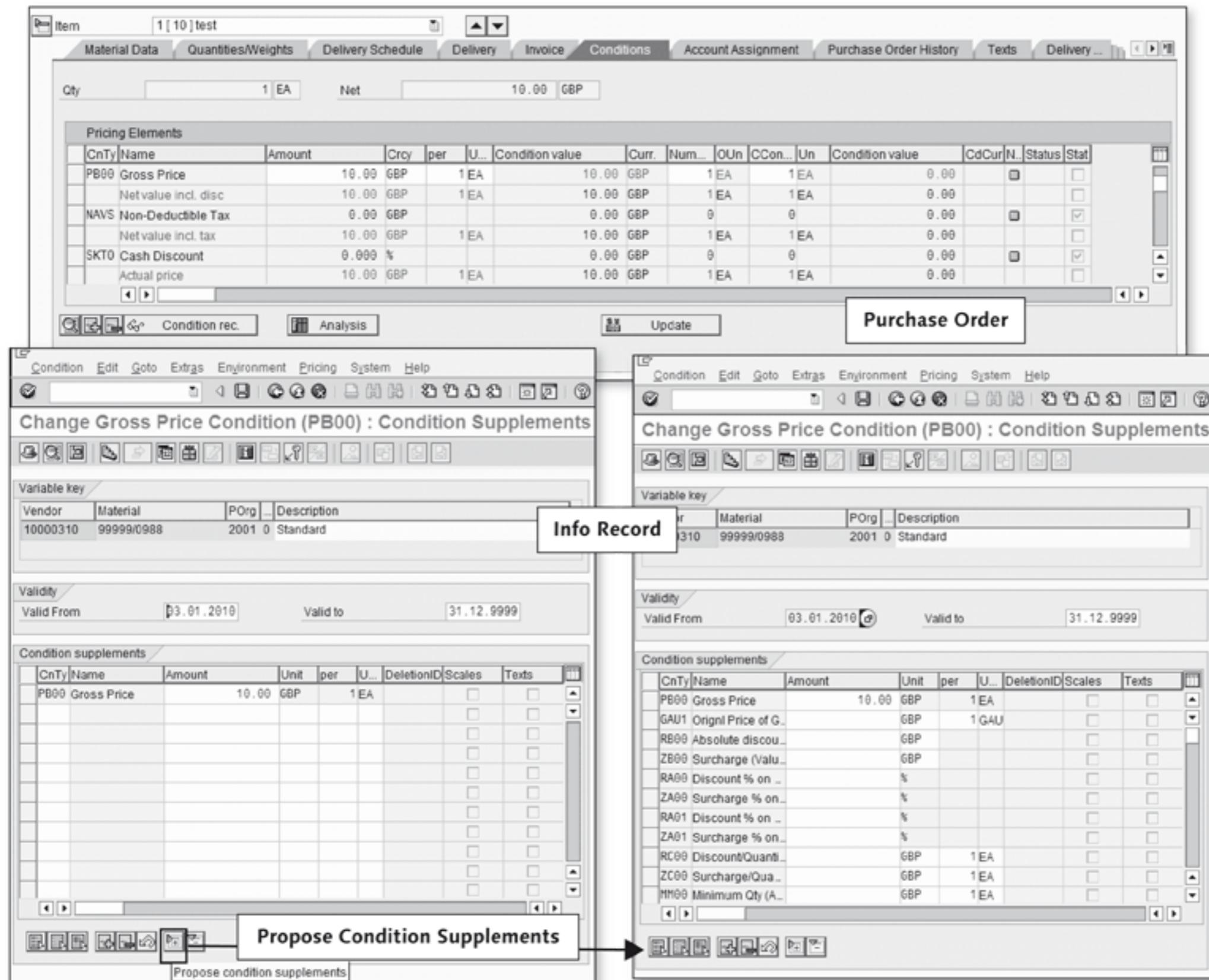


Figure 6.7 Supplementary Conditions in the Info Record

You can maintain supplementary conditions when maintaining an info record condition or a condition for a quotation or outline agreement. This is made possible via the pricing procedure RM0002 associated with condition type PB00 (see Figure 6.2). Supplementary conditions are maintained in calculation schema RM0002. This way, you can ensure that freight surcharges and other similar condition types maintained for the info record are always pulled when the purchase order being created references that info record.

User parameter EVO

The default values for buyers can be maintained under the Customizing menu path SAP IMG • MATERIALS MANAGEMENT • PURCHASING • ENVIRONMENT DATA • DEFINE DEFAULT VALUES FOR BUYERS. On the Price Adoption tab of the default value, you can configure one of the following settings:

- ▶ If the price determination process is unable to arrive at a valid price, the conditions can be copied from the last purchase order.
- ▶ If you enter a price in the current purchase order manually, the conditions aren't copied from the last purchase order.
- ▶ The conditions should never be copied from the last purchase order.

After you have configured the settings corresponding to the default value – for instance, ZZ – then you can enter ZZ as the value for parameter EVO for the user in Transaction SU01. If you want to use the value ZZ of the parameter EVO for multiple users, you may do so by using it in the authorization profile.

You now know how price determination is performed when you enter various values during the creation of standard purchase orders. Next, we'll discuss the various checkpoints and real-time issues related to price determination.

Checkpoints and Real-Time Issues

When you create a scheduling agreement with reference to a contract, only the net price is copied. The system doesn't copy the conditions into the scheduling agreement.

During the pricing of a scheduling agreement (e.g., when posting goods receipt), the access sequence becomes important. The standard system uses access sequence 0002 corresponding to condition type PBOO.

Access Number	Condition Table	Description
5	118	"Empties" Prices (Material-Dependent)
10	68	Outline Agreement Item: Plant-Dependent
13	16	Contract Item Fields: EVRTN< – KOMP-ELPAK Agreement EVRTP< – KOMP-ELPAP Agreement Item
15	16	Contract Item Fields: EVRTN< – KOMP-EVRTN Purchasing Document EVRTP< – KOMP-EVRTP Item
20	67	Plant Info Record per Order Unit
.....

Table 6.3 A Few Rows of Access Sequence 0002

The system first looks for valid entries with the contract document number in condition table A016. If nothing is found, the system performs another access to table A016 with the scheduling agreement number. This is why there are two entries in access sequence 0002 for the same condition table 16.

User parameter EFB: Adopt purchase requisition price in the purchase order

When purchase orders are created with reference to purchase requisitions, the price isn't supposed to be transferred from the purchase requisition to the purchase order. This is the standard behavior. However, you can configure the system to adopt the purchase requisition price in the purchase order with the help of user parameter EFB. Proceed as follows:

- ▶ Set up the function authorization under the Customizing menu path SAP IMG • MATERIALS MANAGEMENT • PURCHASING • AUTHORIZATION MANAGEMENT • DEFINE FUNCTION AUTHORIZATIONS FOR BUYERS.
- ▶ Choose Function Authorizations: Purchase Orders and set the indicator Adopt PO Price (T160-EBPUEB) for the function authorization (e.g., ZZ).
- ▶ Then, back out and choose MAINTAIN USERS. Next, select the Parameters tab and enter parameter ID "EFB" along with the value equal to the key (e.g., ZZ) you just maintained.

There might be problems with pricing after a change of order units in purchasing documents. For analyzing such issues, you might find it useful to check the fields EKPO-BPUMZ and EKPO-BPUMN in subroutine MEPO_PREISFINDUNG. These fields are populated in the include LMEPOF40, FORM MEPO_ITEM_FILL_BPUMZ and the include LMEPOF3Z, FORM MEPO_ITEM_FILL_BPUMN.

Next, we'll describe some of the technical elements of price determination.

Technical Elements

The technical elements of price determination are summarized in Figure 6.8. For technical analysis, we classify the conditions as follows:

- ▶ Master conditions
- ▶ Document conditions

A master condition has master data character and a definite validity period. The conditions in the documents are adopted from the master conditions. They may then be modified subject to the settings in the calculation schema. Document conditions are stored in the database tables populated as a result of the application transactions.

In Figure 6.8, the various condition tables are represented by Annn, where nnn is a variable representing a three-digit number as described in the Technical Elements section of Section 6.1.1.

During the creation of a document, the data from the appropriate condition table Annn is transferred to the header table for master condition KONH. Because the conditions of individual items may vary from the header, the data is stored in table KONP, from where the data is read for the quantity scales and the value scales in the tables KONM and KNOW respectively.

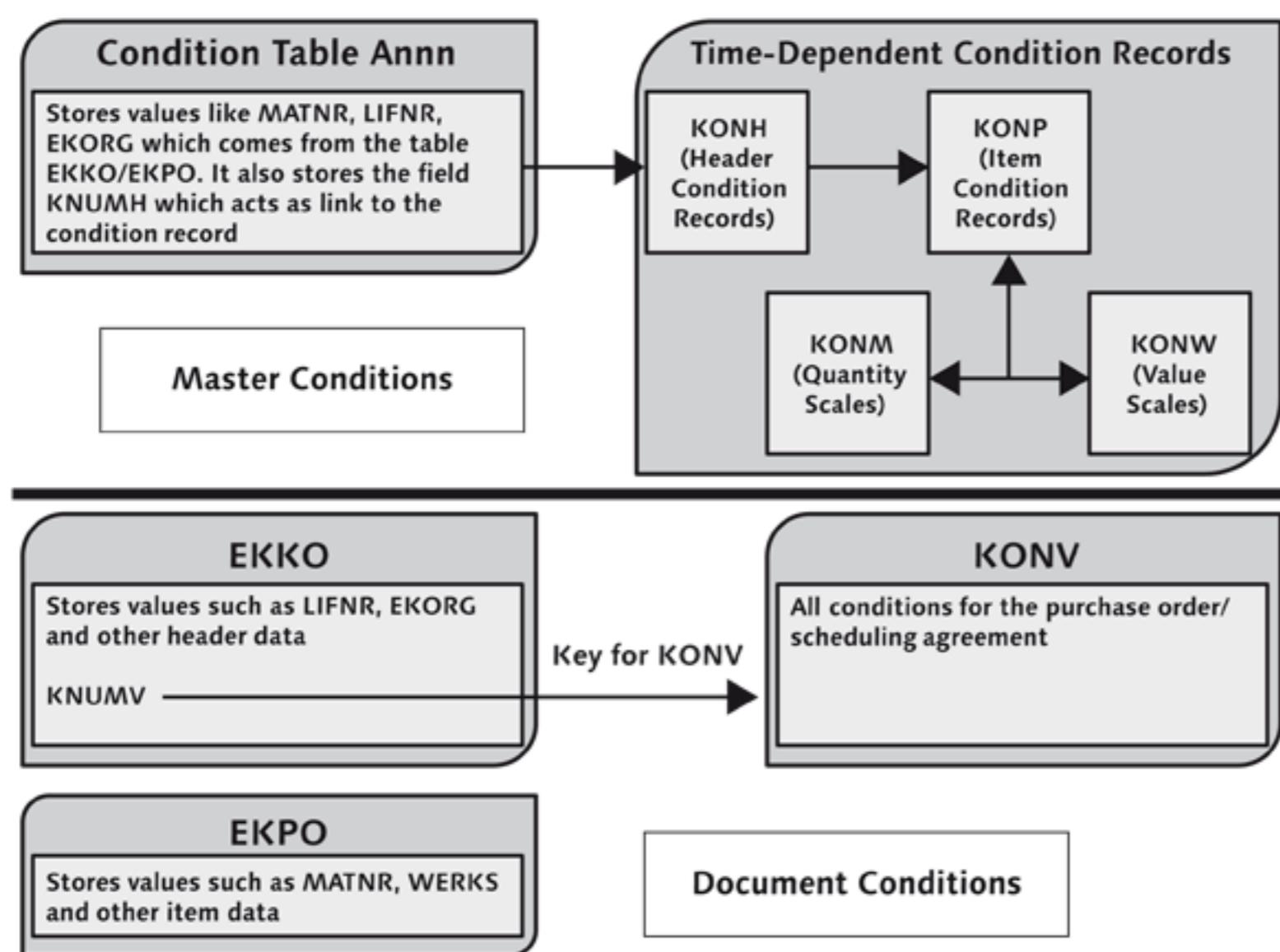


Figure 6.8 Master and Document Conditions

The document conditions are stored in table KONV. The field KNUMV in table EKKO acts as the link between EKKO and KONV.

Pricing in ME21N

On a technical level, the pricing in ME21N follows this sequence:

```

form po_process (LMEPOF2I)
    -> function MEPO_DOC_HEADER_PROCESS
    -> function MEPO_DOC_ITEM_PROCESS
    -> form item_process (LMEPOF2G)

```

```

- > form item_process_main (LMEPOF2B)
- > form mepo_preisfindung (LMEPOF1T)
    form mepo_preisfindung_pruefen (LMEPOF1S)

```

The error log is created in the following subroutine:

```
form log_error (LMEPOF1L)
```

The following form deserves a detailed explanation because it's of vital importance in pricing:

Form mepo_preisfindung (LMEPOF1T)

1. Pricing type (CALCTYPE) is determined in form mepo_determine_calctype and consists of three subroutines:

► form mepo_set_calctype_bc

This is used to set the CALCTYPE to B (or C) when changing significant criteria such as vendor, plant, and material or when pricing is performed for the first time.

► form mepo_set_calctype_c

This is used to set the CALCTYPE to C when changing material group, configuration, or account assignment category.

► form mepo_set_calctype_c

This is used to set the CALCTYPE to A when changing quantity, order unit, or tax code.

2. When CALCTYPE is B, the system performs form mepo_preisfindung_b to determine whether conditions have to be copied from a reference document.

If_copy_cond_type = bstyp-anfr = 'A' copies conditions from an RFQ (with document conditions); form kond_copy is used.

If_copy_cond_type = bstyp-best = 'F'copies conditions from a purchase order; form kond_copy is used.

To copy conditions from a contract, function PRICING is called with CALCTYPE 'B', and a contract number is given with KOMP-EVRTN / KOMP-EVRTP to function PRICING.

-> form preisfindung_prdat is used to set the pricing date ekpo-prdat

-> form preisfindung is used to perform pricing (SD function PRICING)

-> form preisfindung_staffel_pruefen is used to check scales (generates message 06 244 "Lower price obtained for quantities greater than...")

-> form mepo_kond_copy_best is used if no price is found, to copy the conditions from the last purchase order (form kond_copy_best is used)

-> form mepo_transfer_manual_changes is used to take over the manually entered price into TKOMV-entry for the gross price.

-> form mepo_uebernahme_banf_preis is used to take over the price from the purchase requisition (if a purchase requisition is referenced), if field EBAN_BPUEB = 'X' or no other price was found during pricing and there's no material in the purchase order item.

3. When CALCTYPE is A or C, the system performs:

-> form mepo_transfer_manual_changes, to take over the manually entered price into the TKOMV entry for the gross price.

-> form preisfindung, to perform pricing (SD function PRICING)

-> form preisfindung_staffel_pruefen, to check scales (generates message 06 244 "Lower price obtained for quantities greater than...")

-> form kond_taxes, for the tax calculation of a non-deductible tax value

-> form mepo_wpb00_determine, to set the fields bekpo-netzu / pot-netzu

This field controls whether the net price field of the purchase order item is open for changes.

bekpo-netzu = 'Y' means the field is grayed out

bekpo-netzu = 'X' means the field is open for input

You've now learned about the various technical elements of price determination. In addition, we also discussed the various subroutines and the sequence in which pricing takes place during purchase order creation in Transaction ME21N. We'll now move on to some troubleshooting tips.

Troubleshooting Tips

Almost all of the functional and the technical aspects for pricing have already been explained. Troubleshooting should generally not be a problem, using the information contained in Sections 6.1.1 and 6.1.2. However, there is a common problem encountered with user exits in pricing, which we'll describe here.

There are two user exits:

- ▶ ZXM06U14 for KOMK
- ▶ ZXM06U15 for KOMP

The first line of the user exits has to be:

I_KOMK = E_KOMK (for the header) and/or I_KOMP = E_KOMP (for the item)

The key fields for reading the condition table (e.g., A017) are:

- ▶ KOMK-LIFNR
- ▶ KOMP-MATNR
- ▶ KOMK-EKORG
- ▶ KOMP-WERKS
- ▶ KOMP-ESOKZ

These fields have to be checked before and after passing the user exit. If these fields are filled incorrectly in the user exit, pricing won't work. In real-world business requirements, user exit ZXM06U14 can be used to make use of the price list from Sales and Distribution in the purchase order.

So far, you've learned about the various functional and the technical aspects of price determination in purchasing although our focus throughout the book is the accounting interface of Materials Management in SAP ERP Operations. We described the price determination process in a lot of detail, because the price in the purchasing document forms the basis of material valuation and impacts subsequent account postings.

Because you understand price determination quite well by now, we'll only briefly walk through the other topics in conditions, without expanding them under the various subtopics such as functional basis, SAP functional design, and so on.

6.1.3 Header and Group Conditions

Header conditions are entered in the header of a purchasing document and are related to all of the items of that document. Figure 6.2 showed the Header Condition and Item Condition checkboxes. In our case, condition type PB00 was maintained as only the item condition.

Automatic price determination isn't carried out for header conditions. Thus, the condition type you configure as the header condition must not have an access sequence associated with it unless you have the same condition type defined as for the item condition.

A condition type can be defined as a group condition under the segment group condition, as shown in Figure 6.2. Figure 6.9 describes the header condition and the group condition more clearly. As shown in this figure, an absolute surcharge of 10.00 associated with condition type ZB00 is defined as the header condition

but not as the group condition. Header condition type HB00 has been defined as the group condition, as indicated by the checkbox in the figure.

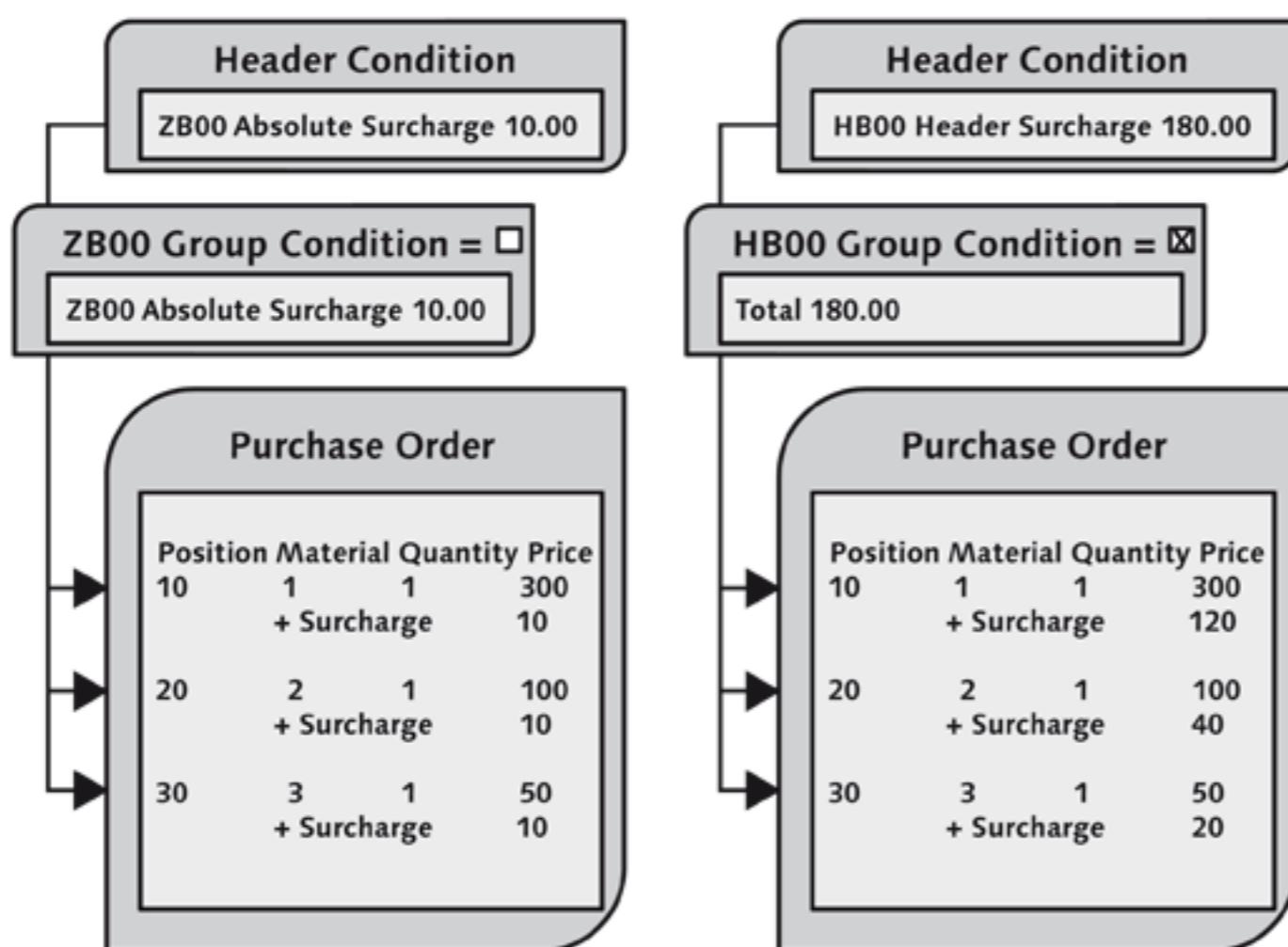


Figure 6.9 Header and Group Conditions

Because HB00 has been defined as the group condition in Customizing, the condition value is spread proportionately among the document items. If the condition type hasn't been defined as the group condition, as is the case for ZB00 in Figure 6.9, the value of the header condition (10 in the figure) is assigned to each item and constitutes an entry aid.

Although the distribution of an absolute header condition is carried out on a value basis in the standard system, in Customizing, you may specify whether the distribution has to be in accordance with the weight or volume of the individual item in the field Base Formula of the calculation schema.

You're now able to understand the differences between header conditions, group conditions, and item conditions. So far, we've discussed the conditions applicable to standard materials. However, there are also special condition types and special functions such as those for precious metals, delivery costs, pallet discount/surcharge, and weight- and volume-dependent conditions. We'll discuss these in the next section.

6.1.4 Special Condition Types and Special Functions

In the following subsections, you'll learn about certain special condition types and special functions.

Precious Metal Condition

The purchase of precious metals (e.g., platinum, gold, silver, or diamonds) may be influenced by fluctuations in market price. In such cases, it's desirable to take an account of day-to-day fluctuations in price at the time of ordering and at the time of goods receipt.

Condition category U, which is used specifically for pricing components of precious metals, causes the purchase/valuation price of the material to be newly determined at the time of ordering and at the time of goods receipt, on the basis of the ruling market price on those dates. A special non-dimensional unit of measure (e.g., GAU = gram of gold) is used to specify the precious metal price portion and is maintained in the material master record and the purchasing info record. For the price determination of precious metals, we use the following condition types:

- ▶ GAU1
- ▶ GAU2

These condition types have the following settings and/or requirements:

- ▶ You enter the precious metal price portion in condition type GAU1.
- ▶ You maintain the daily ruling price in condition type GAU2.
- ▶ You must assign condition class A, condition category U, calculation type C, and identical units of measure to both condition types.
- ▶ The first condition type, GAU1, must be marked as Manual and must have calculation formula 31 assigned to it. Only this first condition type may be entered in the supplementary condition schema. The Statistical indicator must be set for this condition type.
- ▶ An access sequence must be assigned to the condition type for the daily ruling price (GAU2).
- ▶ GAU2 must not be marked as Manual.
- ▶ You must assign calculation formula 32 and requirement 31 to condition type GAU2.

The suggestion of order price at the time of purchase order creation and valuation price at the time of the goods receipt for condition types GAU1 and GAU2 is as shown in Figure 6.10.

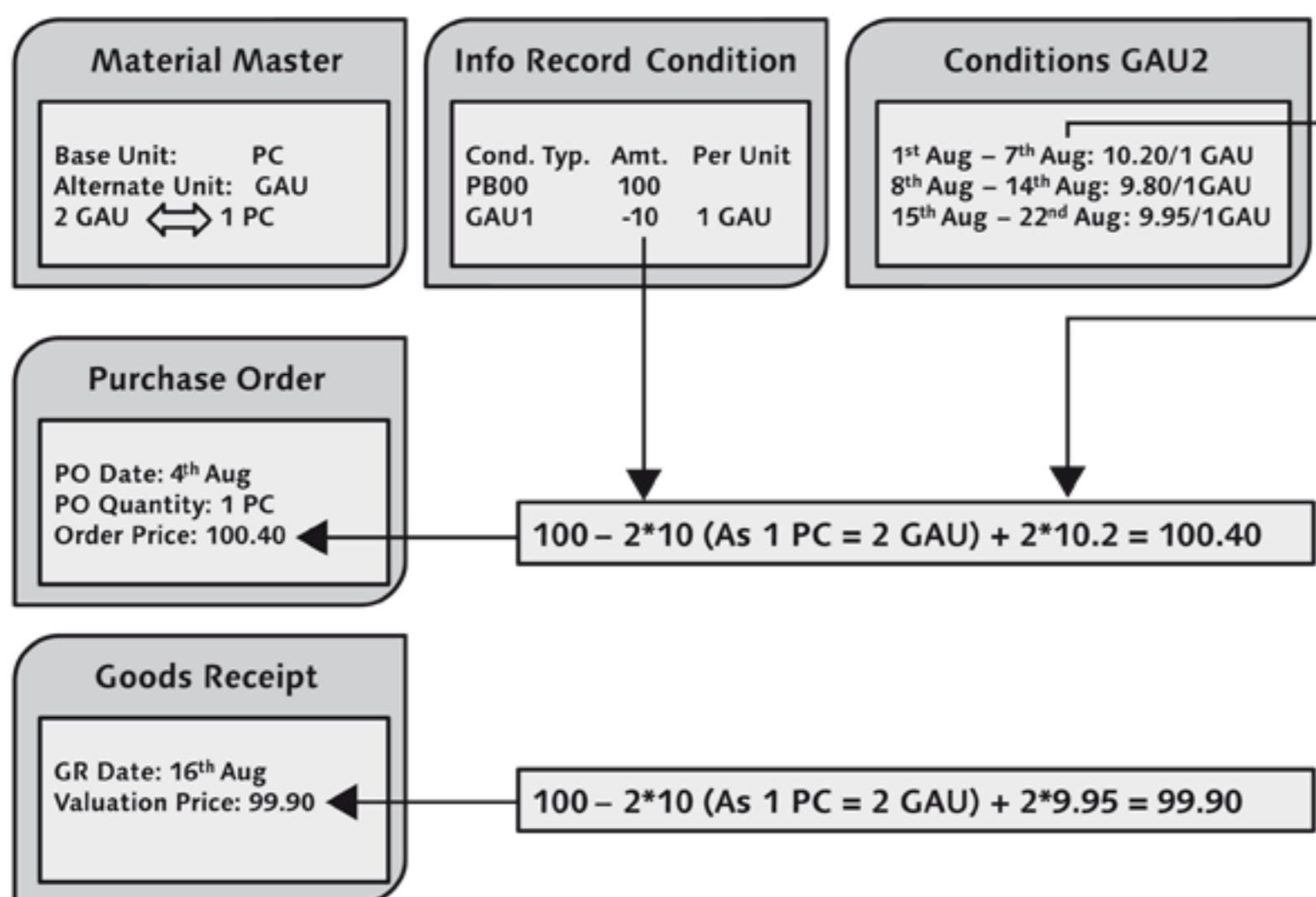


Figure 6.10 Precious Metal Conditions GAU1 and GAU2

As you can see, the relationship between GAU and purchase order is maintained in the material master. This serves as a means for calculating the value of the order price in the purchase order and the valuation price in the goods receipt. The system reads the values in condition types GAU1 and GAU2, which are maintained in the special non-dimensional unit for measure GAU. Generally speaking, condition types PB00, GAU1, and GAU2 are used to calculate the values for price during purchase order creation and goods receipt. The calculation shown in Figure 6.10 is self-explanatory.

Now that you understand how the condition types for precious metals work, we'll move forward to explain the condition types for delivery charges.

Conditions for Planned Delivery Costs

Delivery costs for which you make provisions at the time of purchase order creation are called *planned delivery costs*. They may be associated with a different vendor, generally referred to as the *freight vendor*. Thus, the account postings for the

planned delivery costs may not be included into those for the materials. This is why you enter planned delivery costs with the help of specific condition types

Figure 6.11 shows the condition type for planned delivery cost FRB1.

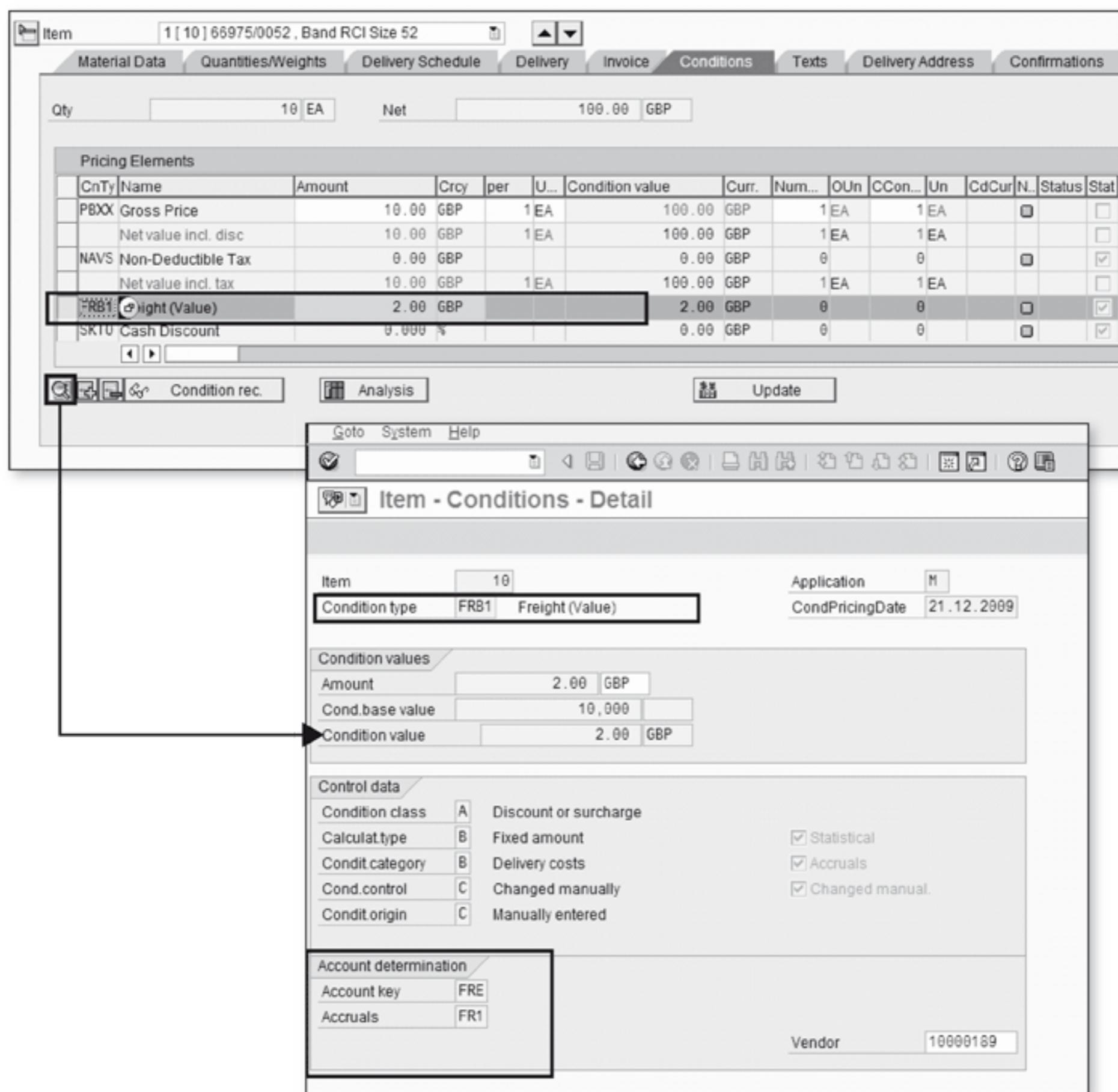


Figure 6.11 Planned Delivery Cost in a Purchase Order

The element of account determination of the planned delivery cost can be displayed by clicking on the magnifying button.

You must ensure that the following requirements are met for the condition types for the planned delivery cost:

- ▶ The condition category should be maintained as B.
- ▶ The Accrual indicator must be set. This indicator (FRE in Figure 6.11) causes the condition to be posted as a provision for accrued cost in Financial Accounting. The accrual in the calculation schema identifies various types of SAP G/L accounts for accruals or provisions. For example, with the help of the account key, rebate accruals that are calculated from pricing conditions can be posted to the corresponding account for rebate accruals.
- ▶ The Statistical indicator must be set for the calculation schema. This indicator ensures that the condition isn't taken into account in the calculation of the net price.

You now understand the need for condition types for planned delivery costs. In addition, we also looked at the various checkpoints for configuring condition types for planned delivery costs. We'll revisit this topic in more detail in Chapter 8.

Condition exclusion procedure

If more than one condition record is valid for price determination purposes, you can define rules specifying the condition records that should be taken into account and those that shouldn't. These rules are configured in the condition exclusion procedure under the Customizing menu path **SAP IMG • MATERIALS MANAGEMENT • PURCHASING • CONDITIONS • DEFINE PRICE DETERMINATION PROCESS • DEFINE CONDITION EXCLUSION**.

The exclusion group controls the exclusion of condition records. It's a list of condition types that are compared amongst each other during price determination and lead to the exclusion of an entire group of condition types or individual condition types within the group. The exclusion group and the exclusion procedure are assigned to the calculation schema.

Now that you understand the various special conditions (for precious metals and planned delivery costs), it's time for us to look into subsequent settlements regarding end-of-period rebates granted by vendors.

6.1.5 Subsequent Settlement

Unlike other conditions, the cumulative value for the subsequent settlement condition is taken into account over a period of time. For example, your vendor may offer you a rebate at the end of the year for a certain amount of business during the year. You may record this agreement with the subsequent settlement process.

Because subsequent settlement is specific to the vendor, you need to indicate it to the system by marking the Subsequent Settlement checkbox in the vendor master, as shown in Figure 6.11. This is the first step for the settings pertaining to rebates from vendors. The system checks this indicator when you create a rebate arrangement in Transaction MEB1.

As you can see in Figure 6.12, the Subsequent Settlement checkbox (technical field name LFM1-BOLRE) is maintained in the purchasing data of the vendor master.

The screenshot shows the SAP Vendor Master Data entry screen. At the top, there are fields for Vendor (10013327), Purchasing Org. (1033), and various codes. Below this is the 'Conditions' section, which includes Order currency (GBP), Terms of payment (ZV30), Incoterms, Minimum order value, Schema Group, Vendor (Standard schema vendor), Pricing Date Control (No Control), and Order optim.rest. The 'Sales data' section contains Salesperson, Telephone, and Acc. with vendor fields. The 'Control data' section is where the checkbox is located. The checkbox for 'Subsequent settlement' is checked and highlighted with a red box. A callout bubble labeled 'LFM1-BOLRE' points to this checkbox. Other options in the control data section include GR-Based Inv. Verif., AutoEvalGRSetmt Del., AutoEvalGRSetmt Ret., Acknowledgment Reqd., Automatic purchase order, ModeOfTrnsprt-Border, Office of entry, Sort criterion (set to 'By VSR sequence number'), PROACT control prof., Revaluation allowed, Grant discount in kind, Relevant for agency business, and Srv.-Based Inv. Ver.

Figure 6.12 Subsequent Settlement Checkbox in the Vendor Master

After activating subsequent settlement for the vendor master, you create the vendor rebate arrangement in Transaction MEB1. You can access this transaction from the SAP Easy Access menu path SAP MENU • LOGISTICS • MATERIALS MANAGEMENT • PURCHASING • MASTER DATA • SUBSEQUENT SETTLEMENT • VENDOR REBATE ARRANGEMENTS • REBATE ARRANGEMENT • CREATE.

As shown in Figure 6.13, a one percent rebate has been maintained for the vendor for the corresponding company code and the purchasing organization. The validity

period indicates the period during which the vendor rebate is valid. You can also maintain scales if the rebate varies according to volume.

The rebate that's maintained in this transaction is used during settlement. For the purpose of settlement, the value of cleared invoices is taken into account and not that of the purchase order, because the rebate is granted against spend and not against order.

The condition type for the rebate A001 is taken into account at the time of purchase order creation, against the specified vendor, purchasing organization, and company code. Condition A001 is present along with other condition types such as PB00, NAVS, STK0, and so on.

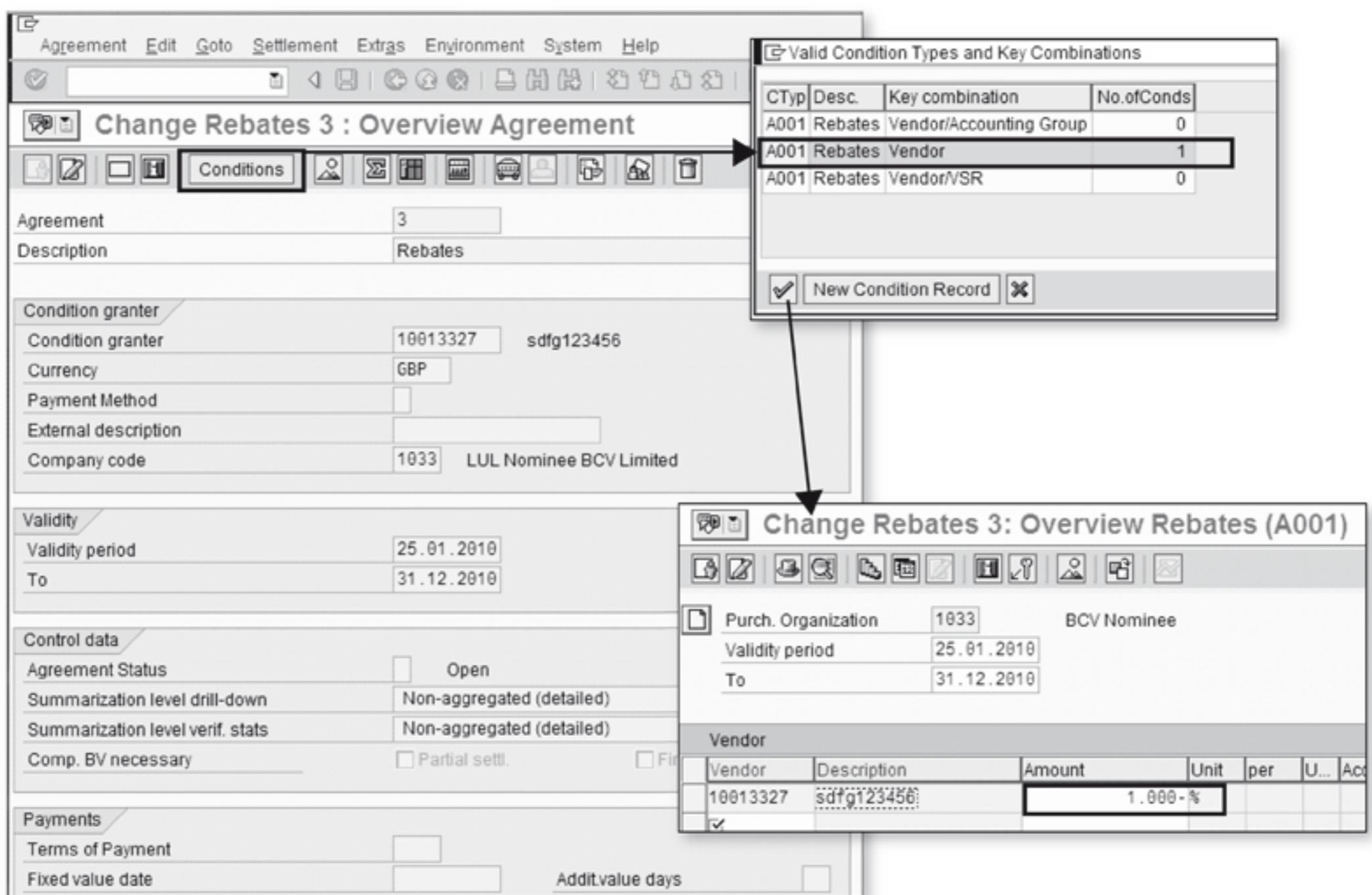


Figure 6.13 Vendor Rebate Arrangement

The goods receipt and invoice verification are done as usual. At the time of invoice receipt, the business volume is updated in database table EBABP. The system takes the entries from this table into consideration when you create the settlement document.

Business volume comparison

The business volume update for subsequent rebate settlement takes place at the time of invoice receipt as per the date on the vendor's invoice. The cumulative figure for the volume of the business done with the vendor (purchases made) is continually updated for the purpose of subsequent settlement. The vendor also keeps its own figure for the volume of business done with your enterprise. As these two sets of figures may differ, the business volume comparison functionality allows reconciliation of such differences prior to settlement. This eliminates the need for subsequent correction. The business volume comparison is performed with Transaction MEU3 under the SAP Easy Access menu path SAP MENU • LOGISTICS • MATERIALS MANAGEMENT • PURCHASING • MASTER DATA • SUBSEQUENT SETTLEMENT • VENDOR REBATE ARRANGEMENTS • BUSINESS VOLUME COMPARISON • EXECUTE.

You have now learned about how subsequent settlement is performed in the SAP system. Although we didn't go into the details of all of the options SAP provides with this functionality, you now have a good idea of the functionality and its implementation.

Now that you know the concept, functionality, and implementation of the conditions and price determination procedures, we'll move on to discuss the area of material price change to analyze the account postings.

The various conditions and the price determination procedures you've learned about so far help with understanding how a price is defaulted and also what price is defaulted at the time of purchase order creation. It doesn't explain, however, how a material is valued. Because we're interested in the more important question of account postings at the time of goods receipt and invoice receipt, we'll dedicate Section 6.2 to consolidating the concepts of material valuation.

6.2 Basics of Material Price Changes

In this section, you'll consolidate the concepts of material valuation already explained in the previous chapters.

Material valuation within Materials Management in SAP ERP determines or records the stock value of a material. The stock value is calculated using the following formula:

$$\text{Stock value} = \text{stock quantity} * \text{material price}$$

Thus, the stock value changes with a change in stock quantity or material price.

In the following subsections, we'll look at the factors that control material valuation.

6.2.1 Control of Material Valuation

Material valuation is controlled by the following factors:

- ▶ System settings
- ▶ Material master record

System Settings

The system settings refer to the Customizing settings you must perform to adapt your company's requirements. As you already know from Chapter 5, the valuation area can either be the company code or the plant. This impacts the way in which a material is valued.

The other factors in Customizing that impact material valuation include the type of goods movement, as shown in Figure 6.14, which you can access by going to SAP IMG • MATERIALS MANAGEMENT • INVENTORY MANAGEMENT AND PHYSICAL INVENTORY • MOVEMENT TYPES • COPY, CHANGE MOVEMENT TYPES.

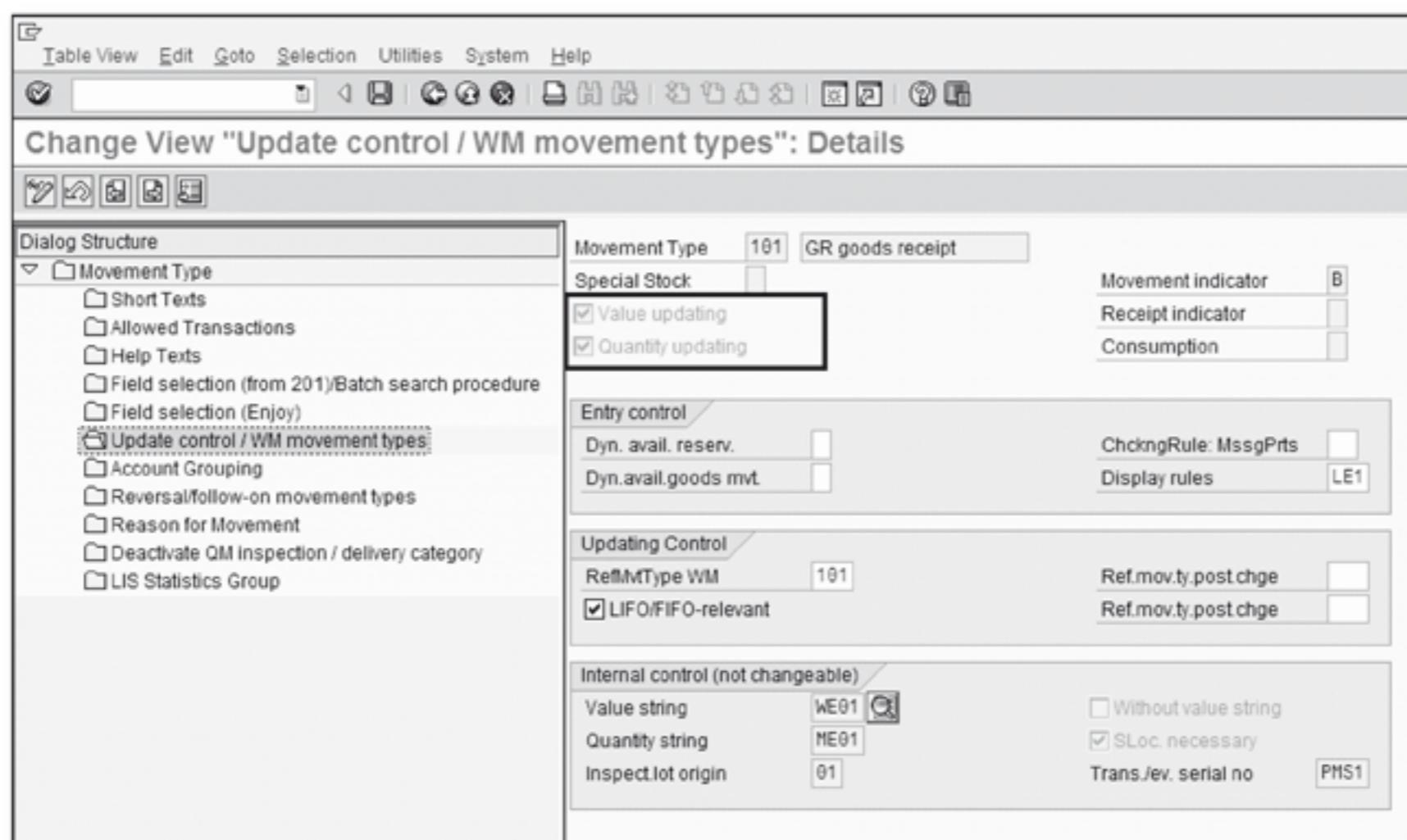


Figure 6.14 Value and Quantity Update for Movement Type 101

As you can see in Figure 6.14, the Value Updating and Quantity Updating fields are grayed out. This is because you can't change all settings for the standard move-

ment types. You need to create your own movement types if the business requirement is to make changes to fields that are otherwise not changeable for the standard movement types.

Material Master Record

The material valuation for the material master record has already been explained in Chapter 5. As a refresher, see Figure 6.15, which describes how the valuation class, along with price control, decides the account assignment at the time of goods movement and invoice verification.

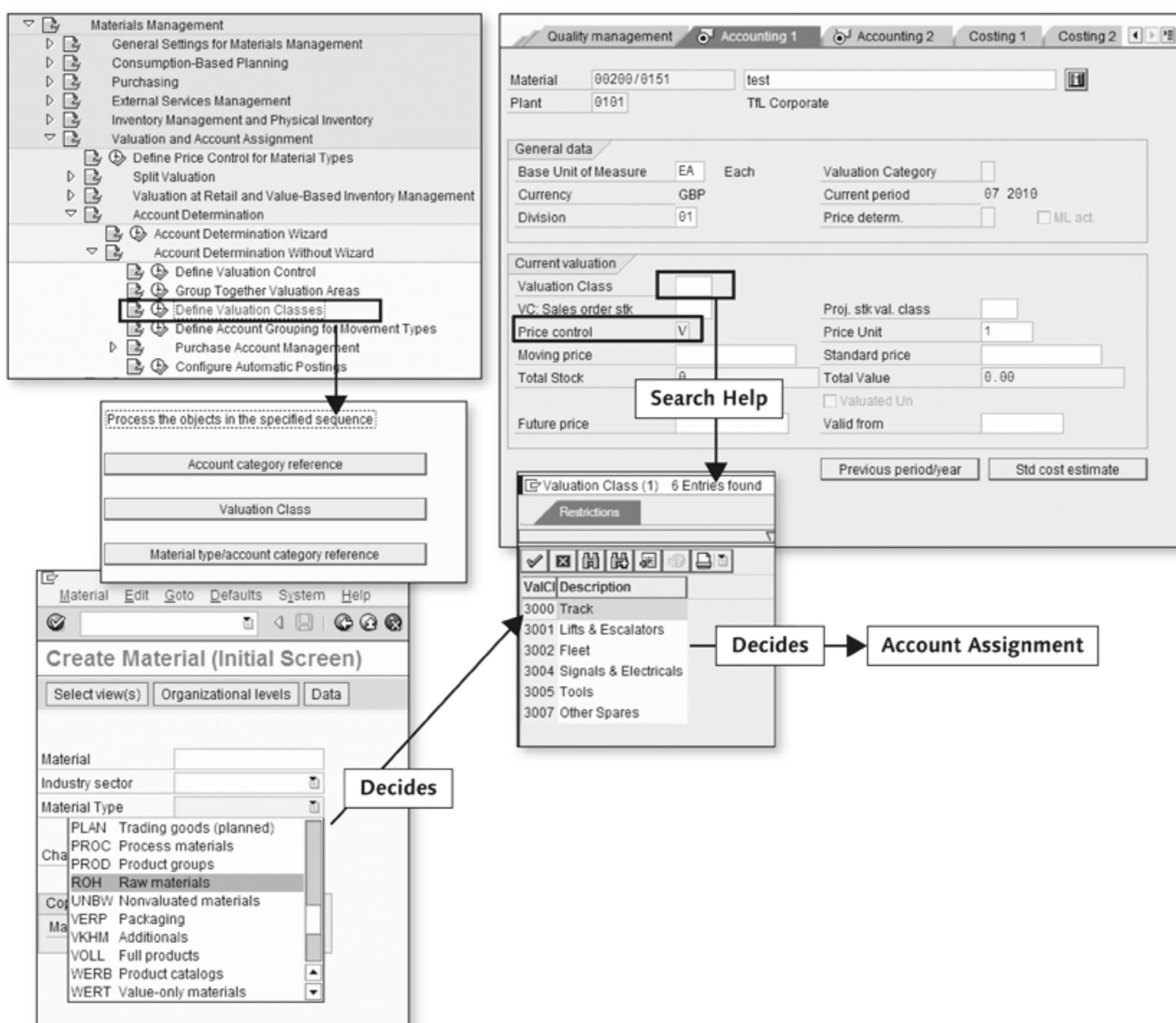


Figure 6.15 Elements of Material Valuation in the Material Master

We'll now examine all of the elements of material valuation that may be related to the material master.

6.2.2 Valuation Structure

The system evaluates the material data using the valuation structure shown in Table 6.4.

Element of Valuation Structure	Customizing Menu Path
Valuation Area	SAP IMG • ENTERPRISE STRUCTURE • DEFINITION • LOGISTICS – GENERAL • DEFINE VALUATION LEVEL
Valuation Class	SAP IMG • MATERIALS MANAGEMENT • VALUATION AND ACCOUNT ASSIGNMENT • ACCOUNT DETERMINATION • ACCOUNT DETERMINATION WITHOUT WIZARD • DEFINE VALUATION CLASSES
Valuation Category	SAP IMG • MATERIALS MANAGEMENT • VALUATION AND ACCOUNT ASSIGNMENT • SPLIT VALUATION • CONFIGURE SPLIT VALUATION
Valuation Type	SAP IMG • MATERIALS MANAGEMENT • VALUATION AND ACCOUNT ASSIGNMENT • SPLIT VALUATION • CONFIGURE SPLIT VALUATION
Material Type	SAP IMG • LOGISTICS – GENERAL • MATERIAL MASTER • BASIC SETTINGS • MATERIAL TYPES • DEFINE ATTRIBUTES OF MATERIAL TYPES
Movement Type	SAP IMG • MATERIALS MANAGEMENT • INVENTORY MANAGEMENT AND PHYSICAL INVENTORY • MOVEMENT TYPES • COPY, CHANGE MOVEMENT TYPES

Table 6.4 Valuation Structure

We'll briefly explain each element of the valuation structure.

Valuation Area

The valuation area, as you know, can either be the plant or the company code. The more common, preferred, and SAP recommended option is to choose plant as the valuation area so that you can evaluate the same material differently in various plants.

Valuation Class

To avoid managing a separate SAP G/L account for every material, you can group the materials with similar properties of a material type into valuation classes. For example, let's say you procure two different classes of raw materials: paint and

glue. You might like to post the transactions related to paints to one SAP G/L account and those related to glues to another SAP G/L account. In this case, you can create one valuation class for paint and another for glue so that you have the account statement for it.

Valuation Category

For split-valuated materials, partial stock of a material may be valued differently from the rest of the stock based on procurement (externally procured or manufactured in-house), origin (local or imported), or status (new, refurbished, used), and so on. For example, a raw material procured from China might be valued at a different price than the same material procured from the UK. You may value the same material differently based on the valuation category, which you can indicate in the material master.

Valuation Type

In procurement, the valuation type specifies the individual characteristic of the valuation category such as internal or external. For every material subject to split valuation, you must enter in the material master record all of the valuation types allowed.

Material Type

The material master has to be created for an industry sector and a material type. The material type decides the value and quantity update during postings for the goods movement for the corresponding material. It also decides the price control that may be used and the valuation classes that will be available in the material master.

Movement Type

Categorically speaking, there is a movement type for every material movement. The quantity and value update during goods movement is controlled by the movement type, as shown in Figure 6.14. The relevance of the goods movement for accounting is also decided by the movement type. In addition LIFO/FIFO valuation can be activated for the movement type. You'll learn more about LIFO/FIFO valuation in Chapter 7.

Now that you know about the various elements of the valuation structure, we'll discuss changes in material valuation.

6.2.3 Changes in Material Valuation

There are two types of changes in material valuation:

- ▶ Automatic changes
- ▶ Manual changes

We'll look into each of these changes briefly.

Automatic Changes

When you post a goods receipt or an invoice receipt into the system, the valuation data of the relevant material is changed automatically. It's important to understand that the sequence of the goods receipt and the invoice receipt impacts the way in which the material valuation changes. The following holds true for the account postings:

- ▶ When goods are received before the invoice, the stipulations in the purchase order are used as the basis for posting.
- ▶ When the invoice is received before the goods, the details on the invoice are used as the basis for posting.

Why is the invoice used as the basis for account postings when the invoice is received before the goods?

You send a purchase order to a vendor with an understanding that the material will be supplied according to the conditions and price mentioned on the purchase order. However, the most exact details for accounting are reflected by the values on the invoice. When there is a goods receipt before the invoice, which is generally the case, you have no option but to make the postings in accordance with the values mentioned on the purchase order. If the invoice value deviates from that of the purchase order, the differences are handled in either the price differences account or the stock account.

However, when you have the invoice prior to the goods receipt, you have the more exact value for the accounting documents. Thus, the system takes the invoice value into consideration when posting and ignores the value in the purchase order.

Manual Changes

You have the following options for manually changing the material valuation:

- ▶ Revaluation
- ▶ Posting of physical inventory difference

A revaluation for a price change of a material can be performed if the price of the material no longer corresponds to the current market price and the purchase price will most likely be different. In addition, a revaluation for the material debit or credit is also possible if the stock value of the material will be increased or decreased.

In a real-world scenario, there might be a difference between the book inventory and the actual stock. You need to acknowledge this and correct the value in your system accordingly. For example, as a result of a physical inventory, a difference between the physical inventory and the book inventory might be noted. You must then post the physically inventory differences to correct the book inventory balance. This is done using Transaction MI07.

6.3 Summary

You now understand the functional and technical aspects of conditions and the price determination process. In addition, we consolidated and extended your knowledge of material price changes and their impact on valuation. We also provided a thorough treatment of the elements of condition techniques and the price determination process, which helped increase your understanding regarding system configuration, default values suggested by the system, and transaction runs on the technical level. We also discussed special condition types such as those for precious metals and planned delivery costs, as well as subsequent settlement. For material price changes, we further discussed the concepts of material valuation and briefly described the various elements of the valuation structure.

So far, we've covered the valuation of materials. In the next chapter, we'll introduce you to balance sheet valuation procedures. The objective of balance sheet valuation is to calculate the material prices for subsequent use in external or internal balance sheets.

At the end of the fiscal year, the material stock and the assets in an enterprise are valued to assess their contribution to the profit and loss statement. The balance sheet valuation is the recalculation of price control prices for subsequent use in external or internal balance sheets.

7 Balance Sheet Valuation

The values of material prices calculated as a result of balance sheet valuation are used in external or internal balance sheets. So, it's important that this value is as close to being exact as possible. You need to ensure that the profit and loss statement and the balance sheet show the correct profitability and financial position in your books. This can be achieved by material valuation according to the regulations laid out by the Generally Accepted Accounting Principles (GAAP) or the International Financial Reporting Standards (IFRS). GAAP are a common set of accounting principles, standards, and procedures that companies use to compile their financial statements. Companies are expected to follow GAAP rules when reporting their financial data via financial statements. IFRS are the accounting standards adopted by the International Accounting Standards Board (IASB). In the following sections, we'll demonstrate and explain to you the following techniques for balance sheet valuation:

- ▶ Lowest value determination
- ▶ LIFO valuation
- ▶ FIFO valuation

The various balance sheet valuation techniques affect the final value in the balance sheet and you need to carefully consider this from the functional point of view. Therefore, we won't use the generic treatment of the subject on the basis of functional basis, SAP functional design, checkpoints and real-time issues, technical elements, and troubleshooting tips. Instead, in this chapter, we'll place more emphasis on the functional relevance.

7.1 Lowest Value Determination

The lowest value determination is the process of valuating materials for balance sheet purposes according to the lowest value principle.

Before we explain the lowest value principle, we'll take a look at the lowest value determination in Customizing. As shown in Figure 7.1, you can find all relevant options for this under the menu path SAP IMG • MATERIALS MANAGEMENT • VALUATION AND ACCOUNT ASSIGNMENT • BALANCE SHEET VALUATION PROCEDURES • CONFIGURE LOWEST-VALUE METHOD.

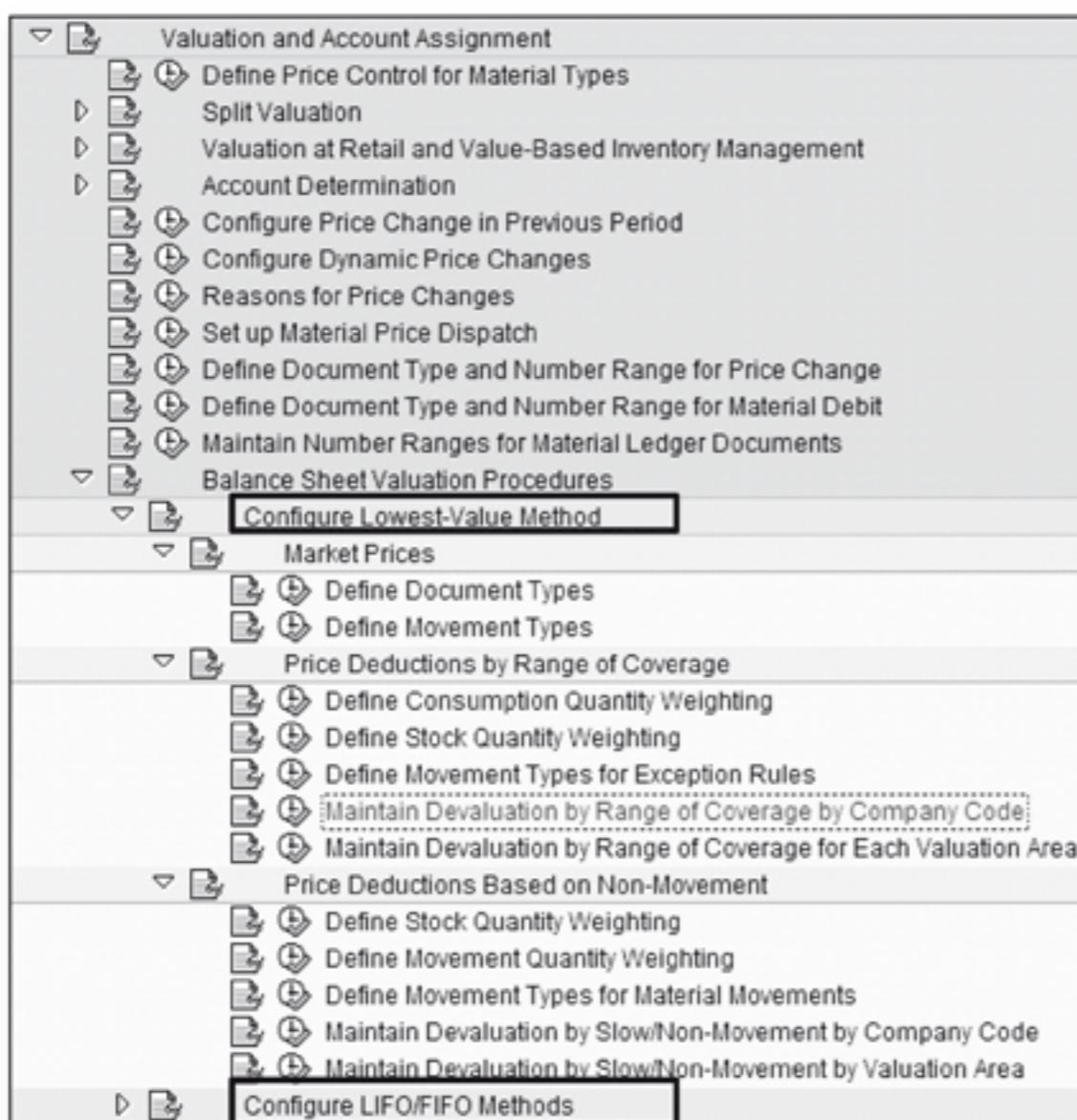


Figure 7.1 Lowest Value Determination

Lowest value principle

The lowest value principle is based on the recognition-of-loss principle – or the principle of conservatism, as they say in accounting terms – and considers the following:

- ▶ As per the accounting principles, the lower among the values of the market or cost price for a material needs to be taken into account. For example, if a material is procured at a price of 20 USD and the current market price is 25 USD, a profit of 5 USD would be expected for each unit of measure. However, this profit shouldn't be included in the books because it's an estimated profit. Therefore, the material would continue to be valued at 20 USD.

- ▶ Anticipated losses are included in the balance sheet as outlined in the accounting principle of conservatism. For example, if a material is procured at 20 USD, and the current price is 18 USD, the material is valued at 18 USD.
- ▶ Material stocks that are no longer required lose their value. You generally assign a devaluation percentage for identifying such slow moving materials. Instead of waiting until you have to scrap the material, you should devalue slow moving materials based on the devaluation percentage value you have identified.

The system provides the following procedures for the lowest value determination, which we'll discuss in more detail in the following sections:

- ▶ Lowest value determination based on market prices
- ▶ Lowest value determination based on range of coverage
- ▶ Lowest value determination based on movement rate
- ▶ Lowest value determination: loss-free valuation

7.1.1 Lowest Value Determination Based On Market Prices

The lowest value determination based on the market prices is based on the principle of conservatism. The system knows about the market price through the various transactions that are executed and the master data that's maintained in it. Thus, for the determination of the market price, the system may retrieve the following data:

- ▶ Receipts for purchase orders or scheduling agreements
- ▶ Purchase orders
- ▶ Contracts/scheduling agreement
- ▶ Purchasing info records

For example, to value the stock of raw materials as per the lowest value determination based on the market price, you need to take the mentioned documents into account. Generally speaking, you need to carry out the following activities in the SAP system in the menu path of SAP Easy Access: SAP MENU • LOGISTICS • MATERIALS MANAGEMENT • VALUATION • BALANCE SHEET VALUATION • DETERMINATION OF LOWEST VALUE • MARKET PRICES. This leads to Transaction MRNO.

- ▶ Indicate the company code under which you need to determine the lowest value of the material.
- ▶ Indicate the date that represents the end of the fiscal year or a posting date. This is called the Key Date in the transaction.
- ▶ You may restrict the selection based on material, plant, valuation type, valuation class, and material group.
- ▶ Select the comparison price to indicate one of the following to the system:
 - ▶ Lowest Value Comparison: If you select this indicator, the program performs a lowest price determination between the market and comparison price.
 - ▶ Comparison Price as Replacement Value for Market Price: If you select this indicator, the market price is adopted as a result. In addition, the comparison price is the result if the system can't determine a market price.
 - ▶ No Comparison Price: If you select this indicator, the market price is adopted as a result, but no result is updated if the market price can't be determined.
- ▶ Choose the market price for a combination of possible sources.
- ▶ You can update the material master with the result of the lowest value determination. The following options are available in the SAP system:
 - ▶ Change Material Prices: Under this option, you can choose from Generation of Batch Input Session, Direct Update, or No Update.
 - ▶ Update Prices: This provides various options for updating physical inventory prices.

Table 7.1 summarizes the price sources and criteria for calculation for the lowest value determination based on market prices, within the specified period of calculation.

It's best to keep the specified period to about three months for the period during which the system retrieves the data. This ensures that prices are as up-to-date as possible. The following is a list of points to consider for the lowest value determination based on market prices:

- ▶ It's possible for you to include the standard price during the calculation of the market price. However, you shouldn't use this option unless you can justify the use of the standard price as the market price. Having said that, the standard price is indeed in use for the market price depending on the company policy and the industry sector.

Price Source	Criteria for Calculation
Receipts for Purchase Orders or Scheduling Agreements	<ul style="list-style-type: none"> ▶ Goods receipt, or invoices whose posting date lies within the specified period. ▶ The document type and the movement type for goods receipt and invoice should be set as relevant for valuation. ▶ The ratio of invoiced quantity to delivered quantity within a specified range.
Purchase Orders	<ul style="list-style-type: none"> ▶ Order dates of the purchase orders in the specified period.
Contracts/Scheduling Agreements	<ul style="list-style-type: none"> ▶ End of the validity period within the specified period.
Purchasing Info Records	<ul style="list-style-type: none"> ▶ Purchasing info records in which the price has last changed in the specified period.

Table 7.1 Price Sources for the Lowest Value Determination Based on Market Price

- ▶ For split-valuated materials, the system determines the lowest value for each valuation type. In split valuation, partial stock of materials is valued differently according to procurement, origin, or status. The system determines the average price for the valuation header based on these prices, and the total stock.
- ▶ At the time of market price determination, the system compares the prices from the selected sources in a predefined sequence. You may assign the sequence in Transaction MRNO when you click on the button Market Price.
- ▶ With the help of identification numbers, you can configure whether the price from a given source is preferred over the other sources or the lowest price comparing all of the sources.

Now that you understand the concept of lowest value determination based on market prices, let's move on to the lowest value determination based on range of coverage.

7.1.2 Lowest Value Determination Based On Range of Coverage

The *range of coverage* signifies the average stock on the basis of average consumption and is expressed in the unit of time, which is generally number of months. It indicates whether materials should be devaluated on account of a high range of coverage or slow movement. If a range of coverage, for example, of five months is

determined for a material of type ROH, the percentage discount is 8%. The values may differ for the other ranges of coverage.

A material's range of coverage is calculated using the following formula:

$$\text{Range of coverage} = \text{average stock} / \text{average consumption}$$

where:

Average stock = weighted average of several period stocks – reservations + stock on order

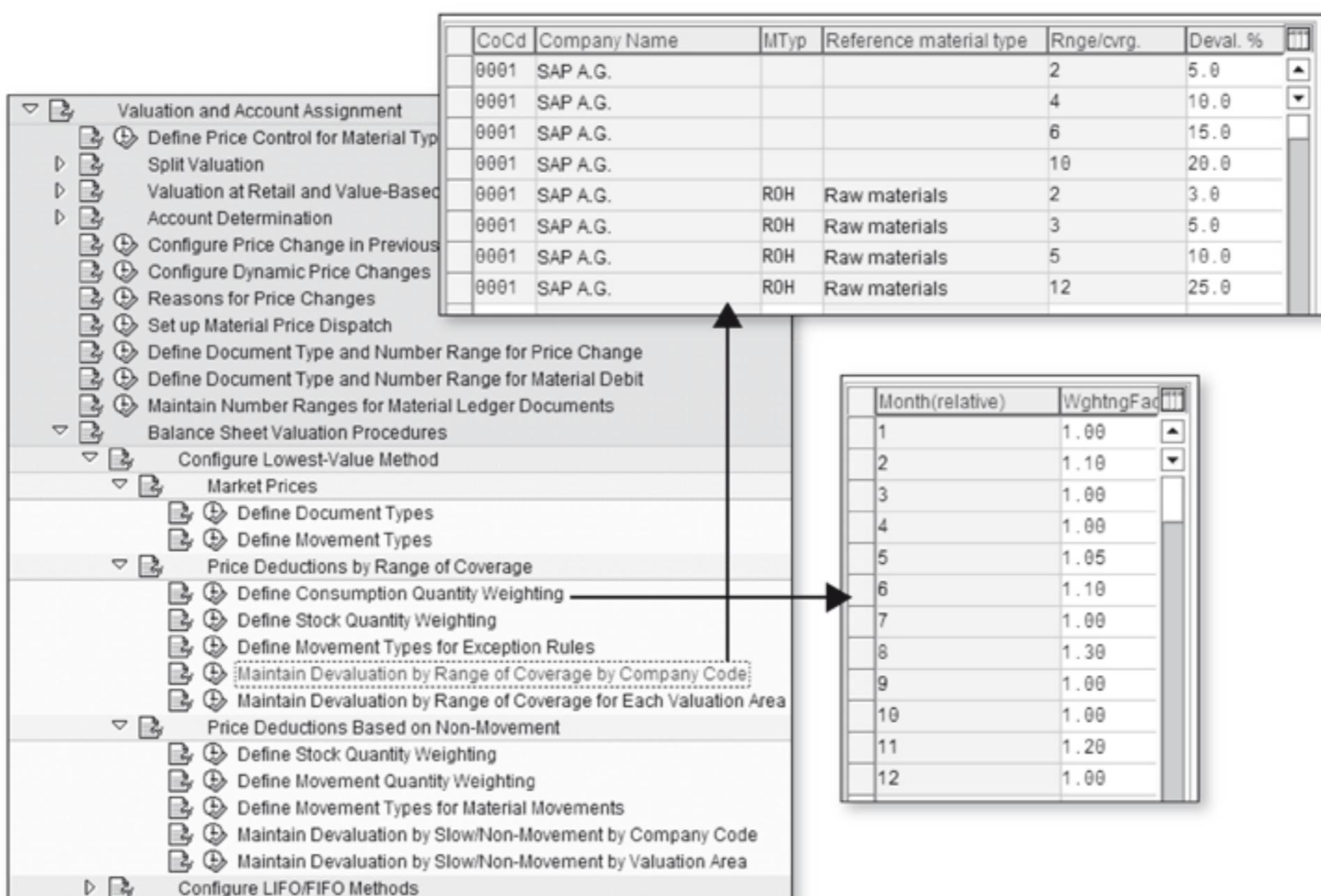
and:

Average consumption = weighted average based on past consumption

or:

Average consumption = weighted average of forecast value determined in the last forecast

The price deduction or *devaluation* is configured in Customizing, as shown in Figure 7.2.



CoCd	Company Name	MTyp	Reference material type	Rnge/cvrg.	Deval. %
0001	SAP A.G.			2	5.0
0001	SAP A.G.			4	10.0
0001	SAP A.G.			6	15.0
0001	SAP A.G.			10	20.0
0001	SAP A.G.	ROH	Raw materials	2	3.0
0001	SAP A.G.	ROH	Raw materials	3	5.0
0001	SAP A.G.	ROH	Raw materials	5	10.0
0001	SAP A.G.	ROH	Raw materials	12	25.0

Month(relative)	WghtngFac
1	1.00
2	1.10
3	1.00
4	1.00
5	1.05
6	1.10
7	1.00
8	1.30
9	1.00
10	1.00
11	1.20
12	1.00

Figure 7.2 Lowest Value Determination Based on Range of Coverage

The devaluation for the range of coverage can be maintained for the company code and the valuation area. Also, the weighting can be defined for the consumption quantity and the stock quantity. In the calculation formulas, calculate the values based on these Customizing settings.

Finally, the lowest price is calculated by deducting the devaluation from the base price as per the following calculation formula:

$$\text{Lowest price} = \text{base price} - \text{devaluation}$$

The SAP system provides you with an option to choose one or more values for the base price in Transaction MRN1 (SAP Easy Access: SAP MENU • LOGISTICS • MATERIALS MANAGEMENT • VALUATION • BALANCE SHEET VALUATION • DETERMINATION OF LOWEST VALUE • RANGE OF COVERAGE (DAY'S SUPPLY)). Your options include the following:

- ▶ Current material price
- ▶ Material price from the previous month or year
- ▶ Current standard price
- ▶ Standard price from the previous month or year
- ▶ Current moving average price
- ▶ Moving average price from the previous month or year

Now that you understand the concept and the calculation for the lowest value determination based on range of coverage, let's move on to lowest value determination based on movement rate.

7.1.3 Lowest Value Determination Based On Movement Rate

The method of lowest value determination based on movement rate is adopted to ensure that the materials' price is devaluated on account of slow or non-movement. The devaluation percentage can be assigned to the company code depending on the material type. For example, a material of the type raw material can be assigned a devaluation percentage on account of slow movement. This is done to ensure that you don't have to wait to get a clear picture before you scrap the material.

The system determines the movement rate for the material on the basis of receipts and issues for the material and the average stock of the material. The movement rate is calculated as a percentage based on the following formula:

*Movement rate = (total quantity of receipts and issues / material stock) * 100*

As shown in Figure 7.3, you can customize the following movement types for material documents:

- ▶ Receipt
- ▶ Receipt reversals
- ▶ Issues
- ▶ Issue reversals

To do so, you can use the menu path SAP IMG • MATERIALS MANAGEMENT • VALUATION AND ACCOUNT ASSIGNMENT • BALANCE SHEET VALUATION PROCEDURES • CONFIGURE LOWEST-VALUE METHOD • PRICE DEDUCTIONS BASED ON NON-MOVEMENT, or Transaction OMWV.

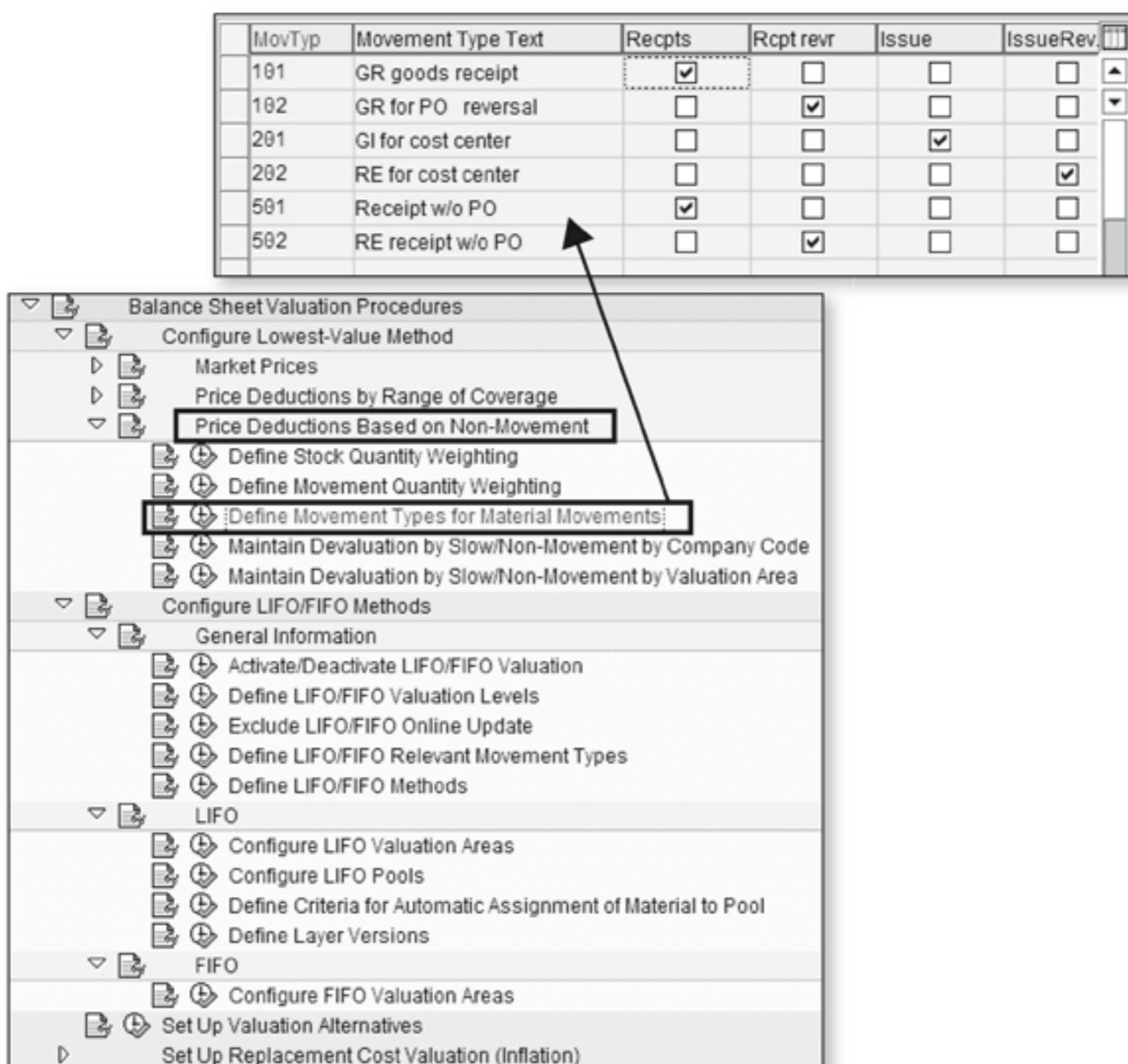


Figure 7.3 Lowest Value Determination Based on Movement Rate

The movement rate is compared with the preset threshold value percentage. The material is considered slow-moving if the movement rate percentage is less than the preset threshold value percentage. As shown in Figure 7.4, you can set the threshold value when you execute Transaction MRN2 under the SAP Easy Access menu path SAP MENU • LOGISTICS • MATERIALS MANAGEMENT • VALUATION • BALANCE SHEET VALUATION • DETERMINATION OF LOWEST VALUE • MOVEMENT RATE.

As you can see in Figure 7.4, there are two ways in which movement rates can be determined:

- ▶ From the material master

In this case, the system only considers the issues of the materials. This process takes considerably less time.

- ▶ From a material document

In this case, the system considers the receipts as well as the issues of the materials. Therefore, a movement rate for receipt and a movement rate for issue are determined. The materials can then be classified as non-moving or slow moving if both of the values are less than the preset threshold percentage.

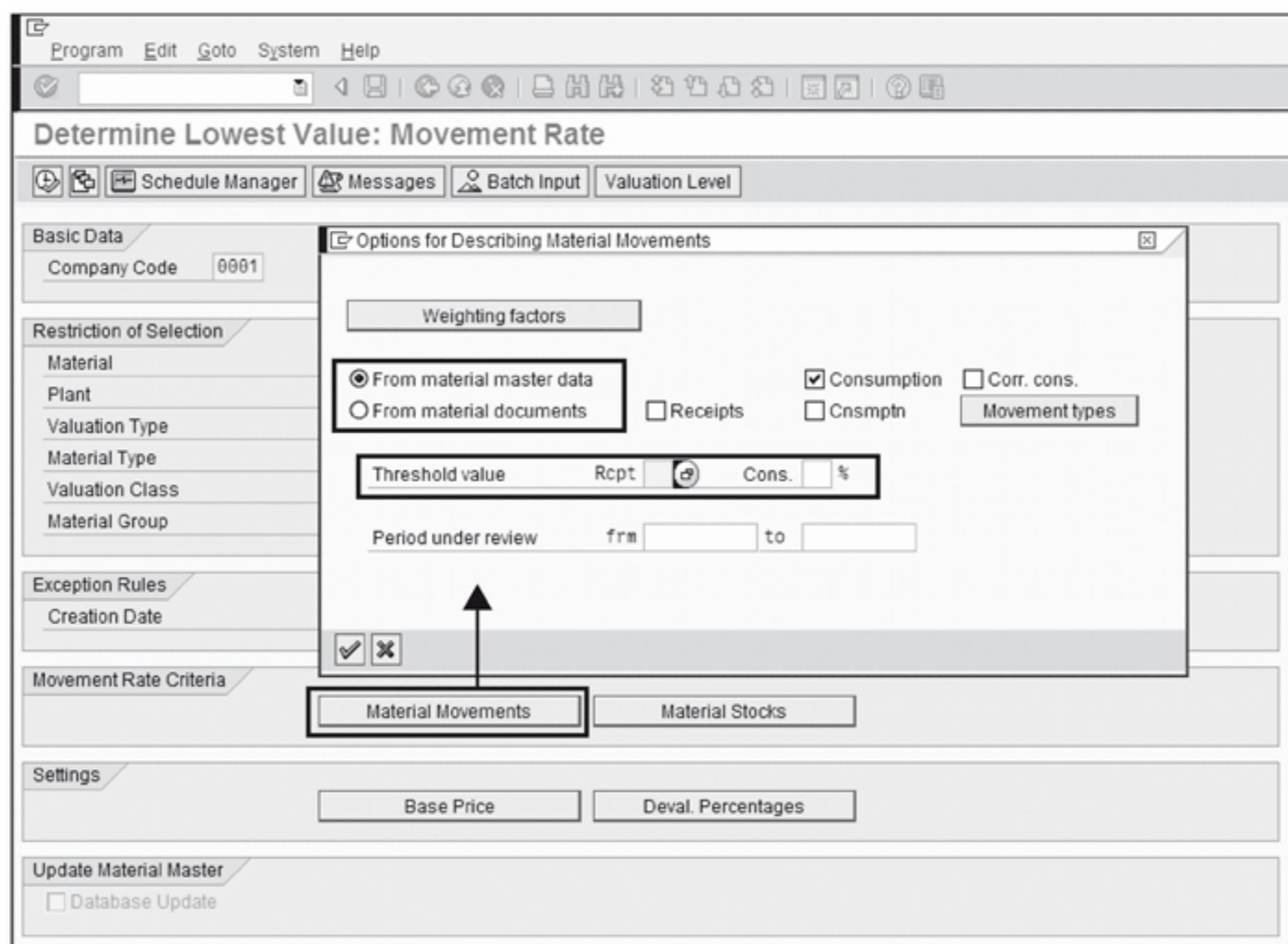


Figure 7.4 Lowest Value Determination Based on Movement Rate

Finally, the lowest price is calculated by deducting the devaluation from the base price as per the following formula:

$$\text{Lowest price} = \text{base price} - \text{devaluation}$$

The SAP system provides you with an option to choose one or more values for the base price in Transaction MRN2 (SAP Easy Access: SAP MENU • LOGISTICS • MATERIALS MANAGEMENT • VALUATION • BALANCE SHEET VALUATION • DETERMINATION OF LOWEST VALUE • MOVEMENT RATE).

As shown in Figure 7.5, the base price is the lowest price you select during the transaction. You may select one or more options for the physical inventory price to compare the lowest of the prices. The lowest price is then calculated as the difference between the base price and the devaluation.

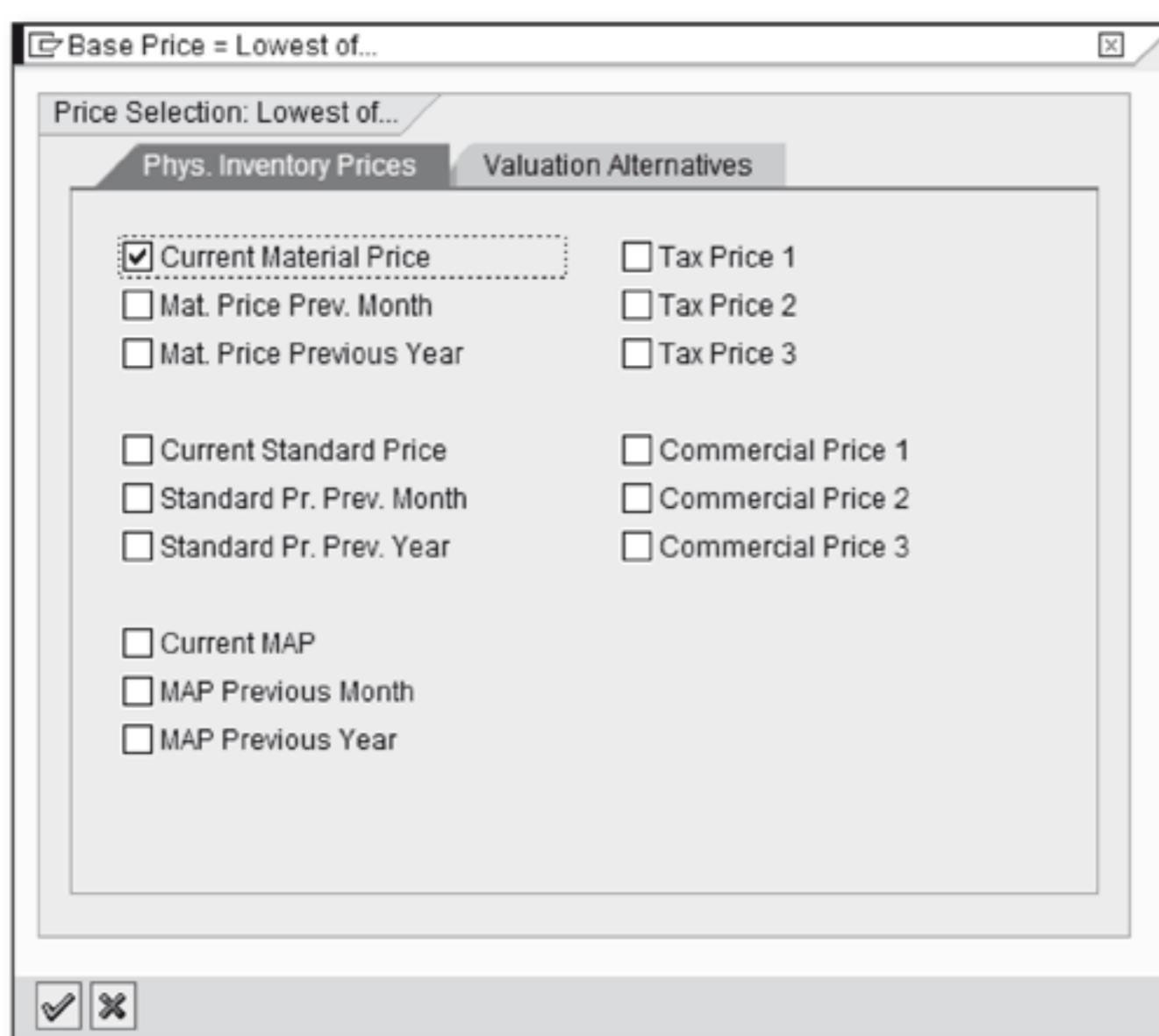


Figure 7.5 Base Price in Lowest Value Determination

Now that you understand the concept and calculation for the lowest value determination based on movement rate, we'll move on to the next lowest value determination: loss-free valuation.

7.1.4 Lowest Value Determination: Loss-Free Valuation

The lowest value determination for loss-free valuation covers the devaluation of materials owing to the obsolescence of a technology, for example. A common example is the industry manufacturing magnetic media such as floppy disks for computers or video cassettes. The determination of the market price in such situations can't be performed based on the values recorded within your enterprise. Thus, any amount of analysis in SAP ERP doesn't guarantee that you'll see the actual picture. For this reason, the SAP system provides enhancement NIWE0003 so that you can define how the system needs to determine the selling price for such materials. In SAP ERP 6.0, this enhancement has migrated to the BAdI definition SMOD_NIWE0003 with the following methods:

- ▶ EXIT_SAPLNIW3_001
- ▶ EXIT_SAPLNIW3_002

Now that you know about the balance sheet valuation technique for the lowest value determination, we'll move on to the other important techniques for balance sheet valuation, starting with LIFO valuation.

7.2 LIFO Valuation

To ensure that an increase in the current market prices of a material doesn't lead to overvaluation of older stock, you can adopt the *last in first out* (LIFO) technique of balance sheet valuation. Using LIFO valuation, you can separately valuate the increase in stock of a material for various settlement periods (fiscal year or month). In the telecom industry, for example, although *first in first out* (FIFO) is better for its customers, most companies like to work with the LIFO method of valuation. With a short carry-over duration, call credit will be lost sooner with LIFO than with FIFO, because the customer first uses his old call credit (the leftover credit from the previous month). The new call credit is used only after using all of the old call credit.

The concept of layer

LIFO is based on the assumption that no value change occurs for older stock when new stock is received or consumed. To differentiate this new stock with a price different from that of the original stock, it's referred to as a *layer*. The following is true for layers:

- ▶ A layer is created for the settlement period in case of stock increases during the same period.
- ▶ A layer is reduced for the previous settlement period in case of stock reduction.

Table 7.2 provides an example of LIFO valuation.

Year	Transaction	Values in Material Master Record		
		Quantity	Value	MAP
2009	Closing Stock	100	100	1.00
2010	+100 UNI@ USD 1.10/UNI	200	210	1.05
	- 80 UNI @ USD 1.05/UNI	120	126	1.05
	+30 UNI @ USD 1.20/UNI	150	162	1.08
2011	+50 UNI @ USD 1.24/UNI	200	224	1.12
	-100 UNI@ USD 1.12/UNI	100	112	1.12
	+20 UNI@ USD 1.30/UNI	120	138	1.15

Table 7.2 Sample LIFO Valuation

In Table 7.2, the goods receipt is indicated by a '+' sign and the goods issue is indicated by a '-' sign. The LIFO price can be calculated from the layer for the corresponding year. There are various ways of valuating the layer in the standard system. They are as follows:

- ▶ Average delivered prices for the settlement period
- ▶ Prices for a partial year (this only makes sense if the settlement period is the fiscal year)
- ▶ Prices on progressive fill-up basis
- ▶ Material master price

We'll provide more detail on this later in this chapter. In the example outlined in Table 7.2, we used the moving average price of the goods receipt. This is the price taken into account on a progressive fill-up basis where:

$$\text{Layer value} = \text{layer quantity} * \text{total value of goods received} / \text{total quantity of goods received}$$

As you can see in Table 7.2, all of the goods receipts combined together are more than the goods issues; therefore, the layer is created in the same settlement year

2010. However, the goods issues are more than the goods receipts for the year 2011; thus, the layer is reduced from the previous settlement period.

Table 7.3 details the values calculated during the LIFO valuation in 2010.

Layer	Quantity	Value
Layer 2009	100 UNI	100 USD
Layer 2010	50 UNI	56.15 USD
Total	150 UNI	156.15 USD
LIFO Price	156.15 / 150 = 1.04	

Table 7.3 LIFO Valuation for Fiscal Year 2010

In fiscal year 2010, the layer is increased by a quantity of 50 UNI. Therefore, the layer value will be created in the same settlement period.

As per the above equation,

$$\text{Layer Value} = 50 * (100 * 1.1 + 30 * 1.2) / (100 + 30) = 56.15$$

$$\text{LIFO price} = \text{total value} / \text{total quantity} = (100 + 56.15) / (100 + 50)$$

Table 7.4 details the values calculated during the LIFO valuation in 2011. Because the stock is reduced by 20 UNI in 2011, the layer is reduced from the previous settlement period. Thus, we specify the quantity as 20 UNI for layer 2010 in Table 7.4.

Layer	Quantity	Value
Layer 2009	100 UNI	100 USD
Layer 2010	20 UNI	22.46 USD
Total	120 UNI	122.46 USD
LIFO Price	122.46 / 120 = 1.02	

Table 7.4 LIFO Valuation for Fiscal Year 2011

In fiscal year 2011, the stock is decreased; thus, the layer is reduced from the last fiscal year by a quantity of 20 UNI.

Therefore, we have a proportional reduction in value,

$$\text{Layer Value} = 56.15 * 20 / 50 = 22.46$$

$$\text{LIFO price} = \text{total value} / \text{total quantity} = (100 + 22.46) / (100 + 20)$$

Now that we've covered layers and LIFO valuation, let's move on to parameters on which LIFO valuation is based. In the next section, you'll learn about layer versions, which act as a mock test for balance sheet valuation.

7.2.1 LIFO Methods and the Layer Versions

LIFO methods contain a set of parameters on which LIFO valuation is based. This ensures that you don't need to enter all of the individual parameters while performing LIFO valuation.

The combinations of the set of parameters of the LIFO methods are called *models* or *samples*. A model or a sample generally determines the following:

- ▶ The consumption tracking method that's implemented
- ▶ Periods of individual layers
- ▶ Grouping of the materials
- ▶ Whether LIFO is carried out with reference to stock quantities or price indexes

The different models or samples available are listed in Table 7.5

Model/ Sample	Description
01	FIFO valuation of individual materials
02	LIFO valuation of individual materials with annual layers
03	LIFO valuation of individual materials with monthly layers
04	LIFO valuation of quantity-based pools with annual layers
05	LIFO valuation of quantity-based pools with monthly layers
06	LIFO valuation of pools subject to index valuation with annual layers

Table 7.5 Various Models/Samples for LIFO/FIFO Valuation

As shown in Figure 7.6, LIFO/FIFO methods can use various models/samples.

In addition, the single receipts and quantity comparison should also be configured for the models. If the Single Receipt indicator isn't checked, this means that the receipts are aggregated on a monthly basis.

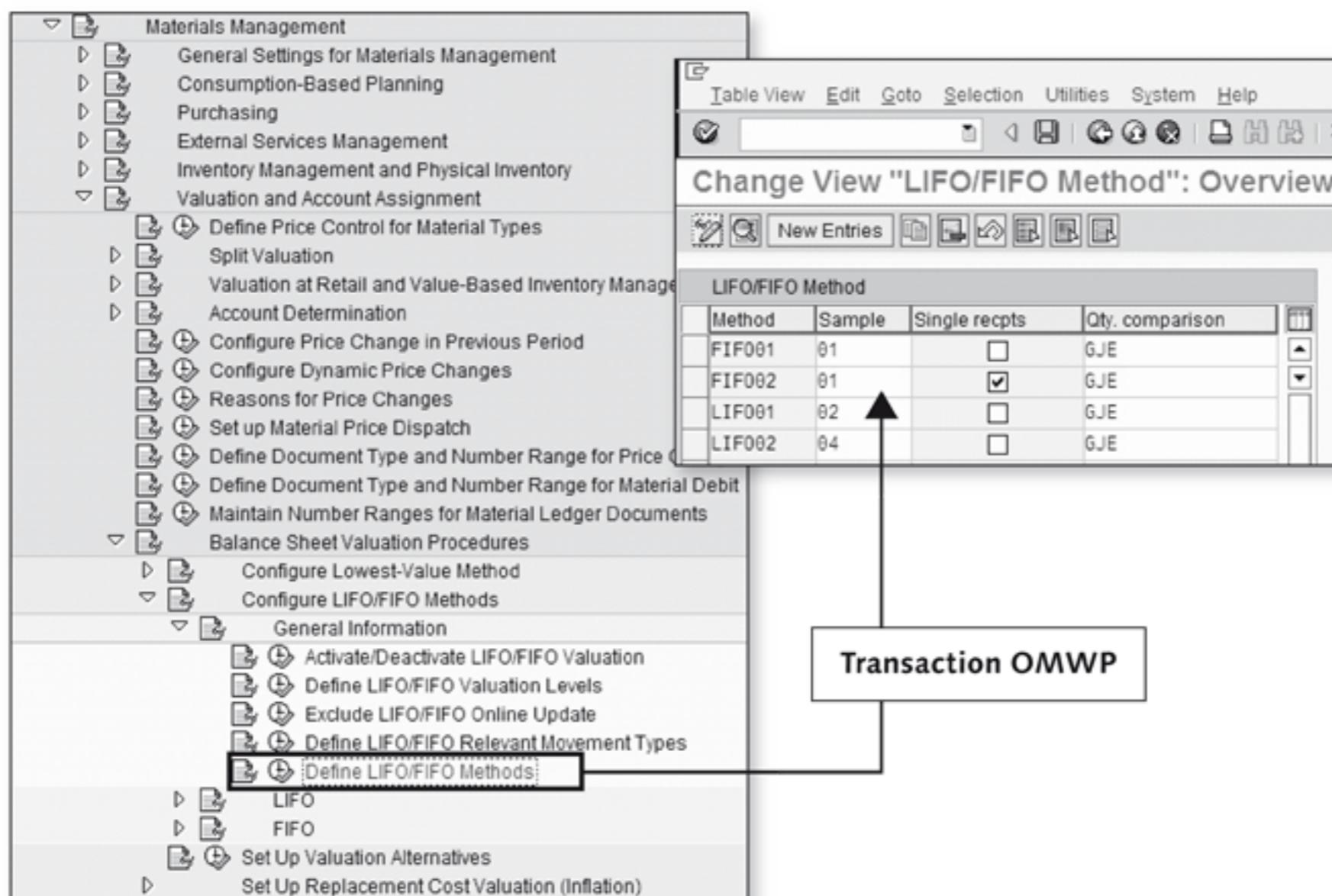


Figure 7.6 LIFO/FIFO Methods

When you carry out LIFO valuation, you define two time-points between which the stock situation or the layer value is compared. The first time-point is indicated by the last LIFO valuation. The Value Comparison field determines the second time-point for LIFO valuation. Table 7.6 describes the various quantity comparison parameters, along with their descriptions. These are the different options for the second time point.

Parameter	Description
GJE	Analysis of closing stock from previous period
VVM	Analysis of closing stock from month before last
VOM	Analysis of closing stock from previous month
CUR	Analysis of current stock

Table 7.6 Quantity Comparison Parameter for LIFO/FIFO

For example, if the last LIFO valuation was performed for the fiscal year before the last and you have chosen the setting GJE, the system compares the stock or value situation between the end of the fiscal year before the last and the end of the last fiscal year.

LIFO valuation is run at the end of the fiscal year, after which the valuation of the materials changes. Due to its significance in the balance sheet, it's best to keep an eye on the LIFO valuation by doing a mock valuation. This doesn't change the values of the layers but still represents the actual LIFO valuation. This mock valuation is performed with the help of layer versions. It ensures that you get the result of the balance sheet valuation without affecting your balance sheet. This can be used for analysis purposes.

You can carry out LIFO valuation using different LIFO methods by specifying the layer versions that are a copy of the productive layer. This way, you ensure that the regular LIFO valuation you carry out at the end of the fiscal year isn't affected.

You can create layer versions, as shown in Table 7.7, for internal interim reporting purposes. For example, you can run LIFO valuation once a year using layer version P. To create quarterly results, you can create layer versions 1, 2, and 3 by copying layer version P.

Layer Version	Description	Method
P	Year-end valuation	LIFO01
1	LIFO results 1st quarter	LIFO02
2	LIFO results 2nd quarter	LIFO02
3	LIFO results 3rd quarter	LIFO02

Table 7.7 Layer Versions in LIFO Valuation

Layer versions can be defined under the Customizing menu path SAP IMG • MATERIALS MANAGEMENT • VALUATION AND ACCOUNT ASSIGNMENT • BALANCE SHEET VALUATION PROCEDURES • CONFIGURE LIFO/FIFO METHODS • LIFO • DEFINE LAYER VERSIONS.

Now that you understand the various LIFO methods and the concept of layer versions, let's move on to the quantity and index LIFO procedures.

7.2.2 Quantity and Index LIFO Procedures

LIFO procedures may vary depending on how the valuation layers are managed. You should use the quantity LIFO procedure if the valuation layers are managed on a quantity basis. When you use the quantity LIFO procedure, all stock changes of a material or pool in each settlement period (fiscal year or month) are considered separately. The stock quantity of a particular material or pool is compared with the sum of the quantities contained in the existing layers.

If the stock is greater at the end of the settlement period, a new layer is created for that settlement period, indicating the increase in quantity and value of the material or pool.

On the other hand, if the stock is smaller at the end of the settlement period, the preceding layers are reduced starting with the most recent layer.

The index LIFO procedure is used for valuation of layers managed on a value basis. Some countries only allow you to manage layers in the pool LIFO valuation on a value basis. With the index LIFO procedure, the value of the pool is considered separately for each settlement period. However, you must consider that in both cases, you're interested in determining the layer value.

For the quantity LIFO procedure, the receipt quantities and values for the individual periods of a fiscal year are taken into account. We'll describe the different ways of valuating the layers in such cases with the help of an example in Table 7.8.

Periods of fiscal year 2010	Receipt Quantity	Receipt Value
01	10	100
02	20	210
03	5	60
04	15	160
05	10	105
06	25	260
07	30	320
08	20	225
09	15	165
10	20	235
11	40	450
12	30	350
Total	240	2640
Issues	140	

Table 7.8 Sample Values for the Quantity LIFO Procedure

As you can see in Table 7.8, a layer with a quantity 100 ($240 - 140$) is created when the stock is valued at the end of fiscal year 2010. The value, however, depends on the valuation base you use. We'll describe these in the following subsections.

Average Delivered Price for Settlement Period

For the average delivered price for a settlement period, the price is used as the basis for valuation. The layer value is calculated as:

*Layer value = layer quantity * total value of goods received / total quantity of goods received*

$$= 100 * 2640 / 240$$

$$= 1100$$

Price for Partial Year

An average price calculated from the goods received during a portion of the fiscal year is used as the basis for valuation. However, you must consider that the partial year needs to begin at the start of the fiscal year. The layer value is calculated as:

*Layer value = layer quantity * total value of goods received in the partial year / total quantity of goods received in the partial year*

If you want to calculate the partial value corresponding to the first four periods, this equation gives you the following result:

$$\text{Layer Values} = 100 * 530 / 50 = 1060$$

Price on Progressive Fill-Up Basis

With the price on progressive fill-up basis method of calculation, the values of goods received in individual periods are used, starting at the beginning of the year and added until the layer stock is reached. For the example in Table 7.8, this would be calculated as shown in Table 7.9.

Period	Quantity	Value	Remaining Quantity
01	10	100	90
02	20	210	70
03	5	60	65
04	15	160	50
05	10	105	40
06	25	260	15
07	15	160	0
Total	100	1055	

Table 7.9 Price on Progressive Fill-Up Basis

As you can see, only a portion of the quantity is used for value formation in period 07. The calculated value is proportional to the quantity.

Material Master Price

For the material master price with individual LIFO valuation, the price corresponds exactly to the moving average price, because the average price is calculated from the closing stock quantity and the corresponding value.

$$\text{Layer value} = \text{layer quantity} * \text{value of the closing stock} / \text{closing stock quantity}$$

As we already mentioned at the beginning of this section, for the index LIFO procedures, the layers are managed on a value basis. This procedure allows you to combine materials in a pool without having to first convert the materials to a single unit of measure.

With the index LIFO procedure, the value of a pool is considered separately for each settlement period. At the end of the settlement, the period is converted to the price level of the base year using a price index and is compared to the base value of the current layer. The layer is created or reduced, depending on whether the current value is more or less than the base value. The example in Table 7.10 for the index LIFO procedure helps illustrate this.

Fiscal Year	Value at the End of the Fiscal Year	Price Index for Each Year	Accumulated Price Index
2009	7000		
2010	10300	3%	1.03
2011	15015	5%	1.0815
2012	10400	4%	1.1248

Table 7.10 Example: Index LIFO Procedure

Table 7.10 shows the movements for one pool in fiscal years 2010, 2011, and 2012, and the index LIFO valuation at the end of each fiscal year.

We'll now look at the valuation data with the understanding that the base year is 2009, and the base layer has a value of 7000. This corresponds to the figures in Table 7.10.

The valuation for 2010 is represented in Table 7.11.

Value at the end of the year	10300
Conversion using price index of 1.03 to 2009 value	10000
Base value of layer 2009 deducted	7000
Base value of new layer	3000
Layer for 2010 with price index 1.03	3090

Table 7.11 Example: Index LIFO Valuation for 2010

The system always converts the value back to the base year when the layer is calculated. In our case, the base year is 2009. Thus, the value converted to the base year 2009 is:

$$10300 / 1.03 = 10000$$

The value obtained as a result is then decreased by the base values of the existing layers. Therefore, in Table 7.11, we decrease the value by 7000.

$$10000 - 7000 = 3000$$

This value is then multiplied by the current price index to get the layer value.

$$3000 * 1.03 = 3090$$

The valuation for 2011 is represented in Table 7.12.

Value at the end of the year	15015
Conversion using price index of 1.0815 to 2009 value	13883.50
Base value of layer 2010 deducted	3000
Base value of layer 2009 deducted	7000
Base value of new layer	3883.5
Layer for 2011 with price index 1.0815	4200

Table 7.12 Example: Index LIFO Valuation for 2011

As you can see in Table 7.12, for converting the value back to the base year 2009, the system has to divide by the price index of 1.0815

$$15015 / 1.0815 = 13883.50$$

The value obtained as a result is then decreased by the base values of the existing layers. Therefore, in Table 7.12, we decrease by the following:

$$13883.50 - 3000 - 7000 = 3883.50$$

This value is then multiplied by the current price index to get the layer value.

$$3883.50 * 1.0815 = 4200$$

The valuation for 2012 is represented in Table 7.13.

Value at the end of the year	10400
Conversion using price index of 1.1248 to 2009 value	9246.09
Base value of layer 2011 to be deducted	3883.50
Base value of layer 2010 to be deducted	3000
Base value of layer 2009 to be deducted	7000
Base value of new layer	-4637.41
Coverage for negative value in this layer	3883.50
Value to be reduced from the previous layer	753.91
Base value of the previous layer 2010	3000
Remaining layer from 2010	2246.09
Layer for 2010 with price index 1.03	2313.47

Table 7.13 Example: Index LIFO Valuation for 2011

The valuation for the fiscal year 2012 is slightly different because the previous layer is reduced in this case.

As you can see in Table 7.13, for converting the value back to the base year 2009, the system has to divide by the price index of 1.1248.

$$10400 / 1.1248 = 9246.09$$

The value obtained as a result is then decreased by the base values of the existing layers. Therefore, in Table 7.13, we decrease by the following:

$$9246.09 - 3883.50 - 3000 - 7000 = - 4637.41$$

Because the value turns out to be negative, the system needs to reduce the previous layer. However, to get an idea of how much needs to be reduced from the previous layer, it's worth checking for the coverage in the current layer. In our case, the current layer is 3883.50. Thus, the value that needs to be reduced from the previous layer can be obtained by the following:

$$3883.50 - 4637.41 = - 753.91$$

Therefore, 753.91 needs to be reduced from the previous layer, which is 3000 in this case, for fiscal year 2010.

$$3000 - 753.91 = 2246.09$$

This value is then multiplied by the current price index for 2010 to get the layer value.

$$2246.09 * 1.03 = 2313.47$$

7.2.3 Pool LIFO Valuation

Materials can be grouped together in a LIFO pool in order to valuate them together. It's helpful to create a LIFO pool for the materials that act as substitutes for each other so that the stock fluctuation of one type of materials is balanced by the other. In this case, similar materials or materials with the same function can generally be grouped together into pools and valuated together. For example, a company that manufactures CDs and DVDs might group these materials together into LIFO pools so that stock fluctuations of CDs are made up by those of DVDs.

The pool allocation can be changed if, for example, you identify a better pool allocation after you have run LIFO valuation. You have the following options to change the pool allocation:

- ▶ **Splitting:** Lets you remove a material from one pool and allocate it to the other.
- ▶ **Merging:** Lets you group several pools together in a new pool.

To split or merge pools, use Transaction MRLE under SAP MENU • LOGISTICS • MATERIALS MANAGEMENT • VALUATION • BALANCE SHEET VALUATION • LIFO VALUATION • POOL FORMATION • CHANGE.

From there, you can click on the Splitting Criteria or Merging Criteria buttons, depending on how you want to change the pool allocation. Figure 7.7 shows the LIFO-relevant data in the material master. The collective maintenance of the data is carried out with the help of the LIFO pool.

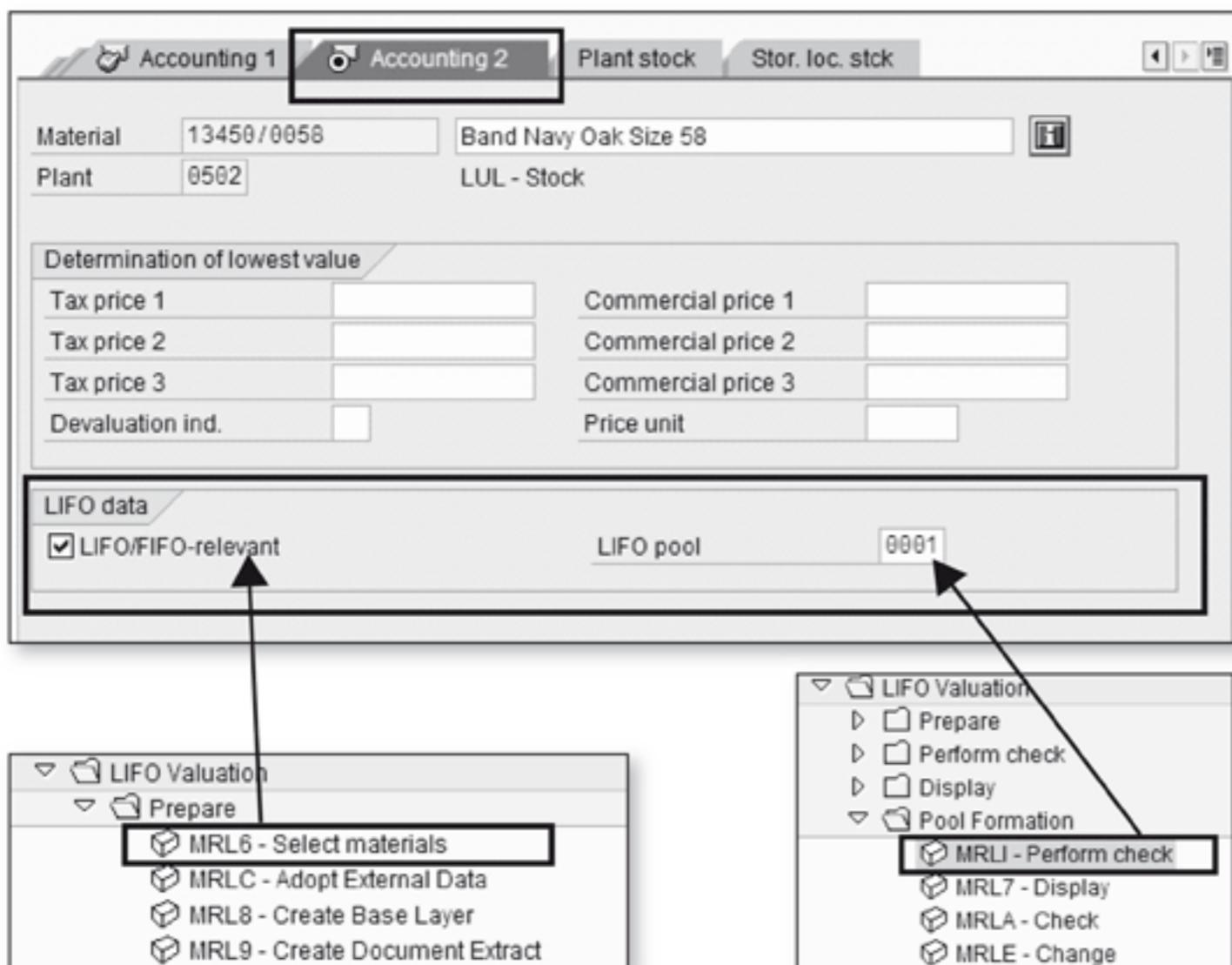


Figure 7.7 LIFO Indicator and the Pool Number in the Material Master

The LIFO/FIFO-Relevant indicator can be either maintained individually in the material master or can be maintained collectively by using Transaction MRL6, as shown in Figure 7.7. Similarly, the pool number can be maintained individually in the material master or collectively from Transaction MRLI.

Now that you know about the configuration and the calculation of the LIFO valuation, we'll move on to explore the link between LIFO valuation and the lowest value determination.

7.2.4 Lowest Value Comparison

Lowest value comparison links LIFO valuation to lowest value determination. The value (which is the result of the prices generated during lowest value determination) is compared to the gross value in the layer. The net value in the layer is stored from the lowest of these values.

Next, let's move on to discuss the concept FIFO valuation.

7.3 FIFO Valuation

To ensure that the valuations of stock of materials are carried out as realistically as possible, you can adopt the FIFO technique of balance sheet valuation. For FIFO valuation, the value of the stock is calculated based on the last stocks received. FIFO and weighted average are the acceptable methods of stock valuation as per GAAP and IFRS norms. Most companies use the FIFO or the weighted average method for stock valuation and the movement of goods. The weighted average method uses average costs over the reporting period to calculate the inventory balance.

Let's explain FIFO valuation with the help of an example, illustrated in Tables 7.14 and 7.15.

Period	GR Quantity	Value of GR	Price of GR
01	200	2000	10.00
02	400	4100	10.25
03	100	1050	10.50
04	300	3050	10.17
05	200	2100	10.50
06	500	5200	10.40
07	600	6600	11.00
08	400	4500	11.25
09	300	3300	11.00
10	400	4700	11.75
11	800	9200	11.50
12	600	7000	11.67
Total	4800	52800	

Table 7.14 FIFO-Relevant Goods Receipt during a Fiscal Year

As you can see in Tables 7.14 and 7.15, in this example, we assume that there are 3600 pieces of material in stock at the end of the fiscal year. For the FIFO valuation, the system adds up all of the quantities of goods received for each period until the closing stock is reached. In this case, the closing stock is 3100 pieces. The cumulative value from period 12 is 600, as shown in Table 7.15.

Period	GR Quantity	Value of GR	Cumulative Quantity
12	600	7000	600
11	800	9200	1400
10	400	4700	1800
09	300	3300	2100
08	400	4500	2500
07	600	6600	3100
Total	3100	35300	

Table 7.15 Sample FIFO Value Calculation

Therefore, the price according to the FIFO calculation is:

$$35300 / 3100 = 11.38$$

You now understand the principle of FIFO valuation and how it's performed. In the next section, we'll discuss FIFO configuration.

7.3.1 FIFO Configuration

Some of the configuration steps for LIFO and FIFO are the same for both. Thus, if you've configured LIFO in the system, you don't need to reconfigure them for FIFO.

The settings that you must address in the system before you run FIFO valuation are as follows:

- ▶ Determination of the FIFO valuation level
- ▶ Determination of the FIFO valuation areas
- ▶ Definition of a FIFO method
- ▶ Selection of movements relevant to FIFO
- ▶ Selection of materials relevant to FIFO
- ▶ Adopting data posted in a posting period

The various steps are as shown in Figure 7.8. The settings for the last three steps as mentioned in above list are common to both LIFO and FIFO. Except for the selection of materials relevant to FIFO and the adopting data posted in a posting period, all other steps as mentioned in the list above, are configured in Customizing under

the menu SAP IMG • MATERIALS MANAGEMENT • VALUATION AND ACCOUNT ASSIGNMENT • BALANCE SHEET VALUATION PROCEDURES • CONFIGURE LIFO/FIFO METHODS • GENERAL INFORMATION.

The step Selection of Materials Relevant to FIFO is maintained in the material master. The final step, Adopting Data Posted in a Posting Period, is performed in SAP Easy Access, as you can see in Figure 7.8.

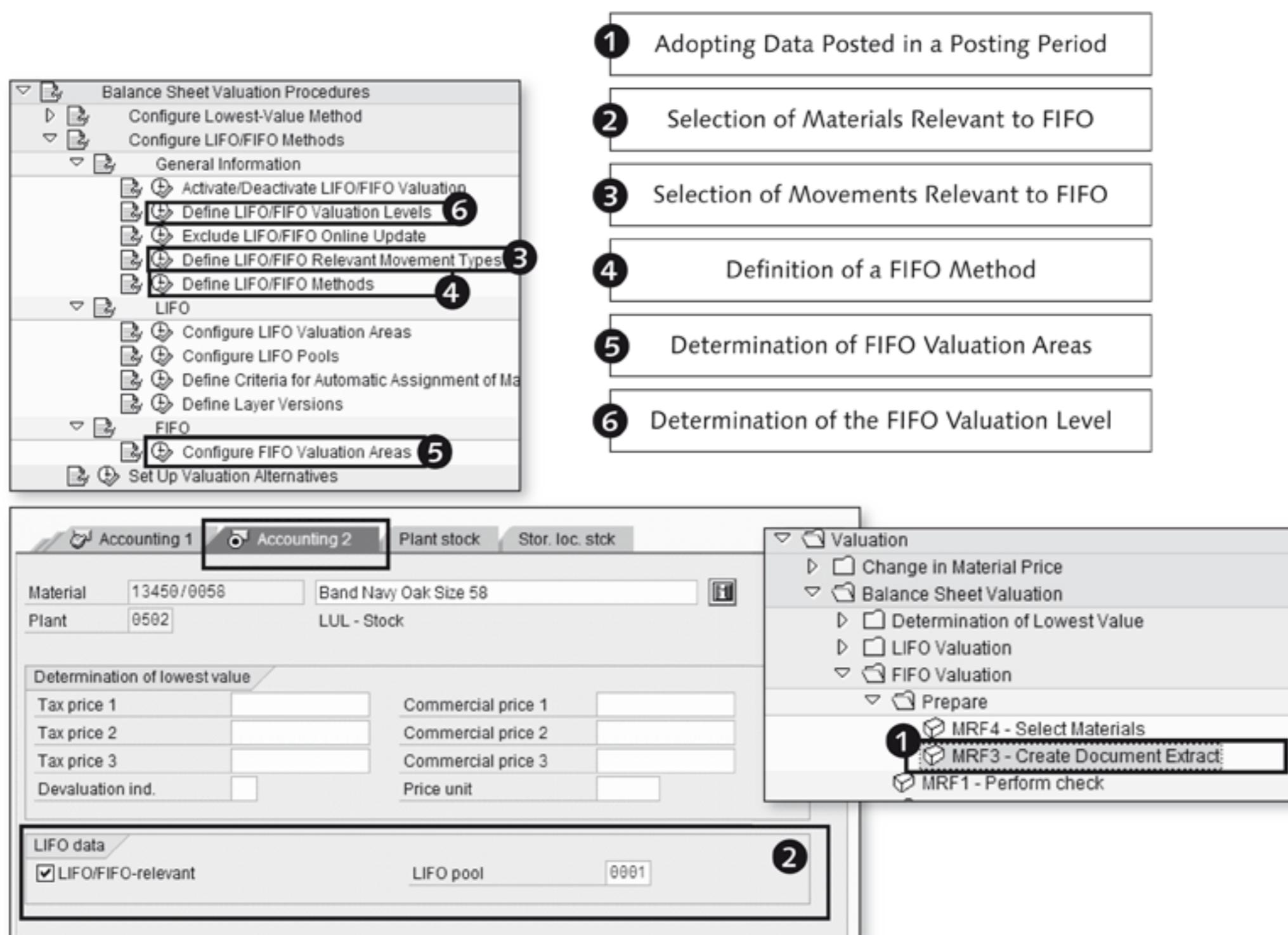


Figure 7.8 Configuration Steps for FIFO Valuation

As you can see from Figure 7.8, most of the options for configuring configuration indicate LIFO/FIFO, which means that the step is valid for both the LIFO and FIFO procedures.

Now that you know the steps for configuring FIFO valuation, we'll move on to outline the transactions associated with FIFO valuation.

7.3.2 Procedures for FIFO Valuation

FIFO valuation is similar to LIFO valuation and is carried out from the transaction codes in the SAP Easy Access menu path SAP MENU • LOGISTICS • MATERIALS MANAGEMENT • VALUATION • BALANCE SHEET VALUATION • FIFO VALUATION.

You can also display, change, and delete the FIFO valuation data. When large volumes of data are involved, it's best to use background processing for the FIFO data.

7.4 Summary

In this chapter, we reviewed the three different techniques for balance sheet valuation: lowest value determination, LIFO valuation, and FIFO valuation. We detailed the various lowest value determination techniques for balance sheet valuation and explained the various calculation formulas the system uses. We also explained LIFO and FIFO valuation with the help of examples to make things easier for you. This should help you understand what options you have available for balance sheet valuation within the SAP system. However, you must check your company's accounting principles policy before carrying out balance sheet valuation. In addition, the principle of conservatism is always the guiding factor.

In the next chapter, we'll explain the different type of account postings regarding inventory management and invoice verification, as well as the cash discount calculation.

Stock value depends on the stock's quantity and material price. A change in stock quantity during inventory management results in a change in material valuation. Similarly, a change in material price during LIV results in a change in material valuation.

8 Material Price Change

We've already described the basics of material price changes in Chapter 6, where we discussed the concept of value changes in the material master. In this chapter, we'll demonstrate and explain value changes in Inventory Management and value changes in Invoice Verification. We'll then move on to discuss value changes from cash discounts, the concept of split valuation, and processes associated with revaluation.

Throughout our discussions of material price changes, we're interested in various accounting entries that are created as a result. Therefore, we won't use the generic treatment of the subject on the basis of functional basis, SAP functional design, checkpoints and real-time issues, technical elements and troubleshooting tips in this chapter.

8.1 Value Changes in Inventory Management

Materials are valued according to the valuation area (plant). The movement of goods from one valuation area to another results in value changes. In this section, you'll learn about value changes that are caused due to a change in stock in Inventory Management. As we've discussed, the equation for stock value is:

*Stock value = stock quantity * material price*

Inventory Management deals with changes in stock quantity, which results in a change in stock value. Although there may not be a price change, we generally classify such changes in stock value under the category material price change. We do this to acknowledge the change in the MAP of the material when the purchase order price is not equal to the price maintained in the material master. As you

can see in Figure 8.1, the price in the purchase order is same as the MAP that's maintained in the material master. The account postings for the goods receipt in this case posts GBP 55.90 to the stock account and an equal amount to the GR/IR clearing account.

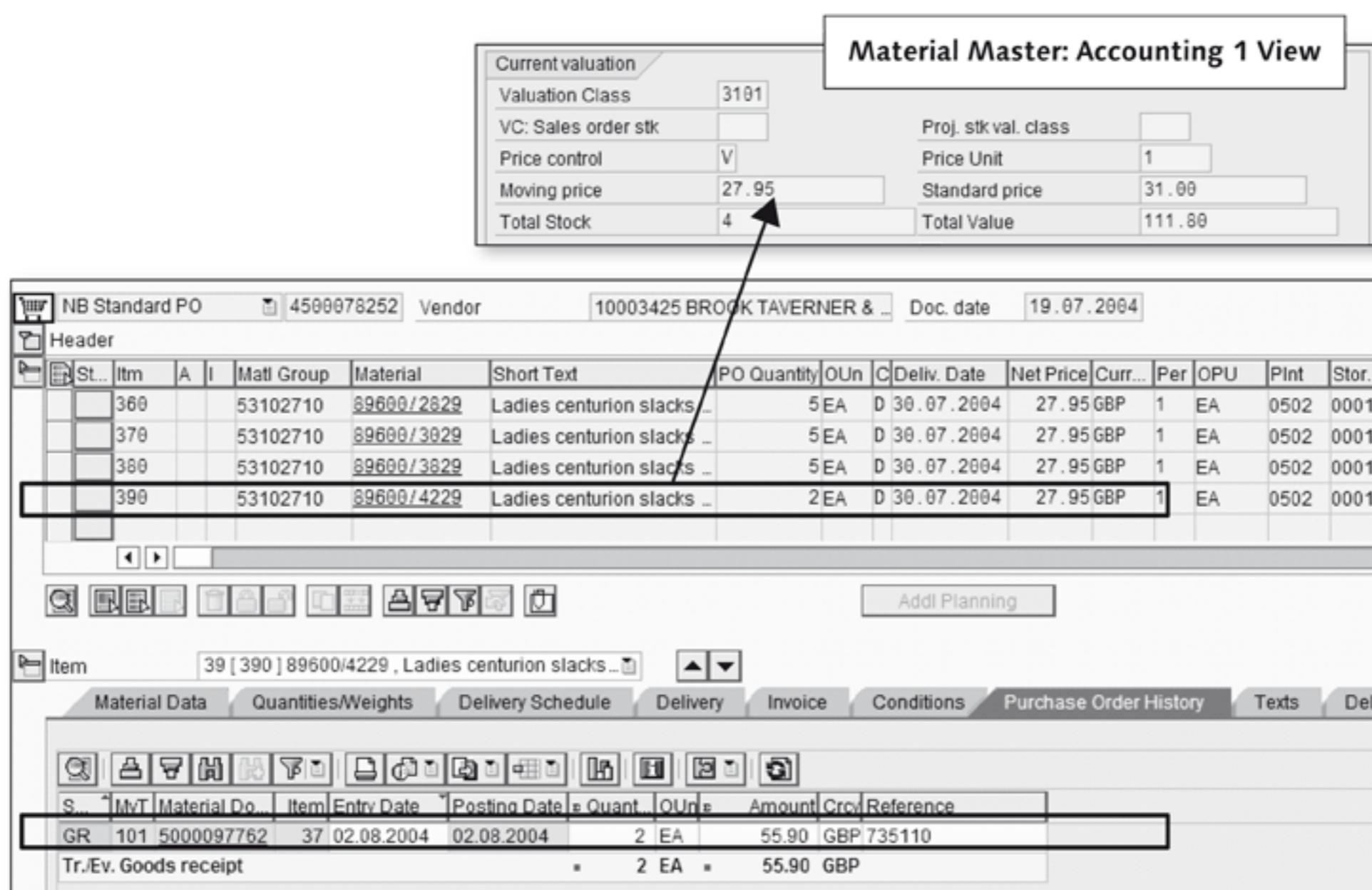


Figure 8.1 Purchase Order Price is the Same as the MAP in the Material Master

In this case, the MAP doesn't change in the material master. But, the quantity and the value are updated in the accounting data, as shown in Figure 8.1. To understand this better, let's start off with looking at the goods receipt for purchase orders.

8.1.1 Goods Receipt for Purchase Orders

Because we're interested in value change analysis, let's assume that all of the goods receipts are valued unless otherwise stated. In addition, we'll assume that the materials in question are MAP-controlled unless otherwise stated.

By price variance during purchase order and inventory management, we mean the difference between the price in the purchase order and that maintained in the material master. When the purchase order price is equal to that in the material

master, the price in the material master doesn't change as a result of goods receipt. The following example helps illustrate this point.

Goods Receipt without Price Variance

Table 8.1 shows the valuation data for a material before and after goods receipt. The initial stock was 2000 pieces with a MAP of 9.

Transaction	Total Stock (Pieces)	Total Value (USD)	MAP (USD/Piece)
Initial Stock Situation	2,000	18,000	9
Delivery of 500 Pieces for Purchase Order with an Order Price of 9 USD/Piece	2,500	22,500	9

Table 8.1 Sample Goods Receipt without Price Variance

A purchase order for 500 pieces was created at an order price of 9 USD/piece. Because the order price isn't different from the MAP in the material master, the stock and the total value increase proportionally to keep the MAP constant.

Goods Receipt with Price Variance

Table 8.2 shows the valuation data for a material before and after goods receipt with price variance.

Transaction	Total Stock (Pieces)	Total Value (USD)	MAP (USD/Piece)
Initial Stock Situation	2,000	18,000	9
Delivery of 500 Pieces for Purchase Order with an Order Price of 8 USD/Piece	2,500	22,000	8.8

Table 8.2 Sample Goods Receipt with Price Variance

A purchase order for 500 pieces was created at an order price of 8 USD/piece. Because the order price is different from the MAP in the material master, the value of 4,000 is added to the initial stock value of 18,000, reducing the MAP to 8.8.

Now that you understand material valuation for the goods receipt with and without price variance, we'll explain the sample account postings for planned delivery costs.

8.1.2 Account Postings: Planned Delivery Costs

As you already know from Section 6.1.4, planned delivery costs are entered in the purchase order. Planned delivery costs can be of the following types:

- ▶ Freight costs
- ▶ Customs charges
- ▶ Miscellaneous costs

You may define additional types of planned delivery costs in Customizing if you need to represent a planned delivery cost that hasn't been delivered in the SAP standard system. You can refer back to Chapter 6 to review the Customizing for condition types.

Just like there's a GR/IR clearing account, there's also a clearing account for planned delivery costs. The amount is cleared between goods receipt and invoice receipt. The example in Table 8.3 helps clarify this.

Purchase Order	Goods Receipt	Invoice Receipt
100 Pieces at USD 1.5/Piece Freight: USD 0.2/Piece Custom: USD 5	100 Pieces	100 Pieces at USD 1.5/Piece Freight: USD 0.2/Piece Custom: USD 5
Stock Account	175+	
GR/IR Clearing Account	150-	150+
Vendor Account		175-
Freight Clearing	20-	20+
Customs Clearing	5-	5+

Table 8.3 Account Postings for Planned Delivery Costs

As you can see in Table 8.3, freight clearing and customs clearing takes place between goods receipt and invoice receipt. If you look at the account postings from a higher level, it's apparent that the stock account is debited by 175 and the vendor account is credited by 175. This is the amount you pay to the vendor for the material you received. In Table 8.3, the amount of 175 is credited to the vendor account because this is the same vendor that needs to be paid for the goods/services and for freight. Had there been a different vendor for freight and customs charges, there wouldn't have been a posting to the freight and customs clearing account during the invoice for the goods/services vendor. In this case, the vendor

would instead have been credited by 150 and a separate invoice booking for the freight and customs vendor would have been necessary, with the system crediting an amount of 25 to this vendor and clearing the freight and customs clearing account.

8.1.3 Delivery Free of Charge

Although rare, there may be instances when materials are delivered and you don't need to pay the vendor for them; for example, the vendor may have a promotional offer that includes free items. Or, a government organization may provide a vaccine or medicine free of charge to your company. In these cases, there's just the goods receipt without need for invoice receipt. Let's look into value update for materials with the following price controls:

- ▶ Standard price-controlled materials
- ▶ MAP-controlled materials

A sample posting for standard price-controlled materials is shown in Table 8.4.

Transactions	Total Stock	Total Value	Standard Price
Initial Stock	2,000	18,000	9
Delivery of 500 Pieces Free of Charge	2,500	22,500	9
Account Postings for the Delivery of 500 Pieces Free of Charge			
Account		Goods Receipt	
Stock Account		4,500+	
Income from Price Differences		4,500-	

Table 8.4 Delivery Free of Charge for Standard Price-Controlled Materials

In this example, because the material is standard price-controlled, the value of the stock must increase in proportion to the total stock to maintain the standard price of 9. For a delivery of 500 pieces, the increase in value for the material is 500 multiplied by the standard price of 9. This is the value of the account posting that debits the stock account. The same amount is then offset from the income from price differences account.

For materials with MAP control, the increase in the material value is accommodated by a corresponding adjustment in the MAP. This is in sync with the assumption that the stock value shouldn't increase for the deliveries that are free of charge. Table 8.5 shows the valuation data.

Transactions	Total Stock	Total Value	MAP
Initial Stock	2,000	18,000	9
Delivery of 500 Pieces Free of Charge	2,500	18,000	7.2

Table 8.5 Delivery Free of Charge for MAP-Controlled Materials

As you can see in Table 8.5, the 500 pieces delivered free of charge increase the total stock but not the total value of the stock. This results in the adjustment of the MAP from 9 to 7.2.

8.1.4 Value Changes in Transfer Postings

A transfer posting generally refers to a change in a material's stock but may also involve an actual transfer of materials. In this section, we're interested in the transfer postings that result in the creation of an accounting document, thus affecting the valuation of materials. For example, the price of a perishable material (e.g., food products) may vary depending on the shelf-life expiry date. There might be one plant for storing and another for distributing, and the same material may be valued differently in each plant. In this case, there's a transfer posting from storage plant to distribution plant.

There are four different types of transfer postings. We'll start by reviewing transfer postings from one plant to another.

Plant-to-Plant

For a plant-to-plant transfer posting, the stock is reduced in the issuing plant depending on the price in the issuing plant, as illustrated in Table 8.6. When we talk about the transfer of stock from one plant to another, we are referring to plants in the same company code. We use the terminology company code to company transfer of stock when the plants involved belong to two different company codes.

Initial Situation	Plant 1000	Plant 1100
Price Control	Either S or V	V
Price	USD 9/Piece	USD 10/Piece
Stock	2,000 Pieces	4,000 Pieces
Value	USD 18000	USD 40000
Transfer Posting of 1,000 Pieces of Material from Plant 1000 to 1100		
Price Control	Either S or V	V
Price	USD 9/Piece	USD 9.8/Piece
Stock	1,000 Pieces	5,000 Pieces
Value	USD 9,000	USD 49,000

Table 8.6 Stock Transfer from Plant to Plant

As you can see in Table 8.6, the material is maintained at a price of USD 9 in plant 1000 and at a price of USD 10 in plant 1100. When 1,000 pieces of the material are transferred from plant 1000 to 1100, the value of the stock in plant 1000 decreases by the price of the issuing plant, which is USD 9 per piece. At the same time, the value of the stock increases for plant 1100 by the same amount. This results in the new MAP for the material in plant 1100.

As you can see, there is a price difference between issuing plant 1000 and receiving plant 1100. For the account postings, these price differences are posted either to the stock account (for a MAP-controlled material) or to the price differences account (for a standard price-controlled material) in the receiving plant. In addition, if plants 1000 and 1100 belong to different company codes, an accounting document is created for each company code.

For stock transfers from one plant to another, you have the following options:

► **Two steps**

In this case, you first post the stock withdrawal at the issuing plant and then the goods receipt at the receiving plant. Thus, two material documents are created. During the time between these two postings, the material is categorized as stock in transfer.

► **One step**

In this case, you post the stock withdrawal at the issuing plant and the receipt into stock at the receiving plant simultaneously. Just one material document is created as a result.

You should remember, however, that we're interested in value changes at the issuing plant and the receiving plant that holds goods, regardless of whether this is done in one step or two.

Now, let's move on to the next type of stock transfer: consignment to company-owned stock.

Consignment to Company-Owned Stock

As you know, consignment materials belong to the vendor but are stored at your company's site, and liability doesn't exist until you withdraw these materials from storage. The consignment info record maintains the price of the material subject to consignment. Table 8.7 shows you the valuation relevant to such a transfer posting.

Transactions	Total Stock	Total Value	Standard Price
Initial Stock	2,000	18,000	USD 9
Transfer Posting of 500 Pieces from Consignment to Company-Owned Stock	2,500	22,500	USD 9
Transfer Posting of 500 Pieces from Consignment to Company-Owned Stock. Price in the Consignment Info Record is 10			
Account	Transfer Posting		
Payables from Consignment Stores	5,000-		
Stock Account	4,500+		
Loss – Consumption	500+		

Table 8.7 Transfer Posting for Consignment to Company-Owned Stock

This is an example posting for materials with standard price control. If you remember, liabilities arise only when you withdraw the materials from the consignment stock. This is reflected by the credit of 5,000 that appears in the account for the payables from consignment stores. Because the price maintained in the consignment info record is different from the standard price in the material master, an amount of 500 is posted to the loss – consumption account. If the material had MAP control, the difference would have been posted to the stock account.

As shown in Figure 8.2, a transfer posting from consignment to your own stock can be carried out by following menu path MOVEMENT TYPE • TRANSFER POSTING • VENDOR CONSIGNMENT • CONSIGNMENT TO OWN. This screen belongs to Transaction MB1B, and can be accessed by going to LOGISTICS • MATERIALS MANAGEMENT • INVENTORY MANAGEMENT • GOODS MOVEMENT • TRANSFER POSTING.

As you can see in Figure 8.2, when you select Consignment to Own, the system defaults to Movement Type 411 and Special Stock indicator K.

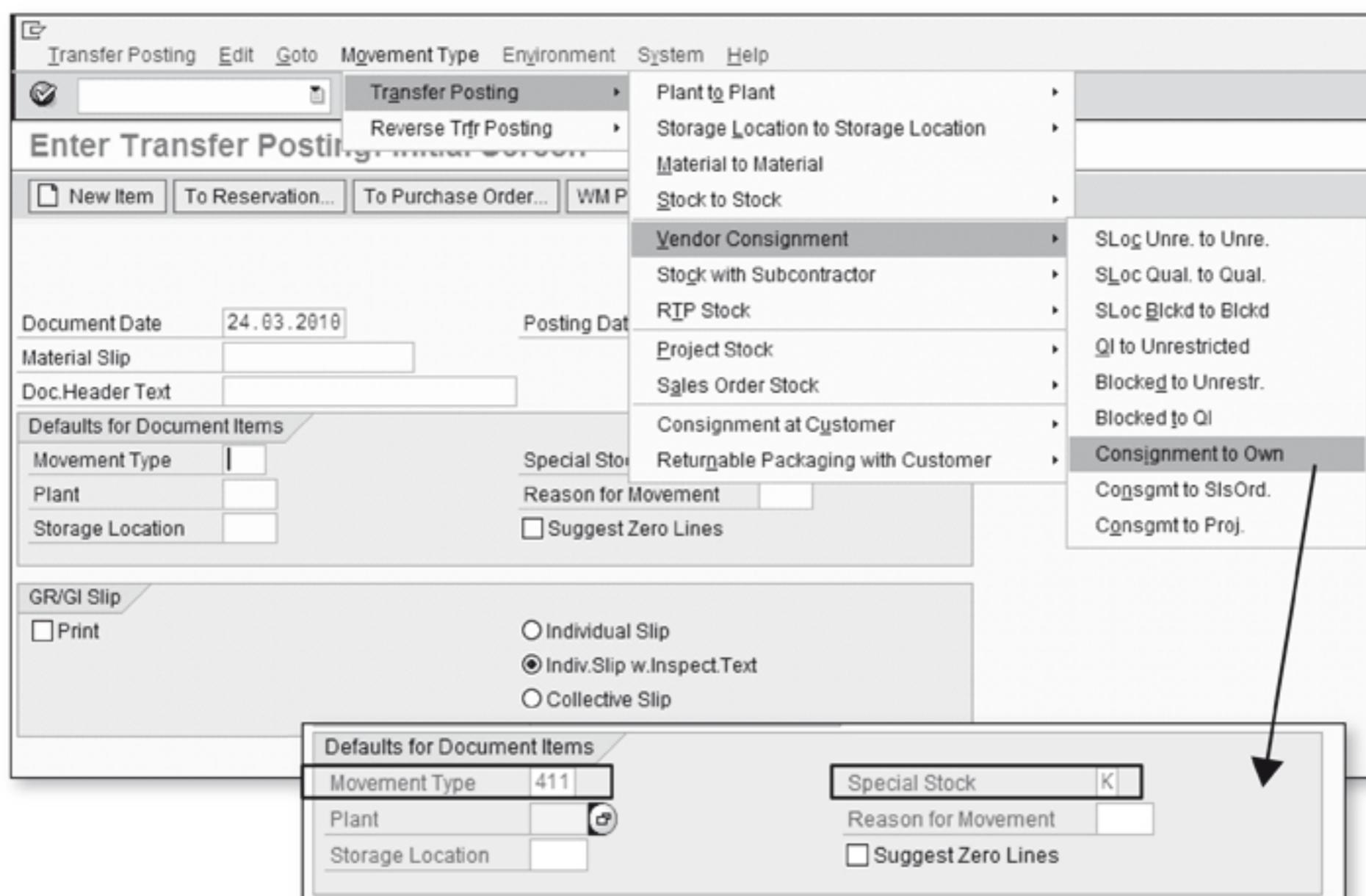


Figure 8.2 Transfer Posting from Consignment to Your Own Stock

We'll now take a look at the change in valuation associated with a transfer posting from material to material.

Material to Material

If you manage the stock of similar materials under different material numbers, you may have to transfer the stock of one material to another material. This tends to happen in the pharmaceutical industry or the chemical industry for example, when a material property changes in the course of time. An example account posting for such a transfer posting is shown in Table 8.8.

Initial Situation	Material A	Material B
Price Control	Either S or V	V
Price	USD 9/Piece	USD 10/Piece
Stock	2,000 Pieces	4,000 Pieces
Value	USD 18,000	USD 40,000
Transfer Posting of 1000 Pieces of Material A to Material B		
Price Control	Either S or V	V
Price	USD 9/Piece	USD 9.8/Piece
Stock	1,000 Pieces	5,000 Pieces
Value	USD 9000	USD 49000

Table 8.8 Transfer Posting from Material to Material

In this example, there's a price difference between Material A and Material B, and Material B is controlled by MAP control. Thus, during account posting, the differences are posted to the stock account. For standard price-controlled materials, differences are posted to the price difference account.

Let's move on to transfer postings from one valuation type to another.

Valuation Type to Valuation Type

You can transfer the stock of a material from one valuation type to another for materials subject to split valuation. The principle of valuation is similar to what we described in the previous subsections regarding value changes in transfer postings. To provide more clarity, we'll use the previous example with standard price control, as you can see in Table 8.9.

Initial Situation	Valuation Type Inland	Valuation Type Ausland
Price Control	Either S or V	S
Price	USD 9/Piece	USD 10/Piece
Stock	2,000 Pieces	4,000 Pieces
Value	USD 18,000	USD 40,000

Table 8.9 Transfer Posting from Valuation Type to Valuation Type

Transfer Posting of 1000 Pieces from Valuation Type Inland to Valuation Type Ausland		
Price Control	Either S or V	S
Price	USD 9/Piece	USD 9/Piece
Stock	1,000 Pieces	5,000 Pieces
Value	USD 9,000	USD 45,000

Table 8.9 Transfer Posting from Valuation Type to Valuation Type (Cont.)

As you can see, the value update for the valuation type Ausland is USD 45,000. The remaining difference of USD 4,000 is posted to the price differences account during account postings because valuation type Ausland uses standard price control.

Having discussed the various kinds of value changes for transfer postings, let's move on to the special case of initial entry of the inventory data.

8.1.5 Initial Entry of Inventory Data

When the SAP system goes live, you initially enter your inventory data from your legacy system. However, it's also possible to enter initial inventory data entries when the SAP system is active, both for new materials and materials for which stock already exists. This could be the case if you're implementing a global rollout of the SAP system at various plants that weren't previously live on the SAP system.

We'll illustrate the initial entry of inventory data with the help of examples for standard price and MAP-controlled materials.

Standard Price Controlled Materials

With standard price-controlled materials, the initial entry of inventory data is valued on the basis of the standard price. If you enter an alternative value during the initial entry of inventory data, the difference is posted to the price differences account. Table 8.10 shows the valuation data and account postings for such a case.

As you can see, an initial entry of inventory data is performed for 2,000 pieces of material with a value of 20,000. Because the material in question is standard price-controlled with a price of USD 9, the value of the stock increases accordingly. The difference of 2,000 is posted to the price differences account.

Transaction	Price Control	Standard Price	Total Stock	Total Value
Values Before Initial Entry	S	USD 9	0	0
Initial Entry of 2,000 Pieces of Material with a Value of 20,000	S	USD 9	2,000	18,000
Account	Initial Stock Balance			
Stock Account	18,000+			
Account for Initial Stock Balance	20,000-			
Price Differences Account	2,000+			

Table 8.10 Initial Entry of Inventory for S-Price-Controlled Materials

We'll now take a look at a similar example for MAP-controlled materials. Table 8.11 shows valuation data and the account postings for materials with MAP control. To emphasize the point that the initial entry of inventory data is also possible for materials for which stock already exists, we've chosen an example where the stock isn't zero initially.

Transaction	Price Control	MAP	Total Stock	Total Value
Values Before Initial Entry	V	USD 9	2,000	18,000
Initial Entry of 2,000 Pieces of material with a value of 20,000	V	USD 9.5	4,000	38,000
Account	Initial Stock Balance			
Stock Account	20,000+			
Account for Initial Stock Balance	20,000-			

Table 8.11 Initial Entry of Inventory for V-Price-Controlled Materials

Because the material in this example is MAP-controlled, the total value and the total stock are updated with the values entered at the time of the initial entry of 2,000 pieces of the material, with a value of USD 2,000. As you can see in the account postings, the price differences account doesn't enter into the picture.

Value changes during goods issue

For materials with MAP control and standard price control, the price before and after the goods issue remains the same. This is because goods issues are always valued at the current price. Therefore, the total value and the total stock reduce in accordance with the price.

Although we've covered most of the cases of value changes in Inventory Management, we've yet to deal with one of its most important aspects: the valuation and the account postings associated with goods receipt reversal.

8.1.6 Goods Receipt Reversal

As you already know, the following types of control exist in the purchase order for goods receipt and invoice receipt:

- ▶ GR-based invoice verification
- ▶ Non GR-based invoice verification

With GR-based invoice verification, the system keeps track of individual deliveries, which are taken into account at the time of invoice verification. Reversing these types of goods receipts is easy because the postings are typically reversed.

For non GR-based invoice verification, the system doesn't keep track of individual deliveries and aggregates them at the time of invoice verification. Reversing such goods receipts might not exactly reverse the account postings, especially in the following cases:

- ▶ Reversal of delivery costs
- ▶ Reversal of goods receipts for returns items
- ▶ Reversal of goods receipts for subcontracting orders that are valued differently
- ▶ Reversal of goods receipts with different values in the local currency

When several goods receipts are posted with different order prices, the system posts the reversal of the goods receipts with the average receipt value of the goods receipts.

In the example provided in Table 8.12, the account postings are made when reversing the goods receipt. The reversal is carried out after the goods receipt, which is valued differently.

As you can see, initially a goods receipt of 10 pieces is entered for a purchase order of 100 pieces at USD 8/piece. The price is then changed in the purchase order to USD 10/piece. Next, another goods receipt is posted for 10 pieces. Finally, the invoice is posted for 10 pieces at USD 10/piece.

Transaction	GR (Pieces)	GR (Pieces)	GR Reversal	Invoice Receipt
Purchase Order for 100 Pieces at USD 8/Piece	10			
Purchase Order Price Changed to USD 10/Piece		10		
Goods Receipt Reversal			10	
Invoice for 10 Pieces at USD 10/Piece				
Account	GR	GR	GR Reversal	Invoice
Stock Account	80+	100+	90-	10+
GR/IR Clearing Account	80-	100-	90+	90+
Vendor Account				100-

Table 8.12 Goods Receipt Reversal

Here, we assume that the material is subject to MAP control. For the first goods receipt of 10 pieces, the price on the purchase order is USD 8/piece; thus, the stock account and the GR/IR clearing account are debited and credited respectively by an amount of USD 80.

For the second goods receipt of 10 pieces, the price on the purchase order is 10/piece; thus, the stock account and the GR/IR clearing account are debited and credited respectively by an amount of USD 100.

At the time of the goods receipt reversal for 10 pieces of the material, the system checks whether this involves GR-based invoice verification so that the corresponding goods receipt can be reversed. Because in our case GR-based invoice verification isn't involved, the system calculates the average receipt price as follows:

$$\text{Average Receipt Price} = \text{Quantity} * \text{GR Value} / \text{GR Quantity}$$

$$= 10 * (80 + 100) / (10 + 10) = 90$$

Finally, when the invoice is entered for 10 pieces at USD 10/piece, the GR/IR clearing account is cleared. Note that the GR/IR clearing account is knocked off based on the quantity. Because the effective goods receipt quantity after the goods receipt reversal is only 10 pieces, the system tends to knock off the balance on the GR/IR clearing account for the invoice receipt of 10 pieces. Therefore, an amount of 90 is debited to the GR/IR clearing account. The vendor account is credited by

the invoice price and quantity. The difference between the vendor account and the GR/IR clearing account is posted to the stock account because this is how MAP-controlled materials are handled.

The sample posting is key to understanding goods receipt reversal. Next, let's review a sample posting for a goods receipt reversal that's posted after goods receipt and invoice receipt.

Goods Receipt Reversal after Goods Receipt and Invoice Receipt

Table 8.13 shows a sample posting where 10 pieces of goods receipt are posted for a purchase order of 100 pieces at USD 8/piece. An invoice is then entered for 10 pieces at a price of USD 11/piece. Finally, the goods receipt reversal for 10 pieces is carried out.

For the first goods receipt of 10 pieces, the price on the purchase order is USD 8/piece; therefore, the stock account and the GR/IR clearing account are debited and credited respectively by an amount of USD 80.

Step No.	Transaction	GR (Pieces)	IR (Pieces)	GR Reversal
1	Purchase Order for 100 Pieces at USD 8/Piece	10		
2	Invoice for 10 Pieces at USD 10/Piece		10	
3	Goods Receipt Reversal			10
	Account	GR	IR	GR Reversal
	Stock	80+	20+	100-
	GR/IR Clearing Account	80-	80+	100+
	Vendor		100-	

Table 8.13 Goods Receipt Reversal for Invoice Receipt before Goods Receipt

For the invoice receipt of 10 pieces at USD 10/piece, the system first knocks off the GR/IR clearing account, because the invoice receipt quantity is equal to the goods receipt quantity of 10 pieces. The vendor account is credited by the amount that's entered in the invoice. Therefore, the difference of 20 is then debited to the stock account.

Finally, during goods receipt reversal, the system takes the invoice price into account and not the purchase order price. Note that the system considers the

invoice price to be more authentic from the point of view of account postings than the purchase order price. Thus, an amount of USD 100 is debited to the GR/IR clearing account and the same amount of 100 is credited from the stock account. In a sense, this balances out the GR/IR clearing account posting of USD 80 based on the purchase order price. If, for example, a new goods receipt is posted for 10 pieces, the GR/IR clearing account would be credited by 100.

Generally, the account postings in the stock account update the total value of the stock and result in a change in the MAP of the materials. This is calculated as the total stock value divided by the total stock quantity.

Order unit and the order price unit in valuation

The order unit (OUn) is the unit in which you create the purchase order, and the order price unit (OPUn) is the unit in which the vendor charges you. For example, you may order 100 apples, but the vendor charges you in kilograms (kg). Therefore, for the purpose of valuation, the OPUn is very important because you'll have to pay your vendor on the basis of the OPUn.

We'll now illustrate sample postings for goods receipt reversal for purchase order price quantity variances.

Goods Receipt Reversal for Purchase Order Price Quantity Variances

The quantity expressed in the purchase order unit is called the purchase order quantity. Similarly, the quantity expressed in the purchase order price unit is called the purchase order price quantity.

The account postings at the time of goods receipt and invoice receipt may look different when the OUn is not same as the OPUn. Table 8.14 shows a sample posting if the OUn is not same as the OPUn.

Step No.	Transaction (1 Piece OUn – 10kg OPUn)	IR (PC)	GR (PC)	GR (PC)	Return Delivery
1	Purchase Order for 100 Pieces at USD 1/kg				
2	Invoice for 100 Pieces, which equals 1,000kg at USD 1/kg	100			
3	Goods Receipt of 50 Pieces – 300kg		50		
4	Goods Receipt of 40 Pieces – 600kg			40	

Table 8.14 Return Delivery for Purchase Order Price Quantity Variance

Step No.	Transaction (1 Piece OUn – 10kg OPUn)	IR (PC)	GR (PC)	GR (PC)	Return Delivery
5	Goods Receipt Reversal of 40 Pieces – 200kg				40 Pieces
	Account	IR	GR	GR	Return Delivery
	Stock		300+	600+	200-
	GR/IR Clearing Account	1,000+	300-	600-	200+
	Vendor	1,000-			

Table 8.14 Return Delivery for Purchase Order Price Quantity Variance (Cont.)

As shown in Table 8.14, we created a purchase order for 100 pieces at USD 1/kg. Kg is the OPn and piece is the OUn with one piece being equivalent to 10kg.

As the first step, we entered an invoice into the system for 100 pieces of the material. This is equivalent to 1,000kg with a value of USD 1,000. Thus, for this transaction, the GR/IR clearing account is debited by 1,000 and the vendor account is credited by the same amount.

For the first goods receipt of 50 pieces, the equivalent order price quantity is 300kg. This means that the account postings are made for that value. Therefore, 300 is credited from the GR/IR clearing account and the equivalent amount is debited to the stock account.

For the second goods receipt of 40 pieces, the equivalent order price quantity is 600kg. This means that the account postings are made for that value. Thus, 600 is credited from the GR/IR clearing account and the equivalent amount is debited to the stock account.

Finally the goods receipt reversal is posted for 40 pieces. In this case, the goods receipt reversal represents the return delivery. Therefore, you must inform the system how much of goods receipt quantity you're returning in terms of OPUn. The valuation is carried out for the quantity you return in the OPUn. Because we're returning 200kg for the 40 pieces, the system debits the GR/IR clearing account by 200 and credits the stock account by the same amount.

You should now understand how goods receipt reversal works for OUn and OPUn. In the example provided, the invoice covered both the goods receipts and the goods receipt reversal in the OPUn. What if the sum of quantities in various goods

receipts in the OPUn exceeded than those in the invoice? Even if you receive more quantity at the time of goods receipts in the OPUn, thus getting more value of material than you've been invoiced, you should only enter the quantity in OPUn during GR, up to the value you have to pay. The example posting in Table 8.15 will help clarify this concept.

Step No.	Transaction (1 Piece OUn – 10kg OPUn)	IR (PC)	GR (PC)	GR (PC)	Return Delivery
1	Purchase Order for 100 Pieces at USD 1/kg				
2	Invoice for 100 Pieces, which equals 1,000kg at USD 1/kg	100			
3	Goods Receipt of 90 Pieces – 950kg		90		
4	Goods Receipt of 10 Pieces – 100kg			10	
5	Return Delivery of 10 Pieces – 105kg				10 Pieces
Account		IR	GR	GR	Return Delivery
Stock			950+	50+	55-
GR/IR Clearing Account		1,000+	950-	50-	55+
Vendor		1,000-			

Table 8.15 Return Delivery for Purchase Order Price Quantity Variance

As shown in Table 8.14, we created a purchase order for 100 pieces at USD 1/kg. Kg is the OPUn and piece is the OUn with one piece equivalent to 10kg.

As the first step, we entered an invoice into the system for 100 pieces of the material. This is equivalent to 1,000kg with a value of USD 1,000. Thus, for this transaction, the GR/IR clearing account is debited by 1,000 and the vendor account is credited by the same amount.

For the first goods receipt of 90 pieces, the equivalent order price quantity is 950kg. This means that the account postings are made for that value. Therefore, USD 950 is credited from the GR/IR clearing account and the equivalent amount is debited to the stock account.

For the second goods receipt of 10 pieces, the equivalent order price quantity is 100kg. This means that the account postings would have to be done for that value.

However, if the system posts 100 to the GR/IR clearing account, this would cause an imbalance, because we aren't expecting any more invoices. For the purchase order of 100 pieces, the following postings are made:

1. Invoice for 100 pieces
2. Goods receipt of 90 pieces
3. Goods receipt of 10 pieces

Therefore, in principle, there should be no balance on the GR/IR clearing account at the end of these three transactions. Because of this, the second goods receipt posts only USD 50 to the GR/IR clearing account and an equivalent amount is debited to the stock account.

Finally, during the return delivery of 10 pieces of material equivalent to 105kg (thus USD 105), the system considers the last goods receipt in which the amount of USD 100 was ignored and only USD 50 was posted for keeping the GR/IR clearing account consistent. Thus, instead of posting 105, the system posts USD 55 ($105 - 50$) to the GR/IR clearing account. The stock account is then credited by the same amount.

You're now in a good position to explain the complex account postings associated with purchase order price quantity variances. This completes our discussion of value changes in Inventory Management and we'll move on to value changes in LIV.

8.2 Value Changes in Logistics Invoice Verification

Although we'll discuss invoice variances in detail in Chapter 10, we'll consolidate the concepts associated with value changes in LIV in this section. Many of the concepts have already been explained to you in bits and pieces.

The stock of a material doesn't change when you enter invoices into the system. Therefore, the value changes in LIV can only be effected by a change in price of the materials. In addition, a price change of a standard price-controlled material isn't possible; therefore, only MAP-controlled materials can effect value changes in LIV. The difference between the invoice price and the purchase order price is posted either to the stock account or the price differences account depending on whether the price control for the material is V or S.

Insufficient stock coverage in LIV

For a MAP-controlled material, the difference between the purchase order price and the invoice price is posted to the stock account. However, if there's not enough stock, the system posts the amount in the stock account to the extent of the stock coverage. The rest of the amount is posted to the price differences account. This prevents fictitious costs from appearing on the stock account. For example, if you have 10 pieces of material in the stock and you put an amount corresponding to the price difference between the purchase order price and the invoice receipt price of 100 pieces, the MAP rises to incorrect values. This isn't desirable, so the system posts the amount associated with 10 pieces to the stock account and posts the amount associated with 90 pieces to the price differences account. This concept will be explained with the help of an example in Chapter 10.

8.2.1 Subsequent Debit/Credit

What do you do if an invoice has already been posted and you learn about additional expenses that should have been taken into account at the time of invoice? Or, if you're informed that you need to pay less than what has been entered in the invoice? In these cases, you post a subsequent debit/credit into the system.

Figure 8.3 shows Transaction MIRO, where you can post the following transactions:

- ▶ Invoice
- ▶ Credit Memo
- ▶ Subsequent Debit
- ▶ Subsequent Credit

As you can see in Figure 8.3, the subsequent debit/credit can be posted in Transaction MIRO by selecting the appropriate option. Because the subsequent debit concerns the additional amount associated with the already posted invoice, the system proposes the quantity from the invoice and keeps the amount blank so that you can enter the appropriate value.

When you post a subsequent debit, the system doesn't retain the text Subsequent Debit in the Transaction field. Instead, it changes the text to Invoice. Therefore, from a posted invoice, you can't tell whether it's an invoice or a subsequent debit. Similarly, you won't be able to tell from a credit memo whether it's a subsequent credit or a credit memo.

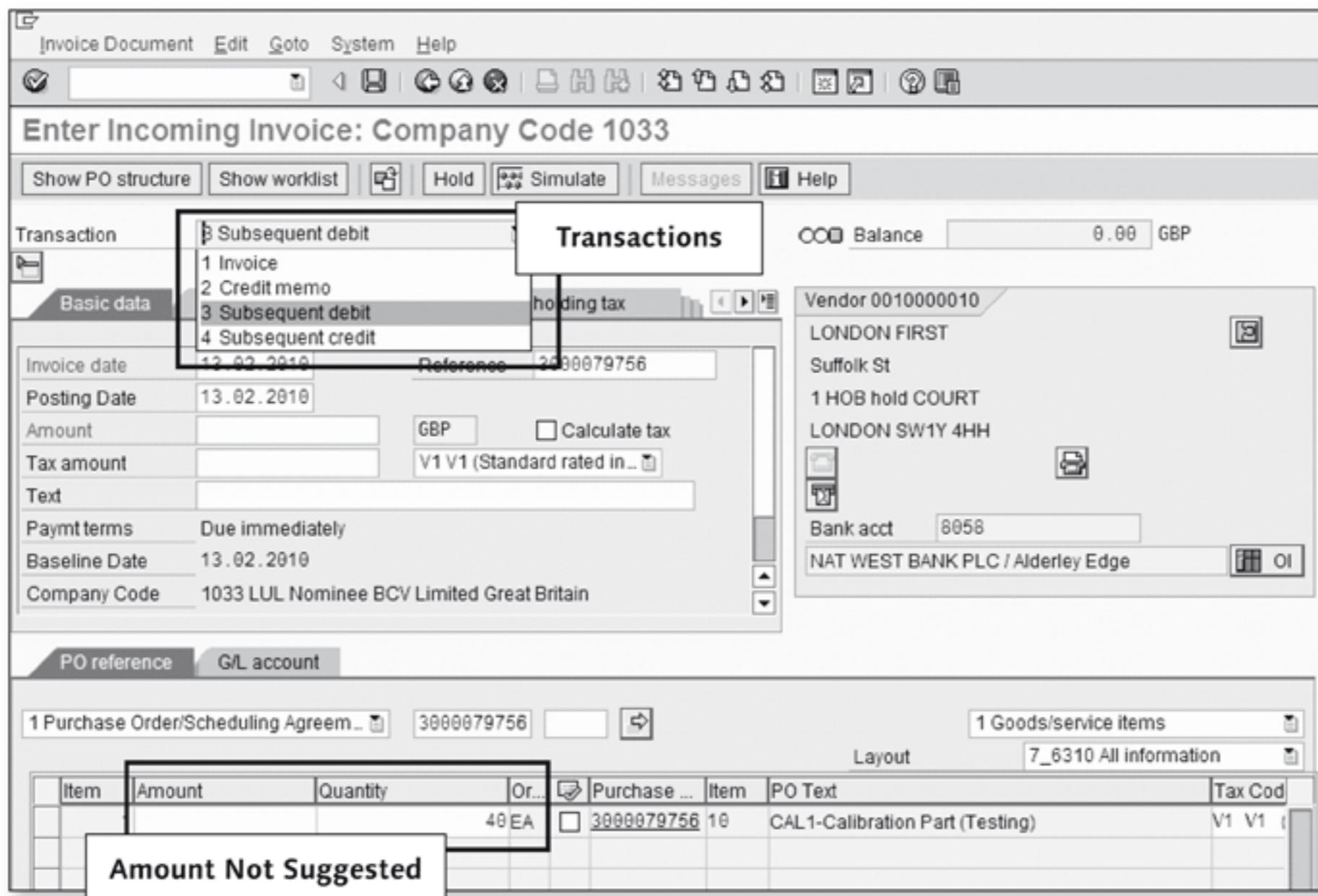


Figure 8.3 Transaction MIRO for Subsequent Debit/Credit

Table 8.16 shows the postings related to subsequent debit.

Transaction	GR (Pieces)	IR (Pieces)	Subsequent Debit (Amount)
Purchase Order for 80 Pieces at USD 1.25/Piece			
Goods Receipt of 80 Piece	100		
Invoice for 80 Pieces at USD 1.25/Piece		80	
Subsequent Debit			20
Account	GR	IR	Subsequent Debit
Stock Account	100+		20+
GR/IR Clearing Account	100-	100+	
Vendor Account		100-	20-

Table 8.16 Postings during Subsequent Debit

You're already familiar with all of the postings except that during subsequent debit. As you can see, an amount of 100 is credited to the vendor account and a similar amount is debited to the stock account. This results in an increase in the stock value of the material and therefore an increase in its MAP.

The postings for subsequent credit are similar, except that they debit the vendor account and credit the stock account. Ideally, this is the case when the vendor agrees to charge you less for the invoices already entered in the system.

We'll now take a look at a scenario where there's a difference between the goods receipt and the invoice receipt quantity for a particular line item of the PO. When there is a mismatch between the quantities goods received and quantities invoiced, amounts posted in the SAP General Ledger account for the GR/IR Clearing Account during GR and IR do not cancel each other. If you want to close the transaction, acknowledging that you don't expect further matching goods receipts or invoice receipts, you go for the transaction Maintain GR/IR Clearing Account. We execute this from Transaction MR11 in the SAP Easy Access Menu path: SAP MENU • LOGISTICS • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • GR/IR ACCOUNT MAINTENANCE • MAINTAIN GR/IR CLEARING ACCOUNT.

Warning and error messages for credit memos

Unlike subsequent credit, credit memos refer to the actual return of materials to the vendor and represent the reversal of an invoice. The system may issue the following messages:

- ▶ Reversal Quantity Greater than Quantity Invoiced to Date
The credit memo represents the reversal of the invoice, and you can't reverse something that's more than what's been invoiced.
- ▶ Reverse Entry Value is Set Automatically for Full Reversal
Because the credit memo represents the reversal of an invoice, the system changes the amount in the credit memo to that in the invoice when you try to post it for the quantity that's been invoiced. This is intended to prevent situations where you don't have stock but have a stock value.
- ▶ Reversal Value is Greater than Value Invoiced to Date
This message indicates that you can't claim the money from your vendor simply by returning the materials supplied.

8.2.2 GR/IR Clearing Account Maintenance

The quantity variance between the goods receipt and the invoice receipt for a purchase order results in a balance in the GR/IR clearing account. You must clear

the GR/IR clearing account manually if you don't expect further goods receipts or invoices to clear this balance.

Table 8.17 shows the postings for manual GR/IR clearing:

Transaction	GR (Pieces)	IR (Pieces)	GR/IR Clearing (Pieces)
Purchase Order for 100 Pieces at USD 1.25/Piece			
Goods Receipt of 100 Pieces	100		
Invoice for 80 Pieces at USD 1.25/Piece		80	
GR/IR Clearing Account Maintenance			20
Account	GR	IR	GR/IR Clearing
Stock Account	125+		25-
GR/IR Clearing Account	125-	100+	25+
Vendor Account		100-	

Table 8.17 GR/IR Clearing Account Maintenance

As you can see, for a purchase order of 100 pieces, a goods receipt is posted for 100 pieces, but the invoice is posted for only 80 pieces. Because we don't expect an invoice for the remaining 20 pieces, we need to manually clear the GR/IR clearing account for the amount corresponding to the difference of 20 pieces. The GR/IR clearing account is debited by an amount of 25 and the stock account is credit by the same amount. This amount is the difference that existed on the GR/IR clearing account during goods receipt and invoice receipt.

For materials with standard price control, the system would have posted the amount of 25 to the price differences account instead of the stock account.

In addition, the system posts to the stock account subject to the stock coverage. In the event of insufficient stock coverage, the system posts to the stock account in proportion to the stock coverage. The remaining amount is posted to the price differences account.

Because the amount posts to the stock account during GR/IR clearing account maintenance, the valuation of the stock may change and this results in the material price change.

In short, LIV doesn't change the stock quantity but may change the stock value of materials with MAP control. If there's a stock shortage at the time of invoice, the system posts the proportionate amount to the price differences account.

8.3 Value Changes Resulting from Cash Discounts

Before we explain value changes resulting from cash discounts, we'll briefly demonstrate the cash discount that's taken into account during purchase order creation and LIV. Figure 8.4 shows screenshots of the areas where cash discounts are taken into account at the time of purchase order creation and invoice entry.

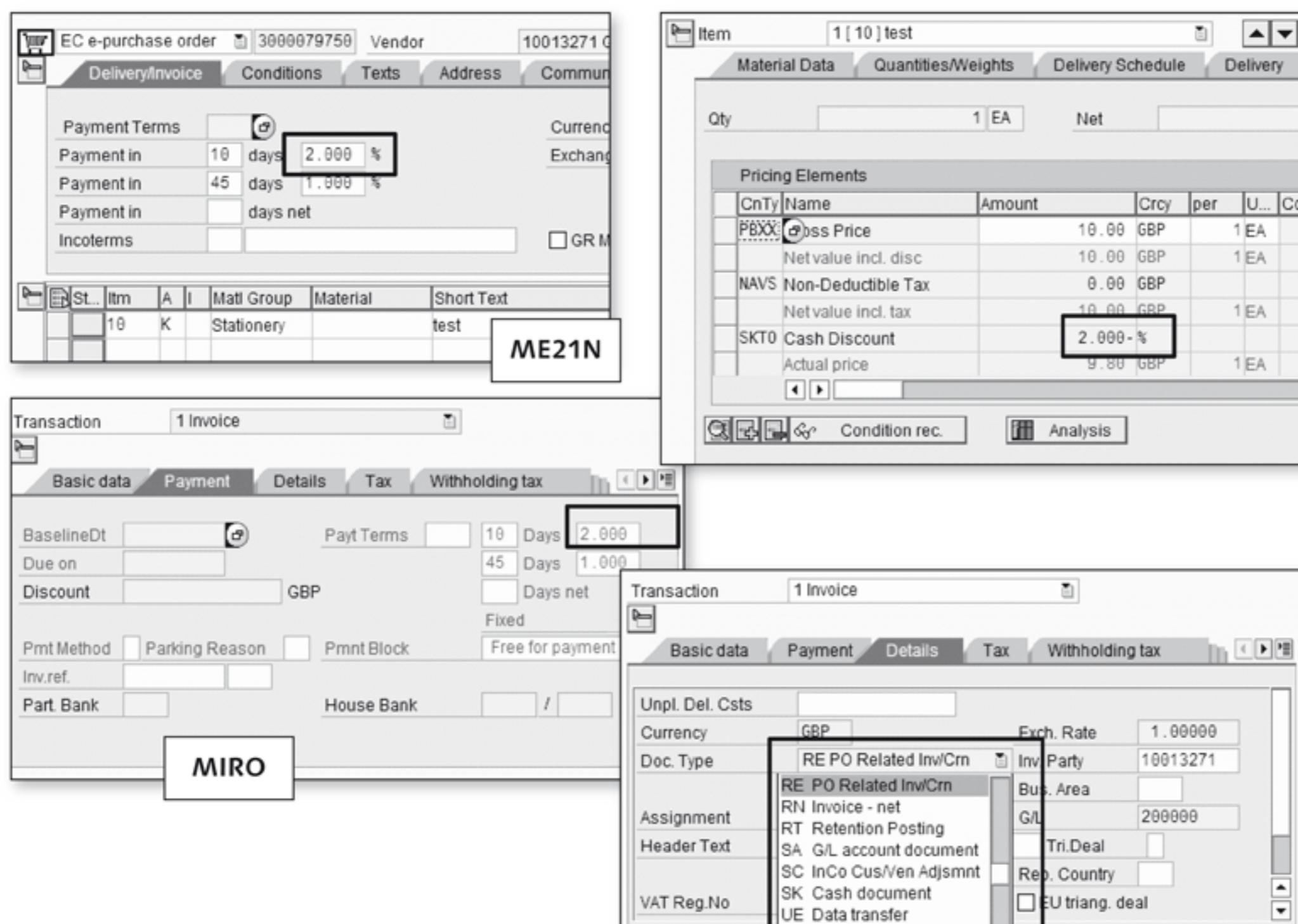


Figure 8.4 Cash Discount During Purchase Order Creation and LIV

As you can see in Figure 8.4, the cash discount is taken into account with the terms of payment. You can either maintain the terms of payment in the vendor master – to default the values at the time of purchase order creation – or enter the cash

discount manually. After you enter a cash discount, the value reflects on the Conditions tab under condition type SKTO. Finally, when you enter invoices in Transaction MIRO, you can edit the cash discount on the Payment tab of the header data. The way the cash discount is handled during account postings is decided by the document type. There are two options available in the SAP system:

- ▶ Gross posting
- ▶ Net posting

With gross posting, the cash discount amount isn't taken into account at goods receipt or invoice receipt. The cash discount amount is posted at the time of payment run, to a non-operating income account instead of the stock account in question.

With net posting, the cash discount amount is posted to the stock account for materials with MAP control. For materials with standard price control, it's posted as a type of price variance.

We'll now take a look at the combination of goods receipt and invoice receipt for gross and net postings. To start, we'll demonstrate gross goods receipt and gross invoice receipt.

8.3.1 Gross Goods Receipt – Gross Invoice Receipt

Here, the cash discount isn't taken into account for either goods receipt or invoice receipt until Financial Accounting payment. Table 8.18 shows a sample posting.

Transaction	GR (Pieces)	IR (Pieces)	FI Payment
Purchase Order for 100 Pieces at USD 1.25/Piece with 4% Cash Discount			
Goods Receipt of 100 Pieces	100		
Invoice for 100 Pieces at USD 1.25/Piece Minus 4% Cash Discount		100	
Account	GR	IR	FI Payment
Stock Account	125+		
GR/IR Clearing Account	125-	125+	
Vendor Account		125-	125+
Non-Operating Result			5-
Bank			120-

Table 8.18 Postings for Gross Goods Receipt – Gross Invoice Receipt

As you can see in Table 8.18, the cash discount doesn't affect the stock account because both the goods receipt and the invoice receipt are posted at gross. The system posts the income from the cash discount to the non-operating result account.

Let's move on to situations where the goods receipt is gross and the invoice receipt is net.

8.3.2 Gross Goods Receipt – Net Invoice Receipt

Here, the cash discount isn't taken into account for the goods receipt but is instead considered during account postings for the invoice receipt. Table 8.19 shows a sample posting.

Transaction	GR (Pieces)	IR (Pieces)	FI Payment
Purchase Order for 100 Pieces at USD 1.25/ Piece with 4% Cash Discount			
Goods Receipt of 100 Pieces	100		
Invoice for 100 Pieces at USD 1.25/Piece minus 4% Cash Discount		100	
Account	GR	IR	FI Payment
Stock Account	125+	5-	
GR/IR Clearing Account	125-	125+	
Vendor Account		125-	125+
Cash Discount Clearing		5+	5-
Bank			120-

Table 8.19 Postings for Gross Goods Receipt – Net Invoice Receipt

As you can see in Table 8.19, the cash discount doesn't affect the stock account at the time of goods receipt but is taken into account for the invoice receipt. For the invoice receipt, the cash discount is debited to the cash discount clearing account, and the same amount is credited from the stock account. At the time of Financial Accounting payment, the cash discount clearing account is knocked off with the value posted at the time of invoice receipt. The other postings for the bank and the vendor account are as expected.

We'll now take a look at a situation where both the goods receipt and the invoice receipt are posted at net.

8.3.3 Net Goods Receipt – Net Invoice Receipt

For net goods receipts with net invoice receipts, the cash discount is taken into account for both the goods receipt and the invoice receipt. Table 8.20 shows a sample posting. Because the cash discount is taken into account during the goods receipt, the system posts the amount reduced by the cash discount into the stock account. An equivalent amount is posted to the GR/IR clearing account.

Transaction	GR (Pieces)	IR (Pieces)	FI Payment
Purchase Order for 100 Pieces at USD 1.25/ Piece with 4% Cash Discount			
Goods Receipt of 100 Pieces	100		
Invoice for 100 Pieces at USD 1.25/Piece minus 4% cash discount		100	
Account	GR	IR	FI Payment
Stock Account	120+		
GR/IR Clearing Account	120-	120+	
Vendor Account		125-	125+
Cash Discount Clearing		5+	5-
Bank			120-

Table 8.20 Postings for Net Goods Receipt – Net Invoice Receipt

As you can see, the posting during invoice receipt doesn't have an impact on the stock account. However, if this had been a case of net goods receipt with gross invoice receipt, the system would have posted the cash discount to the stock account at the time of invoice receipt. In this case, the invoice receipt posting would have cancelled the posting made for the cash discount at the time of goods receipt. Therefore, such a scenario wouldn't make sense in reality.

8.4 Revaluation

The value of stock depends on the quantity and the price of the material in question. A change in the material price results in a change in the value of the stock. Revaluation is most often used by regulated enterprises such as oil companies. Because of governmental or business-related standards, these businesses reevaluate their standard price for oil at regular intervals. They may also reevaluate their physi-

cal inventory if, for example, they have a borrow/loan agreement and exchange business in place.

You may change the price of stock materials to keep it in tune with the current market price. This is known as revaluation of a material. The material price can be changed using Transaction MR21 in the SAP Easy Access menu path: SAP MENU • LOGISTICS • MATERIALS MANAGEMENT • VALUATION • CHANGE IN MATERIAL PRICE • CHANGE MATERIAL PRICES. The MAP of a material keeps changing as a result of the automatic account postings in the system. Therefore, there is often a need to correct this price in accordance with the market price. Revaluation is of special significance in these cases.

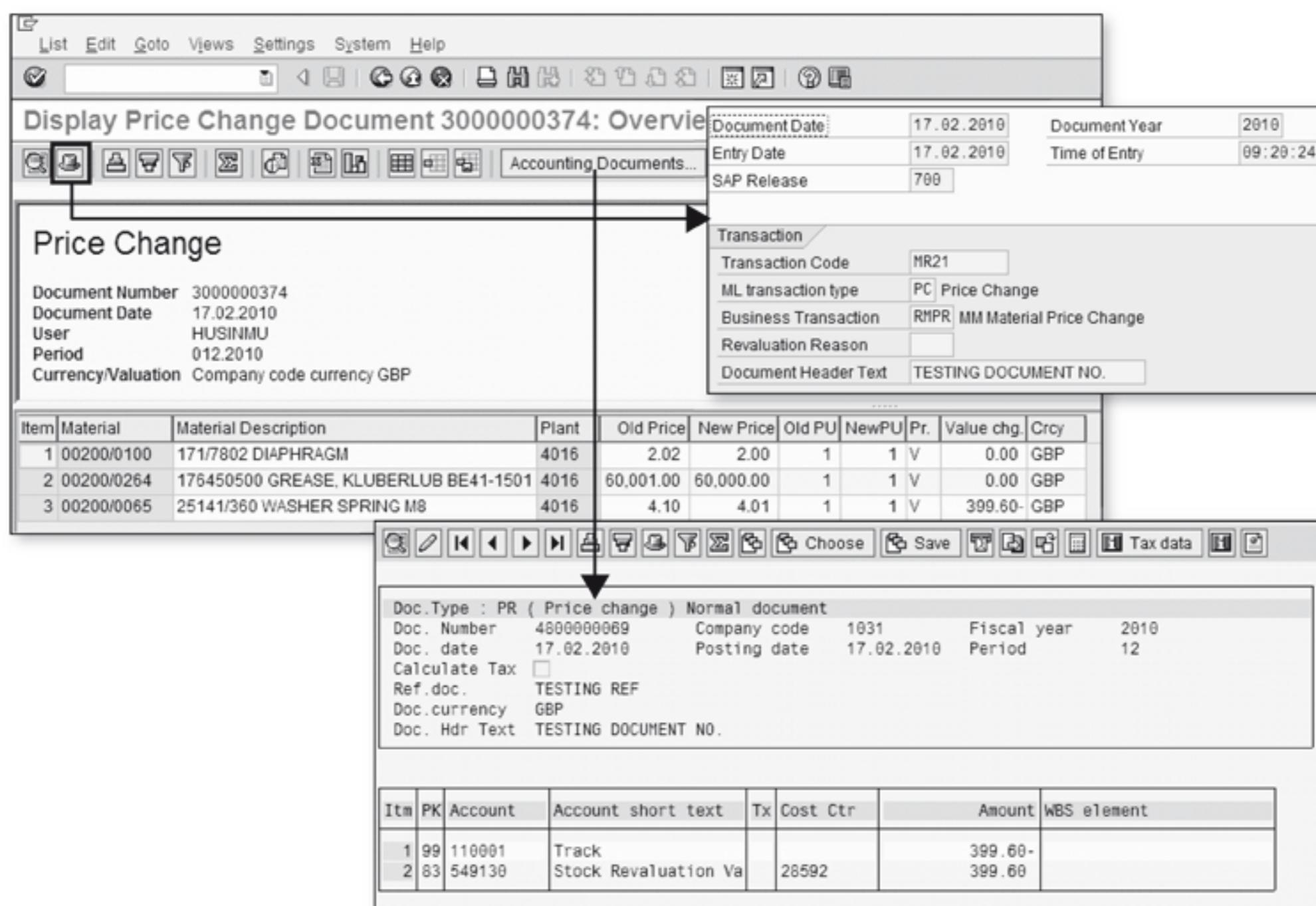


Figure 8.5 Material Price Change Document and Account Postings

There are two Customizing settings for price changes:

- ▶ Price Changes in the Previous Period only
- ▶ Price Changes in the Previous and the Current Period

8.4.1 Price Changes in the Previous Period Only

If you choose the Price Changes in the Previous Period Only setting, the system only changes the price in the previous period or previous year. The account movement that takes place in the previous period is reversed in the current period. The following example will help clarify this concept.

As shown in Table 8.21, the price of a material increases from 8 to 10. This results in a value change for the material from 1,000 to 1,250. The increase in the value, which amounts to 250, is debited to the stock account and an equivalent amount is credited to the income/expenditure account. Because the price change should affect the previous period only, the values in the current period tend to reverse the postings made in the previous period. Therefore, 250 is credited to the stock account and the same amount is debited to the income/expenditure account.

Material Master Record	Previous Period	Current Period
Quantity	125	150
Price	8	10
Value	1,000	1,500
Account Movement	Previous Period	Current Period
Stock Account	250+	250-
Income/Expenditure	250-	250+
Material Master after Price Change	Previous Period	Current Period
Quantity	125	150
Price	10	10
Value	1,250	1,500

Table 8.21 Material Price Change in the Previous Period Only

We'll now take a look at a situation where the price changes both in the previous and the current period.

8.4.2 Price Changes in the Previous and Current Period

If you choose the Price Changes in the Previous and Current Period setting, the system changes the price not only in the previous period or the previous year but also in the current period. If the quantities and previous prices are the same in the previous period or year, account movements occur only in the previous period. If not, account movements also occur in the current period. These account

movements reverse the postings in the previous period and result in the current price change.

We'll explain this using the example in Table 8.22. Note that in this example, we didn't use a current price of 10. If we had, the postings would have been exactly like those in Table 8.21.

In our example, the value changes in the previous period are posted to the stock account and the income/expense account. At the same time, in the current period, the value change of 150 is taken into account and the postings in the current period comprise the difference between the previous postings and the current value changes. Therefore, an amount of 100 is posted to both the stock and the income/expenditure account.

Material Master Record	Previous Period	Current Period
Quantity	125	150
Price	8	9
Value	1000	1350
Account Movement	Previous Period	Current Period
Stock Account	250+	100-
Income/Expenditure	250-	100+
Material Master after Price Change	Previous Period	Current Period
Quantity	125	150
Price	10	10
Value	1250	1500

Table 8.22 Material Price Change in the Previous Period and the Current Period

You now understand the concept of revaluation and the various types of price changes associated with revaluation. We'll now move on to describing the period end closing program.

8.5 Posting to a Previous Period

You may run a program at the end of each period that places data from the current period into the previous period and data from the previous period into the period before that, and so on. This program is known as the period end closing program and affects the following:

- ▶ Stock quantities and values
- ▶ Prices and price units

The transaction for the period end closing program is MMPV. It can be accessed from the SAP Easy Access menu path LOGISTICS • MATERIALS MANAGEMENT • MATERIAL MASTER • OTHER • CLOSE PERIOD.

As you can see in Figure 8.6, you can enter the company code and the period for which you need to run the period end closing program.

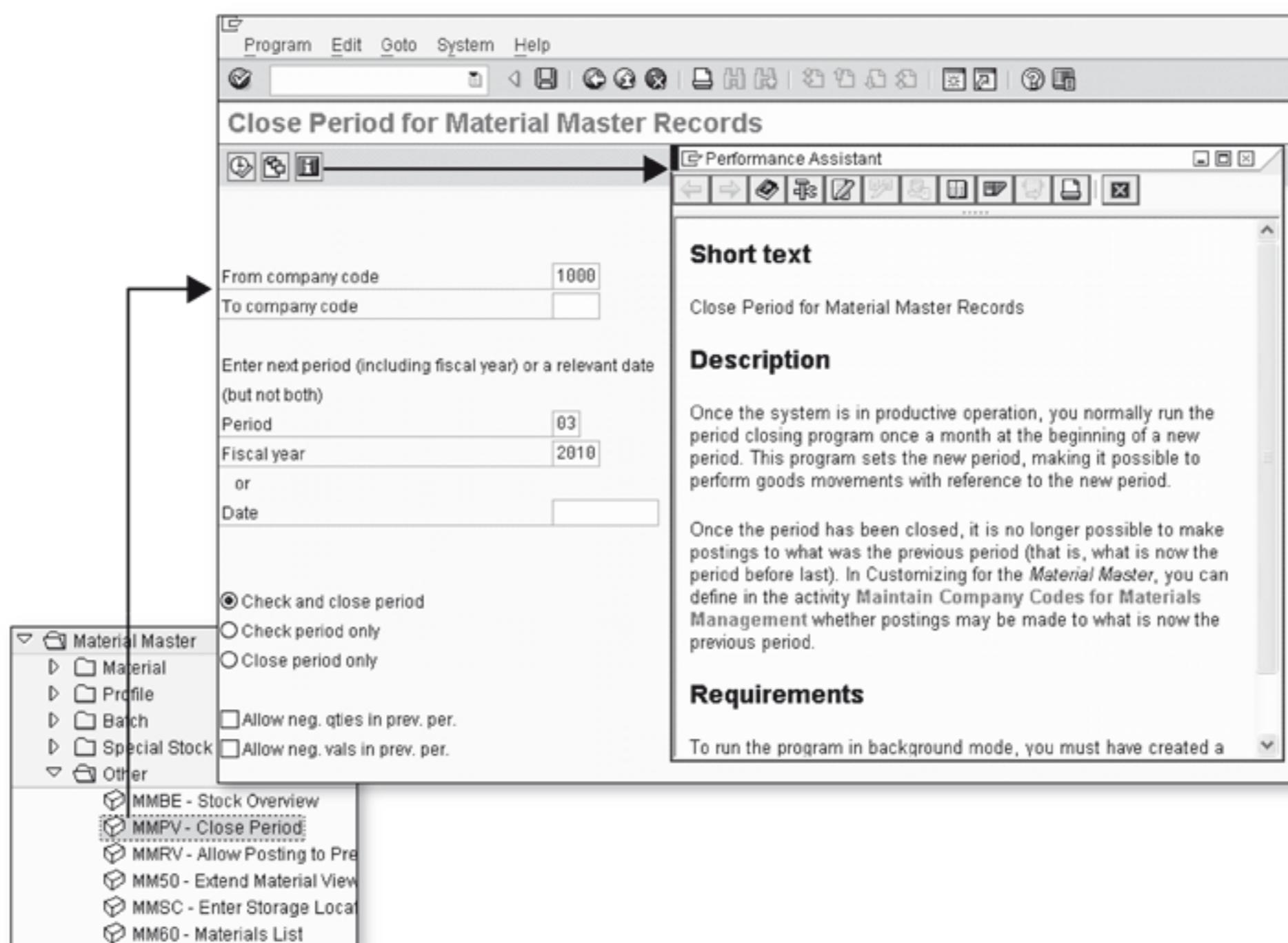


Figure 8.6 Close of the Period for the Material Master

The period end closing program includes the following features:

- ▶ The starting data for the new period is the final data of the previous period
- ▶ For transactions that take place after the period end closing program has run, data is updated in both the current period and the previous period if the posting date lies in the previous period.

- ▶ Although the goods movement can only be posted to the previous period, the transactions in the LIV can be posted to the previous period or the last period of the previous year.

You can make postings to the previous period by entering the previous period's date in the Posting Period field. We'll now look at various examples for postings in the previous period. We'll begin with goods movements in the previous period.

8.5.1 Posting Goods Movements to the Previous Period

You can post goods movements to the previous period. This results in value changes in the stock quantity and the stock value both in the previous period and the current period. Table 8.23 provides a sample posting.

Material Master	Stock Quantity	Stock Value	MAP
Previous Period	400	4000	10.00
Current Period	800	9600	12.00
Goods Receipt for Purchase Order of 200 Pieces at USD 10/Piece			
Previous Period	600	6000	10.00
Current Period	1000	11600	11.60

Table 8.23 Posting Goods Movement to the Previous Period

As you can see, posting the goods receipt to the previous period leads to a change in stock quantity and stock value in both the previous period and the current period. Because the purchase order price for the goods receipt doesn't differ from the MAP in the previous period in this example, the MAP doesn't change in the previous period. However, the MAP does change in the current period.

We'll now take a look at the posting of invoices in the previous period.

8.5.2 Posting Invoices to the Previous Period

You can post invoices to the previous period or the last period of the previous fiscal year. Changes in stock value only occur if there are price variances for a material subject to MAP control. In this case, the stock value changes in both the previous period and the current period.

The example in Table 8.24 will help clarify this concept. In this example, the invoice price exceeds the order price by USD 3. This results in a posting to the stock account with the price variance of $(200 * 3)$. The stock value is increased by

600, both in the current period and the previous period. The MAP increases in each case.

Material Master	Stock Quantity	Stock Value	MAP
Previous Period	400	6000	10.00
Current Period	1000	11600	11.60
<ul style="list-style-type: none"> ▶ Invoice Receipt for a Purchase Order of 200 Pieces at USD 10/Piece ▶ 200 Pieces Delivered in the Previous Period ▶ Invoice for 200 Pieces at USD 13/Piece ▶ Invoice Posted to the Previous Period 			
Previous Period	600	6600	10.00
Current Period	1000	12200	12.20

Table 8.24 Posting of Invoice Receipt to the Previous Period

Now let's delve into more specialized case of the posting to a previous period after the price change.

8.5.3 Posting to a Previous Period after a Price Change

The change in price in the previous period we've discussed so far includes not only the MAP but also the standard price. If the standard price, for example, was changed in the current period, the posting to the stock account must be corrected when you post the goods receipt document in the previous period. Table 8.25 describes a sample posting.

As you can see, the price of the material was increased by USD 2 per piece at the beginning of the current period. Posting the goods receipt to a previous period causes the stock quantity and the stock value to change in both the previous period and the current period by 200 pieces and USD 2,000. The system automatically does the revaluation posting to ensure that the standard price remains unchanged in the current period. The price change at the start of the current period is taken into account.

The increase in the stock value in the current period can easily be calculated as:

Increase in stock quantity = 200 pieces.

Increase in standard price = USD 2/piece

Increase in stock value in the current period = USD 400.

The remaining account postings are self-explanatory.

Material Master	Stock Quantity	Stock Value	S-Price
Previous Period	400	40,00	10.00
Current Period	400	4,800	12.00
Goods Receipt for a Purchase Order of 200 Pieces at USD 10.50/Piece			
Account	GR Document in Previous Period	Revaluation Document in Current Period	
Stock Account	2,000+	400+	
GR/IR Clearing Account	2,100-		
Price Differences Account	100+		
Expenses/Revenues from Revaluation		400-	
Valuation Data After the Account Postings			
Material Master	Stock Quantity	Stock Value	S-Price
Previous Period	600	6000	10.00
Current Period	600	7200	12.00

Table 8.25 Standard Price Changed at the Beginning of the Current Period

You now understand the postings in the previous period for price changes. Finally, we'll take a look at stock shortages in the current period.

8.5.4 Stock Shortage in the Current Period

As you already know, if there's a variance in the price between the purchase order and the invoice, the system posts the difference to the stock account for materials subject to MAP control, provided sufficient stock is available. But what happens if you post the invoice in the previous period when sufficient stock coverage existed, even though stock is insufficient in the current period? The answer is that you can do this, but you must make an adjustment posting for the current period, as illustrated in Table 8.26.

The system calculates the following when you post to the previous period:

$$\begin{aligned} \text{Value from price variance} &= 300 \text{ pieces} * \text{USD } 2/\text{piece} \\ &= \text{USD } 600 \end{aligned}$$

Because there are only 100 pieces in stock in the current period, the stock account can only be debited by:

$$100 \text{ pieces} * \text{USD } 2/\text{piece}$$

$$= \text{USD } 200$$

The system calculates the difference to post to the revaluation account as:

$$\text{Difference} = 600 - 200$$

$$= \text{USD } 400$$

The stock value in the current period increases by USD 200, which results in an increase of the MAP to 13 in the example in Table 8.26.

Material Master	Stock Quantity	Stock Value	S-Price
Previous Period	500	5,000	10.00
Current Period	100	1,100	11.00
<ul style="list-style-type: none"> ▶ Invoice Receipt for Purchase Order ▶ Ordered: 300 Pieces at USD 10/Piece ▶ Delivered in the Previous Period: 300 Pieces ▶ Invoice for 300 Pieces at USD 12/Piece ▶ Invoice Posted to the Previous Period 			
Account	GR Document in previous period	Revaluation document in current period	
Stock Account		400-	
GR/IR Clearing Account	600+		
Price Differences Account	3,000-		
Expenses/Revenues from Revaluation	3,600+	400+	
Valuation Data after the Account Postings			
Material Master	Stock Quantity	Stock Value	MAP
Previous Period	500	5,600	11.20
Current Period	100	1,300	13.00

Table 8.26 Stock Shortage in the Current Period

You now know about many types of postings that result in a material price change. This serves as a basis for understanding the various types of postings made in the previous period.

8.6 Summary

In this chapter, you learned about the different ways in which the material price changes. You also developed an understanding of the value changes in Inventory Management and LIV in SAP ERP. We covered different types of goods receipt and goods receipt reversal postings that affect the valuation data of the material. We also looked at the various material price and valuation changes at the time of LIV; for example, subsequent debit/credit and GR/IR clearing account maintenance. In addition, we explained the various postings during revaluation and price change postings in the previous period and the previous year.

In the next chapter we'll explain the functionalities and technical configuration associated with LIV.

Invoice Verification in Materials Management in SAP ERP is interwoven with the SAP ERP Financials Financial Accounting component. It's the point at which the Materials Management Procurement Cycle ends and is taken over by Financial Accounting. It's important to understand the underlying integration, because without it, analysis of functional behavior is incomplete.

9 Accounts Payable Invoice from Materials Management

Financial accounting is the field of accountancy concerned with the summarization of the financial data taken from an organization's accounting records and publishing this data in form of an annual report for the benefit of people outside the organization and has to be in compliance with regulatory and advisory accounting principles. Therefore, we think it's appropriate for the purpose of easy reference to classify the summarization of the financial data into accounts payable (AP) and accounts receivable (AR). AR is generally associated with customer accounts and refers to the accounting transaction in the Sales and Distribution functionality of SAP ERP. Similarly, AP is associated with vendor accounts and generally refers to the accounting transaction in Materials Management.

The purpose of this chapter is to describe the functionalities associated with invoice verification on a functional and technical level. As in the previous chapters, we'll divide the topics into functional basis, SAP functional design, checkpoints, and real-time issues, technical elements, and troubleshooting tips. However, depending on their relevance, new subtopics will be introduced or omitted.

9.1 Logistics Invoice Verification

Logistics Invoice Verification is the component of Materials Management in which incoming invoices are verified for their content, prices, and arithmetic. Although not primarily a term of SAP, the taxonomy two-way match and three-way match has been in common use among SAP consultants. By three-way match, we mean

that when you enter vendor invoices in the system, you have three different sources with which to match them: purchase orders, goods receipts, and the values suggested by the system at the time of invoice. By two-way match, we mean that just two sources of information are present at the time of invoice verification: purchase orders and the values suggested by the system for the invoice.

In this section, we'll analyze the elements of LIV on the basis of functional and technical design. Additionally, we provide you with troubleshooting tips at the end of each relevant subsection.

9.1.1 Functional Basis

After you procure goods/services, either the vendor sends you an invoice or you make a settlement yourself, according to predefined agreed terms with the vendor. LIV verifies the invoices in terms of their content, prices, and amount.

There are generally three types of details present on the invoice document you receive from a vendor:

- ▶ **Legal requirement**

This includes details such as the vendor name, bank information, value added tax, (VAT) and invoice date.

- ▶ **Reference to procurement**

This includes details such as the purchase order number, material/services, quantity, unit of measure, amount per item, and total amount.

- ▶ **Payment conditions**

This is the number of days in which payment should be made and the cash discount applicable if the invoice is paid within a certain number of days.

9.1.2 SAP Functional Design

As we've discussed, LIV is closely integrated with Financial Accounting and Controlling. The system passes the relevant information to Financial Accounting and Controlling on posting to LIV.

Note on the term invoice verification

In SAP terms, invoice verification takes place when the invoice is entered into the system. This is because you're expected to enter the values the vendor states on the invoice and verify whether the details match the values suggested by the system. If there's a mismatch, the invoice may be blocked for payment depending on the configuration.

Before SAP ERP release 4.6C, conventional invoice verification was possible in the SAP system, and incoming invoices could be verified with Transaction MR01 in online mode. This transaction used to create the accounting documents directly. Now, with Transaction MIRO for online posting, a LIV document is created, which records the details related to procurement. However, this creates a bigger question:

Why was there a switch from conventional invoice verification to LIV?

Using ALE and Business Framework Architecture, it's possible to distribute various applications on different systems. Invoice verification was designed as the final process in Materials Management, but the invoice document in conventional invoice verification used to be the accounting document. Therefore, it wasn't technically possible to distribute Materials Management and Financial Accounting documents to separate systems with conventional invoice verification.

SAP designed a Materials Management document (LIV) for invoice verification that could relate, use, and record the parameters associated with purchase orders and goods receipts. The accounting and controlling documents are linked as follow-on documents to LIV. Generation of a LIV document before the accounting documents, along with other factors, has helped realize some of the functionalities for LIV, as follows:

- ▶ Cross-company code postings are possible
- ▶ Evaluated receipt settlement (ERS) by material documents is possible
- ▶ The material ledger can be used
- ▶ Invoice verification is possible in the background
- ▶ Automatic invoice reduction is possible
- ▶ Unplanned delivery costs can be posted to a separate SAP G/L account
- ▶ A separate exchange rate can be used for taxes
- ▶ The GR/IR clearing account can be managed in several currencies

There are various ways in which an invoice can be processed in LIV. We'll cover each of them in detail throughout the book, but a list is shown in Table 9.1.

Transaction	Description	Relevant Functionalities
MIRO	Invoice Verification Online	Simulate, post, accept and post, hold.
MIR7	Invoice Parking	Save parked document, hold, save as complete, simulate.

Table 9.1 Important Transactions for Logistics Invoice Verification

Transaction	Description	Relevant Functionalities
MIRA, RMBABG00 (Report)	Invoice Verification in the Background	Hold, schedule background verification.
MRRL	Evaluated Receipt Settlement	Settlement based on material documents; message issued to the vendor.
MRKO	Consignment and Pipeline Settlement	Settlement based on material documents; message issued to the vendor.
MRIS	Invoicing Plan Settlement	Settlement based on material documents; message issued to the vendor.
MRNB	Revaluation	Difference values for price changes; message issued to the vendor.
	Invoices Received via EDI	The system attempts to post these invoices in the background. If an error occurs, they can be processed again either automatically or manually.
MIR4	Display Invoice Document	
MIR5	Display List of Invoice Documents	
MIR6	Invoice Overview	
MR8M	Cancel Invoice Documents	
MRBR	Release Blocked Invoice	
MR90	Output Messages	
MR11	Maintain GR/IR Clearing Account	
MR11SHOW	Display/Cancel Account Maintenance Document	
MRA4	Manage Archive	

Table 9.1 Important Transactions for Logistics Invoice Verification (Cont.)

9.1.3 Checkpoints and Real-time Issues

Conventional invoice verification is no longer supported by the SAP system. Therefore, the issues related to switching from conventional invoice verification to LIV

are no longer of significant relevance. Nevertheless, we indicate some of the issues here:

- ▶ Documents created with Transaction MR01 can no longer be processed further in LIV. All of the documents created with MR01 can be reversed with Transaction MR08.
- ▶ Batch input or CALL TRANSACTION isn't possible with Transactions MIRO, MIR7, and MIRA. Instead, the corresponding BAPIs should be used.

9.1.4 Technical Elements

The technical elements are explained in more detail for the specific transactions we've covered in this chapter. However, it's important to remember that the technical elements of invoice verification are best captured in the Financial Accounting documents. For example, the AWTYP field is equal to RMRP for LIV.

This field value (RMRP) is contained in table TTYP. The field AWTYP can be found in most of the database tables, including those shown in Table 9.2.

Table	Description
BKPF	Accounting Document Header
COBK	Controlling Object: Document Header
COOI	Commitments Management: Line Items
MLHD	Material Ledger Document: Header
VBKPF	Document Header for Document Parking
ACCTHD	Compressed Data from Financial Accounting/Controlling Document – Header

Table 9.2 Important Header Tables in Financial Accounting and Controlling

9.1.5 Troubleshooting Tips

Troubleshooting is discussed for individual transactions. However, the following question may serve as a starting point for advanced technical troubleshooting:

Is there an error in the Financial Accounting interface or is wrong data being sent from Materials Management?

You may set a breakpoint at the start of function module AC_DOCUMENT_CREATE. The contents of tables T_ACCHD, T_ACCIT, and T_ACCCR are from Materials Management and haven't been changed in the Financial Accounting interface.

However, function module AC_DOCUMENT_CREATE is invoked only when the user clicks on Post or Simulate. This is one of the reasons why it's difficult to analyze problems that can't be replicated. If this is the case, a starting point might be an analysis based on the comparison of values in various database tables for similar postings, for example, if you know that the account postings were correct for one posted document, but you're not sure why you get different account postings for another invoice with similar values. Thus, you can compare the entries in the various tables (e.g., RBKP, RSEG, and RBCO) in two sessions to check the difference.

9.2 Incoming Invoice

Although most invoices are sent by vendors and can be classified as incoming invoices, there may be invoices that may not have originated with the vendor/invoicing party but are settled automatically in the system. However, because we'll discuss automatic settlements later in the book, in this section, we'll focus on invoices that were sent by the vendor/invoicing party and can be classified as incoming invoices.

9.2.1 Functional Basis

The vendor/invoicing party sends you an invoice with the understanding that you'll recognize the transaction referred to in the invoice because of the references on the invoice document. In addition, it's expected that you'll "remember" (master data) the already agreed on values for various terms and conditions with the vendor (e.g., terms of payment, price, currency, bank details of the vendor, etc.).

9.2.2 SAP Functional Design

The incoming invoice needs to be verified against various elements, including:

- ▶ **Invoicing party**

The invoicing party can be different from the purchase order vendor.

- ▶ **Purchase order**

There can be invoices for which purchase orders don't exist. These invoices can be directly posted against an SAP G/L account or the material account.

- ▶ **Material/services procured**

The material/services that are procured are defaulted from the PO during invoice verification. However, direct posting to the material account is also possible.

- ▶ **Quantity/value already received and (or) invoiced**
The system looks at the purchase order history.
- ▶ **Special instructions about the invoicing party**
The vendor may have been blocked for payment or deleted.

The only way the system can verify the information sent by the vendor is through the data already stored in the SAP system. The data the system uses during invoice verification can be broadly categorized into two types:

- ▶ Master data
- ▶ Transaction data

Master Data

The system uses the following master data during invoice verification:

- ▶ **Material master**
Some of the fields in the material master relevant for incoming invoices to be entered into the system include material number, material description, price control, price, profit center, total stock, and stock value.
- ▶ **Vendor master**
Some of the fields in the vendor master relevant for incoming invoices that need to be entered into the system include vendor number, address, bank data, bank head office, currency of the vendor, terms of payment for purchasing, terms of payment for accounting, and vendor reconciliation account number.
- ▶ **Accounting data**
Some of the fields the system uses from the SAP G/L account at the time of invoicing include G/L master data such as account number, account name, account type (information on whether an account may be posted directly), the currency in which the account is managed, tax category for the account, field status group, and financial budget.

Transaction Data

The system compares incoming invoices sent by vendors against the transactions already recorded in the system. You then use the following transaction data during invoice verification:

- ▶ **Purchasing document**
For purchase orders, the currency and terms of payment are used from the vendor master. These values are suggested and users may change them to different

values. Changed values are then used at the time of invoice verification. The flow of information looks something like this: vendor master → purchase order → invoice verification.

If you change the terms of payment and the currency in the purchase order, these changed values are defaulted at the time of invoice verification. However, you can still change the currency (before entering the purchase order number) and the terms of payment if you're entering the invoice online.

Why does the field Terms of Payment exist in two places in the vendor master?

In the vendor master, the Terms of Payment field exists under Purchasing Data (LFM1-ZTERM) as well as under Payment Transactions (LFB1-ZTERM). The former is suggested at the time of purchase order creation and the latter is expected to be suggested when you're entering invoices without reference to purchase orders.

It's important to understand that the system doesn't suggest terms of payment from the vendor master when you enter invoices without reference to a purchase order. The value in the field LFB1-ZTERM is meant for Financial Accounting and is suggested in Transaction FB60 but not in Transaction MIRO.

► Material document and LIV document

Quantity-based changes are recorded in the material document and its corresponding impact on value is stored in the accounting document linked to the material document. At the time of invoice verification, the system looks into the purchase order history for the previous material and invoice documents. From there, it suggests the relevant values for quantity and amount.

► Accounting document

The checks the previous accounting documents created at the time of goods receipt and invoice verification. The amounts are posted to appropriate SAP G/L accounts based on the previous values. One important account is the GR/IR clearing account, which could post a different amount if the invoice is entered before the goods receipt with a price that's different from that mentioned in the purchase order (which we discussed in Chapter 8).

9.2.3 Checkpoints and Real-Time Issues

You must enter the values as mentioned on the invoice while entering the invoice online into the system. If the values don't match what the system suggests, you can either post the invoice and it's blocked for payment (depending on the system

configuration), or you can park the invoice (EDIT • SWITCH TO DOCUMENT PARKING) if the system doesn't let you post the document. You may also accept or reject the differences (refer to Chapter 10 for more details), and, if you have authorization, you can *accept and post* (EDIT • ACCEPT AND POST) the invoices with differences. This means that even if the vendor invoice doesn't match the amount suggested by the purchase order, you're willing to accept the difference and pay the extra amount the vendor has asked for. However, this functionality shouldn't be used under ordinary circumstances and is often restricted via authorization.

You're able to check whether invoices have been paid by displaying the vendor line item for the invoice via menu path MIR4 • FOLLOW-ON DOCUMENTS • VENDOR LINE ITEM. If an invoice has been cleared, you should be able to see the field Clearing with the clearing document number (BSEG-AUGBL) and clearing date (BSEG-AUGDT) on the screen, as shown in Figure 9.1.

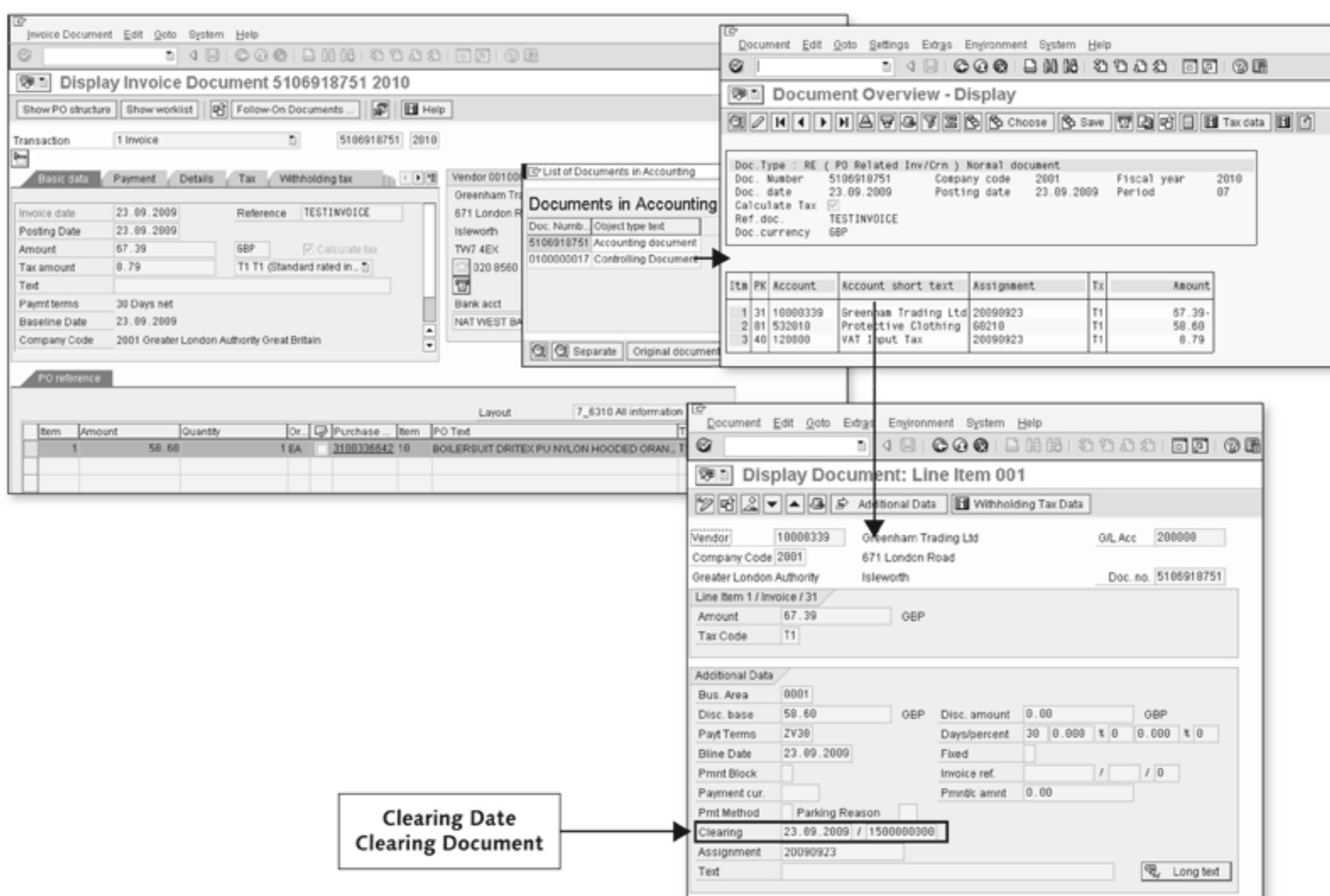


Figure 9.1 Clearing Details on a Paid Invoice

9.2.4 Technical Elements

Table 9.3 contains a list of important database tables for posted invoices.

Table	Description
RBKP	Document Header: Invoice Receipt
RSEG	Document Item: Incoming Invoice
RBCO	Document Item, Incoming Invoice, Account Assignment
RBTX	Taxes: Incoming Invoice
RBWS	Withholding Tax Data, Incoming Invoice
RBVS	Invoice Verification: Split Invoice Amount
RBMA	Document Item: Incoming Invoice for Material
Important Tables Updated as a Result of Invoice Posting	
BKPF	Accounting Document Header
BSEG	Accounting Document Segment
BSET	Tax Data Document Segment
MBEW	Material Valuation
MBEWH	Material Valuation: History
EKBE	History per Purchasing Document
EKBZ	History per Purchasing Document: Delivery Costs

Table 9.3 Important Tables for Incoming Invoices

Because documents in the SAP system are technically stored as data in various database tables, it's very helpful to have this information available during troubleshooting. Figure 9.2 lists various tables in which data is stored during invoice verification. Table RBKP stores the data present in the header of the logistics invoice and is shown at the top in Figure 9.2. The tables below RBKP store data at the item level.

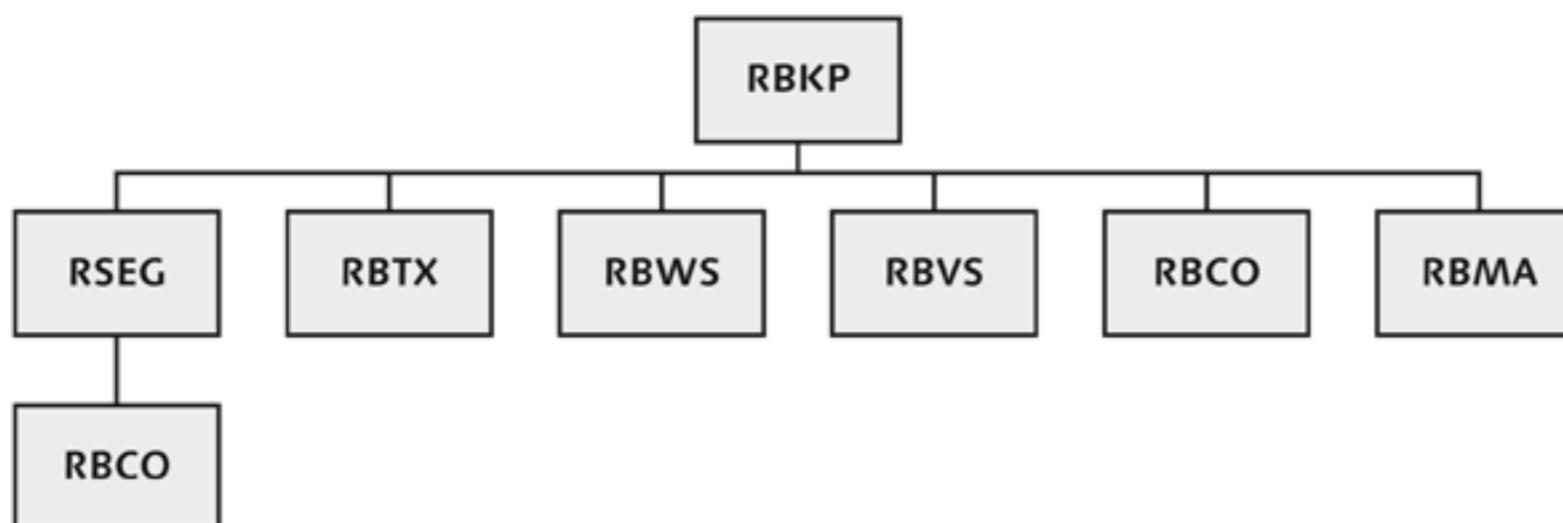


Figure 9.2 Important Tables Where Data is Stored During Invoice Verification

As you can see, table RBCO is mentioned in two places: just below table RBKP, to illustrate that the account assignment is maintained at the line item level in an invoice. Additionally, there may be multiple account assignments for a particular line item (RSEG); therefore, table RBCO is also mentioned below table RSEG to represent this scenario.

Now that you're aware of the design as well as the technical elements of the incoming invoices, we'll move on to troubleshooting incoming invoices.

9.2.5 Troubleshooting Tips

After an invoice is posted, it's often difficult to identify or analyze the cause of errors, if they occur. However, the following may be useful in your analysis:

Display the purchase order history in Chronological Order, as shown in Figure 9.3. This will give you an idea about the postings made prior to the invoice posting.

The figure consists of two vertically stacked screenshots of SAP Fiori interfaces. Both screens have a header with tabs: 'Material Data', 'Quantities/Weights', 'Delivery Schedule', 'Delivery', 'Invoice', 'Conditions', 'Account Assignment', and 'Purchase Order History'. The 'Purchase Order History' tab is active in both.

Top Screen (Invoice View):

S...	MvT	Material Do...	Item	Entry Date	Posting Date	Quant...	OU
GR	101	5000645723	1	04.10.2009	04.10.2009	40	EA
GR	101	5000645722	1	04.10.2009	04.10.2009	60	EA
Tr./Ev. Goods receipt							
IR-L		5106464886	1	04.10.2009	04.10.2009	70	EA
IR-L		5106464885	1	04.10.2009	04.10.2009	30	EA
Tr./Ev. Invoice receipt							
						100	EA

Bottom Screen (Delivery View):

Sho...	Mo...	Material Do...	Item	Posting Date	Quantity	Unit	Amount in LC	L.cur
IR-L		5106464885	1	04.10.2009	30	EA	270.00	GBP
GR	101	5000645722	1	04.10.2009	60	EA	510.00	GBP
IR-L		5106464886	1	04.10.2009	70	EA	490.00	GBP
GR	101	5000645723	1	04.10.2009	40	EA	280.00	GBP

A context menu is open on the right side of the top screen, with the 'Chronolog. Order' option highlighted.

Figure 9.3 Displaying the Purchase Order History in Chronological Order

You may check the TCode, Entered By, Exchange Rate, Entry Date, and Time of Entry fields used for posting the invoice by displaying the header for the corresponding accounting document, as shown in Figure 9.4.

Analysis of data in various related tables, such as those shown earlier in Figure 9.2, should provide more insight.

Document Type		RE PO Related Inv/Crn	
Doc.Header Text			
Request Number			
Reference	4500176065	Document Date	05.10.2009
		Posting Date	05.10.2009
Currency	EUR / GBP	Posting Period	07 / 2010
Exchange rate	/1.48633	Translatn Date	05.10.2009
Ref. Transactn	RMRP	Invoice receipt	
Reference key	51064648872010	Log.System	R3P400
Entered by	MAHBOOFA	Parked by	
Entry Date	05.10.2009	Time of Entry	00:48:34
TCode	MIRO		
Changed on		Last update	

Figure 9.4 Header for an Accounting Document

Now that you understand the concept of incoming invoices, we'll move on to the topic of invoice verification online to explore the functionalities associated with Transaction MIRO.

9.3 Invoice Verification Online

As discussed in the previous sections, invoice verification can take place online as well as in the background. Provisions exist for settling invoices on your own (e.g., ERS, invoicing plan settlement, and consignment and pipeline settlement) and send the settlement document to the vendor for verification.

By online invoice verification, we mean the manual entry of invoices in the SAP system using Transaction MIRO. You can access this transaction using the SAP Easy Access menu path **SAP MENU • LOGISTICS • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • DOCUMENT ENTRY • ENTER INVOICE**.

9.3.1 Functional Basis

Vendors send you invoices either via fax, email, or postal mail. From there, you need to enter the information into your system and verify whether the details sent by the vendor match those suggested by your system. If there's a discrepancy, the invoice is either blocked for payment or parked for further processing. After reviewing and entering the appropriate data, the invoice can be posted (for parked invoices) or cleared to pay.

9.3.2 SAP Functional Design

Transaction MIRO consists of a main screen with subscreens that may be active in certain cases. Refer to Section 9.9 for more details.

Header screen for Transaction MIRO

The header of Transaction MIRO is similar to that of Transaction FB60; essentially, the header screen from Transaction FB60 is used in Transaction MIRO. Therefore, it's the responsibility of Financial Accounting. If you notice changed behavior regarding any field value in the header, you should contact SAP Support for further information.

Figure 9.5 shows the various elements of Transaction MIRO. Some of the important elements are as follows:

► **Transaction**

You need to be especially particular about this field, because you need to make sure that you're using the transaction (e.g., invoice, credit memo, subsequent debit, subsequent credit) in the appropriate context.

► **Balance**

Ideally, you can post an invoice only when the balance is zero. However, if you configure tolerances, you can post an invoice even if the balance isn't zero.

► **Layout (Display Variant)**

You can change the layout of the items by selecting the appropriate variant. You can also configure your own variants in Transaction OLMRLIST.

As you can see from the invoice verification screen, there are multiple tabs for the header data. Although some of the data is defaulted from the previous transactions, a bit of basic data needs to be entered by the user.

Because the company code is the smallest organizational unit in external accounting, you're asked for it the first time you enter Transaction MIRO. However, you can maintain the company code value under parameter BUK in Transaction SU3.

After you enter the company code in the screen for Transaction MIRO, the system pulls all of the relevant data and information from the company code settings in Customizing (SPRO), in user parameters (SU3), and in held/set data (SYSTEM • USER PROFILE • HOLD DATA/SET DATA).

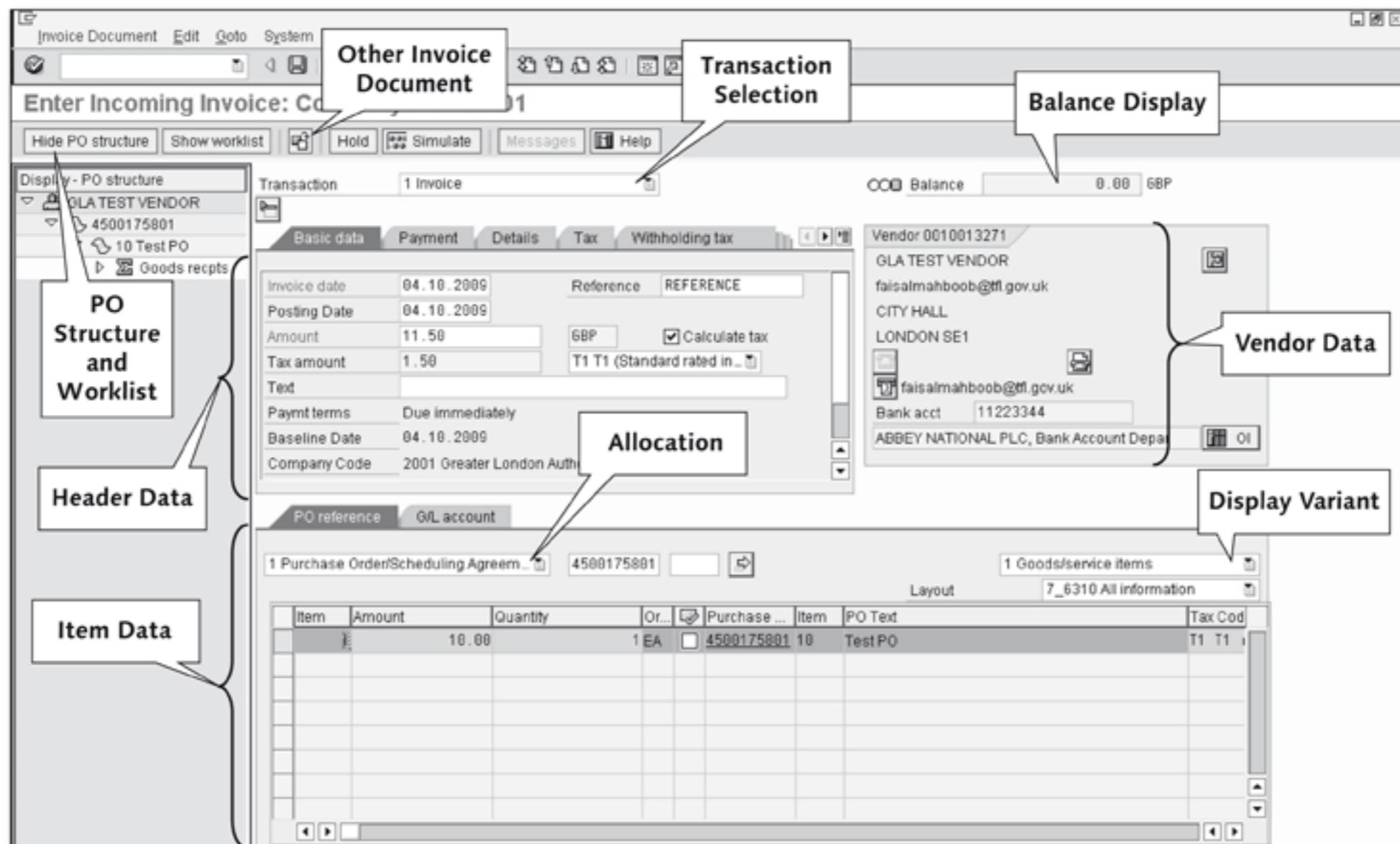


Figure 9.5 Various Elements of Transaction MIRO

The system performs various checks and populates the data at the time of MIRO, as indicated in Table 9.4.

Step	Trn.	Menu Path/Description	Behavior in MIRO
1	SU3	Parameter BUK	Requests company code when you enter MIRO for the first time
2		SYSTEM • USER PROFILE • HOLD DATA/SET DATA	Values to be held/set in MIRO when you enter after setting/ holding the data.
3	SPRO	MATERIALS MANAGEMENT • LIV • INCOMING INVOICE • MAINTAIN DEFAULT VALUES FOR TAX CODES	Tax Code defaults on the Basic Data tab
4	SPRO	MATERIALS MANAGEMENT • LIV • INCOMING INVOICE • NUMBER ASSIGNMENT • MAINTAIN NUMBER ASSIGNMENTS FOR ACCOUNTING DOCUMENTS • DOCUMENT TYPES IN INVOICE VERIFICATION • MIRO • DOCUMENT TYPE	Document Type defaults on the Details tab.

Table 9.4 Various Checks when a User Enters Transaction MIRO

Step	Trn.	Menu Path/Description	Behavior in MIRO
5	SPRO	MATERIALS MANAGEMENT • LIV • INCOMING INVOICE • NUMBER ASSIGNMENT • MAINTAIN NUMBER ASSIGNMENTS FOR ACCOUNTING DOCUMENTS • DOCUMENT TYPE (Double-click on the document type from step number 4.)	The Reference field on the Basic Data tab may become mandatory. Header Text on the Details tab may become mandatory.

Table 9.4 Various Checks when a User Enters Transaction MIRO (Cont.)

After you enter the purchase order reference against the invoice, the system pulls as much information as possible from the master and transaction data. Table 9.5 shows the important data and a brief description of how it might be populated.

Field	Manual Entry	Copied from PO	Derived from PO History	Proposed Based on Settings	Stored in Vendor Master
Document Date	X				
PO Number	X				
Invoice Amount	X				
Tax Amount	X				
Terms of Payment	X	X			
Vendor	Possible	X			
Currency	Possible	X			
Invoice Items		X			
Quantity			X		
Amount			X		
Tax Rate				X	
Bank Information					X

Table 9.5 Various Fields in Transaction MIRO

There are three ways of allocating invoices:

- ▶ Entering invoices with purchase order reference
- ▶ Goods receipt-based invoice verification
- ▶ Entering invoices without purchase order reference

Purchase Order-Based Invoice Verification

The term purchase order-based invoice verification generally refers to the fact that the indicator Goods-Receipt Based Invoice Verification (GR-based IV) isn't checked on the Invoice tab in the item details of the purchase order, as shown in Figure 9.6.

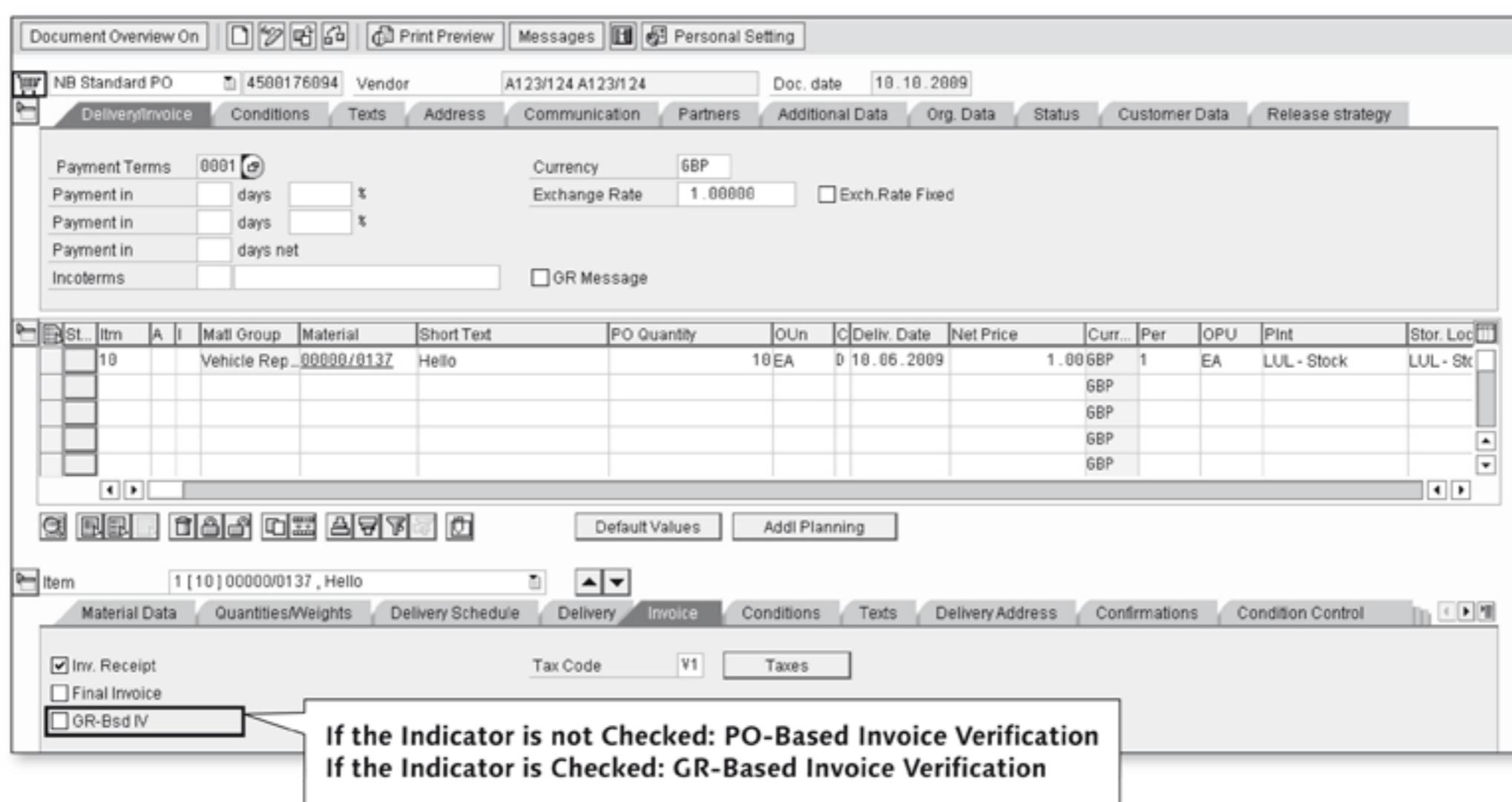


Figure 9.6 Indicator in the Purchase Order to Decide PO-Based IV or GR-Based IV

During invoice verification, the system doesn't consider the account postings during the individual goods receipt. During invoice verification, the GR/IR clearing account is cleared by the amount in proportion to the quantity posted at the time of goods receipt. The rest of the GR/IR clearing account posting at the time of invoice receipt depends on the invoice receipt price. The sample postings in Table 9.6 help clarify this. The postings are for a MAP-controlled material with sufficient stock.

PO of 100pc at 8/pc	IR of 30pc at 9/pc	GR of 60pc	IR of 70pc at 7/pc	GR of 40pc
Vendor	270-		490-	
Stock		510	30-	280
GR/IR	270	510-	520	280-

Table 9.6 Postings for a Material with MAP and Sufficient Stock

The account postings are described in more detail in Chapter 10. For now, the following should serve as an explanation:

$$270 = 30*9$$

$$510 = 270 + (60 - 30)*8$$

$$520 = 30*8 + (70 - 30)*7$$

$$280 = 40*7$$

Goods Receipt-Based Invoice Verification

With this method of invoice verification, the invoice line items are associated with the material document numbers posted during the goods receipt. Therefore, the number of line items suggested at invoice verification is the same as the number of goods receipts against which an invoice can be entered.

You have to decide at the time of creating a purchase order whether you want GR-based invoice verification. To do so, select the appropriate checkbox on the Invoice tab of the line item details while creating the purchase order, as shown in Figure 9.6.

With the GR-based IV indicator checked in the purchase order, you can't enter the first invoice before the goods receipt.

Why does the system let me enter an invoice for GR-based invoice verification when the goods receipt quantity is zero in the purchase order?

For GR-based invoice verification, the system won't stop you from entering an invoice if a goods receipt has been entered and subsequently reversed. In this case, the goods receipt quantity in the purchase order would be zero.

The common confusion that exists in relation to GR-based invoice verification is that the quantities of the materials invoiced should be equal to the corresponding quantities that have already been goods received. However, in the SAP system, it just means that the invoice line items will record the corresponding line items from the material document.

The GR/IR clearing account posting becomes much more simplified because the system knows exactly which invoice line item is being posted against which goods receipt line item and vice-versa.

9.3.3 Invoices for a One-Time Vendor

Vendors that supply materials or services to your company just once or very rarely are classified as one-time vendors (OTVs). You create a vendor master for OTVs, which can then be used for more than one vendor. Therefore, this master data doesn't contain any vendor-specific information. Thus, address, sales person, bank details, and other vendor-specific data is entered at the time of purchasing and invoice verification.

The button OTV appears in the Vendor Data section, as shown in Figure 9.7. Users need to click on this button to maintain vendor-specific data for OTVs, in a pop-up window.

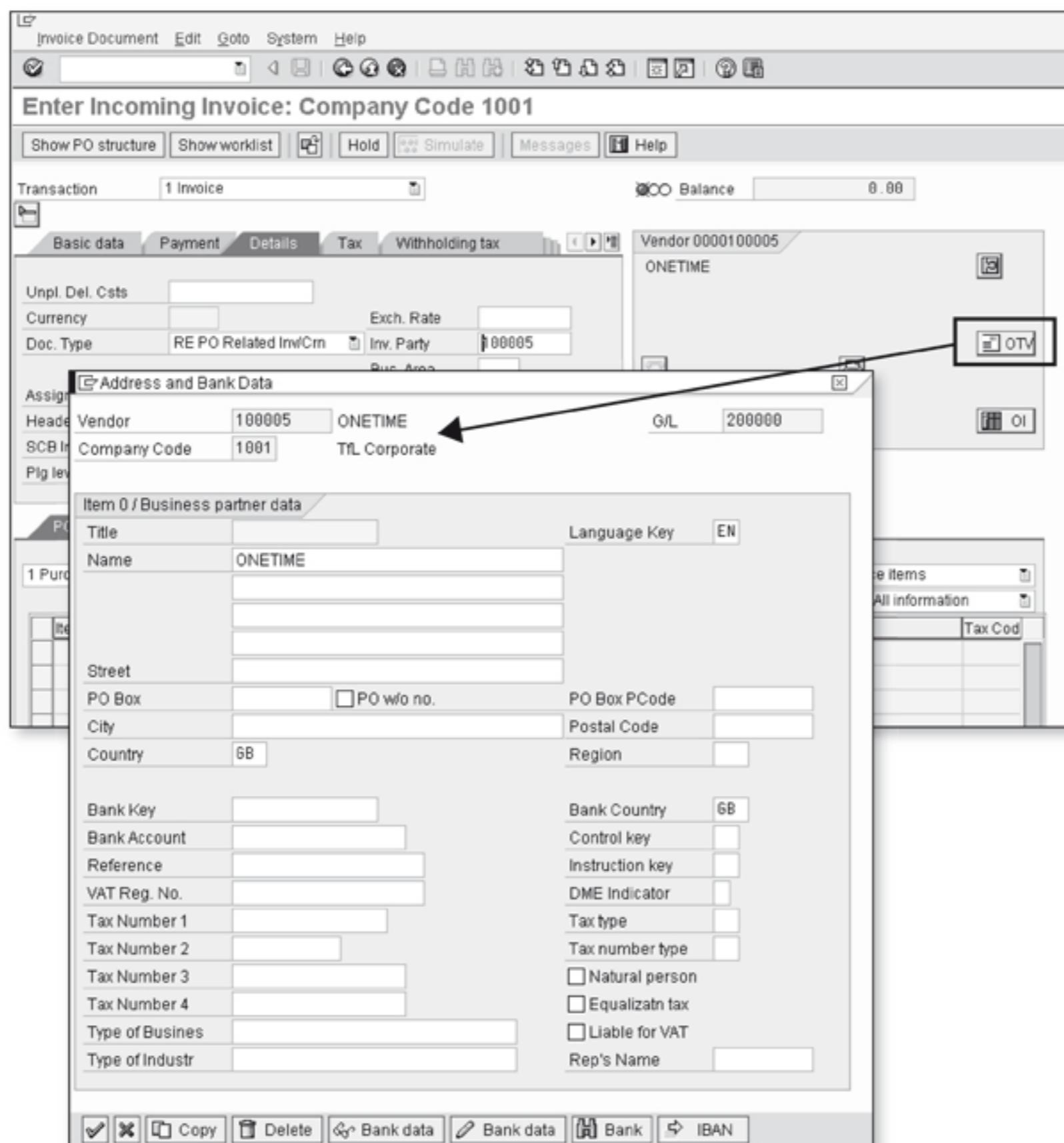


Figure 9.7 The OTV Indicator at the Time of Invoice Verification

As you can see, when you click on the OTV indicator, a pop-up window appears. You can maintain the vendor address and the bank details in this window.

The following are some basics regarding OTVs:

- ▶ OTVs are created for account groups that have the OTV indicator checked.
- ▶ You can check whether a vendor is an OTV from the vendor master menu path EXTRAS • ADMINISTRATIVE DATA.
- ▶ For OTVs, the field in database table LFA1-XCPDK = "X"
- ▶ OTV may also be referred to as conto pro diverse (CPD) in a few places in the documentation.

We'll now describe the technical elements of OTVs, including the data flow. You'll then learn a few important tips for troubleshooting.

Technical Elements of OTV

Function module FI_VENDOR_DATA uses the values for the company code and the vendor number in the fields I_BUKRS and I_LIFNR respectively, as seen in Table 9.7.

Technical Element	Description
FI_VENDOR_DATA	Function Module
I_BUKRS	Company Code
I_LIFNR	Vendor
I_EKRED	I_EKRED-XCPDK = X Indicates OTV

Table 9.7 Technical Elements of OTV

Figure 9.8 shows the technical data flow for an OTV during Transaction MIRO. As you can see, when you enter the data in MIRO, the system uses function module FI_VENDOR_DATA to search for the XCPDK indicator in the vendor master. After it knows that the vendor is an OTV, it goes on to search table ADRC for the address that was maintained during the creation of the purchase order. Various structures that help in the communication with the Financial Accounting interface have been mentioned. Finally, the system posts the invoice and updates the information that the vendor is an OTV in the invoice header table RBKP.

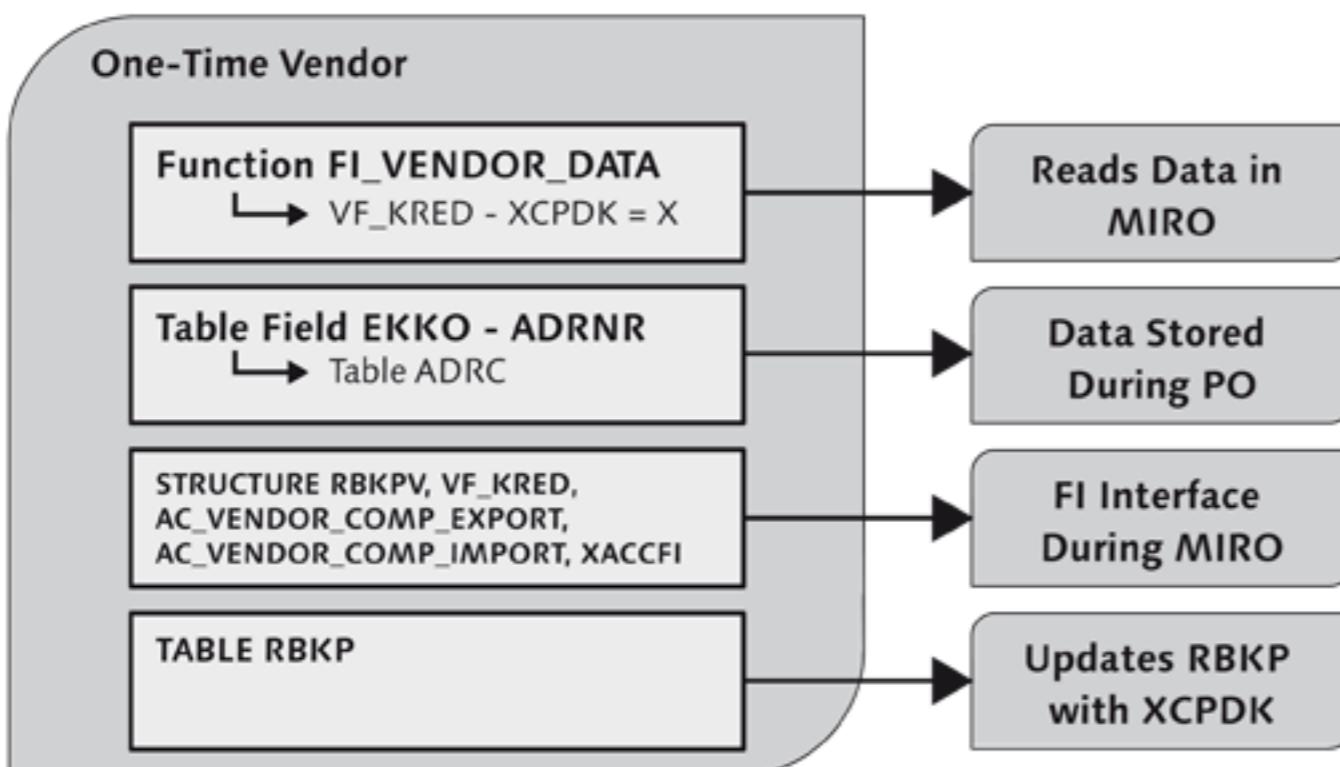


Figure 9.8 Data flow during MIRO for One-time Vendor

Now that you know about the technical program flow, we'll continue with tips regarding troubleshooting.

Troubleshooting Tips for OTVs

You can check the data for OTVs in the following table fields:

- ▶ LFA1-XCPDK in the vendor master
- ▶ EKKO-ADRNR in the purchase order; use ADRNR in table ADRC to check XCPDK
- ▶ Use function module FI_VENDOR_DATA to pass the company code and vendor number to check the field XCPDK in the results
- ▶ Use RBKP-XCPDK to check whether the invoice was posted for an OTV

Note

It's important to implement SAP Customer Note 1227317 if you're on a support pack lower than 14 in SAP ECC 6.0 and encounter the following:

You use Transaction MIRO (Enter Invoice) to enter an invoice for an OTV. You then delete the OTV. The system issues error message F5 104 "Vendor is not Defined in Company Code." You then enter a purchase order with another vendor. The address and bank data of the previous vendor is displayed instead of the data of the new vendor. When you try to post the document, the system issues error message F5 747 "No Alternative Payer/Payee Defined."

We'll now discuss the functionalities associated with the duplicate invoice check in LIV and its similarities and differences with similar functionality in Financial Accounting.

9.3.4 Duplicate Invoice Check

The check for duplication of invoice entries is used to prevent invoices being accidentally created and paid twice.

In the following sections, you'll learn about customization, integration, and troubleshooting of duplicate invoices.

Configuration and Customizing

You need to ensure the following settings in the system for duplicate invoices to be checked during transactions:

- ▶ In the vendor master, you need to click on the checkbox Chk Double Inv. on the Payments in Accounting screen.
- ▶ You can customize the check for duplicate invoices under the Customizing menu MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • INCOMING INVOICE • SET CHECK FOR DUPLICATE INVOICES.

However, you don't have control over all of the checks the system performs during invoice verification. Although the system performs checks on six parameters, you have control over only three of them for Customizing.

Table 9.8 lists the fields that are checked by the system and those you can control in Customizing.

Fields the System Checks	Fields you can Control in Customizing
Reference Number	Reference Number
Vendor	
Currency	
Company Code	Company Code
Gross Invoice Amount	
Invoice Document Date	Invoice Document Date

Table 9.8 Fields that are Taken into Account During a Duplicate Invoice Check in LIV

Points to remember during a duplicate invoice check in LIV

- ▶ The duplicate invoice check works in LIV only when you enter the value in the field Reference (Basic Data tab of MIRO).
- ▶ The system internally checks for duplicate invoices in the accounting document before it checks the LIV document.

- ▶ If you uncheck the company code for duplicate invoice check in Customizing, system performance may deteriorate because the system has to check all of the companies for duplicate invoices.
- ▶ The duplicate invoice check in MIRO doesn't work the same way as that in Transaction FB60. You can reference SAP Customer Note 904652 (MIRO: Different from FB60) for further information.
- ▶ The standard system doesn't check for duplicate credit memos. This functionality, however, has been delivered for the Argentina country version.

Integration with Financial Accounting

As mentioned earlier, the duplicate invoice check works differently for the Financial Accounting Transaction FB60 and the Materials Management Transaction MIRO. Two major differences are:

- ▶ The duplicate invoice check for Financial Accounting works even if you don't enter a reference.
- ▶ The duplicate invoice check works for Financial Accounting invoices as well as for credit memos.

Additional differences are summarized in Table 9.9.

Attributes Checked	Reference entered	Reference not entered
Company Code	X	X
Vendor	X	X
Currency	X	X
Document Date	X	X
Reference Document number	X	
Amount in Document Currency		X

Table 9.9 List of Attributes Checked During Financial Accounting During Duplicate Invoice Check

Troubleshooting Tips on Duplicate Invoices

The following are important troubleshooting tips for you to remember concerning duplicate invoices:

- ▶ Selecting Company Code in Customizing ensures a check on the company code and improves system performance during invoice posting.
- ▶ The duplicate invoice check works only when you populate the field Reference during MIRO.

- ▶ Duplicate invoice check should be active for the vendor in question.
- ▶ Function module MRM_DUPLICATE_INVOICE_CHECK is responsible for the duplicate invoice check in LIV.

9.3.5 Checkpoints and Real-Time Issues

The following are some of the checkpoints and real-time issues associated with the online invoice verification.

- ▶ In Transaction MIRO, check the transaction (e.g., invoice, credit memo, subsequent debit, subsequent credit) before entering the data because the system holds the last transaction used in MIRO.
- ▶ In Transaction MIRO, while posting the invoice, you must pay attention to the balance and the color of the traffic light icon (yellow means blocked for payment) located near it.
- ▶ If you need to post an invoice in a different currency in MIRO, put the currency before the purchase order reference number.
- ▶ If you need to enter a different exchange rate in MIRO, you must put the currency, invoicing party, and exchange rate before the purchase order reference.
- ▶ Document types in Transaction MIRO can't be defaulted based on users. This functionality is only available for Financial Accounting Transactions such as FB60.

Users frequently come across a variety of questions or common issues. The following list helps identify these questions and provides practical, useful answers:

- ▶ What are the options to default the document type in MIRO from the User ID (as you're able to do in Financial Accounting Transaction FB60)?

In Transaction MIRO, the document type is determined from the Customizing settings (document types in invoice verification). Here, a document type can only be assigned to a transaction, not a specific user.

However, this is possible through a modification with Badi MRMBADI_HEADER_DEFAULT. For further information, you can reference SAP Customer Note 539793.

- ▶ Can the system show me the accounting document number along with the LIV document number when I post invoices?

In Transaction SU3, the user parameter IVFIDISPLAY can be entered for a user with an X value. The system then starts displaying the accounting document in the status bar along with LIV document when a document is created. This

parameter applies to Transactions MIRO, MIR7, MR8M, MIR6, MRRL, MRNB, MRIS, Report RMBABG00, and EDI invoices.

- ▶ Can the system automatically change the amount for a line item in an invoice if you change the quantity?

In Transaction SU3, the user parameter IVAMOUNTADJUST can be entered for a user with an X value. This means that if you change the quantity of an invoice item and press **Enter**, the system automatically calculates the new item amount. However, this doesn't mean that you won't be able to change the amount. Thus, the system doesn't change the amount again if you change the amount manually.

- ▶ Why doesn't the system show the corresponding accounting documents for my LIV documents?

You may receive the message No Subsequent Document Found in Accounting (RW011) due to some Basis activity that might have changed the logical system. You can check and compare the logical systems in the table field RBKP-LOGSYS and T000-LOGSYS. If the values are different, you should run the report from ZZLOGSYS referenced in SAP Customer Note 28958. If the issue isn't resolved, you should contact SAP Support – it might be a case of inconsistency.

9.3.6 Technical Elements

Transaction MIRO consists of a main screen comprising many subscreens that may be active in certain cases, as indicated in Table 9.10.

User Interface	Program	Screen
Main Screen	SAPLMR1M	6000
Subscreens for Header Data (Tabs)		
Basic Data	SAPLFDCB	0010
Payment	SAPLFDCB	0020
Details	SAPLFDCB	0150
Tax	SAPLTAX1	0501
Withholding Tax	SAPLFWTD	0120
Amount Split	SAPLFDCB	0090
Contacts	SAPLMR1M	6130
Subscreen for PO Reference	SAPLMR1M	6310
Subscreen for Material	SAPLFSKB	0100
Subscreen for G/L Account	SAPRCKM_MR22	0250

Table 9.10 Programs and Screens of Various Subscreens in Transaction MIRO

Figure 9.9 illustrates the interface between MIRO and the dialog interface of Financial Accounting with the help of a program flow. The acronym PBO stands for *process before output* and refers to the process steps technically executed by the program before the selection screen appears for the user. PAI, on the other hand, is an acronym for *process after input* and represents the coding block that's executed after the user enters the values in the screen. The PBO and PAI form a part of the dialog step in ABAP programming. This is especially useful for a support consultant analyzing the dialog interface of accounting with MIRO technically.

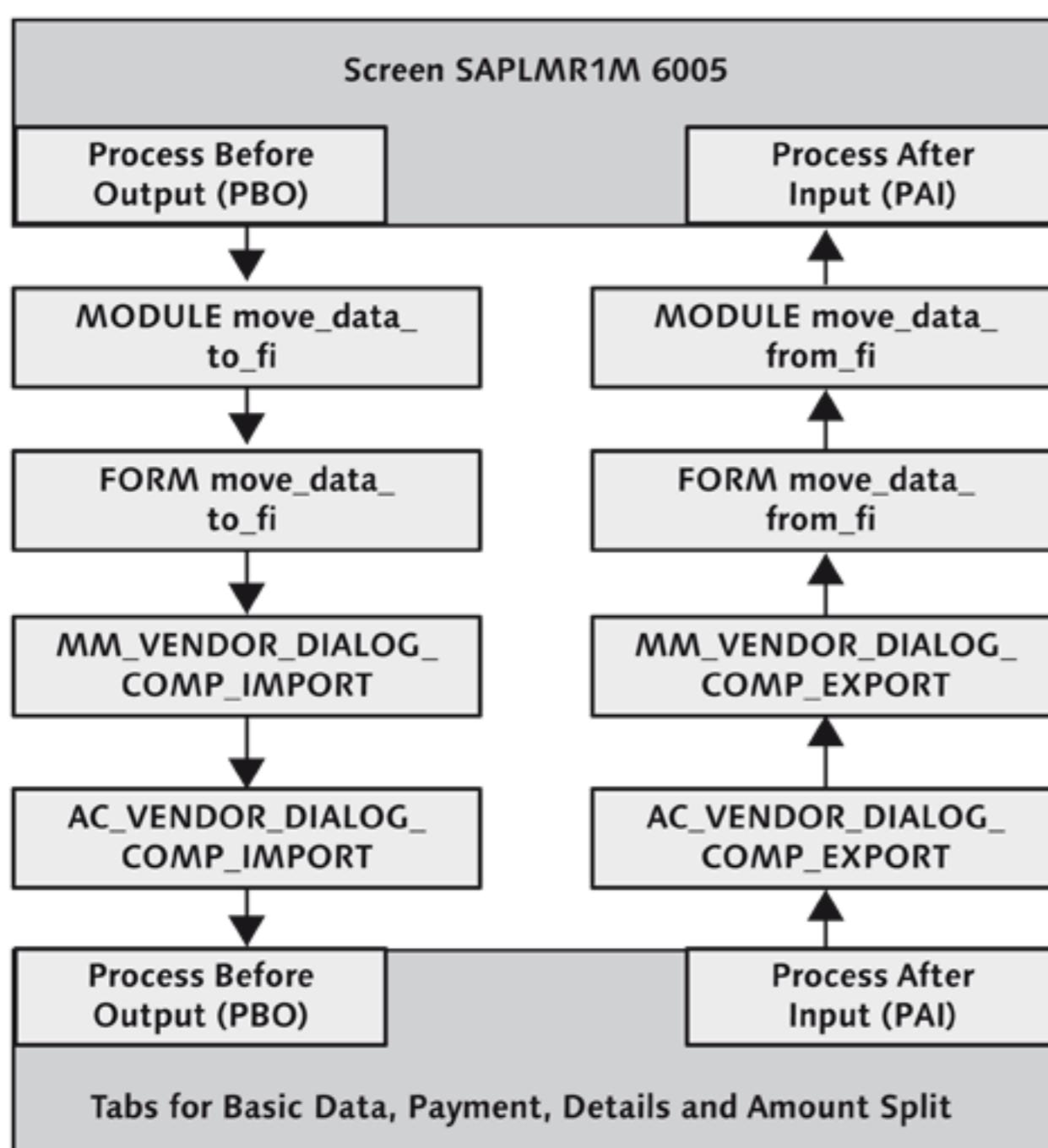


Figure 9.9 Technical Flow of Data between Transaction MIRO and the Financial Accounting Dialog Component

Now that you know about the technical aspects of LIV in the online mode, we should ideally continue with the troubleshooting tips that help you in your daily work. However, the topic is too generic and diverse to provide you with specific information. Therefore, our approach is to develop your understanding further by explaining the Materials Management, Financial Accounting, and Controlling interface for Transaction MIRO. We'll treat troubleshooting tips under specific subtopics as and when required.

9.3.7 Materials Management, Financial Accounting, and Controlling Interface for Transaction MIRO

The accounting documents are always authoritative and contain the account assignment information that's applicable at the time of posting. On the other hand, the incoming invoice documents contain the values that were entered by the user or proposed by the purchase order.

During invoice entry, the system transfers the entire Controlling account assignment information from the purchase order item to the invoice item. During the transfer in Financial Accounting, the system checks the invoice item and might find that there are still substitutions and derivations. Validations and substitutions are covered in Appendix A.

The account assignment features can be replaced by a Controlling substitution (Transaction OKC9). From the master data of the account assignments, you can derive other information than what you can derive at the time of purchase order entry (e.g., new derivation of the profit center).

The characteristics changed during the course of the transfer in Financial Accounting are not, however, transferred to the documents of LIV. The LIV documents still show the original characteristics from the purchase order item. However, if you make changes in the invoice item, the system also updates the account assignment information in the logistics invoice document.

Now that you understand invoice verification online, let's move on to invoice parking, which means that you can capture the information in an invoice document without posting it.

9.4 Invoice Parking

The data in invoices and credit memos can be entered into the system and saved in a document. Although the system doesn't post invoices initially, it's possible to post them later on. This is referred to as document parking.

9.4.1 Functional Basis

Under the following circumstances, you might want to capture data as stated in a vendor's invoice but don't want to post the invoice:

- ▶ You're interrupted when entering an invoice and would like to park it for further processing later on.
- ▶ You need to clarify certain issues before posting the invoice.
- ▶ You park invoices without checking them; these invoices are then posted by another employee who reviews them. It's possible that the parked documents were changed by the other employee.
- ▶ You park an invoice after checking it; the invoice is then reviewed, approved and posted by another employee.

9.4.2 SAP Functional Design

Invoice parking is carried out with Transaction MIR7 and can be invoked from the invoice verification Transaction MIRO (EDIT • SWITCH TO DOCUMENT PARKING).

The system assigns a document number to the parked invoice document similar to that of the posted document. The worklist in Transaction MIRO then displays a list of the parked documents.

The SAP system provides three functionalities for parked documents, as shown in Figure 9.10.

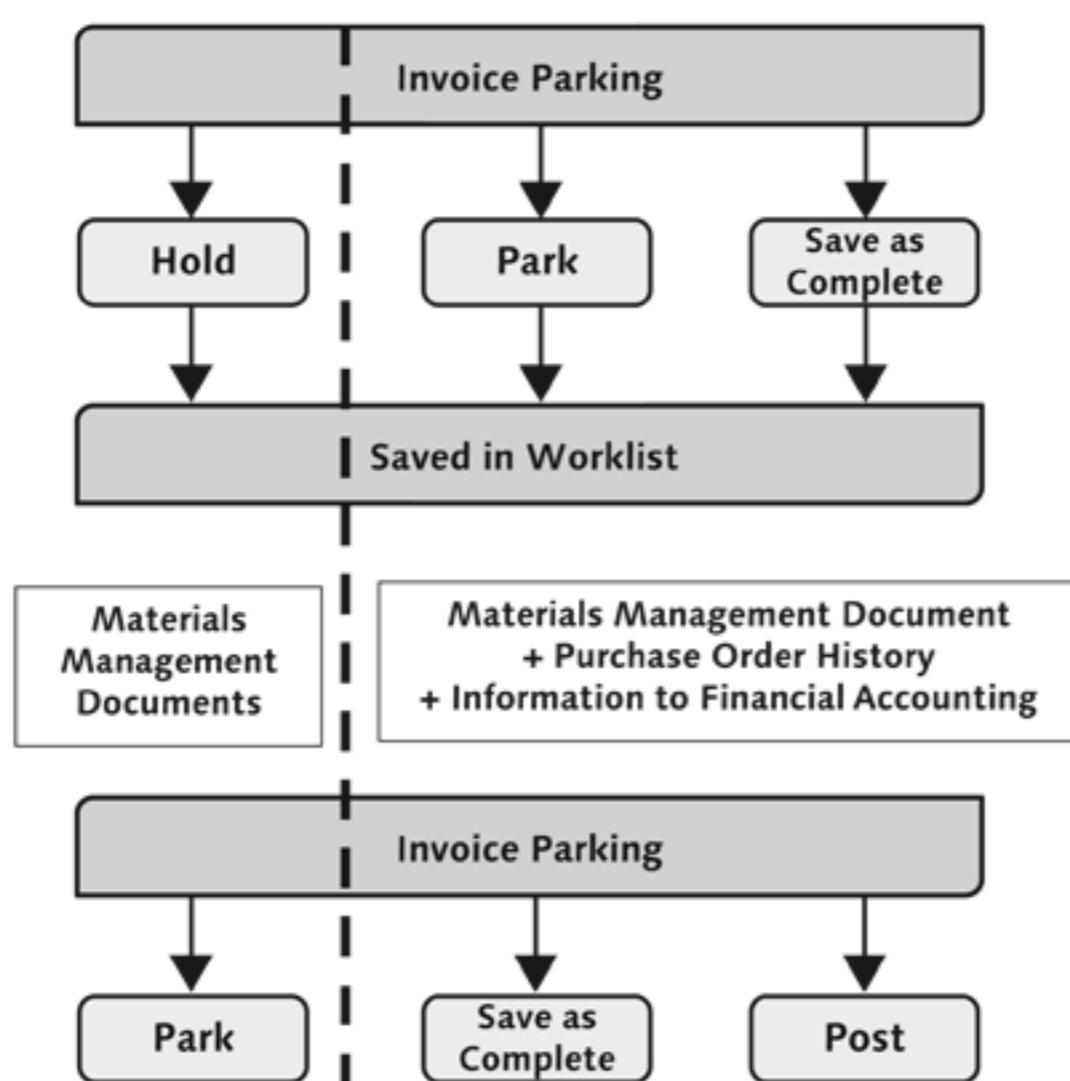


Figure 9.10 Functionalities in Invoice Parking

The three functionalities Hold, Park, and Save as Complete save the invoice in a worklist that can then be parked, saved as complete, or posted.

Table 9.11 describes these functionalities and the corresponding impact on the purchase order history and Financial Accounting.

Function	Scenario	Updates
Hold	<ul style="list-style-type: none"> ▶ You want to save the document in its current status 	<ul style="list-style-type: none"> ▶ Minimal checks performed such as those for the company code ▶ No updates take place
Park	<ul style="list-style-type: none"> ▶ Information required to post an invoice is missing and you don't want to reenter the data ▶ The balance isn't zero 	<ul style="list-style-type: none"> ▶ Purchase order history ▶ Data for advanced tax return ▶ Index for duplicated invoice check ▶ Open vendor items in parked documents ▶ Log of document changes
Save as Complete	<ul style="list-style-type: none"> ▶ No more changes should be made to the invoice document ▶ The balance is zero ▶ The invoice document is flagged for posting but shouldn't be posted yet 	<ul style="list-style-type: none"> ▶ All updates made during Park ▶ Purchase order Commitments ▶ Controlling documents ▶ Funds Management documents

Table 9.11 Details of Various Parking Functionalities

Update Allocation

A parked invoice offers additional functionalities, and therefore buttons that don't exist in the transaction for posting invoices. One such functionality is update allocation (EDIT • UPDATE ALLOCATION) and the button for it is below the line item on the PO Reference tab, with a spiral on it.

Update allocation works only with GR-based invoice verification. It suggests the line item amount and quantity in a parked invoice for the goods receipt with movement type 101. It doesn't consider the goods receipts cancelled before the first parked invoice.

An example is shown in Table 9.12. In this example, no goods receipts have been cancelled before the first parked invoice.

PO Line Item No.	PO Line Item Qty.	GR	Parked Qty.	GR Reversal	Update Allocation
10	15	15	10	15-	10
20	20	20		20-	0
30	35	35		35-	0

Table 9.12 Update Allocation for Goods Receipt Reversal

Parking Workflow

The four eyes principle for invoices means checking the invoice again before it's posted and paid. The parking workflow implements this principle in the sense that the invoice is reviewed by another employee before it's actually posted. The invoices you park can reach the appropriate agent depending on the way you have configured the workflow. There are two types of parked invoice workflows in the SAP system:

- ▶ **Complete invoices for posting**

An accounts payable clerk may park the invoice, which is then sent to the inbox of the user authorized to complete the invoice for posting. This user can complete the invoice, delete it, or post it.

- ▶ **Release of invoices completed for posting**

You use this workflow if the invoice documents have to be approved by certain users before posting, based on certain release criteria. The approver receives the invoices as work items in his inbox after Save as Complete. He can then decide to either release, post, or delete the invoice.

Now that you know the guiding principles and the functional design for the parking of invoices, we'll move on to explore its integration with Financial Accounting.

9.4.3 Integration with Financial Accounting

The system doesn't carry out the regular account checks and movements during invoice parking. When you enter an amount on the Basic Data tab during invoice parking, the system creates an accounting document with that amount against the vendor. Any other accounting line item isn't created.

As the vendor line item is created during invoice parking, the SAP ERP Financials Financial Accounting transaction takes those parked invoices into account. The transaction FBL1N is used to display the open and cleared line items of the vendors. Transaction FBL1N for vendor line item display takes into account the

parked invoice documents if the checkbox is clicked for the same under the segment Type.

Why doesn't the system display all of the parked invoices in Transaction FBL1N?

Because Transaction FBL1N belongs to Financial Accounting, it only searches accounting documents to find relevant invoices. However, there may be parked invoices for which accounting documents don't exist. Thus, FBL1N won't display these parked invoices.

Parking of a document with amounts in Basic Data creates the vendor line item in the accounting document. The entries in the document header table BKPF of the accounting document is also created, with the status Parked (BSTAT = 'V').

With Save as Complete, the system updates the purchase order commitments, controlling documents, and Funds Management documents. It ensures all necessary checks in Financial Accounting.

Validation and substitution with parked invoices

For parked documents with document status A (RBKP-RBSTAT = A), Controlling modules, and subsequently, Controlling substitutions, are processed for transactions with account assignment. For documents that are parked as complete with document status B (RBKP-RBSTAT = B), the system processes the AC interface, and, consequently, the Financial Accounting/Controlling substitution/validation.

Now that you understand the design and functionalities of invoice parking, we'll discuss an important checkpoint and real-time issue.

9.4.4 Checkpoints and Real-Time Issues

The parking of invoices is often used as a means to prevent the creation of the GR/IR line items, posting at the time of invoices. The documents can then be posted later with the same document number. However, the invoices parked in one fiscal year are deleted and assigned a different number when posted in a different fiscal year. Therefore, it's good practice to post or delete all parked invoices before a new fiscal year.

Here, we've discussed only one real-time issue; however, it will be helpful for you to remember a few troubleshooting tips when you encounter other real-time issues.

9.4.5 Troubleshooting Tips

The following are some useful troubleshooting tips for invoice parking:

- ▶ The system doesn't create an accounting document for parked invoices unless you enter the amount in the header.
- ▶ Update allocation only works for GR-based invoice verification. Therefore, it's important to compare the values with the purchase order.
- ▶ There might be parked invoices not available in the purchase order history if they haven't been entered with reference to the purchase order. However, you can view all parked invoices from the worklist in MIRO or MIR7.
- ▶ For analysis using database tables, you might want to view the fields TCODE and RBSTAT in table RBKP, and the fields TCODE and BSTAT in table BKPF.

You now understand that the invoice parking functionality can be used both for convenience during invoice entry as well as for approval.

Now that you know about the features, design, checkpoints, and troubleshooting tips for invoice parking, we can move on to prepayments in the SAP system.

9.5 Prepayment

Prepayment, as the name suggests, is used for making early payments to vendors, independently of corresponding goods receipts or invoice checks. Before SAP release ECC 5, prepayments had to be carried out as down payment to vendors in Financial Accounting (using Transaction F-47). The prepayment functionality exists because early payments to vendors initiated from Materials Management should ideally be handled in Materials Management and not in Financial Accounting.

It's your responsibility to ensure that any unauthorized payments are paid back, because the system doesn't take the corresponding goods receipt or invoice receipt into account when making prepayments.

We'll now examine the functional aspects of prepayment.

9.5.1 Functional Basis

Making early payments to vendors with whom you have built up good business relations over a long period of time is typically not a problem. However, prepayment mustn't be an excuse for affecting the standard functionalities and checks

during invoice verification. That is, you want to be able to make prepayments to vendors, but it's important that their invoices are subjected to blocking, reduction, and checks just like any other invoice.

9.5.2 SAP Functional Design

Because the prepayment functionality should be assigned to a vendor, you need to inform the SAP system accordingly. You can do this with the help of Customizing settings (MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • INCOMING INVOICE • PREPAYMENT • CONFIGURE FIELD CONTROL FOR PREPAYMENT) for the company code and the vendor master (Prepayment Relevance field on the Payment Transactions tab).

If a prepaid Logistics invoice doesn't have the status Posted, the prepaid invoice has to be posted after it's been paid.

Figure 9.11 describes the sequence of steps you must carry out during the posting of a prepaid invoice. Note that an external invoice number in the Reference field at the time of entering the invoice isn't mandatory but rather a recommendation. Based on this field and the appropriate settings in Customizing, the system performs automatic Financial Accounting clearing of the prepayment document.

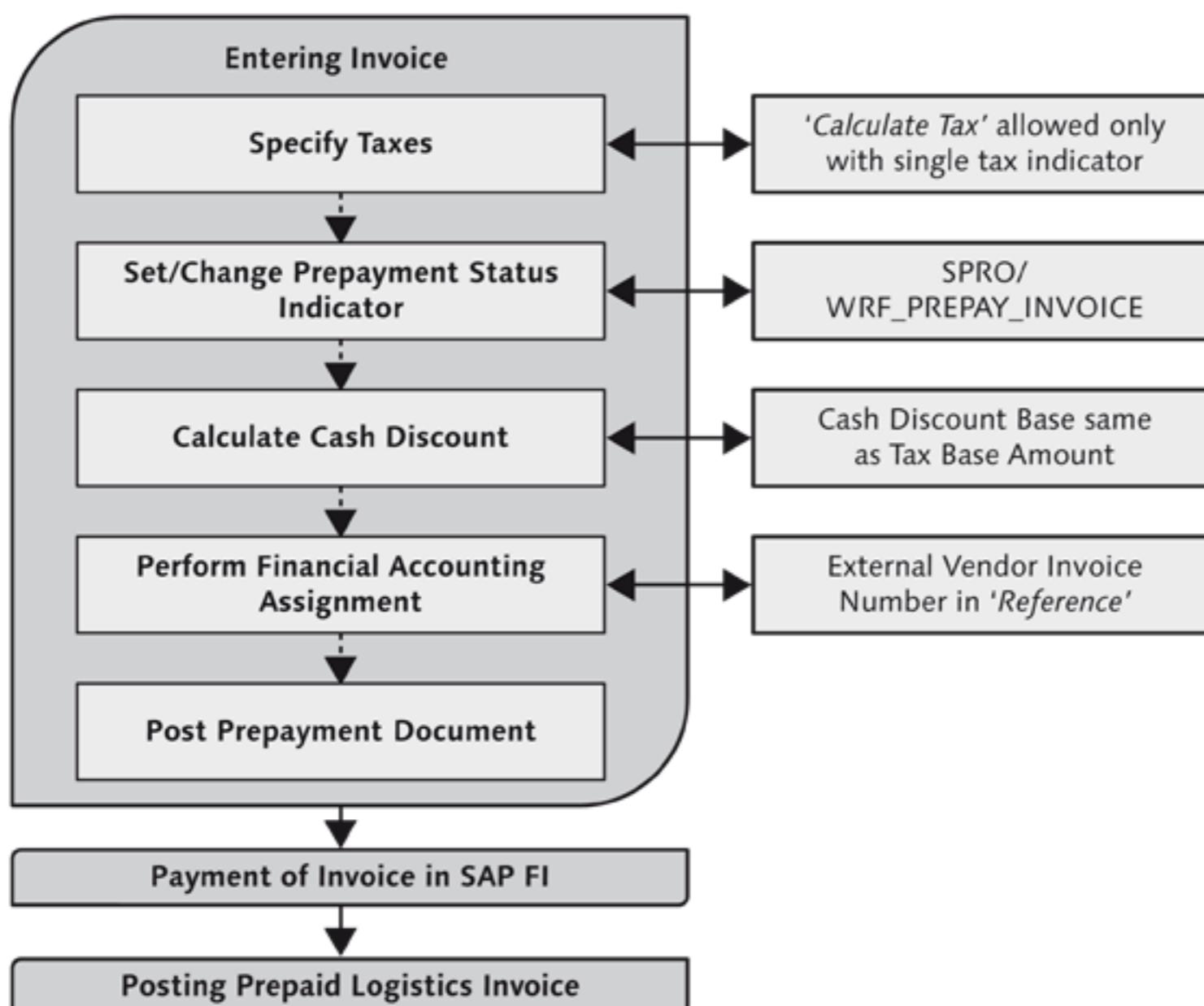


Figure 9.11 Functional Process Flow and Its Interfaces for Prepayment

Generally, taxes need to be entered manually. Specifically, tax amounts for each tax rate need to be entered manually for invoices with several tax rates. The system makes a posting for each one to the clearing account for prepayment if you have several tax codes. The calculate tax tool, on the other hand, you can use only when you have a single tax code.

If you set the attribute for the company code in Customizing and the prepayment Relevance indicator in the vendor master to Prepayment Requested or Prepayment Possible, the prepayment status can be changed manually, and you can determine whether the system should prepay an invoice.

The cash discount base amount should be equal to the tax base amount. There are no provisions in LIV to enter the cash discount base amount manually, unlike with Financial Accounting transactions. The system may therefore post the wrong cash discount base amount if it's not equal to the tax base amount.

Now that you know about the functionalities of prepayment, we'll move on to the checkpoint and real-time issues you may encounter with prepayments.

9.5.3 Checkpoints and Real-time Issues

The functionalities, limitations, and real-time issues associated with prepayments are as follows:

- ▶ The prepayment functionality can only be used for invoices. Prepayments can't be used in the following circumstances:
 - ▶ Credit notes or subsequent credits
 - ▶ In connection with a U.S. tax jurisdiction code
 - ▶ In connection with import sales/purchase tax or acquisition tax
 - ▶ For OTVs
 - ▶ For invoices for which the case discount base isn't the same as the tax discount base
- ▶ The prepayment clearing account must be created in the local currency as a balance sheet account such as the GR/IR clearing account, which only allows automatic postings and is stored in account determination.
- ▶ The prepayment of an invoice document is technically similar to parked invoices and works at the header level. Therefore, the system doesn't derive a business

area for vendor line items if the business area balances are active. The business area must be entered manually in such cases.

- ▶ You can change the invoice amount, taxes, reference (because of the Financial Accounting assignment), and invoicing party for a prepaid invoice based on the Customizing settings (**MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • INCOMING INVOICE • PREPAYMENT**). Frequent changes to the header data may result in the creation of a large number of Financial Accounting documents because the system creates a credit memo and an invoice document for each change. It's best to discuss this with your external auditors in advance.
- ▶ With prepayment, the system doesn't identify variances between the invoice and the purchase order or goods receipt. Also, the system doesn't set an automatic payment block in line with tolerance limits you configure in Customizing.
- ▶ The data on the Payment tab can be updated for prepaid invoices only when the relevant fields are allowed to be changed in accordance with the Customizing settings.
- ▶ The system doesn't post exchange rate differences during prepayment. It may, however, post the exchange rate differences when it clears the open items on the prepayment clearing account.
- ▶ You must check customer-specific substitutions or validations in Financial Accounting or Controlling that have been configured in the system and adjust them if necessary.

The following troubleshooting tips will help you if you face new real-time issue.

9.5.4 Troubleshooting Tips

The following are some troubleshooting tips for you to use throughout the prepayment process:

- ▶ To use the prepayment functionality, you must configure the field status groups for the account group, as well as the vendor master. You may maintain this under field status Company Code Data for the group Payment Transactions and the field Prepayment.
- ▶ Prepayment can be configured under the Customizing path **MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • INCOMING INVOICE • PREPAYMENT**. The values listed in Table 9.13 should then be maintained in the vendor master for the field Prepayment.

Value	Description
	Prepayment Not Allowed
A	Prepayment Requested
B	Prepayment Not Requested before Goods Receipt is Effected (see Documentation)
C	Prepayment Possible, but not Planned

Table 9.13 Various Values for the Prepayment Relevance Indicator in the Vendor Master

- ▶ If you have issues with the posting date, you may check whether the BAdI implementation for WRF_PREPAY_INVOICE is active in the system.
- ▶ You can check document changes to prepaid invoice documents and relate this to posted credit memos and invoices. This should help with understanding the document postings.

Now that you understand prepayments, let's move on to the next step: invoice verification in the background.

9.6 Invoice Verification in the Background

When you enter an invoice online (with Transaction MIRO), the system suggests the invoice items based on the corresponding previously posted documents. In the SAP system, you can verify invoices in the background. This means that you can enter the header details (e.g., invoice amount, currency, and tax information) and the purchase order number, and the system doesn't execute the checks for the items. Instead, a program that's scheduled in the background runs to check whether the invoice can be posted. This is particularly useful for posting invoices with mass amounts of data for which no item check is needed. In addition, this functionality may also be used to post invoices referring to transactions that haven't yet been entered in the system.

9.6.1 Functional Basis

Most invoices sent to you don't have any discrepancies with the prices stated on the purchase order or the quantities at the time of goods receipt. Thus, it's a matter of manual effort to enter the data from the vendor invoice into the SAP system. Ideally, you'd like to minimize the time spent on this kind of data entry in

the organization. EDI is the ideal solution, but not all vendors can transmit their invoices through EDI.

Invoice verification in the background requires minimum data entry for posting an invoice document. The program attempt to post the invoices. A list can be displayed, errors rectified, and invoices are either posted manually or scheduled for background processing again.

In the following section, we'll discuss how the SAP system's design can help you minimize the effort required for invoice entry.

9.6.2 SAP Functional Design

Transaction MIRA is used for invoice verification in background. It requires only the header data and the allocation of the purchase order to be entered, as shown in Figure 9.12. You can then save the document, which generates and displays the document number in the status bar. The document number is taken into account by the background program.

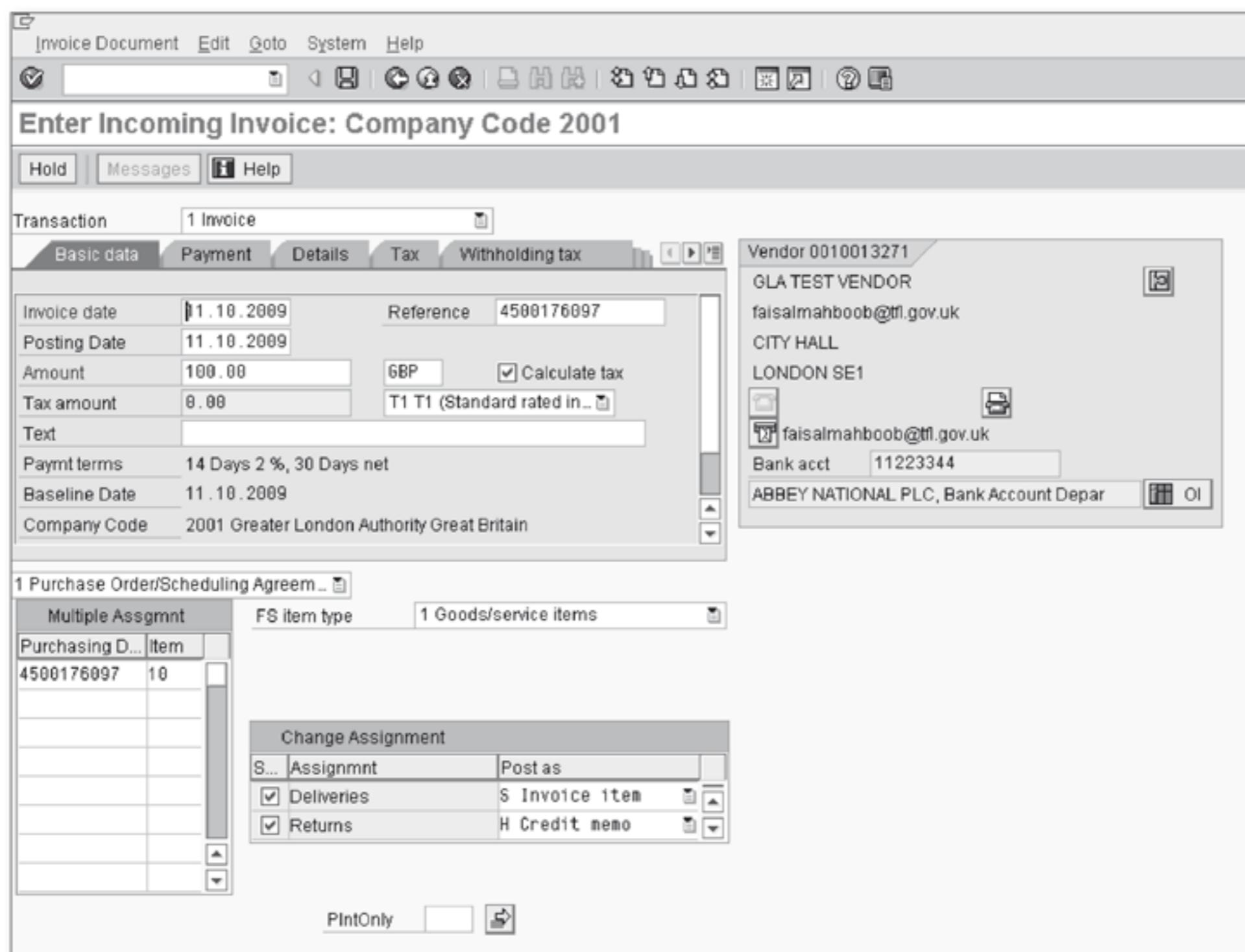


Figure 9.12 Transaction MIRA to Enter Invoices in Background

Report RMBABG00 is scheduled in the background and runs periodically to post invoices. If this report is configured to execute and print (PROGRAM • EXECUTE AND PRINT), a log is printed each time the report is executed. You can also check the status of all of the invoices scheduled for invoice verification in the background from Transaction MIR6. If there's an error, it can be either corrected and posted online, or scheduled for background verification again.

While posting invoices in the background, the system checks whether the entered values in the header match with the expected value of the net total of the item list from the purchase order.

- ▶ If the *net total = gross amount invoiced - tax amount (+/- tolerance)*, the system posts the invoice in the background.
- ▶ If the net total \neq gross amount invoiced - tax amount ($+/-$ tolerance), the system doesn't post the invoice in the background.

Now that you know about the functionality and design of invoice verification in the background, we'll describe its technical program flow in the following section.

9.6.3 Technical Elements

When you enter an invoice with Transaction MIRA:

RBKP-IVTYP = 3 (Batch Run)

Report RMBABG00 then looks at all of the invoices with this status. The line items of the invoice are saved and stored in table RBDRSEG.

Report RMBABG00 (Transaction SE38)

```
Call Function 'MRM_Invoice_Verification_NTASK'
    Loop at all selected invoices
    Call Function 'MRM_Invoice_Lock'
        Locks the invoice
    Call Function 'MRM_DBTAB_RBKPV_Read'
        Reads RBKP, RBKPB, RBKP_BLOCKED, RBWS, RBVS
    Perform 'Periode_Check'
    Call Function 'MRM_DBTAB_T169P_Read'
    Call Function 'MRM_Invoice_Verification'
        CALL FUNCTION 'MRM_TEMP_INVOICE_DATA_READ'
    CALL FUNCTION 'MRM_DBTAB_RBSEL_READ'
    Reads RBSELBEST, RBSELLIFS, RBSELWERK, RBSELRBR
    RBSELBEST: Invoice Receipt, Purchasing Documents Selection
    RBSELLIFS: Invoice Receipt, Delivery Notes Selection
```

```

RBSELWERK: Invoice Receipt, Plants Selection
RBSELFBR: Invoice Receipt, Plants Selection
CALL FUNCTION 'MRM_ASSIGNMENT' OR
(CALL FUNCTION 'MRM_ASSIGNMENT_EDI')
    Assignment (with RBSEL...)
CALL FUNCTION MRM_AMOUNT_QUANTITY_PROPOSE_N*
CALL FUNCTION MRM_POSITIONS_MERGE OR
(CALL FUNCTION MRM_POSITIONS_MERGE_EDI)
    Merges old and new values (e.g., there's a new goods receipt
for one PO-item, so something has changed)
    Call Function 'MRM_Final_Check'
IF status = c_status_ok AND s_rbkpv-xkorrekt = 'X' AND xunklfeh =
space.
    Call Function 'MRM_Invoice_Post'
IF status NE c_status_ok OR s_rbkpv-xkorrekt = space OR
( s_rbkpv-xkorrekt = 'X' AND xunklfeh = 'X' ).
    CALL FUNCTION 'MRM_DBTAB_KONV_READ'
    Reads KONV (Conditions)
    CALL FUNCTION 'MRM_INVOICE_DOCUMENT_SAVE'

```

Listing 9.1 The Program Flow for Invoice Verification in the Background

The program flow shown in the Listing 9.1 will help you resolve even the most complex issues related to invoice verification in the background. We'll look at some of the checkpoints and real-time issues in the following section.

9.6.4 Checkpoints and Real-Time Issues

After report RMBABG00 has been started, the creator of the document is overwritten with *background user*. Therefore, you might not be able to view the documents under your user name from Transaction MIR6. The user who created the document is documented in the Financial Accounting document, and when background processing is triggered automatically, this is done by the background user. Consequently, the background user is updated in the Financial Accounting document header.

If report RMBABG00 is started manually, the name of the user who started the report is likewise located in the Financial Accounting document header.

You should check the troubleshooting tips in the following section for issues we haven't yet specifically addressed.

9.6.5 Troubleshooting Tips

The following are a few trouble shooting trips for invoice verification in the background:

- ▶ The fields IVTYP and RBSTAT in table RBKP should give you a good idea about the stage your document is currently in.
- ▶ If invoice documents are scheduled for background processing, the line items should be present in table RBDRSEG.

Invoice verification in the background shouldn't trouble you much because you know the functionalities and detailed program flow for this.

We'll now take a quick look at the basic principles of account determination during invoice verification.

9.7 Account Determination

Although we'll discuss valuation and account determination in more detail in Chapter 11, it's useful for us to walk you through the basics of account determination at the time of LIV now.

Here, we'll cover the fundamental concepts of Financial Accounting and its integration with LIV. You should keep these concepts in mind when we discuss account postings in later sections in this chapter. Furthermore, you should generally analyze all account postings while keeping these guiding principles in mind.

9.7.1 Principles of Financial Accounting Integration in an SAP System

There are two basic principles related to the integration of Financial Accounting during account postings in the SAP system:

- ▶ The sum total of all account postings for any given transaction must be zero.
- ▶ One transaction can be related to another transaction in Materials Management from an accounting perspective via clearing accounts (GR/IR clearing account, prepayment clearing account, freight clearing account, etc.).

The system tries to automatically determine the SAP G/L accounts from the values entered in the purchase order. If the system isn't able to do so, you need to enter

the accounts manually, because without them, the system can't send purchase orders to vendors.

Therefore, the goal of the system is to make appropriate account postings while you execute transactions in Materials Management. It uses the elements outlined in Table 9.13 to determine the appropriate SAP G/L account.

Influencing Factors						G/L Determined	
Client (Clnt.)	Chart of Accounts (C/Ac.)	Accounting Transaction (Trx.)	Valuation Modification or Valuation Grouping Code (VM)	Account Grouping (AG)	Valuation Class	G/L Ac. Debit	G/L Ac. Credit
800	INT	BSX	0001	-	3000	300 000	300 000
800	INT	WRX	0001	-	3000	191 100	191 100
800	INT	PRD	0001	-	3000	231 000	281 000
800	INT	GBB	0001	VBR	3000	400 000	400 000

Table 9.14 Overview of Automatic Account Determination

The following are important points for automatic account determination:

- ▶ You enter the chart of accounts for the company code in Customizing (IMG • FINANCIAL ACCOUNTING • COMPANY CODE • ENTER GLOBAL PARAMETERS).
- ▶ The transaction is determined internally by the system, and most requirements for its determination are hard-coded.
- ▶ The valuation modification or the valuation grouping code is related to the valuation area (plant or company code).
- ▶ The valuation class depends on the material type.

9.7.2 Functional Elements of Account Determination

Automatic account determination takes the following functional elements into account to extract the desired information for account determination:

- ▶ Data entered during LIV
 - ▶ Vendor account
 - ▶ Amount
- ▶ Material master
 - ▶ Valuation class

- ▶ Type of price control
- ▶ Stock level during invoice
- ▶ Posted documents
 - ▶ Purchase order price
 - ▶ Purchase order history
- ▶ Customizing settings
 - ▶ Gross or net posting of the invoice
 - ▶ The G/L account number

As mentioned before, automatic account determination is covered in more detail in Chapter 11.

Before we'll analyze various kinds of standard postings in LIV, we'll quickly take a look at the purchase account management functionality developed specifically for a few European countries.

9.8 Purchase Account Management

The purchase account functionality was developed specifically to address the special legal requirements in Belgium, Spain, Portugal, France, Italy, and Finland. Before using this function, you should make sure that you need it. As per the legal requirements in these countries, purchase accounts must be managed to document the value at which the externally procured materials are posted. The purchase account is posted at the time the goods receipt and invoice receipt are posted, with the same amount as the stock account. The offsetting entry is posted to a purchase offsetting account.

Purchase account management documents the value at which externally procured materials are posted and is updated in the following two ways:

- ▶ At the receipt value
- ▶ At the stock value

9.8.1 Postings at Receipt Value

In this case, the exact amount posted to the GR/IR clearing account at goods receipt is posted to the purchase account. The postings based on receipt value for materials with MAP are shown in Table 9.15. This assumes that the Customizing has

been configured to create separate accounting documents for purchase account postings.

Purchase Order	Goods Receipt	Invoice
100 Pieces of Mat. at 10/Piece Freight Cost 200	100 Pieces of Mat.	100 Pieces at 11/Piece Freight Cost 250
Stock Account	1,200+	150+
GR/IR Clearing Account	1,000-	1,000+
Freight Clearing Account	200-	200+
Vendor Account		1,350-
Purchase Account	1,000+	100+
Freight Purchase Account	200+	50+
Purchase Offsetting Account	1,200-	150-

Table 9.15 Purchase Account Postings at Receipt Value for Materials with MAP Control

9.8.2 Postings at Stock Value

In this case, the exact amount posted at goods receipt or at invoice receipt is posted to the purchase account. The postings based on stock value for materials with standard price are shown in the Table 9.16. This assumes that the Customizing has been configured to create separate accounting documents for purchase account postings.

Purchase Order	Goods Receipt	Invoice
100 Pieces of Mat. at 10/Piece Freight Cost 200	100 Pieces of Mat.	100 Pieces at 11/Piece Freight Cost 250
Stock Account	900+	
GR/IR Clearing Account	1,000-	1,000+
Freight Clearing Account	200-	200+
Expense from Price Diff.	100+	100+
Vendor Account		1,350-
Purchase Account	900+	
Freight Purchase Account	200+	50+
Purchase Offsetting Account	900-	

Table 9.16 Purchase Account Postings at Stock Value for Materials with Standard Price Control

9.9 Direct Posting

The LIV documents can be posted without reference to purchase orders, for example, for a bill of expenses. The header details, including the vendor number, currency, and amount should be entered manually because there's no reference document to pull them. The direct postings can be made either to the SAP G/L Account or the material subject to Customizing, as shown in Figure 9.13.

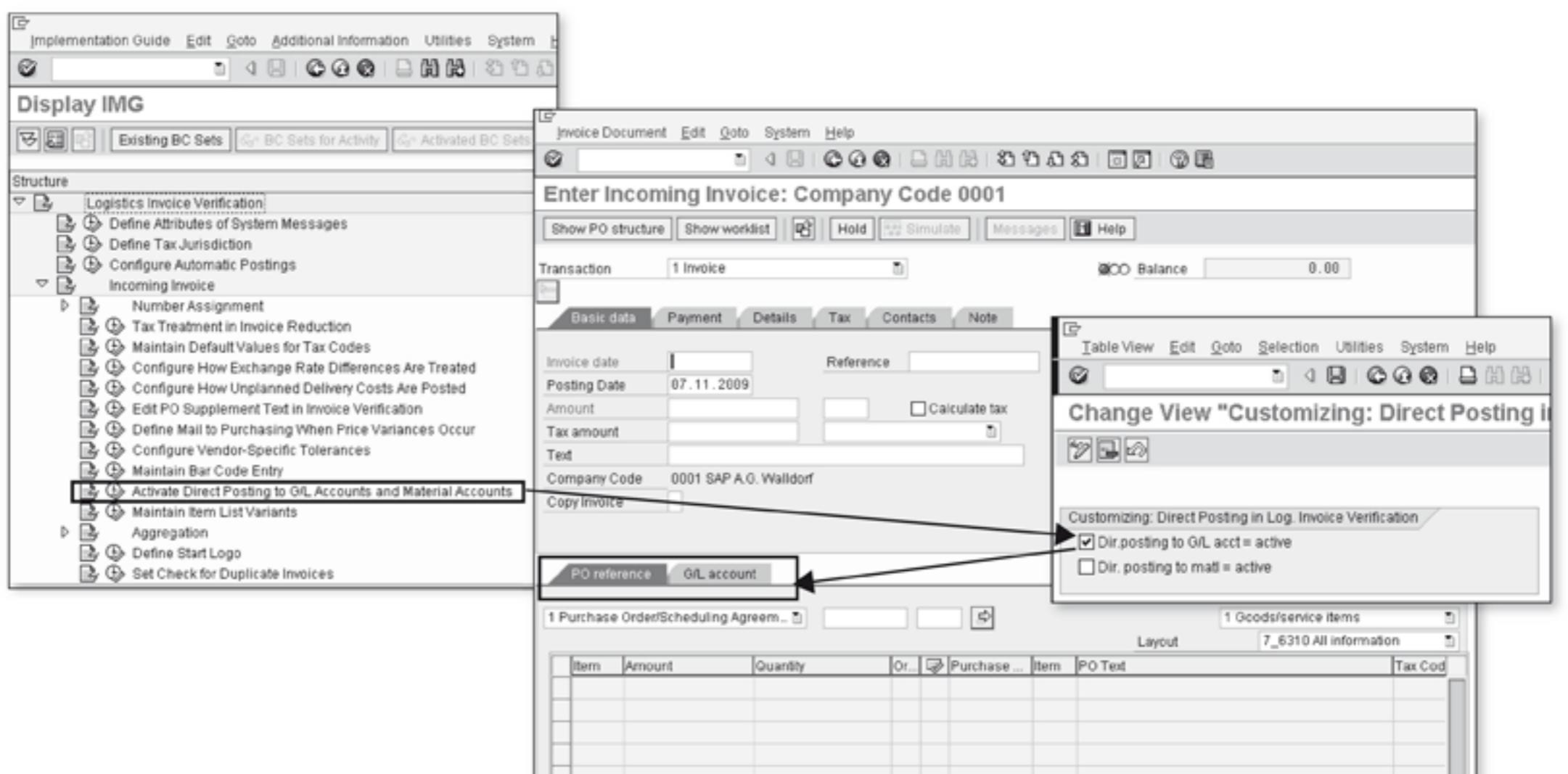


Figure 9.13 Customizing Steps for Direct Postings to SAP G/L and Material Accounts

9.9.1 Posting to SAP G/L Accounts

With LIV, you can post directly to an SAP G/L account without reference to a purchase order. Table 9.17 lists the sequence of steps that needs to be carried out to do so. It's also possible to reference a purchase order and post directly to the SAP G/L account in the same invoice.

1. Customizing	MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • INCOMING INVOICE • ACTIVATE DIRECT POSTING TO G/L ACCOUNTS AND MATERIAL ACCOUNTS
2. Transaction Header	Invoicing Party on the Details tab Currency on the Basic Data tab

Table 9.17 Sequence of Steps for Posting Directly to an SAP G/L Account

3. Transaction Item	G/L account number Credit or debit posting Amounts Account assignment information, for example, cost centers
----------------------------	---

Table 9.17 Sequence of Steps for Posting Directly to an SAP G/L Account (Cont.)

9.9.2 Posting to a Materials Account

You can post directly to a materials account in a manner similar to that explained for posting to an SAP G/L account. The only difference is that you use the Material tab instead of the G/L Account tab. Also, the corresponding line item entries may differ as well. Table 9.18 lists the sequence of steps that needs to be carried out for posting directly to a material account.

1. Customizing	MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • INCOMING INVOICE • ACTIVATE DIRECT POSTING TO G/L ACCOUNTS AND MATERIAL ACCOUNTS
2. Transaction Header	Invoicing Party on the Details tab Currency on the Basic Data tab
3. Transaction Item	Material number Plant Valuation type is subject to split valuation Credit or debit posting Amount

Table 9.18 Sequence of Steps for Posting Directly to a Material Account

Now that you know about the Customizing settings and functionality of direct postings, we're done with most of the operational parts of LIV.

Therefore, it's time for you to learn about how the system makes various calculations in terms of taxes and cash discounts and to what level you have control over this in Customizing. We'll discuss both topics in the following sections, starting with taxes.

9.10 Posting Taxes

In this section, we'll discuss the various types of taxes, proposal logic for tax codes, Customizing of taxes, and tax calculations. We'll also analyze the technical elements of communication between Materials Management and Financial Accounting with respect to taxes.

9.10.1 Types of Taxes

Taxes are an important and inevitable topic for all businesses. Generally speaking, taxes are classified into two categories: deductible and non-deductible. The taxes for transactions in individual cases are determined depending on the type of business transaction and the regulation of the tax authorities such as the internal revenue service (IRS).

Deductible Taxes

For deductible taxes, the input tax is paid to the vendor, who passes it on to the tax authorities. The offsetting entry for a tax is posted to a separate input tax account, and on the basis of this account and the sales tax account, Financial Accounting can calculate the difference between the tax received and the tax paid, and move on to pay this amount to the appropriate tax authority.

The SAP system creates a line for every tax code you enter. If various line items have the same tax code, the tax postings are added together.

Non-Deductible Taxes

Non-deductible taxes can be processed in three different ways. For each, the tax for a tax code can be defined on several levels. However, the postings on individual levels can be distributed to different accounts.

- ▶ Distribution among invoice items

In this case, the taxes are proportionately distributed among the SAP G/L accounts for line items. The following example helps to clarify this.

Example: Distribution among invoice items

You receive the following invoice for a purchase order against which a goods receipt has been entered:

100 pieces of material A @5/pc = 500

100 pieces of material B @3/pc = 300

Subtotal = 800

5% of Tax1 = 40

2% of Tax2 = 16

1% of Tax3 = 8

Total = 864

Account movements

	Goods Receipt	Invoice Receipt
Stock account A	500+	40+
GR/IR account A	500-	500+
Stock account B	300+	24+
GR/IR account B	300-	300+
Vendor account	864-	

How is the posting to the stock account of A calculated at invoice receipt?

Tip: $40 = (40 + 16 + 8) * 500/800$

- Separate posting lines

In this method, the offsetting entry for the tax amount is posted to a separate tax account.

Example: Separate posting lines

You receive the following invoice for a purchase order against which a goods receipt has been entered:

100 pieces of material A @5/pc = 500

100 pieces of material B @3/pc = 300

Subtotal = 800

5% of Tax1 = 40

2% of Tax2 = 16

1% of Tax3 = 8

Total = 864

Account movements

	Goods receipt	Invoice Receipt
Stock account A	500+	
GR/IR account A	500-	500+
Stock account B	300+	
GR/IR account B	300-	300+
Vendor account	864-	
Tax1	40+	
Tax2	16+	
Tax3	8+	

► Sales tax not charged

In this case, the invoice doesn't contain tax. The tax expense is either distributed among the invoice items or posted separately. The offsetting entry is posted to separate tax accounts.

Example: Sales tax not charged

You receive the following invoice for a purchase order against which a goods receipt has been entered:

100 pieces of material A @5/pc	= 500
100 pieces of material B @3/pc	= 300
Total	= 800

On the item list, you enter a tax amount and tax code for each item. For example, 2% tax for material A and 5% tax for material B.

Account movements

	Goods Receipt	Invoice Receipt
Stock account A	500+	10+
GR/IR account A	500-	500+
Stock account B	300+	15+
GR/IR account B	300-	300+
Vendor account	864-	
Tax1	10-	
Tax2	15-	

These examples show various postings for non-deductible taxes. However, our focus of study in Customizing is on deductible taxes. Moving forward, unless otherwise stated, we're referring to deductible taxes when we use the term tax.

9.10.2 Proposal Logic for Tax Codes

Figure 9.14 describes the proposal logic of taxes from Customizing to the online invoice verification transactions.

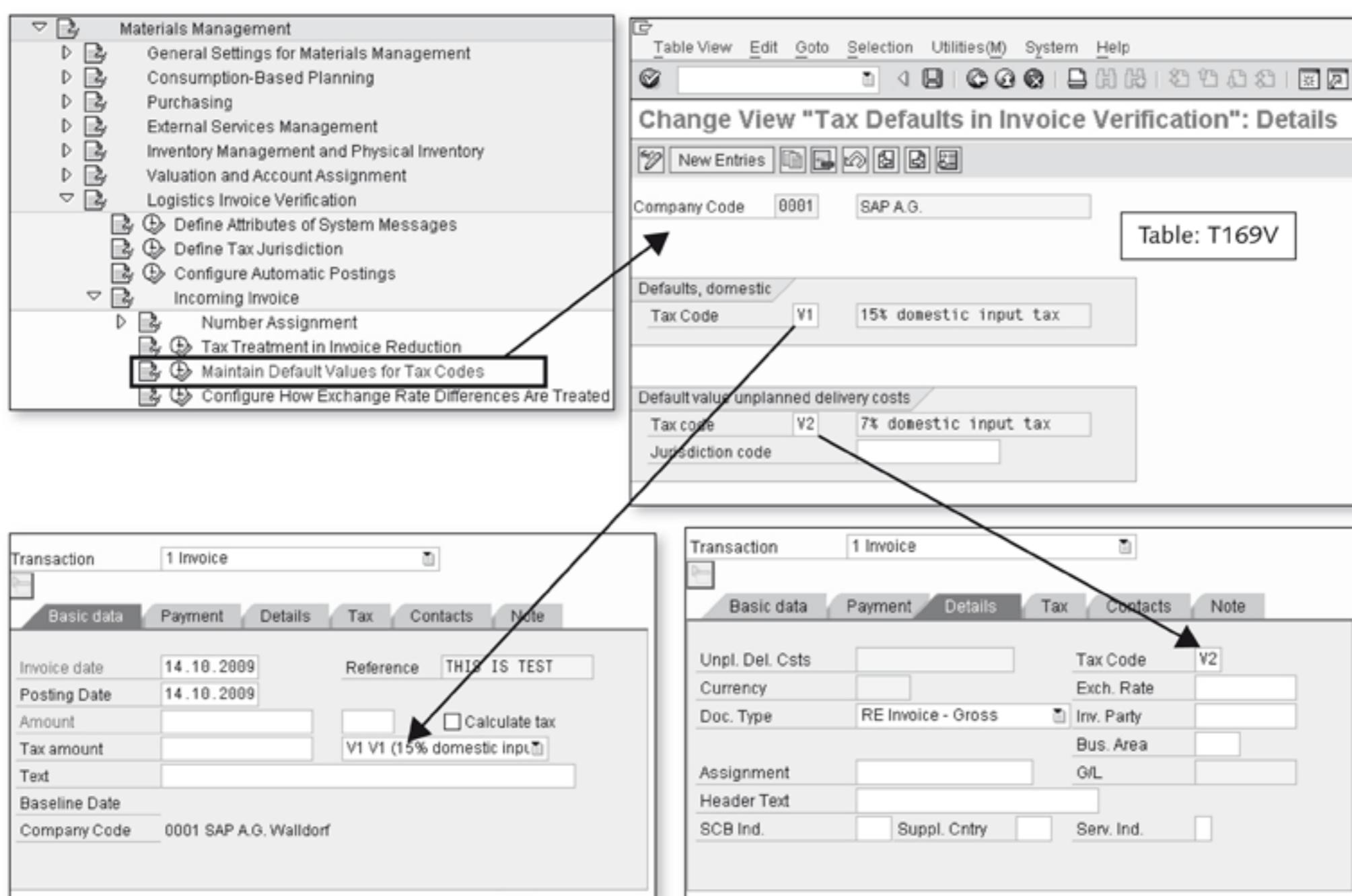


Figure 9.14 Proposal Logic for Taxes in Online Transactions for LIV

Note that the Tax Code field for unplanned delivery cost only appears if you choose to post unplanned delivery costs to a separate SAP G/L account.

From where is the list of tax codes on the Basic Data tab of MIRO populated?

The system asks for the company code before you can enter Transaction MIRO. Additionally, there's a country key assigned to the company code definition which helps in attaching the exact tax procedure to the company code. All of the tax codes under the relevant tax procedure are available in the dropdown list for Transaction MIRO. The same is true for Transaction MIR7.

A list of tax codes is available in Transaction FTXP (IMG • FINANCIAL ACCOUNTING • FINANCIAL ACCOUNTING GLOBAL SETTINGS • TAX ON SALES PURCHASES • CALCULATION • DEFAULT TAX CODES FOR SALES AND PURCHASES).

9.10.3 Settings for Taxes in Customizing and in Master Data

Various kinds of information about taxes can be maintained for the company code, country, and SAP G/L account. These settings impact the way taxes are calculated during transactions.

Figure 9.15 illustrates tax code Customizing settings.

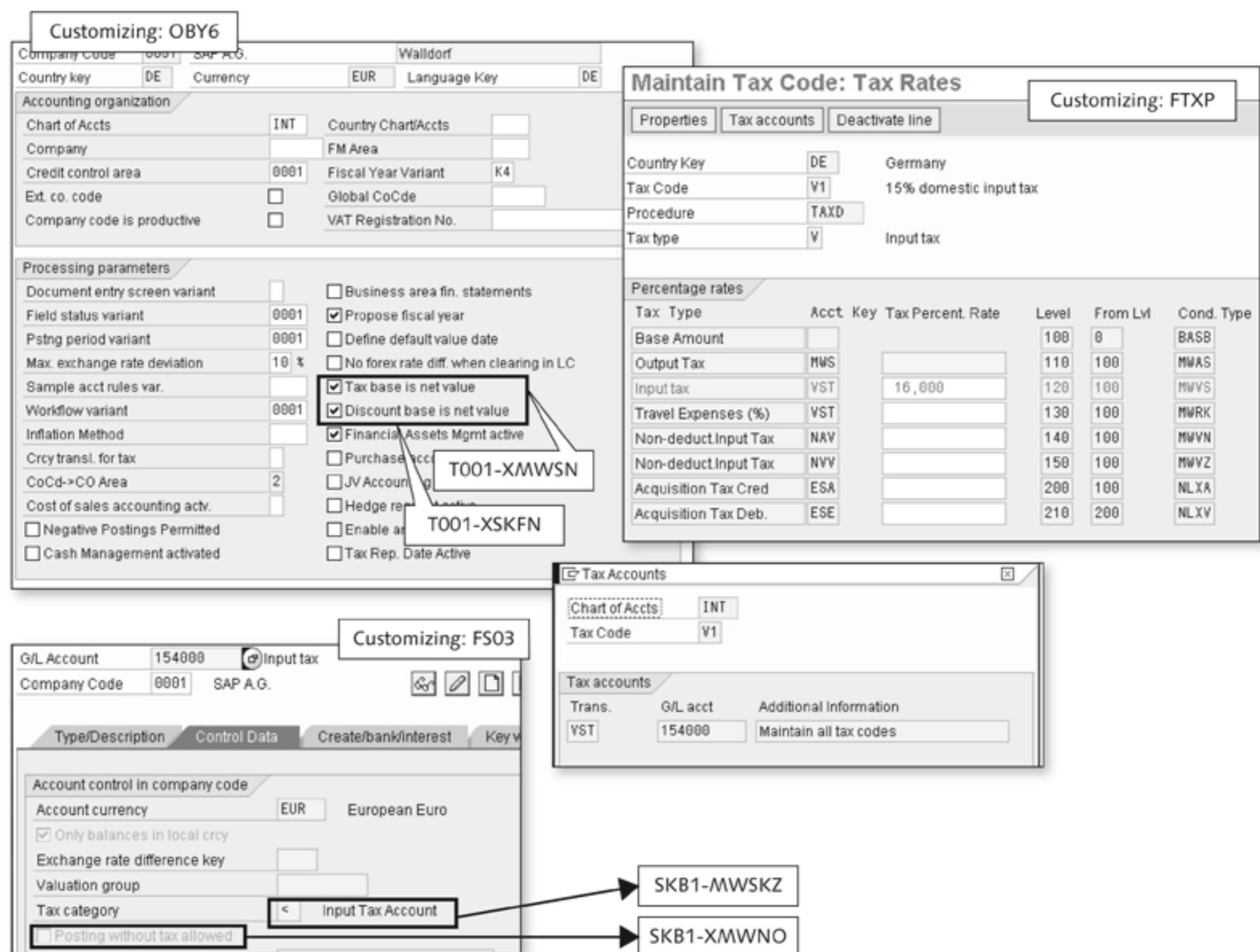


Figure 9.15 Customizing Settings for Tax Codes

Figure 9.15 shows the tax settings in various Customizing transactions. You enter the Chart of Accounts and the Country Key in the Customizing for the company code. The tax Transaction FTXP maintains the tax codes according to the country key and the SAP G/L account according to the chart of accounts. In addition, the SAP G/L account indicates whether it's an input tax account or whether postings without taxes are allowed for it. Overall, the company code, chart of accounts, country key, and SAP G/L account implement the way in which tax should be posted.

As we touched on previously, the system derives the country key from the company code and, based on the country key, there is a corresponding tax procedure. The SAP G/L account in the tax procedure can then be configured for how taxes can be posted.

9.10.4 Technical Flow and Architecture

The technical flow of data for tax configuration is summarized in Figure 9.16. There are more tables involved than those shown in the figure, but the figure provides a good overview for what's needed in determining the configuration settings.

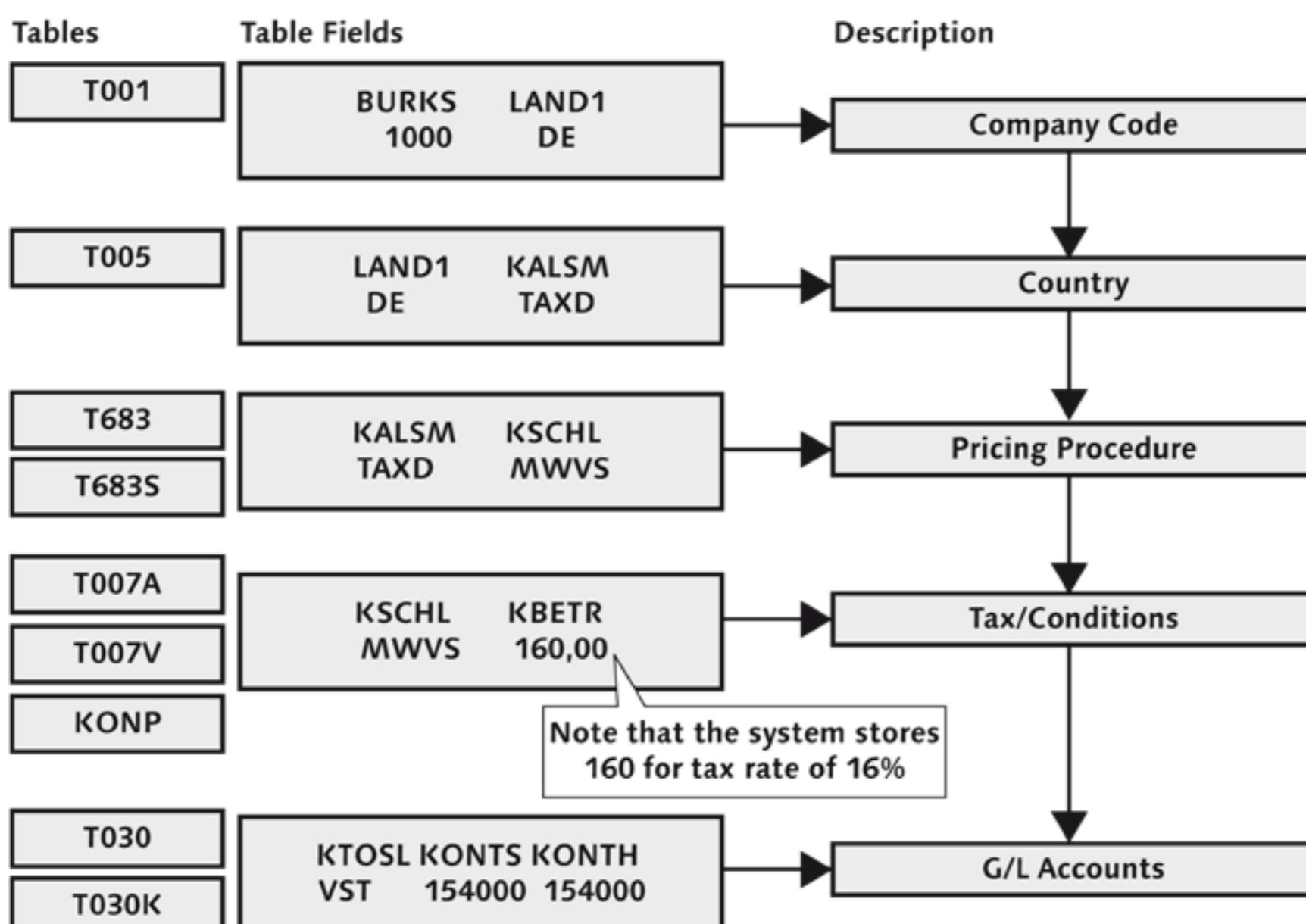


Figure 9.16 Tables and Fields Involved in the Configuration of Taxes

The system determines the tax data in the order in which it's presented in Figure 9.16, starting with the company code. The country key is present in the company code, which pulls down the pricing procedure from tables T683 and T683S. The tax conditions are then taken from tables T007A, T007V, and KONP. The SAP G/L account is stored in tables T030 and T030K.

9.10.5 Technical Details of Tax Calculations

On the technical side, the tax calculation is carried out with the help of function modules and various tables, as illustrated here.

```
FM: MRM_FINAL_CHECK
    FM: MRM_SET_TAX_AMOUNT << RBKPV-RBTX[ ], RBKPV-WMWST1 << Basic Data
        tab of MIRO
    FM: MR_CALCULATE_TAX_DOCUMENT
        FM: CALCULATE_TAX_DOCUMENT
        Table: YBSEG << DRSEG << Line Items in MIRO
        Table: YDBSEG << DRSEG << Line Items in MIRO
        FM: CREATE_BSET_ITEM
        Table: T_BSET >> Table XBSET
```

For non-deductible input taxes, function modules MR_NDVAT_ADJUSTMENT and NDVAT_ADJUSTMENT are called after function module MR_CALCULATE_TAX_DOCUMENT and update tables BSEG and DRSEG.

9.11 Cash Discount

The terms of payment in Materials Management and Financial Accounting provide information for cash management and payment transactions. The terms of payment are composed of cash discount percentages and payment periods.

The terms of payments agreed on with the vendor are maintained in the vendor master. In addition, different terms of payment can be agreed on for finance and procurement. Therefore, there's a provision to enter different terms of payment in the purchasing and accounting data of the vendor master, as already indicated in Chapter 9, Section 9.2.2.

The terms of payment are suggested from the vendor master into purchase orders and from purchase orders to invoice verification. However, you can change the suggested value based on what's been agreed on with the vendor after sending the purchase order.

Example: Cash discount for the terms of payment

Terms of Payment: 0003

Payment: Within 14 days, 3% cash discount

Payment: Within 20 days, 2% cash discount

Payment: Within 30 days due net

By providing a cash discount, the vendor encourages your accounts payables department to make quick payment.

Now that you understand the concept of cash discounts, we'll move on to learn about the cash discount calculation based on the type of tax base amount and the type of cash discount base.

9.11.1 Cash Discount Base

Depending on your country's legislation, you may be required to include the tax amount in the base amount for the cash discount calculation. This can be done via the menu path FINANCIAL ACCOUNTING • ACCOUNTS RECEIVABLE AND ACCOUNTS PAYABLE • BUSINESS TRANSACTIONS • INCOMING INVOICES/CREDIT MEMOS • DEFINE CASH DISCOUNT BASE FOR INCOMING INVOICE.

In Germany, the possible discount deduction is first taxed when the document is posted. A tax adjustment is performed when the balance is paid. Therefore, the deduction is gross in Germany. However, in the UK, it's net. This means that in the UK, the tax adjustment for the cash discount is performed at the time of invoice posting and isn't deferred until payment is made.

9.11.2 Cash Discount Postings

There are two ways for posting a cash discount. We classify them into *gross posting* and *net posting*. We'll look at both of these types and combine them with the different types of cash discount base amounts to show sample account postings.

The cash discount type is associated with the document type by going to MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • INCOMING INVOICE • NUMBER ASSIGNMENT • MAINTAIN NUMBER ASSIGNMENT FOR ACCOUNTING DOCUMENT. Then, if you click on the document type RN for example, you'll be able to find the checkbox for Document Type checked.

► **Cash Discount Gross**

During gross posting, the system ignores the cash discount amount when the invoice is entered. However, the cash discount amount is posted at the time of payment.

► **Cash Discount Net**

During net posting, the system posts the cash discount amount to the cash discount clearing account at the time of invoice verification. The cash discount clearing account is then cleared at the time of payment.

Sample Account Postings

Now that you know about the concept of gross and net postings, we'll extend this further by analyzing sample account posting for the various combinations of tax base and cash discount base for document type Net Posting. Remember, the cash discount calculation is performed at the time of invoice verification for only document type Net Posting. For document type Gross Posting, the cash discount calculation is performed at the time of payment.

Three parameters impact account postings for cash discount:

- Tax base
- Cash discount base
- Cash discount clearing account's relevance for tax

You'll learn about the impact of the combination of these three parameters on the account postings at the time of invoice verification. The document type for the invoice posting is net so that the cash discount calculation is performed at the time of invoice verification

Case I: Tax base = gross and cash discount base = gross

Material Value	100
Tax Rate	10%
Cash Discount	3%
Invoice Amount	110

Because the cash discount base is gross, the cash discount amount is calculated from the invoiced amount:

$$3\% \text{ of } 110.00 = 3.30$$

Because the tax base is gross, the tax is calculated from the invoiced material value:

$$10\% \text{ of } 100.00 = 10.00$$

Posting for the Net Posting Document Type if the Cash Discount Clearing Account is not Relevant to Tax (SKB1-MWSKZ = SPACE)

Posting Key	Account	Amount
31	Vendor	110.00
86	Expense	96.70
40	Tax	10.00
40	Cash Discount Clearing	3.30

Posting for the Net Posting Document Type if the Cash Discount Clearing Account is Relevant to Tax (SKB1-MWSKZ <> SPACE)

Posting Key	Account	Amount
31	Vendor	110.00
86	Expense	97.00
40	Tax	10.00
40	Cash Discount Clearing	3.00

Case II: Tax base = gross and cash discount base = net

Material Value	100
Tax Rate	10%
Cash Discount	3%
Invoice Amount	110

Because the cash discount base is net, the cash discount amount is calculated from the net amount:

$$3\% \text{ of } 100.00 = 3.00$$

Because the tax base is gross, the tax is calculated from the invoiced amount:

$$10\% \text{ of } 100.00 = 10.00$$

Posting for the Net Posting Document Type if the Cash Discount Clearing Account is not Relevant to Tax (SKB1-MWSKZ = SPACE)

Posting Key	Account	Amount
31	Vendor	110.00
86	Expense	97.00
40	Tax	10.00
40	Cash Discount Clearing	3.00

Simulation for the Net Posting document type if the cash discount clearing account is relevant to tax (SKB1-MWSKZ <> SPACE)

The system generates error message M8129: Account <G/L Account Number> <CCode> for Deductions/Cash Discounts can't be Tax Relevant. This is because it's not an allowed combination.

Case III: Tax base = net and cash discount base = Net

Material Value	100
Tax Rate	10%
Cash Discount	3%
Invoice Amount	109.70

Because the tax base is net, the cash discount amount is also calculated from the net amount (material value minus cash discount):

$$10\% \text{ of } 97.00 = 9.70$$

Posting for the Net Posting Document Type if the Cash Discount Clearing Account is not Relevant to Tax (SKB1-MWSKZ = SPACE)

Posting Key	Account	Amount
31	Vendor	109.70
86	Expense	96.70
40	Tax	10.00
40	Cash Discount Clearing	3.00

Simulation for the 'Net Posting' document type if the cash discount clearing account is relevant to tax (SKB1-MWSKZ <space>):

The system generates error message M8129: Account <G/L Account Number> <CCode> for Deductions/Cash Discounts can't be Tax Relevant. This is because it's not an allowed combination.

Case IV: Tax base = net and cash discount base = gross

This combination is only allowed for tax calculations with a tax jurisdiction code.

9.12 Summary

In this chapter, you should have developed a solid conceptual understanding of both the functional and technical sides of integration and design of LIV with Financial Accounting. We covered various functionalities in invoice verification, including duplicate invoice check, parking, prepayment, invoice verification in the background, direct postings to material and SAP G/L accounts, tax postings and cash discount calculation, and postings. This chapter also covered the checkpoints and real-time issues faced by consultants and companies for AP invoices in Materials Management. Troubleshooting tips, checkpoints, and lessons learned under each topic should provide direction in even the most complex scenarios.

In the next chapter, you'll learn about variances and the blocking of invoices. We'll explain various kinds of tolerances and the functionalities associated with them.

The success and efficiency of the accounts payable department in your business depends on how well you handle invoices. That is, your success depends on how efficiently your invoices are blocked and released.

10 Variances and Blocking of Invoices

In this chapter, you'll learn about variances and blocking of invoices. After having learned about AP invoices with respect to account postings, functionalities, and technicalities, it's now time for us to analyze more practical scenarios. We've already discussed the terms two-way match and three-way in Chapter 9, and we'll need these terms again in this chapter.

Vendor invoices might not match the corresponding purchase orders exactly: there could be discrepancies in price, quantity, or both. Under these circumstances, you need to configure the system so it can react automatically to such variances. A possible solution is automatic blocking of invoices that have variances, which is what you'll learn about in this chapter.

In the following sections, we'll study variances and blocking of invoices. From there, we'll investigate the release of invoices and the invoice reduction functionality.

10.1 Invoice with Variances

You first need to understand invoices variances, especially regarding price, quantity, and order price quantity. Generally speaking, there are four types of variances for invoices:

- ▶ Quantity variance
- ▶ Price variance
- ▶ Quantity and price variance
- ▶ Order price quantity variance

We'll discuss each of them in the following sections.

10.1.1 Quantity Variance

In this section, we'll describe the functional aspects and technical elements of quantity variances.

Functional Basis

During LIV, the quantity that still needs to be invoiced (also known as the *open quantity*) is used to describe the difference between the quantity of material delivered and the quantity that's already been invoiced. When you enter the invoice, the system suggests the open quantity based on the purchase order history. A *quantity variance* occurs when the open quantity doesn't match the invoice. From the business perspective, it's important to stop such invoices from being paid until the discrepancy has been reviewed and agreed upon. But the question is: why should you allow a mismatch between the quantity delivered and the invoice?

Generally speaking, there can be two business scenarios which can result in quantity variances during invoice receipt:

- ▶ The system should allow an invoice quantity for more than what's been delivered, in anticipation of additional deliveries linked to the invoices.
- ▶ The system should allow an invoice quantity smaller than what's been delivered, in anticipation of additional invoices for the deliveries.

SAP Functional Design

The SAP system keeps a track of all goods receipts and invoice receipts associated with a purchase order in the purchase order history. When you enter the invoices in Transaction MIRO with reference to the purchase order, the system immediately knows the quantity received and the amount invoiced. Depending on that value, the system suggests the amount and the quantity during invoice receipt. However, you can always overwrite the defaulted values with those stated on the vendor invoice.

Table 10.1 describes a sample posting, in which the invoice quantity is greater than the goods receipt quantity. The internal transaction keys listed in Table 10.1 are explained later in Chapter 11.

Purchase Order of 100 Pieces at USD 10/Piece	GR for 50 Pieces	IR for 80 Pieces at USD 10/Piece	GR for 30 Pieces	Internal Transaction Key
Stock Account	500+		300+	BSX
GR/IR Clearing Account	500-	800+	300-	WRX
Vendor Account		800-		KBS

Table 10.1 Account Postings for Quantity Variance

In this example, a purchase order exists for 100 pieces of a material priced at USD 10 per piece. A goods receipt is posted in the system for 50 pieces. Thus, the stock account is debited by 500 and the GR/IR clearing account is credited by an equivalent amount. The invoice is then posted for 80 pieces when in fact the goods receipt was only for 50 pieces. Because there's no price variance for this example, the GR/IR clearing account is debited by 800 and the vendor account is credited by 800.

At a later date, a goods receipt is posted for the remaining 30 pieces of the material. This results in knocking off the GR/IR clearing account during goods receipt and invoice receipt. What if the final goods receipt hadn't been posted? In this case, the GR/IR clearing account would have had to be cleared manually, as we discussed in Chapter 9.

Checkpoints and Real-Time Issues

When you receive partial invoices from a vendor, the system suggests the amount and quantity from the purchase order history. If you acknowledge that there's no price variance but only a quantity variance, you can configure the system to suggest the amount based on the price the system expects. To do this, enter the value X for the user parameter IVAMOUNTADJUST in Transaction SU3. After you maintain this user parameter, simply change the quantity in Transaction MIRO/MIR7 and press **Enter**. The system adjusts the amount accordingly. However, it's important to remember that the system doesn't stop you from entering a different amount. This means that you're free to change the amount the system has suggested due to IVAMOUNTADJUST. As shown in Figure 10.1, the quantity of 8 and the amount of 80 default at the time of invoice verification in Transaction MIRO. When the user changes the quantity to 10, the amount automatically changes to 100.

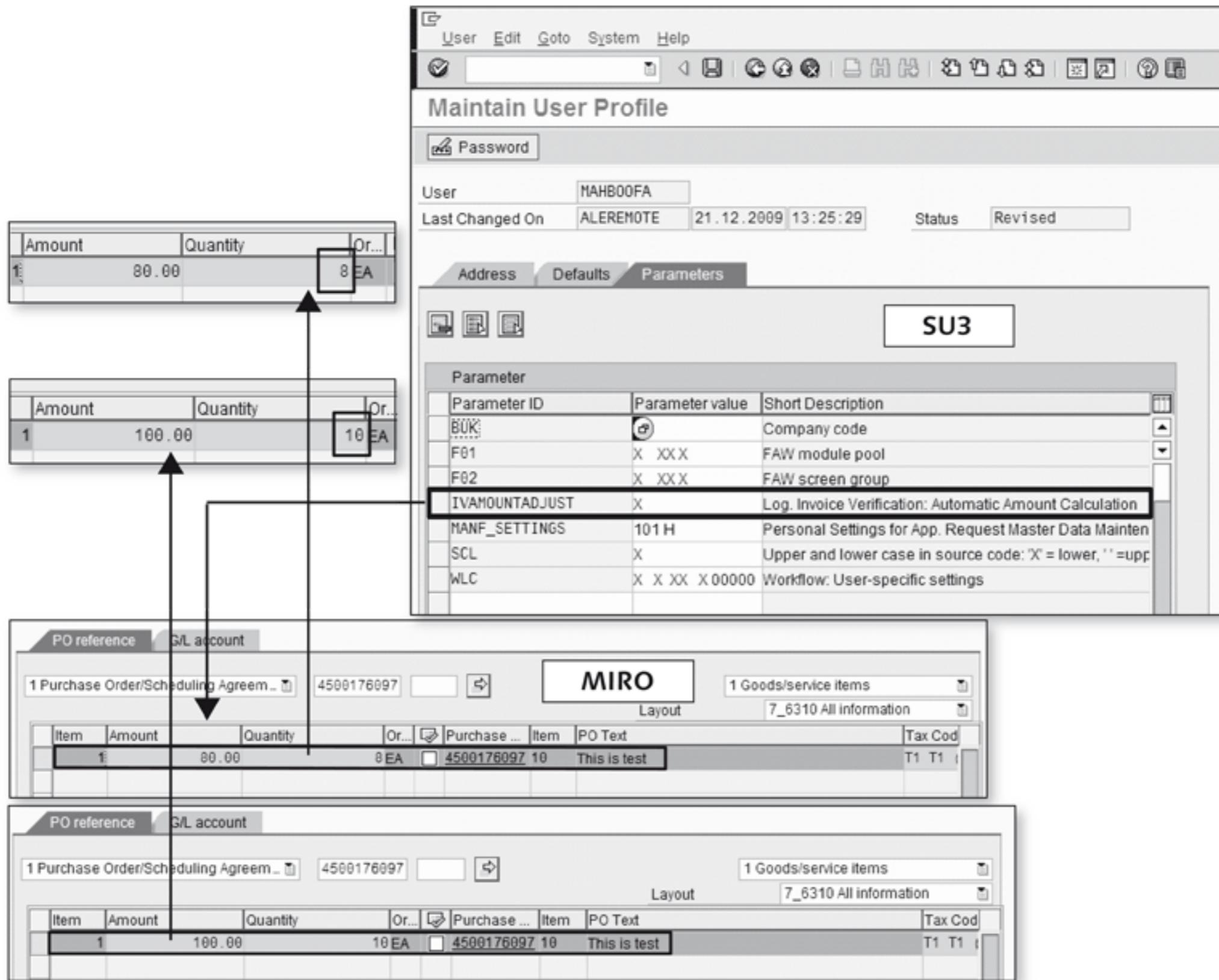


Figure 10.1 Impact of Parameter IVAMOUNTADJUST on Transaction MIRO

For GR-based invoice verification, if the invoice quantity is more than the goods receipt quantity, you can't match more goods receipt to this invoice. This may result in a situation where you have a goods receipt for one piece of material against which an invoice exists for two pieces. If you then post another goods receipt for one piece, the GR/IR clearing account is cleared, although there would not be an invoice against the new goods receipt. A possible solution in this case is to configure the system in Customizing to issue error message M8 504: Quantity Invoiced Greater than Goods Receipt Quantity.

As you can see in Figure 10.2, in the standard system, this message is configured as the warning message. To get to the error message, use menu path SAP IMG • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • DEFINE ATTRIBUTES OF SYSTEM MESSAGES.

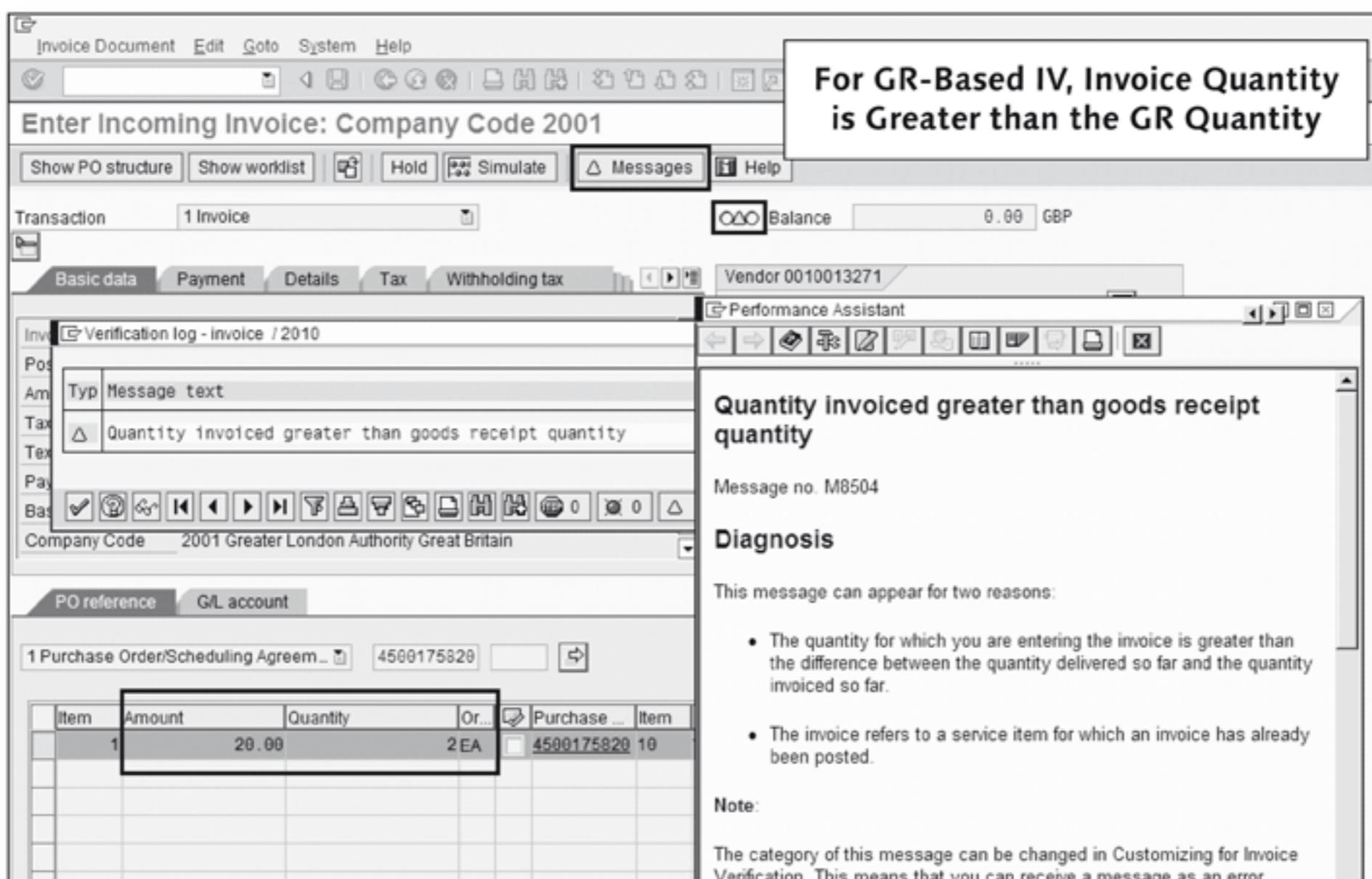


Figure 10.2 Quantity Variance for GR-Based Invoice Verification

Figure 10.2 illustrates a case of a purchase order with GR-based invoice verification where the goods receipt has been posted for one piece of material and an additional invoice needs to be posted for the second piece in the same purchase order.

Technical Elements

Table 10.2 lists some of the technical elements associated with quantity variance during LIV.

Technical Element	Description
MRM_QUANTITY_CHECK	Function Module
EKBE	Database Table for Purchase Order History
EKBE-MENGE	Table Field for Quantity
EKBE-WRBTR	Table Field for Amount

Table 10.2 Useful Technical Elements for Quantity Variances during LIV

The system uses the values from the purchase order history table EKBE for calculating the amount and quantity during LIV. The calculation is performed in function module MRM_QUANTITY_CHECK.

Troubleshooting Tips

The parameter IVAMOUNTADJUST doesn't guarantee that the amount depends on the quantity. The amount can manually be changed from the value suggested by the system.

Having discussed quantity variances, let's move ahead to reviewing price variances.

10.1.2 Price Variance

We'll describe the functional aspects and technical elements of price variances in the following sections.

Functional Basis

In a perfect world, you could expect vendors to send you invoices with the same prices as those listed on the purchase orders. However, this isn't always the case. A price variance exists if the price on the vendor invoice is different from that on the purchase order. Price variances occur for the following reasons:

- ▶ The vendor doesn't abide by the price arrangements with your purchasing department.
- ▶ Your purchasing department entered the incorrect price in the purchase order.

SAP Functional Design

The system knows about the purchase order price from the purchase order line item table EKPO and the purchase order history table EKBE. Your company stands to benefit or suffer, depending on the price variance between the purchase order and the invoice, if you don't receive a subsequent debit or credit from the vendor. The account postings during LIV may vary depending on the price control of the material and the stock coverage. By now, you should know that for standard price-controlled materials, the gain or loss is posted to the price differences account. But, for materials subject to MAP control, the system passes the gain or loss to the stock account and changes the price of the material. We'll analyze the account postings for price variances in the following cases:

- ▶ Standard Price
- ▶ MAP with sufficient stock
- ▶ MAP with insufficient stock

Standard Price

Table 10.3 describes a sample posting for a price variance during LIV for the materials controlled by the standard price. In this example, the standard price of the material is USD 1/piece. The system posts USD 100 to the stock account depending on the quantity of the goods receipt and the standard price in the material master. The GR/IR clearing account is posted with USD 150; this is the amount that has to be paid. The difference of 50 posts to the price differences account. The internal transaction keys listed in Table 10.3 are explained later in Chapter 11.

Purchase Order for 100 Pieces at USD 1.50/Piece for a Material with an S-Price of USD 1/Piece	GR for 100 Pieces	Invoice of 100 Pieces at USD 1.25/Piece	Internal Transaction Key
Stock Account	100+		BSX
GR/IR Clearing Account	150-	150+	WRX
Vendor Account		125-	KBS
Expense from Price Difference	50+		PRD
Income from Price Difference		25-	PRD

Table 10.3 Price Variance for S-Price Controlled Materials

At the time of invoice for the 100 pieces of the material at the reduced price, the system clears out the GR/IR clearing account and posts an amount to the vendor account based on the invoice price. The difference is finally posted to the price differences account.

Let's now look at the account postings for price variances for materials maintained with MAP Control.

MAP with Sufficient Stock

Table 10.4 shows a sample posting for a price variance during LIV for MAP-controlled materials. In this case, we assume that there's sufficient stock, so the system doesn't need to post anything to the price differences account. The internal transaction keys listed in Table 10.4 are explained later in Chapter 11.

Purchase Order for 100 Pieces at USD 1.50/Piece for a Material with a V-Price of USD 1/Piece	GR for 100 Pieces	Invoice of 100 Pieces at USD 1.25/Piece	Internal Transaction Key
Stock Account	150+	25-	BSX
GR/IR Clearing Account	150-	150+	WRX
Vendor Account		125-	KBS

Table 10.4 Price Variance for V-Price-Controlled Materials

In this case, when the goods receipt is processed, the account postings reflect the price on the purchase order. The GR/IR clearing account is credited by 150 while the stock account is debited by the same amount.

Because the invoice is entered at a lower price, the difference between the GR/IR clearing account and the vendor account is passed to the stock account.

Let's move on to the special case of insufficient stock during invoice receipt.

MAP with Insufficient Stock

Table 10.5 describes the account postings for a case where stock is insufficient. The internal transaction keys listed in Table 10.5 are explained later in Chapter 11.

Purchase Order for 100 Pieces at USD 1.50/Piece for a Material with a V Price of USD 1/Piece	GR for 100 Pieces	Goods Issue of 120 Pieces	Invoice for 100 Pieces at USD 1.25/Piece	Internal Transaction Key
Initial Stock = 100 Pieces				
Quantity of Stock (Pieces)	200	80	80	
Value of Stock (USD)	250	100		
MAP	1.25	1.25	1	
Stock Account	150+	150-	20-	BSX
GR/IR Clearing Account	150-		150+	WRX
Vendor Account			125-	KBS
Expense from Price Difference				PRD
Income from Price Difference			5-	PRD
Cost Center		150+		KBS

Table 10.5 Price Variance for V-Price-Controlled Materials with Insufficient Stock During Invoice Receipt

KBS is the account assignment that's not determined automatically by the system. You can verify it from Transaction OBYC to see whether the automatic account determination indicator isn't checked for the internal transaction key KBS. As you can see in Table 10.5, internal transaction key KBS is used for the vendor and the SAP G/L account you enter for the cost center when you create the purchase order.

As you can see, the MAP of the material is USD 1/piece and the initial stock of the material is 100 pieces. The purchase order is sent to the vendor for 100 pieces of the material at a price of USD 1.5/piece.

As is the case for MAP-controlled materials, the stock account and the GR/IR clearing account is posted based on the price in the purchase order during goods receipt. Thus, 150 is credited from the GR/IR clearing account and debited to the stock account. After the goods receipt, the stock quantity becomes 200 pieces and the value of the stock becomes 250 after 150 is added to the stock account. Therefore, the new MAP is USD 1.25/piece.

After the goods issue of 120 pieces, the quantity of stock becomes 80 pieces. The stock account is credit by:

$$120 * 1.25 = 150$$

When the invoice is entered for the 100 pieces of the material at the rate of USD 1.25/piece, we have only 80 pieces of the material in stock. This means, after knocking off the GR/IR clearing account with an amount of 150 and crediting the vendor account with 125, the difference of 25 has to be proportionately posted to the stock account and the price differences account.

$$\text{Stock account posting} = \text{stock} * (\text{invoice price} - \text{purchase order price})$$

$$= 80 * (1.25 - 1.50)$$

$$= -20$$

Similarly,

$$\text{Price differences account posting} = (\text{invoice quantity} - \text{stock}) * (\text{invoice price} - \text{purchase order price})$$

$$= (100 - 80) * (1.25 - 1.50)$$

$$= -5$$

Thus, the system credits the stock account by 20 and credits the income from the price differences account by 5. The system has posted the price variance to the extent of stock coverage at the time of invoice receipt. The rest of the amount is posted to the price differences account.

We'll now take a look at the checkpoints and real-time issues of price variances.

Technical Elements

Table 10.2 lists some of the technical elements associated with price variances during LIV.

Technical Element	Description
MRM_AMOUNT_CHECK	Function Module
MRM_QUANTITY_CHECK	Function Module
EKBE	Database Table for Purchase Order History
EKBE-MENGE	Table Field for Quantity
EKBE-WRBTR	Table Field for Amount

Table 10.6 Useful Technical Elements for Price Variances during LIV

The system uses the values from the purchase order history table EKBE for calculating the amount and the quantity during LIV. From these values, the price is calculated. If there's a change in the amount or the quantity, it affects the price and the system keeps track of this in internal table YDRSEG during the LIV program flow. The calculation is performed with the help of function modules MRM_QUANTITY_CHECK and MRM_AMOUNT_CHECK.

Troubleshooting Tips

Account postings may appear different from what you anticipate. This might be due to price changes after a purchase order has been sent to a vendor.

To identify price variances, the system compares the price from invoices with the price in purchase orders. However, if the price was changed later in the purchase order, you may encounter account postings that might not be very obvious. The following strategy generally helps during analysis:

1. Review the account postings for the invoice.
2. Sort the purchase order history in chronological order to get an exact picture.
3. Analyze the log of purchase order price changes. For a particular line item, use menu path ENVIRONMENT • ITEM CHANGES in Transaction ME23N.

Now that you understand price variances, let's move on to a more applied topic: simultaneous quantity and price variances in an invoice.

10.1.3 Quantity and Price Variance

The more realistic kind of variance during LIV is one where there's a quantity and a price variance in the same invoice. We'll examine the functionalities and account postings in such cases in the following sub-sections.

Functional Basis

A vendor may send you an invoice that doesn't match the open quantity that needs to be invoiced. In addition, the price may vary from that mentioned on the purchase order. This constitutes a quantity and price variance.

SAP Functional Design

At the time of LIV, the system defaults the values for the line item quantity and the amount based on the purchase order history. For invoices with quantity and price variances, you have to overwrite the default values suggested by the system. It's important to note, however, that you can overwrite only the amount and the quantity for the line items. The system calculates the price from the amount and the quantity. Therefore, the vendor invoice might contain a variance just in the quantity or both the amount and the quantity, which results in a quantity and price variance.

You already know that the account postings for a price variance may vary depending on the price control of the materials. Let's analyze the account postings for the standard price and the MAP with sufficient stock.

Standard Price

Table 10.7 describes a sample posting for a quantity and price variance during LIV for materials controlled by the standard price. The internal transaction keys listed in Table 10.7 are explained later in Chapter 11.

Purchase Order for 100 Pieces at USD 1.50/Piece for a Material with an S-Price of USD 1/Piece	GR for 50 Pieces	Invoice of 80 Pieces at USD 1.25/ Piece	GR for 50 Pieces	Internal Transaction Key
Stock Account	50+		50+	BSX
GR/IR Clearing Account	75-	112.50+	57.5-	WRX
Vendor Account		100-		KBS
Expense from Price Difference	25+		7.5+	PRD
Revenue from Price Difference		12.5-		PRD

Table 10.7 Quantity and Price Variance for S-Price-Controlled Materials

As you can see, the material in question is controlled by the standard price of USD 1/piece. The purchase order is created for the 100 pieces of the material at an order price of USD 1.50/piece.

The goods receipt is posted for 50 pieces of the material. Because the material is S-Price-controlled, the following posting takes place:

*Posting to the stock account = goods receipt quantity * standard price*

$$= 50 * 1$$

$$= 50$$

*Posting to the GR/IR clearing account = goods receipt quantity * purchase order price*

$$= 50 * 1.50$$

$$= 75$$

The difference between the GR/IR clearing account and the stock account is posted to the price differences account.

An invoice is posted for 80 pieces of the material at 1.25 USD/piece. In this case, the GR/IR clearing account posting has two parts. The first part consists of the amount that's already been posted to the GR/IR clearing account corresponding to the quantity of 50 pieces of the first goods receipt. The second part consists of the 30 additional pieces on the invoice that weren't covered by the goods receipt. The amount corresponding to these 30 pieces is calculated on the basis of invoice price.

*Posting to the GR/IR clearing account = GR/IR knockoff for the quantity already goods received + invoice quantity not already covered by the goods receipt * invoice price*

$$= 75 + (80 - 50) * 1.25$$

$$= 112.50$$

*Posting to the vendor account = invoice quantity * invoice price*

$$= 80 * 1.25$$

$$= 100$$

The difference between the GR/IR clearing account and the vendor account is posted to the price differences account.

A second goods receipt arrives for 50 pieces of the material. For the posting to the GR/IR clearing account, the system checks the quantity for which an invoice surplus already exists. For the amount to be posted to the GR/IR clearing account, the system looks at the following:

50 pieces of goods receipt = 30 pieces already covered by the previous invoice receipt + 20 pieces that need to be posted based on the S-price

*Posting to the GR/IR Clearing Account = GR/IR cleared for the quantity already covered by the invoice receipt + goods receipt quantity not already covered by the invoice receipt * standard price*

$$= 37.5 + (50 + 50 - 80) * 1$$

$$= 57.50$$

The difference between the GR/IR clearing account and the stock account is posted to the price differences account.

MAP with Sufficient Stock

Table 10.8 describes a sample posting for a quantity and price variance during LIV for MAP-controlled materials. In this case, we assume that there's sufficient stock so the system doesn't need to post anything to the price differences account.

As you can see, the material in question is MAP-controlled. The purchase order is created for 100 pieces of the material at an order price of 1.25 USD/piece. The invoice is posted for 50 pieces of the material at a price of USD 1.50/piece. The following account postings take place as a result of the invoice:

*Posting to vendor account = invoice quantity * invoice price*

$$= 50 * 1.5$$

$$= 75$$

The GR/IR clearing account is debited by the same amount.

Purchase Order for 100 Pieces at USD 1.25/Piece for a Material with V-Price Control	Invoice of 50 Pieces at USD 1.50/Piece	GR for 80 Pieces	Invoice of 50 Pieces at USD 1.75/Piece	Internal Transaction Key
Stock Account		112.50+	15+	BSX
GR/IR Clearing Account	75+	112.50-	72.5+	WRX
Vendor Account	75-		87.5-	KBS

Table 10.8 Quantity and Price Variance for V-Price-Controlled Materials for Sufficient Stock

The goods receipt is posted for 80 pieces of material. Because an invoice has already been posted for 50 pieces of the material, the GR/IR clearing account posting takes that into account. From the point of view of posting to the GR/IR clearing account, the 80 pieces of goods receipt comprise 50 pieces already covered by the previous invoice and an additional 30 pieces not covered by any previous posting. The following account postings take place as a result of the 80 pieces on the goods receipt.

*Posting to the GR/IR clearing account = amount covered by the previous invoice posting + goods receipt quantity not already covered by the invoice * purchase order price*

$$= 75 + 30 * 1.25$$

$$= 75 + 37.5$$

$$= 112.50$$

The same amount is credited to the stock account.

A second invoice arrives for another 50 pieces of the material at an increased price of 1.75 USD/piece. The following account posting is made to the vendor account:

*Posting to the vendor account = invoice quantity * invoice price*

$$= 50 * 1.75$$

$$= 87.50$$

The account posting to the GR/IR clearing account is comprised of two parts. The first is already covered by the previous goods receipt. The other isn't covered by the goods receipt. The following account postings take place:

*Posting to the GR/IR clearing account = posting for the quantity already covered by the goods receipt + quantity not already covered by the goods receipt * invoice price*

$$= 37.5 + (50 + 50 - 80) * 1.75$$

$$= 37.5 + 35$$

$$= 72.50$$

The difference between the vendor account and the GR/IR clearing account is posted to the stock account.

Let's move on to review a few checkpoints in the system.

Checkpoints and Real-Time Issues

The following are some of the checkpoints and real-time issues associated with the quantity and price variance:

- ▶ A quantity and price variance might not always be related to changes during invoice verification. It can also result from a change in the price in the purchase order and the quantity at the time of invoices.
- ▶ You can get an idea of the quantity variance from the values suggested during invoice verification. However, the price isn't apparent from the values suggested during invoice verification unless you calculate it. It's a good idea to double-click on the purchase order to check whether the price is different from that mentioned on the invoice.

Technical Elements

The technical elements for quantity and price variances comprise those mentioned individually under Sections 10.1.2 and 10.1.3.

Troubleshooting Tips

Following are a few troubleshooting tips for the price and quantity variances of an invoice:

- ▶ Sort the purchase order history to know the sequence of goods receipts and invoice receipts already posted. The postings to these accounts during goods receipt and invoice receipt depend on the previous postings.
- ▶ In this case, the price changes in the purchase order line items are relevant for analysis but not the quantity changes. You can find them using Transaction ME23N for a particular line item from the menu path ENVIRONMENT • ITEM CHANGES.

Now that you know about quantity and price variances, let's move on to discuss the account postings associated with the OPUn variance.

10.1.4 Order Price Quantity Variance

In this section, we'll discuss variances during invoice verification that are associated with order price quantity. Figure 10.3 shows the relationship between the OUn and OPUn in a sample purchase order.

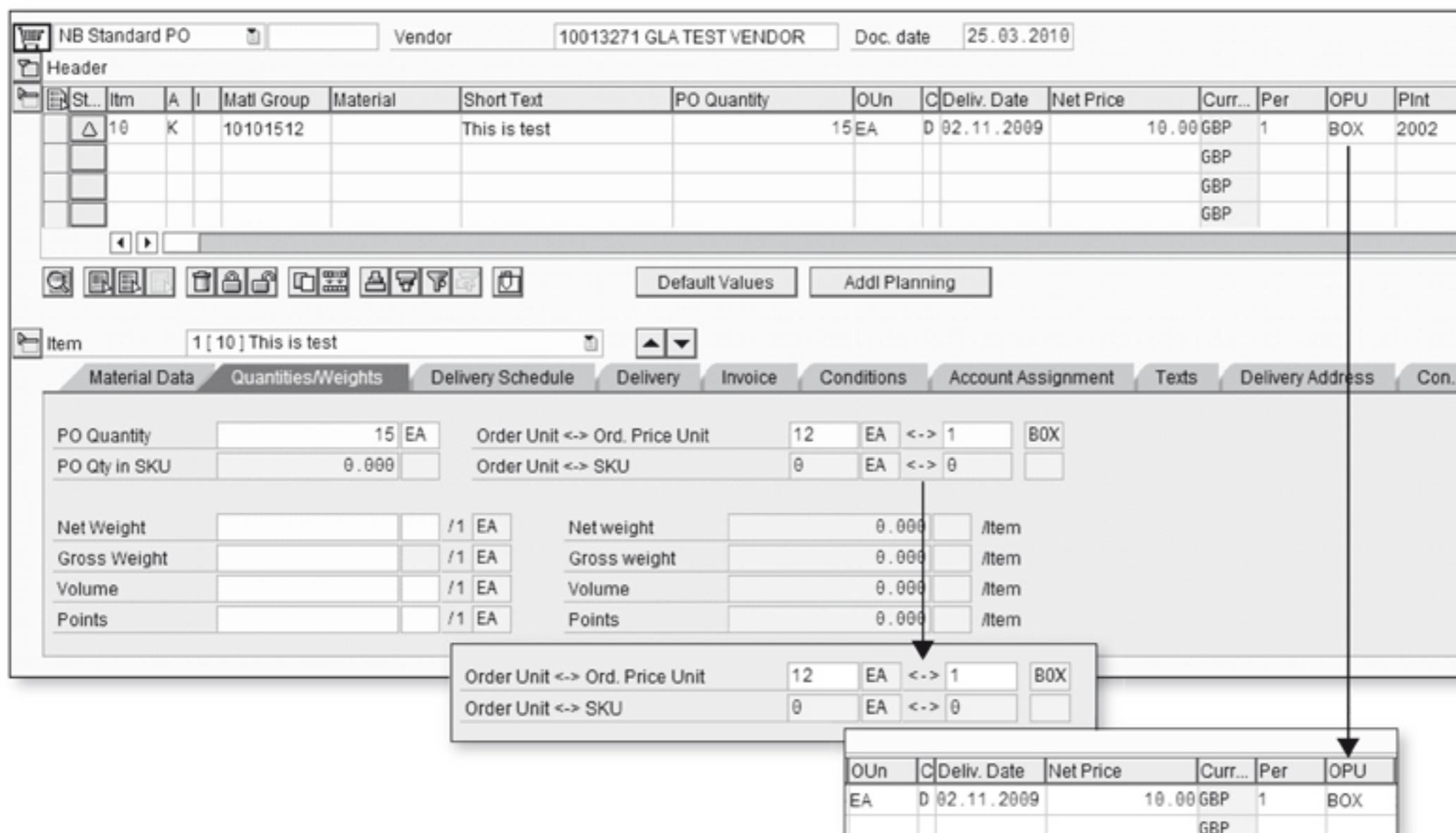


Figure 10.3 Order Unit and Order Price Unit in a Purchase Order

Functional Basis

The OUn is the unit in which you create the purchase order and the OPU is the unit in which the vendor charges you. For example, you may order 100 pieces of apples but the vendor charges you in kilograms. In this case, if each apple weighs 0.7kg, we say that the order quantity is 100 pieces and the order price quantity is 700kg. There might be a goods receipt for an order quantity of 100 pieces, resulting in an order price quantity of 650kg. The vendor may then send you an invoice for 100 pieces and 675kg. An order price quantity variance exists if the order price quantity varies between the goods receipt and the invoice receipt or between the invoice receipt and the purchase order.

SAP Functional Design

The system considers the order price quantity variance in the following cases:

- ▶ Invoice receipt after goods receipt

For invoice receipt after goods receipt, the system compares the following:

(Invoice quantity in OPU) / (invoice quantity in OUn) \neq (goods receipt quantity in OPU) / (goods receipt quantity in OUn).

- ▶ Invoice receipt before goods receipt

For invoice receipt before goods receipt, the system compares the following:

(Invoice quantity in OPUn) / (invoice quantity in OUn) <> (order quantity in OPUn) / (order quantity in OUn)

As is evident from both of these logical expressions, when the system has a goods receipt, it compares the values with the goods receipt at the time of invoice verification. However, if there's no goods receipt prior to the invoice, the system compares the values with the purchase order during LIV.

Let's take a look at sample postings of MAP-controlled materials. As you can see in Table 10.9, a purchase order is created for 100 pieces of material with a price of USD 1/kg. Note that 100 pieces of the materials is equivalent to 700kg and that the price is stated for each kg because this is the amount we'll have to pay to the vendor. The account postings are governed by two principles:

- ▶ The value of the material is calculated from the OPUn
- ▶ The GR/IR clearing account takes the OUn into account

The internal transaction keys listed in Table 10.9 are explained later in Chapter 11.

Purchase Order of 100 Pieces (=700kg) at USD 1/kg for a Material with V-Price Control	GR for 100 Pieces (=650kg)	Invoice of 100 Pieces (=675kg) at USD 1/kg	Internal Transaction Key
Stock Account	650+	25+	BSX
GR/IR Clearing Account	650-	650+	WRX
Vendor Account		675-	KBS

Table 10.9 Posting Order Price Quantity Variance

As shown in Table 10.9, the account posting at the time of goods receipt is governed by the order price quantity at the time of goods receipt and the price in the purchase order for each OPUn.

During the invoice receipt, the GR/IR clearing account is cleared because the quantity of the invoice receipt in the OUn is equal to the quantity of the goods receipt in the OUn.

The vendor account is posted by the price and the order price quantity on the invoice. The difference between the vendor account and the GR/IR clearing account is then posted to the stock account.

Checkpoints and Real-Time Issues

Even if there's no need for an OPUn in the purchase order, you'll still find the corresponding field populated by the order price. During invoice verification, this field may or may not appear depending on whether the line item is subject to a different order price or not.

The GR/IR clearing account is cleared on the basis of order quantity but the amount posted depends on the order price quantity. However, a relationship between the OUn and the OPUn should be maintained in the material master so that you can use it in the purchase order and during invoice verification.

Technical Elements

Table 10.10 lists a few relevant technical elements for an order price quantity variance during LIV.

Technical Element	Description
MRM_ORDER_PRICE_QUANTITY_CHECK	Function Module
EKBE	Database Table for Purchase Order History
EKBE-BPMNG	Table Field for Quantity in Purchase OPUn

Table 10.10 Useful Technical Elements for an Order Price Quantity Variance during LIV

Troubleshooting Tips

The purchase order history provides a clear picture of the values for the goods receipt and the invoice receipt in an OUn and OPUn.

Date variance

Another type of variance exists in the SAP standard system: the date variance. Here, the system compares the planned delivery date in the purchase order with the invoice date. In the real world, companies are generally not as strict about variances between planned delivery dates and invoice entry dates. The date variances are taken into account during the configuration of the tolerance key ST in the Customizing Transaction OMR6. This can be accessed from the Customizing menu path SAP IMG • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • INVOICE BLOCK • SET TOLERANCE LIMITS.

Now that you know about the different kinds of variances you may come across during LIV, let's move on to how to treat the variances.

10.2 Invoice Blocking

In the previous sections, you learned about variances in invoices. From a business point of view, it's very important that the system reacts to variances automatically when a certain preconfigured limit is violated, for example, if you want to automatically block invoices if the price deviates by a certain amount from that in the purchase order. You can then review the invoice before deciding on the payment.

Before we go into the details of invoice blocking, we want to clarify that by invoice blocking, we're not referring to invoices that can't be entered into the system, for example, on account of a block in the vendor master or because of an unreleased purchase order. Here, we're talking about invoices that can be entered into the system but are blocked for payment.

The invoice blocking functionality involves interaction with SAP ERP Financials. The blocking information is passed from Materials Management to Financial Accounting. However, Materials Management has its own additional functionalities for invoice blocking and release.

10.2.1 Functional Basis

From a business point of view, it's important that you're set up for the following:

- ▶ The system automatically blocks invoices that don't comply with the terms mentioned in the purchase order.
- ▶ The system can preconfigure a tolerance limit up to which invoices with variances can be allowed to pass through.
- ▶ Blocked invoices can be released for payment after review.

10.2.2 SAP Functional Design

The SAP system realizes all of the functional objectives in the last section with the help of tolerance limits you can configure in Transaction OMR6 or by going to SAP IMG • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • INVOICE BLOCK • SET TOLERANCE LIMIT, as shown in Figure 10.4.

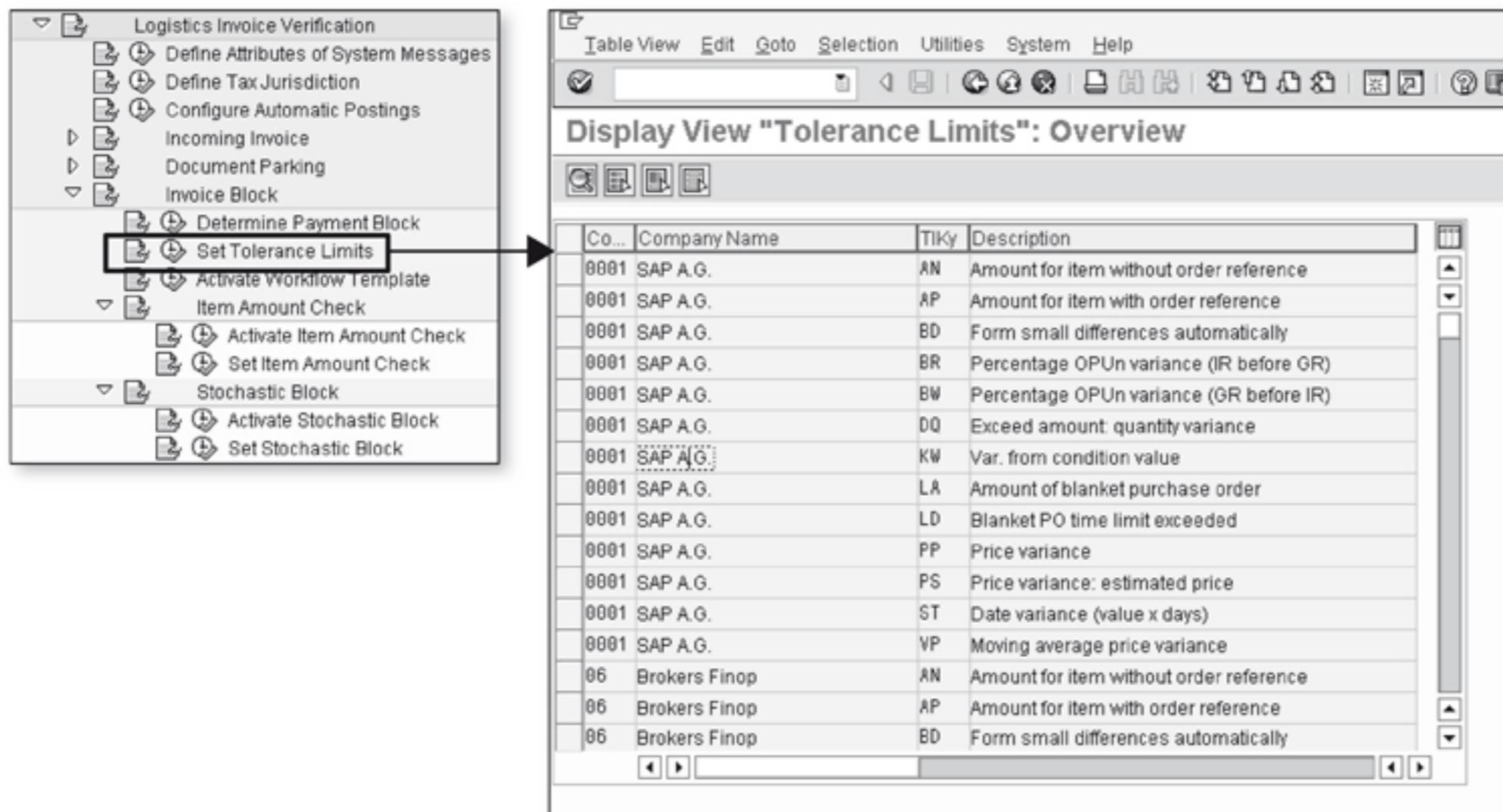


Figure 10.4 Tolerance Keys for Automatic Blocking of Invoices

There may be invoices that are blocked automatically for quantity reasons. For example, let's say that the quantity of material you receive against a purchase order is 50 and you receive an invoice for a quantity of 100, which you enter into the system. In this case, additional partial deliveries are expected by the system. If, for example, the additional goods receipts are posted in the meantime, the blocking reason should no longer be valid. These invoices can be released automatically if the transaction for automatically releasing invoices is executed. As a result, you'll have fewer invoices to review before you clear them for payment.

Tolerance keys

According to the SAP documentation in Customizing, tolerance keys have the following functionalities:

AN: Amount for item without order reference

If you activate the item amount check, the system checks every line item in an invoice without order reference against the absolute upper limit defined.

AP: Amount for item with order reference

If you activate the item amount check, the system checks specific line items in an invoice with order reference against the absolute upper limit defined. Which invoice items are checked depends on how you configure the item amount check.

BD: Form small differences automatically

The system checks the balance of the invoice against the absolute upper limit defined. If the upper limit isn't exceeded, the system automatically creates a posting line called Expense/Income from Small Differences, making the balance zero and allowing the system to post the document.

BR: Percentage OPUn variance (invoice receipt before goods receipt)

The system calculates the percentage variance with the following ratios: quantity invoiced in order price quantity units; quantity invoiced in OUns is compared with quantity ordered in order price quantity units; and quantity ordered in OUns. The system compares the variance with the upper and lower percentage tolerance limits.

BW: Percentage OPUn variance (goods receipt before invoice receipt)

The system calculates the percentage variance with the following ratios: quantity invoiced in order price quantity units; quantity invoiced in OUns and goods receipt quantity in order price quantity units; and goods receipt quantity in OUns. The system compares the variance with the upper and lower percentage limits defined.

DQ: Exceed amount: quantity variance

If a goods receipt has been defined for an order item and a goods receipt has already been posted, the system multiplies the net order price by (quantity invoiced – [total quantity delivered – total quantity invoiced]).

If no goods receipt has been defined, the system multiplies the net order price by (quantity invoiced – [quantity ordered – total quantity invoiced]).

The system compares the outcome with the absolute upper and lower limits defined.

This allows for relatively high quantity variances for invoice items for small amounts, but only small quantity variances for invoice items for larger amounts. You can also configure percentage limits for the quantity variance check. In this case, the system calculates the percentage variance from the expected quantity, irrespective of the order price, and compares the outcome with the percentage limits configured.

The system also carries out a quantity variance check for planned delivery costs.

DW: Quantity variance when goods receipt quantity = zero

If a goods receipt is defined for an order item but none has been posted yet, the system multiplies the net order price by (quantity invoiced + total quantity invoiced so far).

The system then compares the outcome with the absolute upper tolerance limit defined.

If you haven't maintained tolerance key DW for your company code, the system blocks an invoice for which a goods receipt hasn't yet been posted. If you want to prevent this block, set the tolerance limits for your company code for tolerance key DW to Do not Check.

KW: Variance from condition value

The system calculates the amount by which each delivery cost item varies from the product of the quantity invoiced times planned delivery costs/ planned quantity. It compares the variance with the upper and lower limits defined (absolute limits and percentage limits).

LA: Amount of blanket purchase order

The system calculates the sum of the value invoiced so far for the order item and the value of the current invoice and compares it with the value limit of the purchase order. It then compares the difference with the upper percentage and absolute tolerances defined.

LD: Blanket purchase order time limit exceeded

The system determines the number of days by which the invoice lies outside of the planned time interval. If the posting date of the invoice is before the validity period, the system calculates the number of days between the posting date and the start of the validity period. If the posting date of the invoice is after the validity period, the system calculates the number of days between the posting date and the end of the validity period. The system compares the number of days with the absolute upper limit defined.

PP: Price variance

The system determines by how much each invoice item varies from the product of quantity invoiced times the order price. It then compares the variance with the upper and lower limits defined (absolute limits and percentage limits).

When posting a subsequent debit/credit, the system first checks whether a price check has been defined for subsequent debits/credits. If so, the system calculates the difference between (value of subsequent debit/credit + value invoiced so far) / quantity invoiced so far times quantity to be debited/credited and the product of the quantity to be debited/credited times the order price and compares this with the upper and lower tolerance limits (absolute limits and percentage limits).

PS: Price variance: estimated price

If the price in an order item is marked as an estimated price, for this item, the system calculates the difference between the invoice value and the product of quantity invoiced times the order price and compares the variance with the upper and lower tolerance limits defined (absolute limits and percentage limits).

When posting a subsequent debit/credit, the system first checks whether a price check has been defined for subsequent debits/credits. If so, the system calculates the difference between (value of subsequent debit/credit + value invoiced so far) / quantity invoiced so far times the quantity to be debited/credited and the product quantity to be debited/credited times the order price. It then compares the variance with the upper and lower tolerance limits defined (absolute limits and percentage limits).

ST: Date variance (value x days)

The system calculates for each item the product of amount times (scheduled delivery date – date invoice entered) and compares this product with the absolute upper limit defined. This allows for relatively high schedule variances for invoice items for small amounts, but only small schedule variances for invoice items for large amounts.

VP: MAP variance

When a stock posting line is created as a result of an invoice item, the system calculates the new MAP that results from the posting. It compares the percentage variance of the new MAP to the old price using the percentage tolerance limits defined.

The list of tolerance keys discussed is an exhaustive list of all available types of tolerances for automatic invoice blocking. As shown in Figure 10.5, the status indicated by the yellow icon next to Balance in Transaction MIRO acts as warning for invoices that are blocked for payment. You can find the corresponding reason in the message log.

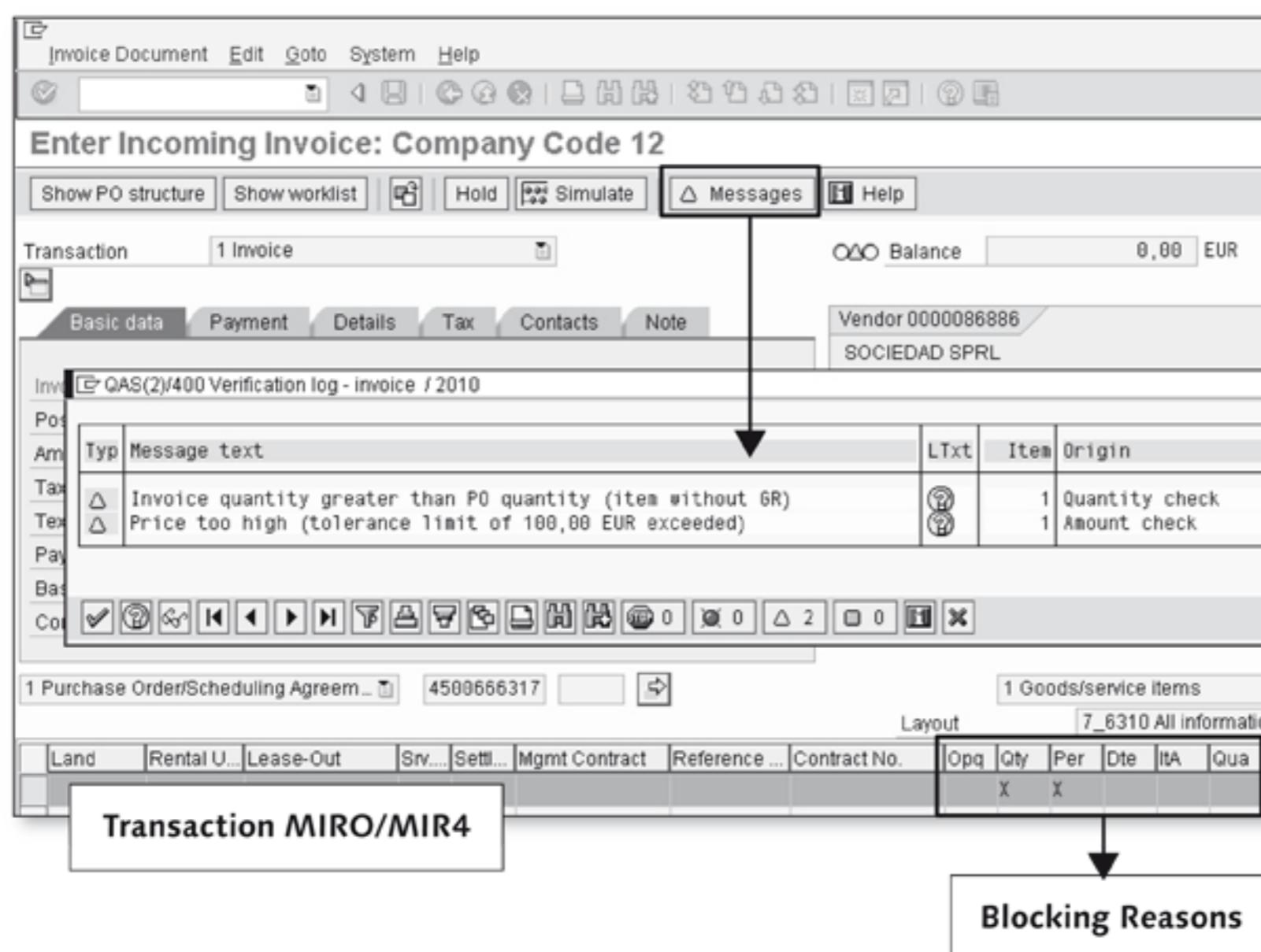


Figure 10.5 Blocking Reasons and Messages during LIV

As you can see in Figure 10.5, the following blocking reasons can be displayed by scrolling right in Transaction MIRO/MIR4:

- ▶ OPQ: Order price quantity block
- ▶ QTY: Quantity block
- ▶ DTE: Date block
- ▶ ITA: Item amount block
- ▶ QUA: Quality block

Aside from invoice blocks that originate from a purchase order, there are three other types of blocks you can configure just for invoice verification:

- ▶ Invoice item amount block
- ▶ Stochastic block
- ▶ Manual block

Invoice Item Amount Block

This determines whether the system blocks invoice items when the value exceeds a certain amount. There are two options for item amount blocks: the item amount in question may be for invoices with reference or invoices without reference to a purchase order. This can be configured under the Customizing menu path SAP IMG • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • INVOICE BLOCK • ITEM AMOUNT CHECK.

However, you should also consider that the item amount block works when you configure the tolerance keys AN or AP.

We'll now take a look at the stochastic blocking of invoices.

Stochastic Block

Stochastic blocking of invoices refers to random blocking of invoices that don't contain any blocking reason. In this case, you mention a threshold value above which a fixed percentage of the total invoices entered into the system are blocked for payment. Below the threshold value, the system follows a linear relationship for the percentage of invoices that will be randomly blocked for payment.

As you can see in Figure 10.6 (Transaction OMRG), the threshold value is 5,000 and the threshold percentage is 60%. This means that the system should randomly block 60% of incoming invoices whose amount is equal to or exceeds 5,000.

For all incoming invoices whose value is less than 5,000, the percentage of random blocking is limited to the extent of linear variance. For example, 30% of the

invoices that amount to 2,500 would be blocked. In a similar manner, 15% of the invoices that amount to 1,250 would be blocked.

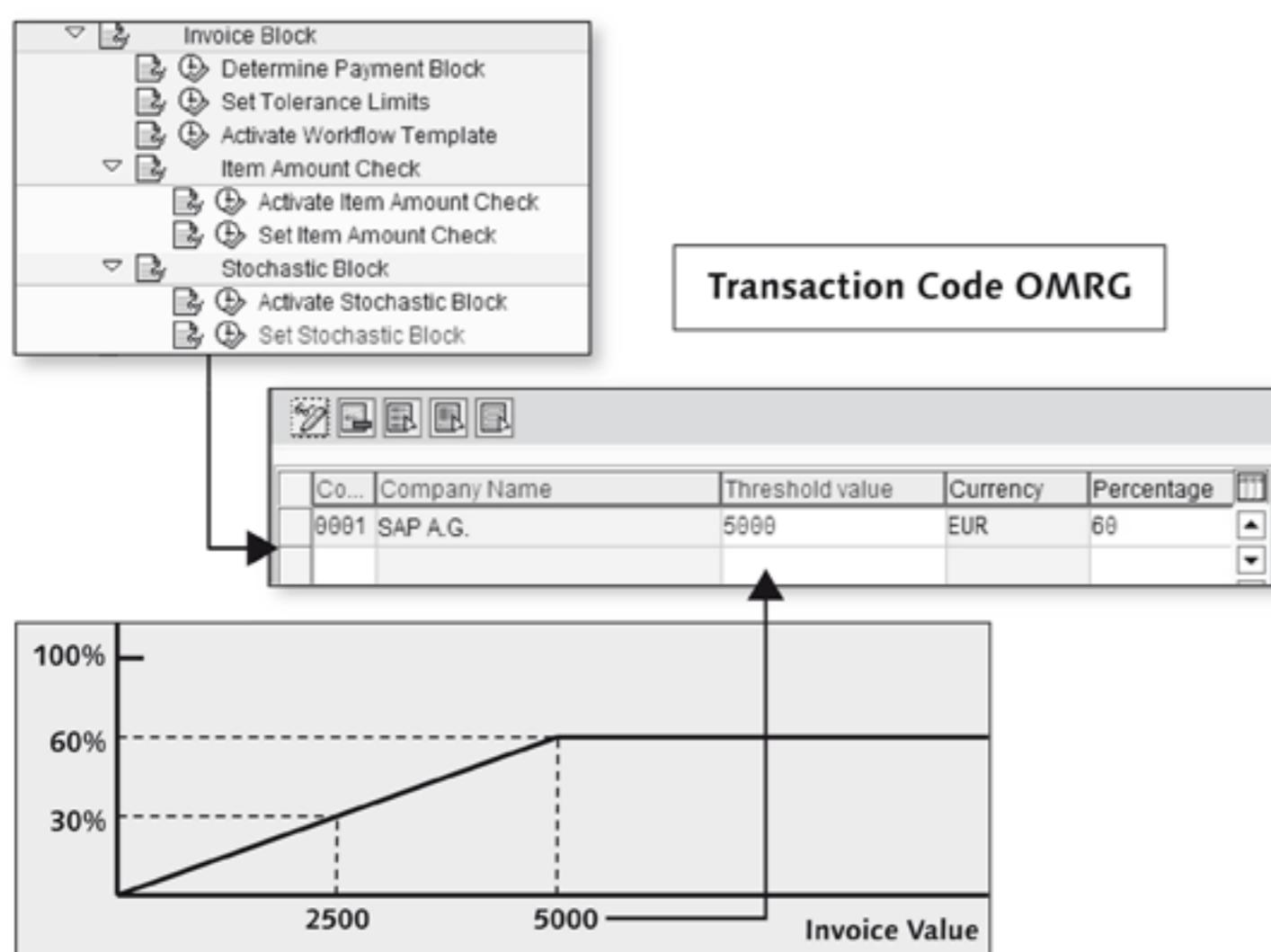


Figure 10.6 Stochastic Blocking During Invoice Verification

Invoices can't be blocked stochastically at the line item level. Therefore, with stochastic blocking, the system blocks the accounting document.

Manual Block

Despite the many automatic blocking features available during LIV, in the standard system, you can still block invoices manually while entering invoices. There are two ways to do so:

- ▶ Manual blocking at the item level
- ▶ Manual blocking at the header level

To manually block an invoice, you use Transaction MIRO/MIR4, as you can see in Figure 10.7. An appropriate blocking reason should be selected from the dropdown in the Payment tab of the header data in Transaction MIRO. The various blocking reasons can be configured under the customizing menu path: SAP IMG • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • INVOICE BLOCK • DETERMINE PAYMENT BLOCK. To block an invoice at the item level, you need to click on the checkbox Ma, which informs the system to block the invoice.

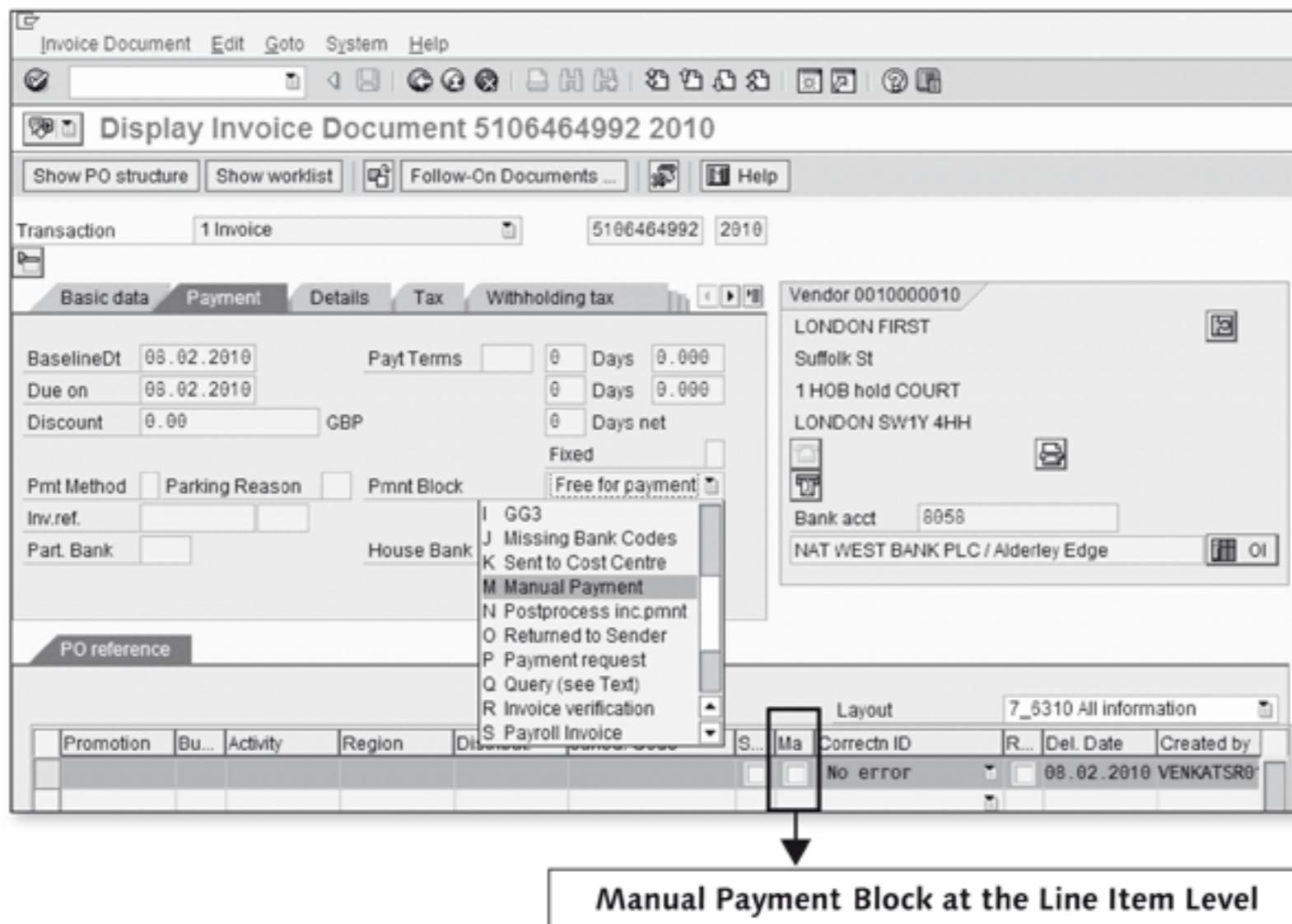


Figure 10.7 Manual Blocking of the Invoices

Now that you know about the functional design for blocking invoices, let's move on to describe the checkpoints and real-time issues.

10.2.3 Checkpoints and Real-Time Issues

The following are some of the checkpoints and real-time issues for blocking invoices:

- ▶ The configuration related to invoice blocking is maintained at the company code level. Therefore, it is possible to block invoices for a specific vendor based on company codes. For blocking the Vendor Account from being posted in a list of company codes, you need to set the posting block in the vendor master of all those company codes. You can however, block invoices for vendors by setting up blocking for all company codes in the vendor master.
- ▶ An invoice may contain multiple line items. If any of the line item is blocked, the invoice is blocked at the header level. More precisely, the accounting document associated with the invoice is blocked. This means that even if just one line item of the invoice is blocked, the entire invoice can't be paid. Therefore, it's best to have as few line items in an invoice as possible.

- The flow logic for blocked invoices is that a block in the LIV document results in a block in the corresponding accounting document. The converse, however, isn't true. That is, if you delete the blocking reason in the accounting document, the LIV document doesn't know about this and still shows the invoice as blocked. Also, if the accounting document is blocked manually, the system doesn't put the block into the LIV document.

10.2.4 Technical Elements

When a LIV document is blocked for payment, the entries are created in database table RBKP_BLOCKED. The field RBKP_BLOCKED-MRM_ZLSPR can have one of the following values:

- A: Automatically blocked due to the existence of blocking reasons
- S: Stochastically blocked
- M: Manual payment block set in header – no blocking reason

Table 10.11 shows the blocking reasons in the various database tables for the automatically blocked invoices.

Blocking Reason	Technical Name	Entries in RSEG	Entries in RBMA	Entries in RBCO
Price Variance	SPGRP	X	-	-
Quantity Variance	SPGRQ	X	-	-
Date Variance	SPGRT	X	-	-
Order Price Quantity Variance	SPGRG	X	-	-
Project Budget	SPGRV	X	-	-
Manual Blocking	SPGRQ	X	-	-
Quality	SPGRC	X	-	-
Others	SPGRS	X	X	X

Table 10.11 Technical Elements for Invoice Blocking

As a result of blocking invoices, a payment block is set in the Financial Accounting document. Technically, the payment block is set in the database table field BSEG-ZLSPR with a value equal to R.

Payment block in the header of a LIV document

Table RBKP contains exactly the data users have entered; therefore, RBKP-ZLSPR is filled only when a user has entered a value. This means:

- ▶ The field RBKP-ZLSPR isn't necessarily set in the case of blocked invoices.
- ▶ The field RBKP-ZLSPR will never be changed in the release process.

10.2.5 Troubleshooting Tips

You must analyze issues related to the blocking of invoices in the following manner:

- ▶ The Accounting document is blocked as a result of the LIV document. At the functional level, you can check this in Transaction FB03. At the technical level, you can check the table field BSEG-ZLSPR.
- ▶ You can display the vendor line item by double-clicking it in Transaction FB03.
- ▶ To check whether a payment block has been manually changed in the accounting document, you can display the document changes for the vendor line item by going to ENVIRONMENT • DOCUMENT CHANGES.
- ▶ You can check for blocks in the LIV document using the field Pmnt Block on the Payment tab in the header data.
- ▶ You can check the blocking reason for line items of the LIV document by scrolling right. Figure 10.5 showed you where to look for the blocking reasons.
- ▶ You can drill down to the purchase order to check the price from the purchase order and the quantity from the purchase order history.
- ▶ If you don't see a change in price between the purchase order and the invoice and find that the LIV document is still blocked for price reasons, this may be due to a price change in the purchase order after the LIV document was posted. You can review item changes for purchase order line items from menu path ENVIRONMENT • ITEM CHANGES.
- ▶ If you see account postings to the price differences account for MAP-controlled materials, this could be due to insufficient stock at the time of LIV. You can take a look at the stock situation for the material on a particular date from Transaction MB5B.

So far, we've looked at blocking invoices. Now, let's look at releasing invoices that have been blocked.

10.3 Invoice Release

Blocked LIV documents result in the blocking of the corresponding accounting documents. This means, when you release a LIV document, the payment block from the corresponding Accounting document is deleted as well. Therefore, there's a lot of interaction between Materials Management and Financial Accounting during the invoice release. The following subsections cover this integration.

10.3.1 Functional Basis

There should be an option to release invoices before they can be paid. Generally speaking, there are two desirable functionalities:

- ▶ Invoices for which the blocking reason no longer applies should automatically be released for payment. At the same time, there should be a control for when such invoices can be released in bulk. For example, if an invoice was blocked for quantity reasons and now additional deliveries have been received, the invoice should be released because the blocking reason is no longer valid.
- ▶ Authorized invoice reviewers should have the ability to overrule the blocking reason the system has encountered.

10.3.2 SAP Functional Design

SAP ERP incorporates these functional requirements in the standard system with the help of Transaction MRBR where it's possible to release invoices, both manually and automatically.

Based on a variety of selection criteria, invoices can be released automatically for payment if the reason for blocking no longer applies. As shown in Figure 10.8, there are options in Transaction MRBR (Menu path: LOGISTICS • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • FURTHER PROCESSING • RELEASE BLOCKED INVOICES) to release invoices either automatically or manually. You can release invoices based on the following criteria:

- ▶ Company Code
- ▶ Invoice Document number
- ▶ Fiscal Year
- ▶ Vendor
- ▶ Posting Date

- ▶ Due Date
- ▶ Purchasing Group
- ▶ User

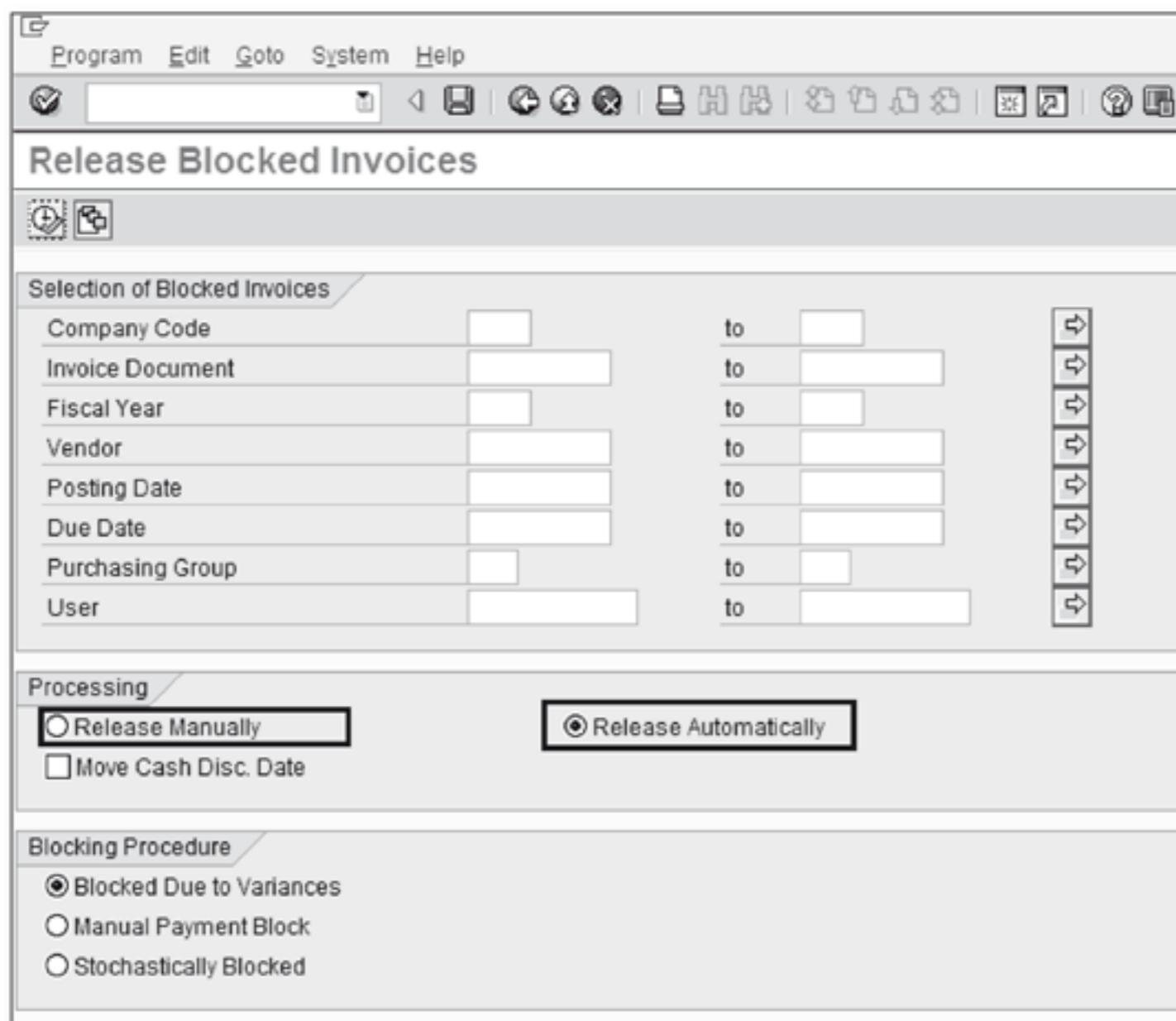


Figure 10.8 Transaction MRBR for Releasing Invoices

The field **Move Cash Disc. Date**, as shown in Figure 10.8, results in the following when checked during the transaction:

Blocked invoice with baseline date for payment = 7th July 2010

Terms of payment:

7 days 3%

14 days 2%

20 days net

Now, if you run Transaction MRBR so that the invoice is released on 17th July 2010:

Invoice release date = 17th July 2010

With the field **Move Cash Disc. Date** checked, the system changes the terms of payment to the following:

Terms of payment:

17 days 3%
 24 days 2%
 30 days net

If you choose the Release Manually option, the system generates a list of the blocked invoices based on the selection criteria. You can then release the invoices manually from the generated list. The following blocking reasons appear in the list of blocked invoices:

- ▶ Order price quantity
- ▶ Quantity
- ▶ Price
- ▶ Quality
- ▶ Item amount
- ▶ Date
- ▶ Manual payment block

The blocking reasons that are set in the LIV document are indicated by means of a cross in that list. In addition the blocking reasons which are no longer valid are indicated by a cross in the colored box as shown in Figure 10.9.

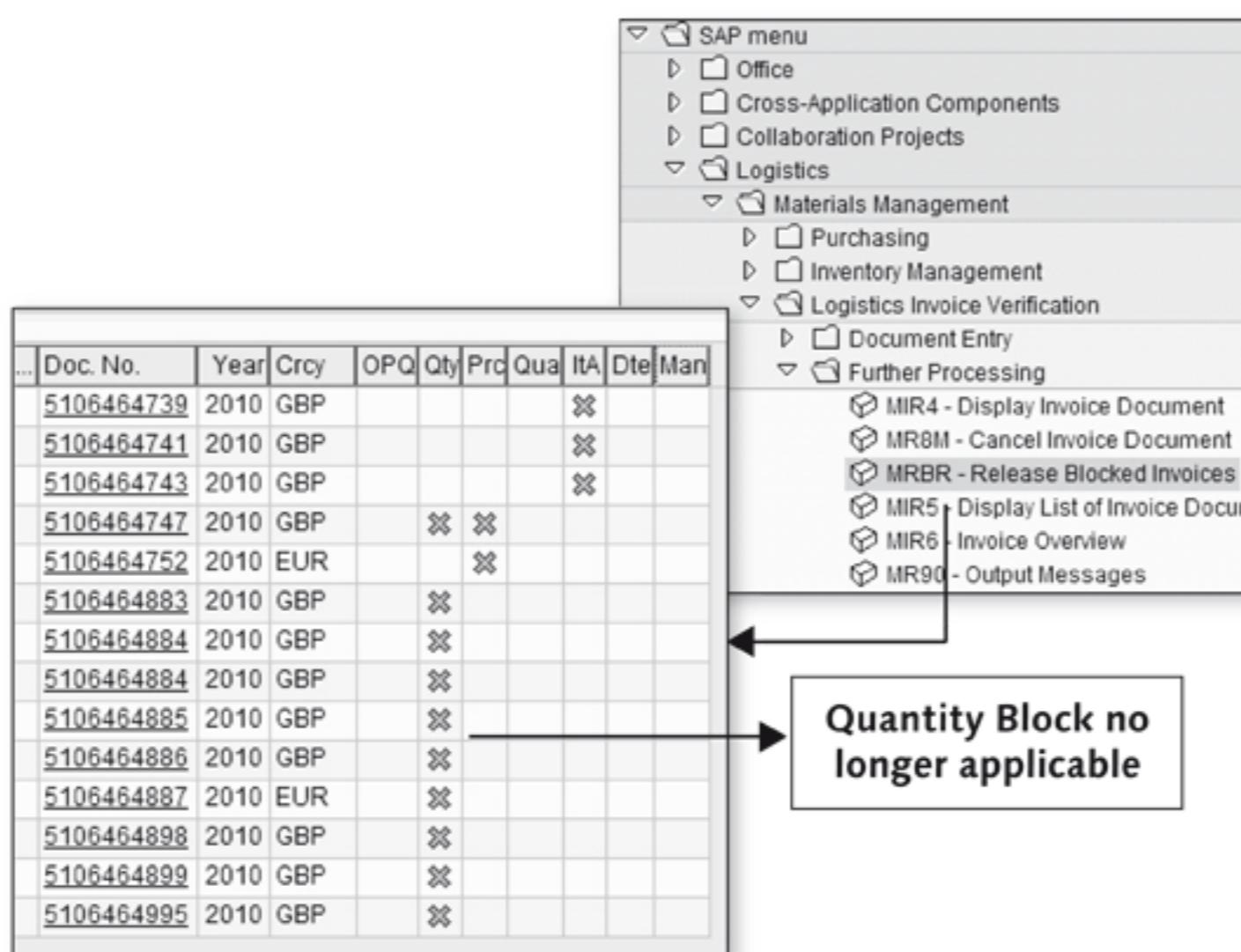


Figure 10.9 Blocking Reasons in Transaction MRBR

Deleting blocking reasons of a LIV document

You can delete blocking reasons while processing a blocked invoice item. You may do so to accommodate the following business needs:

- ▶ The time required to investigate each blocking reason for an invoice line item may vary. You can delete blocking reasons that are no longer valid without affecting other blocking reasons.
- ▶ If different people are responsible for different blocking reasons, it makes sense that each person deletes the blocking reason for which he's responsible.

Now that you know about the functionalities associated with the release of invoice documents, let's move on to the checkpoints and the real-time issues involved during the invoice release functionality.

10.3.3 Checkpoints and Real-Time Issues

The following are the checkpoints and real-time issues associated with the release of invoices.

- ▶ Blocked invoices that were posted with the conventional invoice verification Transaction MR01 can only be released using Transaction MR02.
- ▶ If you've upgraded from conventional invoice verification to LIV, you can use report RM08RBKPBLOCKED to convert the old invoice documents. These can then be processed from LIV Transaction MRBR.
- ▶ You might need to make different users responsible for different blocking reasons during invoice release so that they can manually delete the corresponding blocking reason after review. If you need to set up authorizations for users based on blocking reasons, you can use authorization object M_RECH_SPG to do so. The field SPEGR contains the various blocking reasons.
- ▶ You might need to authorize a few purchasing groups for releasing blocked invoices. You can use authorization object M_RECH_EKG to do so.

Report RM08RELEASE

SAP has delivered Transaction MRBR with report RM08RELEASE to enable organizations to set this transaction for background execution on a periodic basis. This ensures that invoices for which the blocking reasons no longer apply can be released for payment automatically. This reduces the workload for the employees reviewing the blocking reasons.

Now, let's discuss the technical elements during invoice release.

10.3.4 Technical Elements

As a result of blocking a LIV document, a payment block is set in the vendor line item of the accounting document. The table field is BSEG-ZLSPR. Figure 10.10 shows an overview of the technical flow logic for Transaction MRBR. It describes the technical sequence of steps executed during the transaction. Based on the criteria you enter in the selection screen, the system triggers the event START-OF-SELECTION. This looks for all blocked LIV documents in table RBKP_BLOCKED.

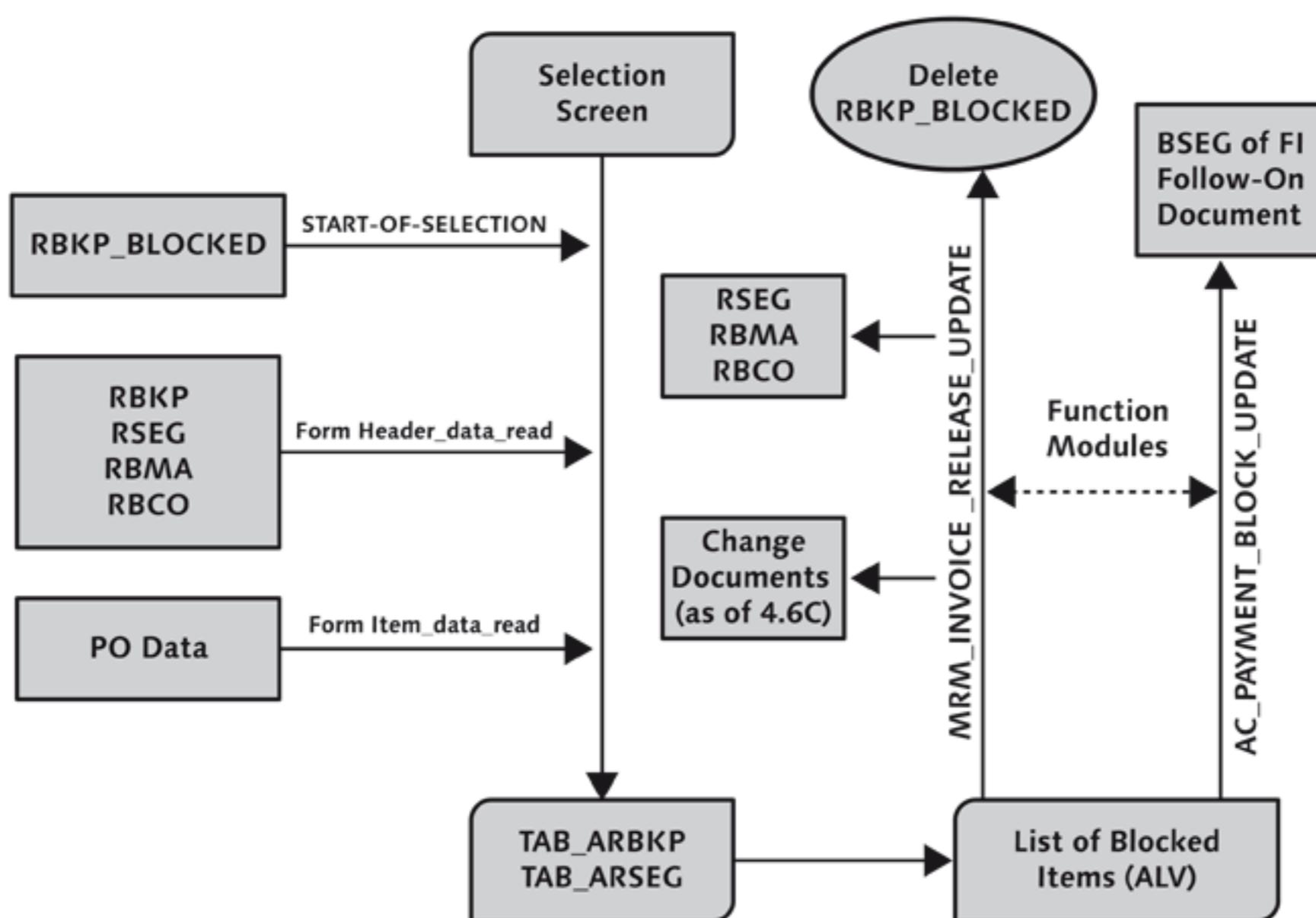


Figure 10.10 Technical Program Flow of MRBR

The form Header_data_read reads the database tables RBKP, RSEG, RBMA, and RBCO. The form Item_data_read reads the purchase order data. The entries from these tables populate internal tables TAB_ARBKP and TAB_ARSEG. The list of blocked invoices that you can see in the transaction in the form of ALV is the data from these internal tables.

When you delete the blocking reasons from the list of invoices, function module MRM_INVOICE_RELEASE_UPDATE updates the entries in tables RSEG, RBMA, and RBCO. Also, the necessary change documents are created for the invoice. At the same time, function module AC_PAYMENT_BLOCK_UPDATE updates the payment block in the accounting document. However, you must note that table BSEG

is updated only if all of the blocking reasons have been deleted from the invoice document. If any of the blocking reasons remain, the block isn't removed from the vendor line item of the accounting document.

10.3.5 Troubleshooting Tips

The troubleshooting tips for invoice release are almost the same as those for invoice blocking. However, now that you know the technical flow of documents during invoice release, we'll touch on some functional troubleshooting tips.

For troubleshooting invoice block problems, it's a good idea to set a breakpoint on Select of RBKP_BLOCKED in RM08RELEASE.

```
...
START-OF-SELECTION.

* Selection from RBKP_BLOCKED -----
-*
SELECT * FROM rbkp_blocked INTO TABLE tab_rbkp_blocked
  WHERE mrm_zlspr = f_mrm_zlspr
    AND bukrs      IN so_bukrs
    AND gjahr     IN so_gjahr
    AND lifnr     IN so_lifnr
    AND belnr     IN so_belnr
    AND usnam     IN so_usnam
    AND budat     IN so_budat
    AND faell     IN so_faell
    AND ekgrp     IN so_ekgrp.
...
```

For issues related to the validity of a blocking reason, place a breakpoint on the following:

- ▶ Form BLOCKING_REASON_VALIDITY_CHECK of report RM08RELEASE
- ▶ Function module MRM_TOLERANCE_CHECK

MRM_TOLERANCE_CHECK is executed in report RM08RELEASE from function module MRM_BLOCK_REASON_VAL_CHECK_P. For the tolerance key PP for example, it's called from form BLOCKING_REASON_VALIDITY_CHECK.

Function module MRM_TOLERANCE_CHECK also determines whether an invoice is blocked for payment when you post it, for example, with Transaction MIRO.

Now that you understand the functional and the technical process flow for the invoice release functionality, let's move on to the functionality and the technical configuration associated with delivery costs.

10.4 Delivery Costs

In this section, we'll describe the costs that are invoiced for a delivery over and above the value of the delivery itself. This includes freight charges, custom duty, or any other cost associated with the delivery.

The delivery costs at the time of LIV are classified into planned delivery costs and unplanned delivery costs, which we'll discuss in more detail in the following sections.

10.4.1 Planned Delivery Costs

In this section, you'll learn about the business need for planned delivery costs.

Functional Basis

The additional costs incurred upon the delivery of materials aside from the actual cost of the materials can be taken into account during purchase order creation. These costs can then be accounted for during goods receipt and suggested during invoice receipt. We call these costs planned delivery costs because we know these costs in advance, at the time of purchase order creation.

Planned delivery costs generally refer to freight. Usually, the freight vendor is different from the vendor that supplies the material and services. Therefore, ideally, you need to post two different invoices for the purchase order, one for the goods/services vendor and another for the freight vendor.

SAP Functional Design

Planned delivery costs are taken into account when you create purchase orders. These are represented as condition types, as we explained earlier in Chapter 6, Section 6.1.4.

Figure 10.11 shows the condition type for planned delivery cost FRB1. The element of account determination of the planned delivery cost can be displayed by clicking on the magnifying button.

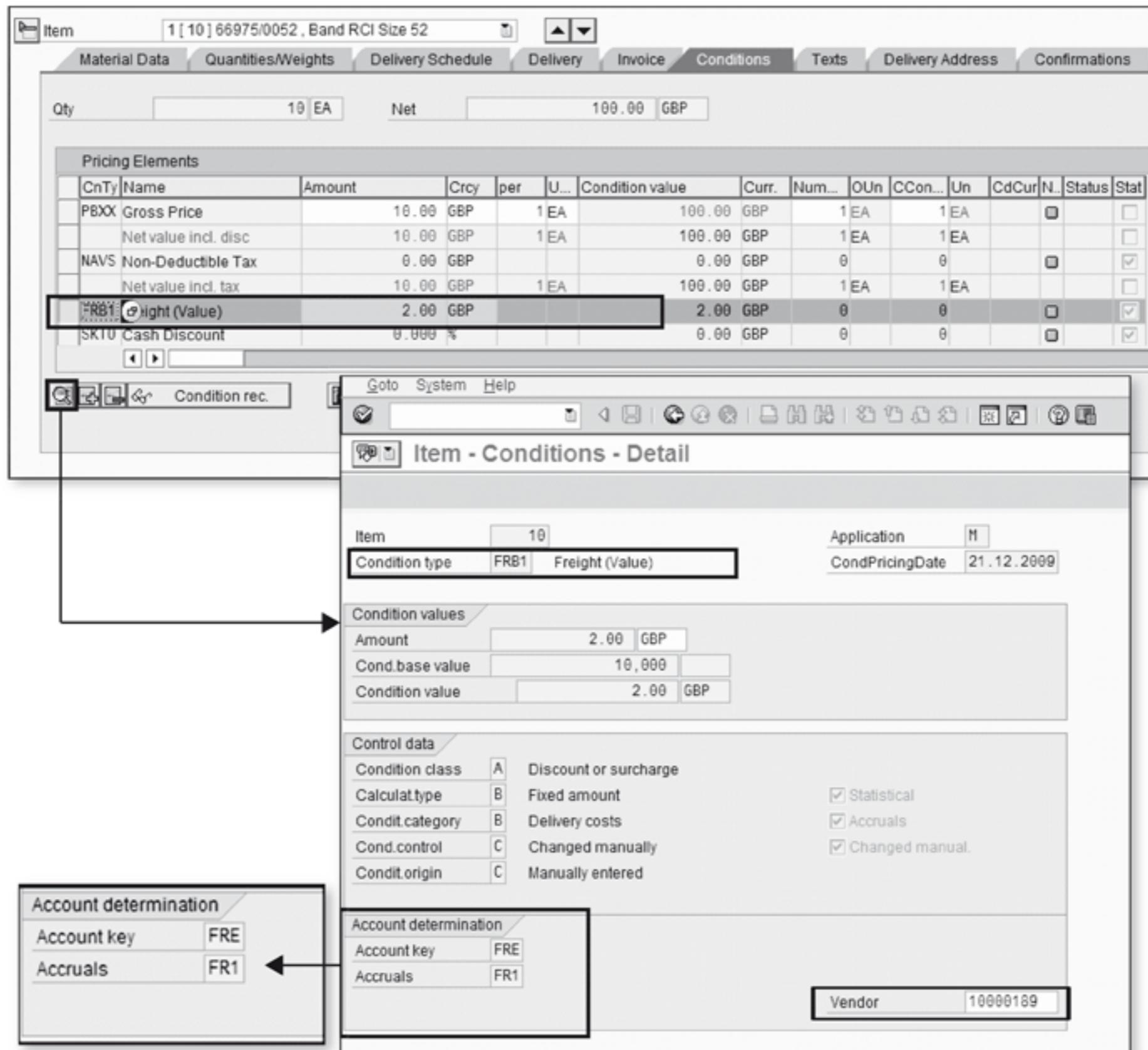


Figure 10.11 Planned Delivery Cost in a Purchase Order

Various condition types exist in the standard system for freight charges and customs charges. If they aren't useful for you, you can create your own condition types.

As you can see, the elements of the account determination for planned delivery costs are shown in the corresponding condition type. These account keys and accruals are considered at the time of goods receipt and invoice receipt. Planned delivery costs can be of one of the following types:

- ▶ Freight costs
- ▶ Customs charges
- ▶ Miscellaneous costs

As mentioned, the freight vendor can be different from the vendor that supplies goods/services. Therefore, you can enter the vendor number in the condition for the planned delivery cost. During LIV in Transaction MIRO, you can enter an invoice for a particular purchase order for only the planned delivery costs or only the goods/services. If the vendors are different, you need to post two different invoices because an invoice can belong to only one vendor.

As with the GR/IR clearing account, there's a clearing account for planned delivery costs. The amount is cleared between the goods receipt and the invoice receipt. The example in Table 8.3 illustrates this. The internal transaction keys listed in Table 10.12 are explained in Chapter 11.

Purchase Order	Goods Receipt	Invoice Receipt	Internal Transaction Key
100 Pieces at USD 1.5/ Piece Freight: USD 0.2/Piece Customs: USD 5	100 Pieces	100 Pieces at USD 1.5/Piece Freight: USD 0.2/ Piece Customs: USD 5	
Stock Account	175+		BSX
GR/IR Clearing Account	150-	150+	WRX
Vendor Account		175-	KBS
Freight Clearing	20-	20+	FR1
Customs Clearing	5-	5+	FR3

Table 10.12 Account Postings for the Planned Delivery Costs

As you can see, the freight clearing and the customs clearing is knocked off during goods receipt and invoice receipt. If you view the account postings from a higher level, it's apparent that the stock account is debited by 175 and the vendor account is credited by 175, which is the amount you pay the vendor for the received material.

We'll now take a look at the checkpoints and real-time issues of planned delivery costs.

Checkpoints and Real-Time Issues

The Buyer field isn't available on the Contacts tab of Transaction MIRO. This is because of a technical limitation. The field ERNAM isn't available in the structure

handling planned delivery costs (XEK08BNC), but it's handled by the goods/service items structure (XEK08RNC). Thus, if you select goods/services or goods/service + planned delivery costs, the field is available. See SAP Customer Note 824164 for more information.

Planned delivery costs don't work on the principle of GR-based invoice verification. Therefore, the system can't calculate the invoice default values for the individual material documents. These costs are aggregated during Transaction MIRO. You won't realize the issue unless you're entering invoices with reference to a vendor.

Planned delivery costs in Transaction MIRO

You can enter invoices in Transaction MIRO with reference to the following in the dropdown list on the left side:

- ▶ Purchase Order/Scheduling Agreement
- ▶ Delivery Note
- ▶ Bill of Lading

You can take the following into account from the dropdown list on the right side:

- ▶ Goods/Service Items
- ▶ Planned Delivery Costs
- ▶ Goods/Service Items + Planned Delivery Costs

When you choose Delivery Note or Bill of Lading, the dropdown list on the right disappears. The system behaves in this manner for the following reasons:

- ▶ You can't book planned delivery cost with reference to a delivery note. Only goods/services can be booked with reference to a delivery note number.
- ▶ You can't book goods/services with reference to a bill of lading number. Only planned delivery costs can be booked with reference to a bill of lading number.
- ▶ Both goods/services and planned delivery costs can be booked for invoices with reference to a purchase order/scheduling agreement. Therefore, you'll see the dropdown list to the right of these options.

If you start Transaction MIRO with a purchase order and goods/services item assignment, the goods supplier is used. If you then switch to Goods/Service Items + Planned Delivery Costs, the goods supplier is retained. If you now switch to Planned Delivery Costs, the system issues message M8 287: "Different invoicing party & planned for del. costs item in PO&." You can control this message in Customizing. If the message is set as warning message, the goods supplier is retained.

The freight vendor is retained in the reverse case. For example, let's say you start the transaction with planned delivery costs and then switch via the mixed case to the goods/service items. Reassignment only takes place if you switch directly between goods/service items and planned delivery costs.

The system can't identify whether the invoicing party was entered manually or determined automatically.

If the vendor for planned delivery costs is different from the vendor that delivers the goods/services, you must enter different invoices for the planned delivery costs and the goods/services, because the system can post to only one vendor account during Transaction MIRO.

Technical Elements

The purchase order history date for planned delivery costs is stored in database table EKBZ. A few technical elements of planned delivery costs are listed Table 10.13.

Technical Element	Description
ME_READ_COND_INVOICE	Function Module
EKBZ	Database Table for the Purchase Order History of the Planned Delivery Cost
EKBZ-KSCHL	Table Field for Condition Type
EKBZ-ZAEHK	Table Field for Condition Number

Table 10.13 Technical Elements for Planned Delivery Costs

Troubleshooting Tips

As you can see in Figure 10.11, the condition type for planned delivery costs is in the purchase order. The vendor and the account key is displayed for the planned delivery cost in question. You can analyze the accounting documents created during goods receipt and invoice verification for the account key of the condition type. The data related to the planned delivery costs is contained in the database table EKBZ.

Now that you know about the functional design and technical objects of planned delivery costs, let's move on to discuss unplanned delivery costs.

10.4.2 Unplanned Delivery Costs

In this section you'll learn about the functional basis and the technical realization of unplanned delivery costs. Unplanned delivery costs are delivery costs that aren't planned in the purchase order and aren't entered in the system until the invoice is received.

Functional Basis

Aside from the actual cost of the materials, there might be small additional costs incurred upon the delivery of materials that can't be taken into account when creating purchase orders. That is, you might not know about these costs until you receive an invoice from the vendor. In addition, you want to control whether to distribute the additional costs to the material stock or to a different SAP G/L account. For example, the amount on a purchase order might be USD 100. The vendor may then send an invoice for USD 105, consisting of the amount as per the purchase order of USD 100 plus an additional delivery charge of USD 5. This additional delivery charge can be treated as an unplanned delivery cost.

SAP Functional Design

Figure 10.12 shows the Customizing for unplanned delivery costs and its impact on Transaction MIRO.

There are two options for customizing unplanned delivery costs:

- ▶ Distribute the costs to the invoice items on a prorated basis
- ▶ Post the costs to a separate SAP G/L account

As you can see in Figure 10.12, when you choose the option to distribute unplanned delivery costs to line items, you only have to enter the costs in the field Unpl. Del. Csts. The system then distributes them to the invoice line items on a prorated basis.

When you customize your system to post the unplanned delivery costs to a different SAP G/L account, the Tax Code field is displayed in Transaction MIRO next to the unplanned delivery costs. The system then posts the costs to a different SAP G/L account with the tax code you select.

Table 10.14 describes a sample posting for unplanned delivery costs with distribution to line items. The internal transaction keys listed in Table 10.14 are explained in Chapter 11.

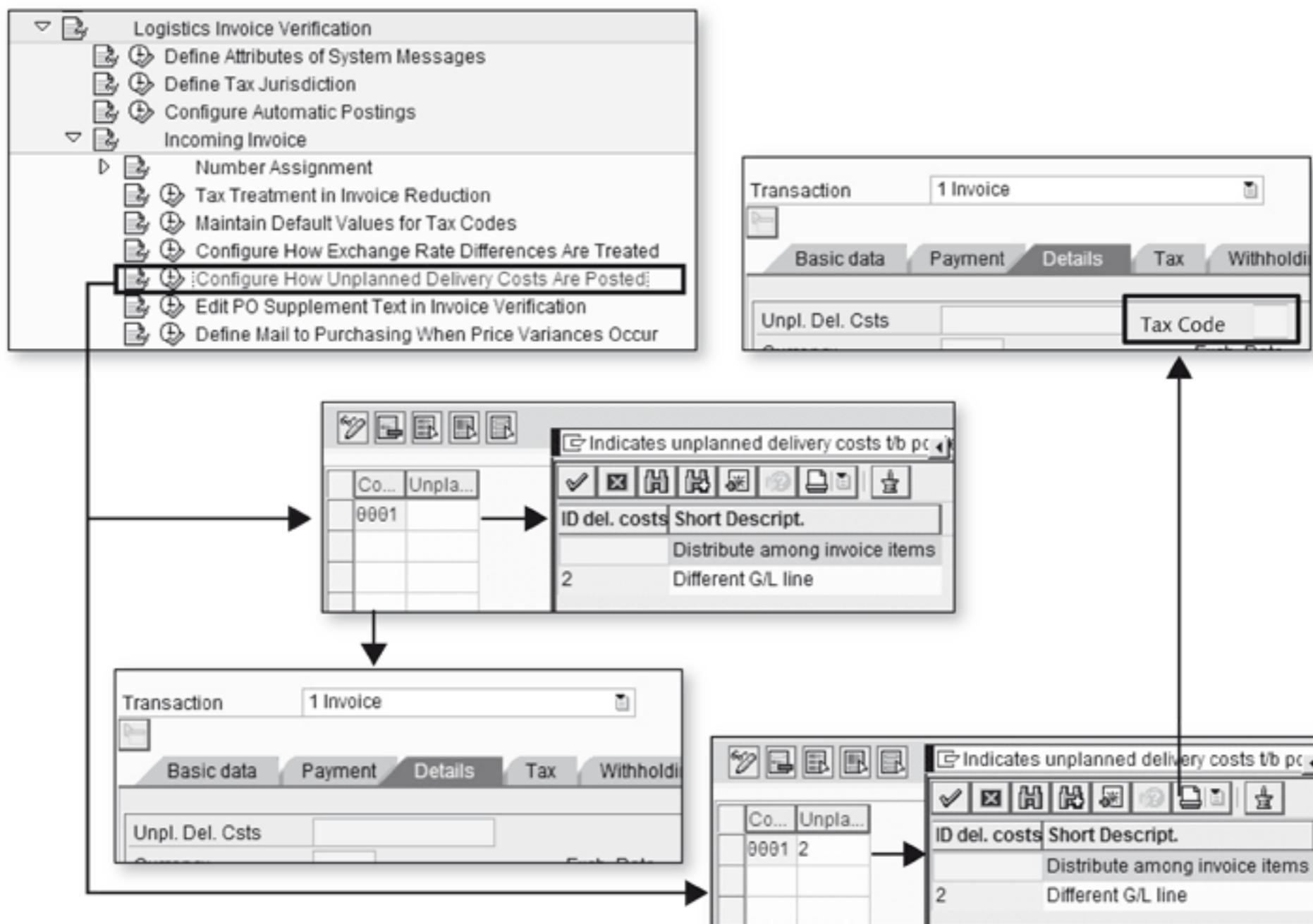


Figure 10.12 Customizing of Unplanned Delivery Costs and its Impact on Transaction MIRO

Purchase Order of: 100 Pieces of Material A at USD 20/Piece 100 Pieces of Material B at USD 10/Piece	GR of 50 Pieces of Material A	IR of 50 Pieces of Material A at USD 20/Piece	GR of: 50 Pieces of Material A 80 Pieces of Material B	IR of: 50 Pieces of Material A at USD 20/Piece 50 Pieces of Material B at USD 10/Piece Unplanned Delivery Costs of USD 100	Internal Account Key
Stock Account A	1,000+		1,000+	80+	BSX
GR/IR Clearing Account A	1,000-	1000+	1,000-	1,000+	WRX
Stock Account B			800+	20+	BSX
GR/IR Clearing Account B			800-	500+	WRX
Vendor Account		1,000-		1,600-	KBS

Table 10.14 Sample Account Postings For Unplanned Delivery Costs

Only the postings for the unplanned delivery costs need to be explained. Let's take a look at the invoice containing an unplanned delivery cost of USD 100. The invoice contains the following items:

50 pieces of material A @ USD 20/piece = USD 1000

50 pieces of material B @ USD 10/piece = USD 500

Unplanned delivery cost = USD 100

The system uses the following formula for the calculation of the distribution to the line items:

$$\begin{aligned} \text{Invoice value of line item for material A} &= \text{invoice value for invoice 1} \\ &+ \text{invoice value for invoice 2} \\ &= 1000 + 1000 \\ &= 2000 \end{aligned}$$

$$\begin{aligned} \text{Invoice value of line item for material B} &= \text{invoice value for invoice 1} \\ &+ \text{invoice value for invoice 2} \\ &= 0 + 500 \\ &= 500 \end{aligned}$$

$$\begin{aligned} \text{Share of line item for material A} &= \text{unplanned delivery cost} * (\text{invoice value of line item for material A}) / (\text{invoice value of line item for material A} + \text{invoice value of line item for material B}) \\ &= 100 * 2000 / (2000 + 500) \\ &= 80 \end{aligned}$$

$$\begin{aligned} \text{Share of line item for material B} &= \text{unplanned delivery cost} * (\text{invoice value of line item for material B}) / (\text{invoice value of line item for material A} + \text{invoice value of line item for material B}) \\ &= 100 * 500 / (2000 + 500) \\ &= 20 \end{aligned}$$

If there are more line items, the share of each line item can be calculated per this formula.

If the system had been configured to post to a different SAP G/L account, it would have posted only the amount of 100 USD to that account during the second invoice with the unplanned delivery cost.

Checkpoints and Real-Time Issues

The following checkpoints and real-time issues exist for unplanned delivery costs:

- ▶ If the goods items for the purchase order items to which they refer have already been settled, enter the unplanned delivery costs as a subsequent debit (See SAP Customer Note 130830 for further information). The system then distributes the unplanned delivery costs entered to the items based on the values settled so far. The prerequisite for this is that invoices have already been entered for these purchase order items; that is, the settled amount must not be zero. If it is, the system will determine an incorrect tax base and will issue message FF 747.
- ▶ You can't enter negative unplanned delivery costs.
- ▶ You can't distribute unplanned delivery costs to planned delivery costs.
- ▶ If the purchase order items are settled, you can enter unplanned delivery costs as a normal invoice by choosing the proposed items to which the delivery costs are to be distributed and entering a zero value and quantity.
- ▶ During the price check, the system compares the invoice value with the product of Invoiced Quantity times Order Price. The delivery costs aren't considered.

Technical Elements

Table 10.15 displays some of the technical elements of unplanned delivery costs.

Technical Element	Description
MRM_DISTRIBUTION_BNK	Function Module
RBKP	Database Table for the Header of the LIV Document
RBKP-BEZNK	Table Field for Unplanned Delivery Costs
T169P	Customizing Table for Unplanned Delivery Costs

Table 10.15 Technical Elements of Unplanned Delivery Costs

We'll now take a look at some of the troubleshooting tips for unplanned delivery costs.

Troubleshooting Tips

You can get an idea of how unplanned delivery costs have been configured in Customizing by looking at the Details tab of the LIV document. Figure 10.9 illustrates this. If you don't find the Tax Code field, unplanned delivery costs are configured to be distributed to line items. If the field Tax Code is present on the Details tab, unplanned delivery costs will post to a different SAP G/L account.

You should now understand the functional and technical aspects of delivery costs. We described both planned delivery costs and unplanned delivery costs and their account postings during LIV. Let's move on to the posting of total-based differences.

10.5 Total-Based Differences

In a real-world business scenario, it can be too time-consuming and costly to identify the reasons for different values in the vendor invoice and purchase order. In this case, you might want to post a total-based difference.

10.5.1 Functional Basis

Many invoices contain a lot of line items with slight differences in the amount the vendor quotes in the invoice from the amount that's suggested by the system. However, it isn't worth wasting a lot of business hours searching for the reason of a variance of, for example, USD 10 for an invoice of USD 10,000. Instead, it would be helpful if the system could post small differences to the income or expense accounts. You can do so using vendor-specific tolerances.

10.5.2 SAP Functional Design

You can configure vendor-specific tolerances in the Customizing menu path SAP IMG • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • INCOMING INVOICE • CONFIGURE VENDOR-SPECIFIC TOLERANCES, which also corresponds to Transaction OMRX. You have the following options:

- ▶ Total-based acceptance
- ▶ Total-based reduction

Total-Based Acceptance

When you post an invoice, there may be a difference between the value the vendor states on the invoice and the value suggested by the system. If this value lies within the tolerance set in Transaction OMRX, the system posts the difference to the income/expense account. For example, a vendor may send an invoice to you in the amount of USD 10,008 when it should have been USD 10,000. In addition,

this invoice document consists of hundreds of line items. In this case, it might not be worth locating the line item whose value has deviated from what should have been invoiced. Instead, you can pay USD 8 more to the vendor, thus accepting the difference in the total amount.

Total-Based Invoice Reduction

With total-based invoice reduction, the system creates two accounting documents when you post an invoice. One is an invoice posting with the suggested values and quantities and the other is a credit memo that creates an offsetting entry to the clearing account.

Figure 10.13 shows the configuration of a vendor-specific tolerance (Transaction OMRX) that is then assigned to the vendor master.

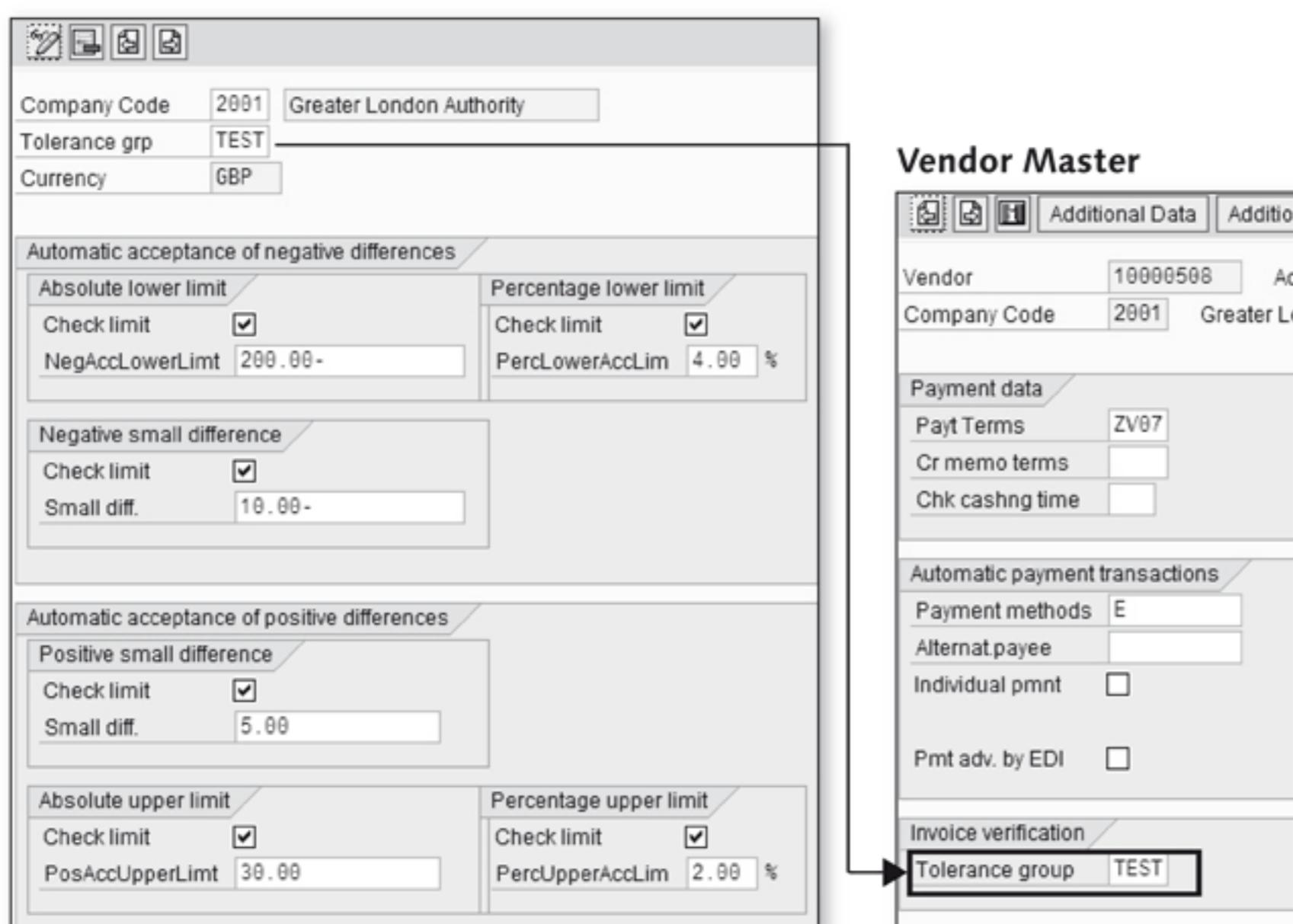


Figure 10.13 Vendor-Specific Tolerances

Vendor-specific tolerances are configured and then entered into the vendor master. This ensures that the total-based differences are posted at the time of invoice verification for the corresponding vendor.

Table 10.16 shows an account posting for total-based acceptance. The internal transaction keys listed in Table 10.16 are explained in Chapter 11.

Amount Suggested from the Purchase Order: USD 10,003	Vendor Sends an Invoice for USD 10005	Internal Transaction key
GR/IR Clearing Account	10,003+	WRX
Vendor Account	10,005-	KBS
Small Differences Account	2+	DIF

Table 10.16 Sample Posting for Total-Based Acceptance

Table 10.17 shows an account posting for the total-based reduction. In this case, an invoice as well as a credit memo is created simultaneously.

Amount Suggested from the Purchase Order: USD 10,003	Vendor sends an Invoice for USD 10,005		Internal Transaction key
	Invoice	Credit Memo	
GR/IR Clearing Account	10003+		WRX
Vendor Account	10005-	2+	KBS
Clearing Account for Invoice Reduction	2+	2-	RKA

Table 10.17 Sample Posting for Total-Based Invoice Reduction

10.5.3 Checkpoints and Real-Time Issues

You should only use total-based invoice reduction when all of the following conditions are fulfilled:

- ▶ The invoiced amount is larger than the planned amount.
- ▶ You haven't reduced the invoice manually.
- ▶ You haven't yet accepted the difference in the invoice manually.
- ▶ The difference exceeds the positive small difference set in Customizing for LIV.
- ▶ An invoice reduction tolerance has been set for the vendor and company code in Customizing for LIV.
- ▶ The difference lies within the invoice reduction tolerance limits set.

The system first checks whether the variance falls within the small differences configured for vendor-specific tolerances. If there's a positive difference that's greater than this small difference, the system checks whether it falls within the defined

invoice reduction limit. If the invoice reduction limits are set to Do Not Check, the system compares the variance with the acceptance limits.

10.5.4 Technical Elements

Table 10.18 lists a few technical elements for total-based differences.

Technical Element	Description
LFB1	Database Table for the Vendor Master
LFB1-TOGRR	Table Field for Vendor-Specific Tolerances
T169L	Customizing Table for Vendor-Specific Tolerances

Table 10.18 Technical Elements of Vendor-Specific Tolerances

Troubleshooting Tips

The following are troubleshooting tips for total-based differences:

- ▶ With total-based acceptance, the system posts the difference to the small difference account.
- ▶ You can check the vendor master of the LIV document for a vendor-specific tolerance.
- ▶ The various values of tolerances can be checked from Transaction OMRX.
- ▶ With total-based invoice reduction, the system creates an invoice and a credit memo in the same step.
- ▶ You can check the vendor master of the LIV document for a vendor-specific tolerance if you find two accounting documents for a LIV document.

Now that you understand the functionality of the total-based differences, let's move on to discuss invoices for purchase orders with account assignment.

10.6 Invoices for Purchase Orders with Account Assignment

In this section, we'll check the requirements and functionalities associated with invoices for purchase orders with account assignment. Because this is closely related to the technical design of your SAP system, (rather than a functional requirement), we won't cover the same subtopics as we have for previous topics.

In the material master, you maintain the valuation data of materials managed in stock. This means that you maintain the price control, price, and valuation class

for the material in the Accounting 1 view of the material master. The costs associated with the procurement of stock material ultimately have to be reported to a cost object such as profit center or cost center. This is taken care of by the system for stock materials as a result of Customizing settings in Financial Accounting, and Controlling and as a result of valuation and account assignment. However, for materials not managed in stock, you need to attribute the cost to a cost center or profit center when you create the purchase order. This provides the system with information about who bears the cost for the procurement. In addition, if the determination of an SAP G/L account isn't possible, you have to specifically mention this in the purchase order.

As we've discussed in previous chapters, the system checks the accounting elements during the creation of the purchase order. If the system can't perform an automatic account determination from the values you enter during the creation of the purchase order, you have to enter the account assignment manually for use during goods receipt and invoice verification.

The following values need to be entered if the system isn't able to determine an account assignment automatically at the time of purchase order creation:

- ▶ Account assignment category (for example cost center, WBS element, or asset)
- ▶ The number of the SAP G/L account to be debited
- ▶ The number of the cost center, WBS element, or asset corresponding to the account assignment category
- ▶ Expectation of a goods receipt or invoice receipt
- ▶ The type of goods receipt (valuated or non-valuated)

Figure 10.14 shows an account-assigned purchase order.

As you can see, the purchase order is created for account assignment category K, which means that the cost center and the relevant SAP G/L account has to be entered at the time of purchase order creation.

Default SAP G/L account in a purchase order

The system may default the SAP G/L account based on the account assignment in a purchase order. If this is the case, the system checks for transaction key GBB in Transaction OBYC, which generally contains the following fields:

- ▶ Valuation Modifier – The system takes the valuation modifier from the valuation area.

- ▶ General Modification (Account Modification) – The system takes the general modification from the account modification code in the corresponding account assignment category. This is maintained in Transaction OME9.
- ▶ Valuation Class

The screenshot shows the SAP ERP Purchase Order screen. At the top, it displays "e-purchase order 3000079750 Created by Dr. Faisal Mahboob". Below this is a toolbar with various icons for document overview, print preview, messages, and personal settings. The main area shows a purchase order header with vendor information: EC e-purchase order 3000079750, Vendor 10013271 GLA TEST VENDOR, Doc. date 19.10.2009. The header table includes columns for Item, Matl Group, Material, Short Text, PO Quantity, OUn, Deliv. Date, and Net Price. A single row is visible with Item 10, Matl Group Stationery, Short Text test, PO Quantity 1 EA, and Deliv. Date 05.06.2009. Below the header is a toolbar with icons for planning and scheduling. The bottom section is the "Account Assignment" tab, which is selected. It contains fields for Unloading Point (1), Recipient (MAHBOOFA), G/L Account (533010), CO Area (2001), and Cost Center (2001). There are also tabs for Material Data, Quantities/Weights, Delivery Schedule, Delivery, Invoice, Conditions, and Account Assignment.

Figure 10.14 An Account Assigned Purchase Order

Figure 10.14 shows an example of a single account assignment. However, you can switch to multiple account assignment by clicking on the Multiple Account Assignment icon, as shown in the top left corner of the Account Assignment tab. When you're in the screen for multiple account assignment, the name of the icon changes to Since Account Assignment, as does the icon.

When you choose the Multiple Account Assignment option, you can use the Distribution and Partial Invoice fields when entering the account assignment, to control how the system distributes the invoice quantity among the goods receipt quantity:

- ▶ On a quantity or percentage basis
- ▶ On a progressive fill-up basis or proportional to the planned distribution

Automatic quantity and amount distribution is possible during invoice verification for multiple account assignment.

You now understand the need for account-assigned purchase orders and the associated functionalities. Finally, we'll move to the topic of invoice verification for invoices in a foreign currency.

10.7 Entering Invoices in a Foreign Currency

In this section, you'll learn about the functionalities that enable you to enter invoices in foreign currencies. An invoice is said to be in a foreign currency if the currency in which the invoice is entered is different from the local currency defined for the company code.

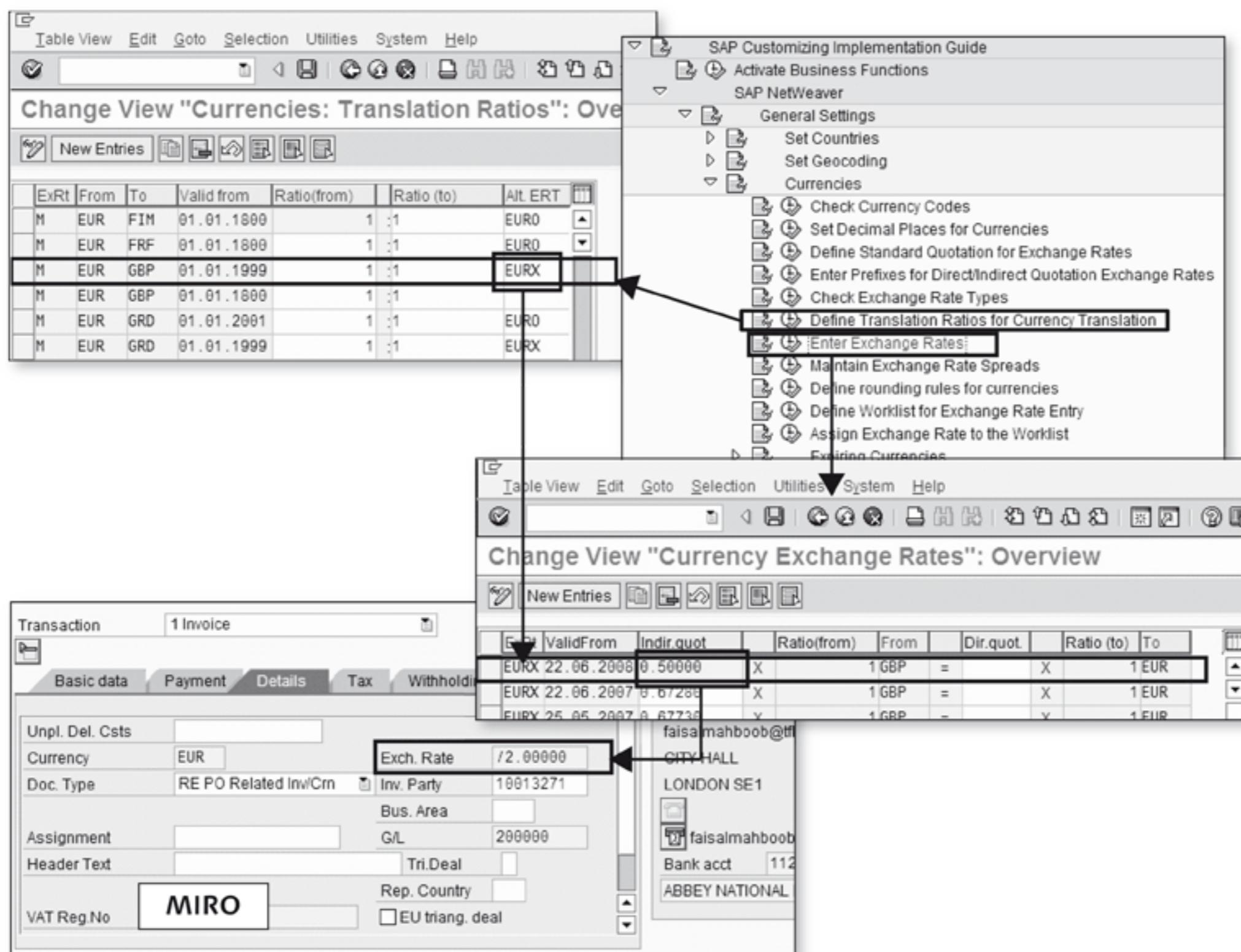


Figure 10.15 Exchange Rate during Transaction MIRO

As shown in Figure 10.15, the Customizing settings for the translation ratios and the values for the exchange rate determine the value that will be used during LIV.

Here, we entered an invoice in the currency EUR while our company code local currency is GBP. The exchange rate type that's used for Materials Management is represented by M. The system checks the relevant translation in the Define Translation Ratios for Currency Translation option. If the system finds an alternate exchange rate in this transaction (in our case, it found EURX), the new exchange rate type is used to check the values in the transaction Enter Exchange Rate.

However, you can specify in the purchase order that the exchange rate is fixed. In this case, the system doesn't determine the value from the exchange rate table, as shown in Figure 10.15.

10.8 Summary

In this chapter, we covered invoice variances and the blocking of invoices. We described invoice variances with respect to price, quantity, and order price quantity variance. We then analyzed how the system reacts automatically to these variances when a certain preconfigured limit is violated. Finally, you learned about the functional and the technical process flow during invoice release. In addition, we covered the topic of planned and unplanned delivery costs in the context of functionalities and technicalities. Other topics we discussed included total-based differences, invoices for purchase orders with account assignment, and invoices in a foreign currency. You'll now be able to replicate realistic business scenarios within your enterprise for invoice variances and blocking of invoices.

In the next Chapter we'll learn the Valuation and account assignment along with Automatic Settlements.

The additional functionalities in LIV complement and complete the study of invoice verification in the context of functional design and account assignment. Optimization can't be realized until you know all of the options available in AP.

11 Additional Functionalities in LIV

In this chapter, we'll demonstrate and explain the topics that complete the study of LIV and you'll learn about different kinds of settlements, reversals, and clearings. Before we start with these topics, we'll take a look at valuation and automatic account assignment.

11.1 Valuation and Account Determination

In this section, you'll learn about the fundamentals of valuation and account determination for stock and consumable materials. In the material master, you maintain the valuation data of materials managed in stock. This means that you maintain the price control, price, and valuation class for the material in the Accounting 1 view of the material master. This helps in the determination of the SAP G/L during account posting. The costs associated with the procurement of stock material ultimately have to be reported to a cost object such as a profit center or cost center. This is taken care of by the system for stock material as a result of Customizing settings in Financial Accounting, Controlling, and valuation and account assignment.

However, for materials that aren't managed in stock, you need to attribute the cost to a cost center or profit center when you create the purchase order. This provides the information about who bears the cost for the procurement. In addition, if the determination of an SAP G/L account isn't possible, you have to specifically mention this in the purchase order. The transactions in Financial Accounting can't be completed without information about the SAP G/L. Therefore, you have to ensure that the SAP system either gets the SAP G/L account number from the automatic

account assignment in Customizing, or you have to enter it manually during purchase order creation.

We'll discuss influencing factors before going into the details of organizational level dependency.

11.1.1 Influencing Factors

Generally speaking, the following influencing factors exist for automatic account determination:

- ▶ **Organizational level**

The organizational level is the level at which valuation occurs, and in our examples, the plant is the valuation level. Thus, for the purpose of account determination, the application transaction should ideally result in postings to different accounts for similar transactions if they're executed for different plants. When we refer to the term account, we generally mean an SAP G/L account.

- ▶ **Material/material type**

The account postings depend on the material and the material type for which the transaction is entered. This means that if you have a different material and all other conditions remain the same, the application transaction should ideally post to a different account.

- ▶ **Materials Management transaction**

The business transaction you execute decides the type of account postings that may occur. You already know that postings are made to the stock account and the GR/IR clearing account in most cases at the time of goods receipt. In addition, postings are made to the GR/IR clearing account, vendor account, and stock account, or the price differences account at the time of invoice receipt.

These three influencing factors represent a very high level system design. We need a more detailed analysis to offer a concrete contribution to the study of valuation and account determination. Therefore, we'll describe these topics in more detail in the following sections.

First, we'll expound on the organizational level dependency already explained in the previous Chapter 4. Next, we'll explain the account determination for stock materials and consumables, and finally, we'll discuss the configuration of automatic account determination.

11.1.2 Organizational Level Dependency

Organizational level dependency refers to the way in which organizational units impact account postings. For this reason, the organizational unit in question should be the one at which valuation takes place. In essence, we're talking about the valuation area.

Figure 11.1 shows the levels of valuation and account determination in Materials Management. The organizational units are on the left, whereas the blocks on the right indicate various values in the context of organizational units.

You can assign the company code to the chart of accounts in the Customizing menu path SAP IMG • FINANCIAL ACCOUNTING • COMPANY CODE • ENTER GLOBAL PARAMETERS, as shown in Figure 11.1.

Figure 11.1 Global Company Code Parameters

The valuation area isn't displayed during the transactions in Materials Management. You can select the plant level the company code level for the valuation area. Unless otherwise stated, we'll assume that the valuation area is maintained at the plant level.

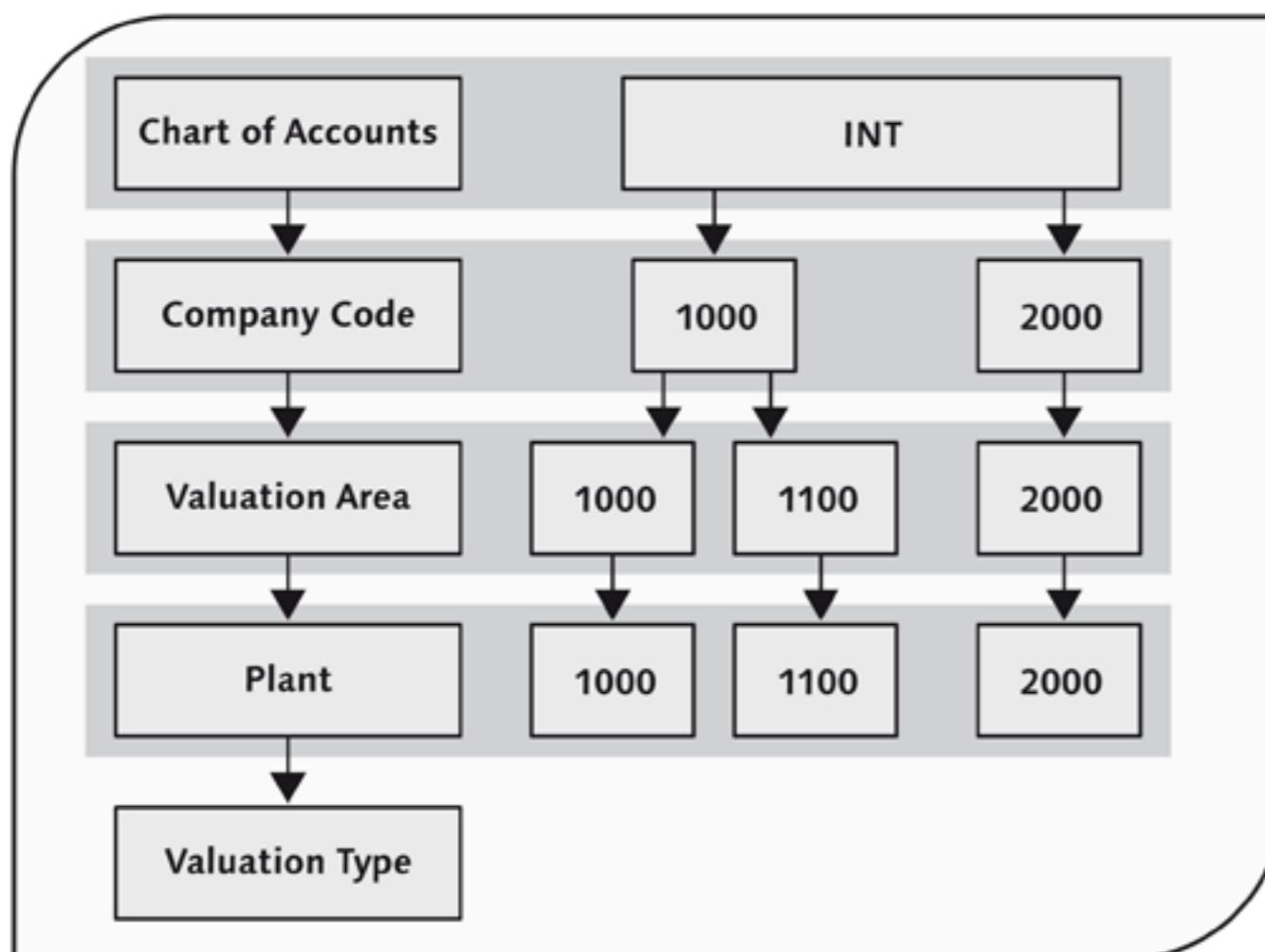


Figure 11.2 Levels of Valuation and Account Determination

As you can see, the plant is effectively the valuation area. This means that the system should get the information about plants while executing transactions that involve valuation and account determination in Materials Management.

The valuation type corresponds to materials subject to split valuation. Split valuation has already been explained in Chapter 3 and Section 8.1.4 in Chapter 8. In this case, you can value partial stocks of a material at different prices and manage them using separate accounts.

Now that you understand the organizational level dependency of valuation and account assignment, we'll discuss the account determination for stock materials.

11.1.3 Account Determination of Stock Materials

Stock materials are materials that are managed on the basis of quantity and value. There can't be an automatic account determination of materials that are non-valuated. Thus, in this section, we'll discuss valued stock materials. The following are the influencing elements in the automatic account determination of stock materials:

- ▶ Chart of accounts
- ▶ Valuation grouping code
- ▶ Valuation class

- ▶ Transaction
- ▶ Account grouping code

These factors help in the automatic account determination of stock materials for the client. This means that if the system has information about all of these factors, it can automatically generate account postings to the relevant SAP G/L account. We'll study each of these factors in the following sections.

Chart of Accounts (C/A)

The chart of accounts is a classification for the recording of values or value flows to ensure the correct rendering of accounting data. This is used as a key for account determination, to enable a differentiation for the purposes of SAP G/L account assignment. Thus, you must assign a chart of accounts to each company code. In addition, if you have more than one chart of accounts in your enterprise, you must configure automatic account determination separately for each chart of accounts.

Valuation Grouping Code (VM)

The valuation grouping code or the valuation modifier is the key for account determination that enables a differentiation for G/L account assignment by valuation area. It's about grouping together valuation areas for the purpose of automatic account determination. Rather than creating account determination for each plant, you can group the plants together and create only one account assignment – provided all of the plants follow the same account determination rules. You can activate or deactivate valuation grouping codes in the Customizing menu path **SAP IMG • MATERIALS MANAGEMENT • VALUATION AND ACCOUNT ASSIGNMENT • ACCOUNT DETERMINATION • ACCOUNT DETERMINATION WITHOUT WIZARD • DEFINE VALUATION CONTROL**. If you activate a valuation grouping code, you must assign a code to each valuation area. In addition, you must configure automatic account determination separately for each valuation grouping code within a chart of accounts.

Valuation Class

The valuation class is a key for account determination that enables a differentiation of the SAP G/L account assignment depending on the material. The list of valuation classes in the material master depends on the material type. However, different materials of the same material type can use different values of the valuation class from among this list. As already explained in the previous chapters, you assign materials to a valuation class for each valuation area on the Accounting 1 view of the material master. We've repeated this in Figure 11.3 for your reference.

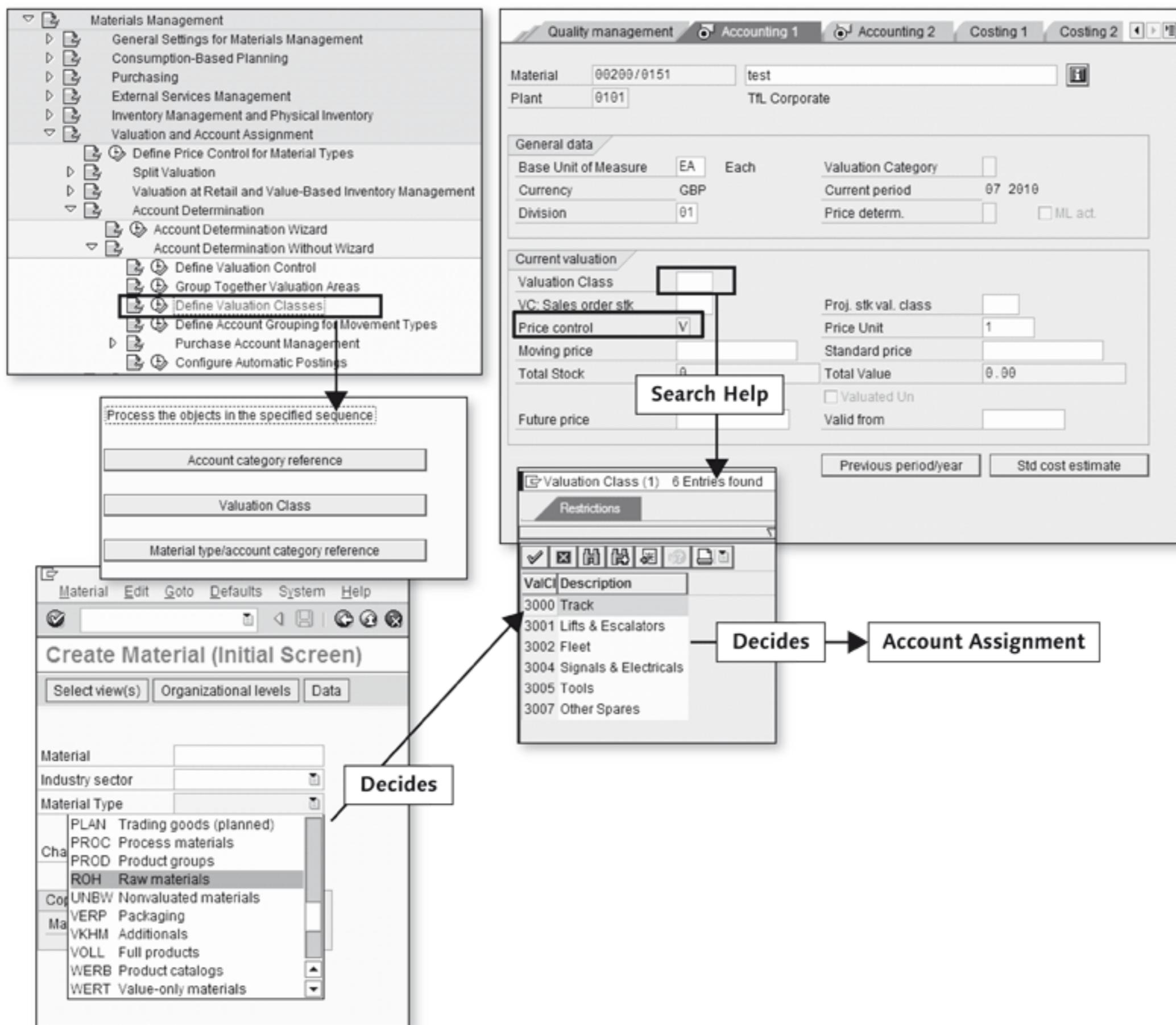


Figure 11.3 Valuation Class in the Material Master

The valuation class acts as the key for grouping materials that have the same account determination. If different accounts should be posted according to valuation class in a transaction, the account determination for this transaction must be set as dependent on the valuation class.

The material type decides the list of valuation classes from which you can choose during the creation of the material master.

Transaction

By transaction we mean the key for the account determination that symbolizes the business transactions. The posting transactions for Materials Management are fixed

and can be found in the SAP Customizing menu path SAP IMG • MATERIALS MANAGEMENT • VALUATION AND ACCOUNT ASSIGNMENT • ACCOUNT DETERMINATION • ACCOUNT DETERMINATION WITHOUT WIZARD • CONFIGURE AUTOMATIC POSTINGS. You'll notice that all of the Transactions in Figure 11.4 are located under Group RMK.

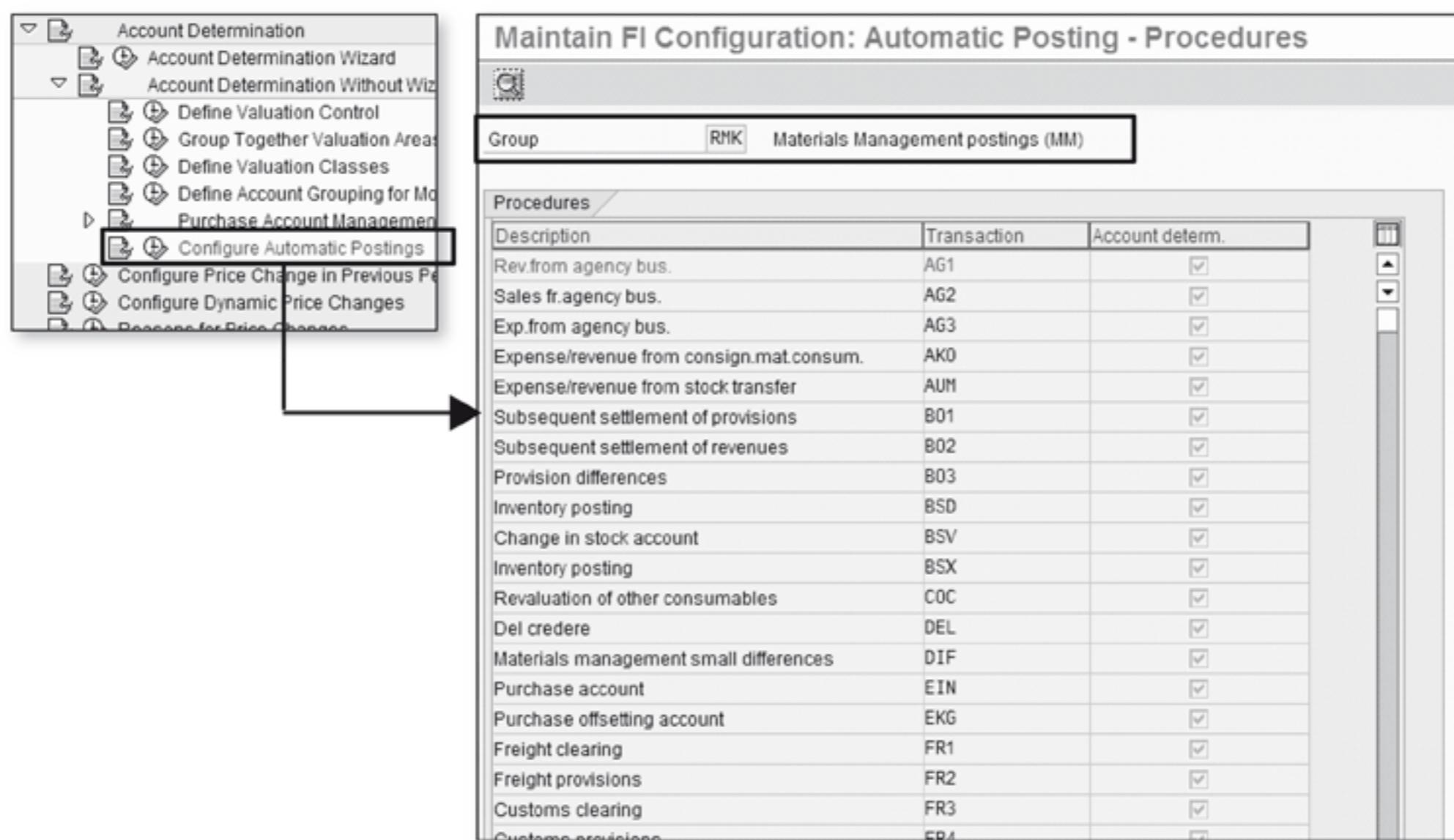


Figure 11.4 Transactions in Materials Management

Group RMK stores information about all Transactions Materials Management can use. Transactions that aren't mentioned here can't be posted for Materials Management. This group has been delivered by SAP and you shouldn't try to make changes to it. You can also see the checkbox Account Determ. in Figure 11.4. If this checkbox is selected, the transaction is subject to automatic account determination. Note that the checkbox isn't selected for Transaction KBS. This means that account determination isn't automatic for this transaction. Postings are generally made against Transaction KBS for account-assigned purchase orders and when the amount should be posted to the vendor account during LIV.

Account Grouping Code (AG)

The term offsetting entry for inventory posting can be quite vague in the sense that it may come into play as a result of a variety of transactions such as goods issue,

scrap, physical inventory, and so on. A generic posting to the offsetting entry for inventory posting during these transactions might not be desirable during financial reporting. To differentiate between the similar kinds of postings such as offsetting entry for inventory posting or the price differences account, SAP ERP provides more control via an account grouping code. You can have different account grouping keys based on valuation grouping and valuation class. For example, an account posting can be made to an offsetting entry (Transaction GBB). Because this is a generic posting, the account grouping code provides a finer classification of the SAP G/L account based on the valuation grouping code and the valuation class. From a functional point of view, this means that you can assign a different SAP G/L account for the postings to the offsetting entry account (GBB) when you have different combinations of plant and material type.

The influencing factors result in the determination of the SAP G/L account, as shown in Table 11.1.

Influencing Factors						G/L-Determined	
Client	C/A	Transaction	VM	AG	Valuation Class	G/L Debit	G/L Credit
800	INT	BSX	0001	-	3000	300 000	300 000
800	INT	WRX	0001	-	3000	191 100	191 100
800	INT	PRD	0001	-	3000	231 000	281 000
800	INT	GBB	0001	VBR	3000	400 000	400 000

Table 11.1 Influencing Factors in the Determination of the SAP G/L Account

Value string

Value strings group together the various transactions used in account determination. Depending on the movement type during goods movement, or through the hard-coded ABAP programs that run during LIV, the system invokes a particular value string. For example, you can see the value string WE01 in the Customizing menu path SAP IMG • MATERIALS MANAGEMENT • VALUATION AND ACCOUNT ASSIGNMENT • ACCOUNT DETERMINATION • ACCOUNT DETERMINATION WITHOUT WIZARD • DEFINE ACCOUNT GROUPING FOR MOVEMENT TYPES. Here, if you double-click on any of the entries that contain WE01, you'll get a list of the following transactions, along with their descriptions:

- ▶ **BSX:** Inventory posting
- ▶ **WRX:** GR/IR clearing account
- ▶ **PRD:** Cost (price) differences

- ▶ **KDM:** Materials management exchange rate differences
- ▶ **EIN:** Purchase account
- ▶ **EKG:** Purchase offsetting account
- ▶ **BSV:** Change in stock account
- ▶ **FRL:** External activity
- ▶ **FRN:** Incidental costs of external activities
- ▶ **BSX:** Inventory posting
- ▶ **UMB:** Gain/loss from revaluation

The transactions that appear in the value string are hard-coded in the system and you should never try to change them.

As you can see, Transaction BSX appears twice in the list. This is because two different kinds of postings can go to the stock account. During goods receipt, BSX be used for stock postings. The stock posting BSX may also be used as a result of differences at the time of invoice receipt when the material is MAP-controlled.

A summary of the influencing factors for automatic account determination is shown in Figure 11.5. As you can see, the figure is divided into three sections:

- ▶ Organizational Structure
- ▶ Material
- ▶ Business Transaction

The system takes the company code and the plant (valuation area) from the organizational structure. The chart of accounts is determined from the company code, and the valuation grouping code is determined from the valuation area.

The section Material indicates the data associated with the material master. The system gets the information about the valuation class from the Accounting 1 view of the material master. The information whether the value or the quantity or both should be updated during account postings is obtained from the material type.

The value string for the goods movement groups together the movement type, transaction, special stock indicator, and account group code. The value string for invoice verification isn't available in the Customizing and is visible only in the ABAP code.

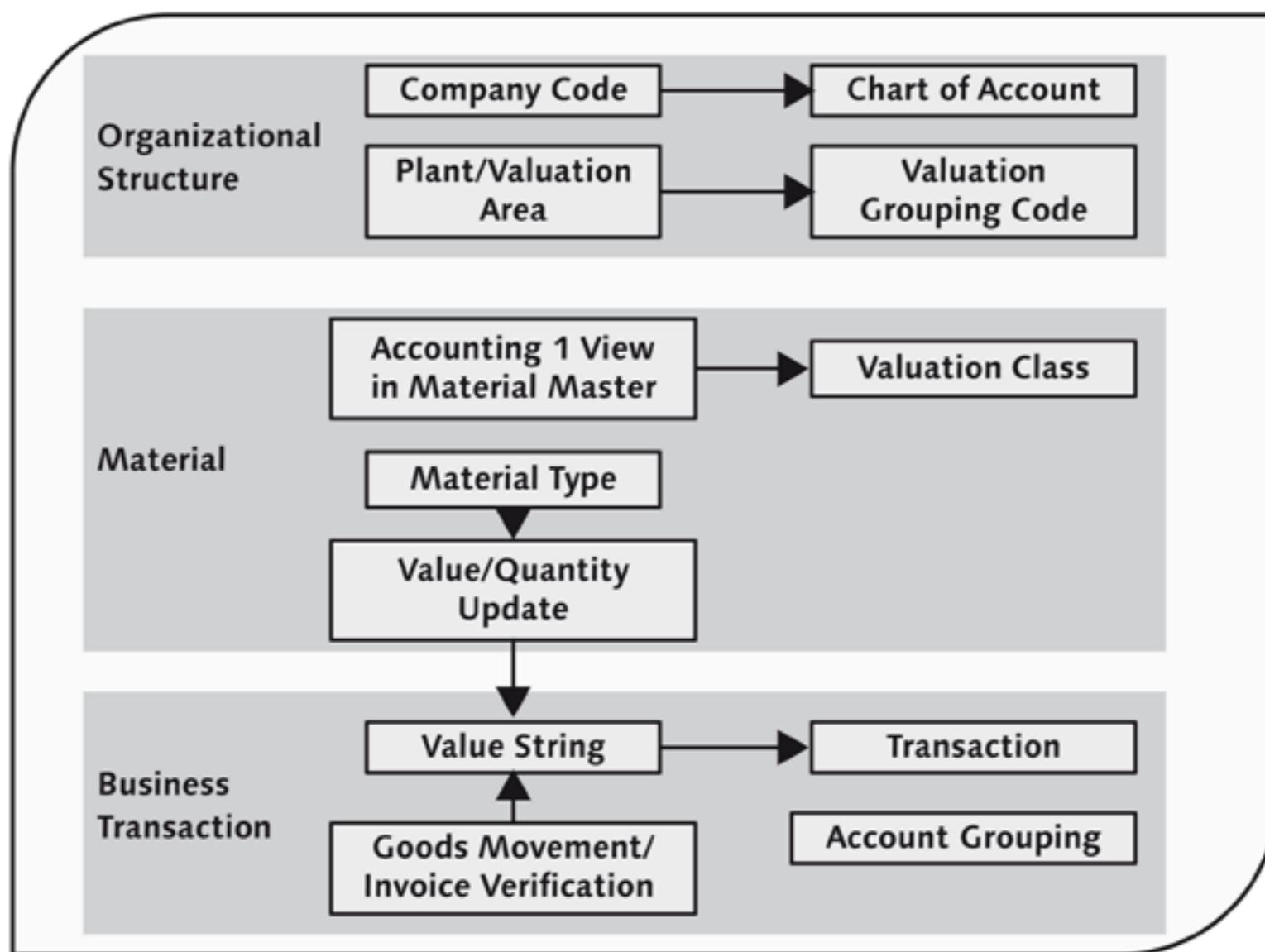


Figure 11.5 Influencing Factors for Automatic Account Determination

The value string consists of a list of transactions from which those that are relevant are used during account postings. The account grouping code determines which particular SAP G/L account should be posted for the offsetting entry for inventory posting or the price differences account posting.

Now that you understand the automatic account determination process for stock material, let's move on to the account determination of consumable materials.

11.1.4 Account Determination of Consumable Materials

Accounts can be determined automatically for stock materials because the accounting elements are present in the stock materials. However, for materials that aren't managed in stock, you have to enter the accounting elements manually at the time of purchase order creation. They will then be used during goods receipt and invoice verification.

Figure 11.6 repeats the description we provided in the previous chapter. It serves as an easy reference for our current topic.

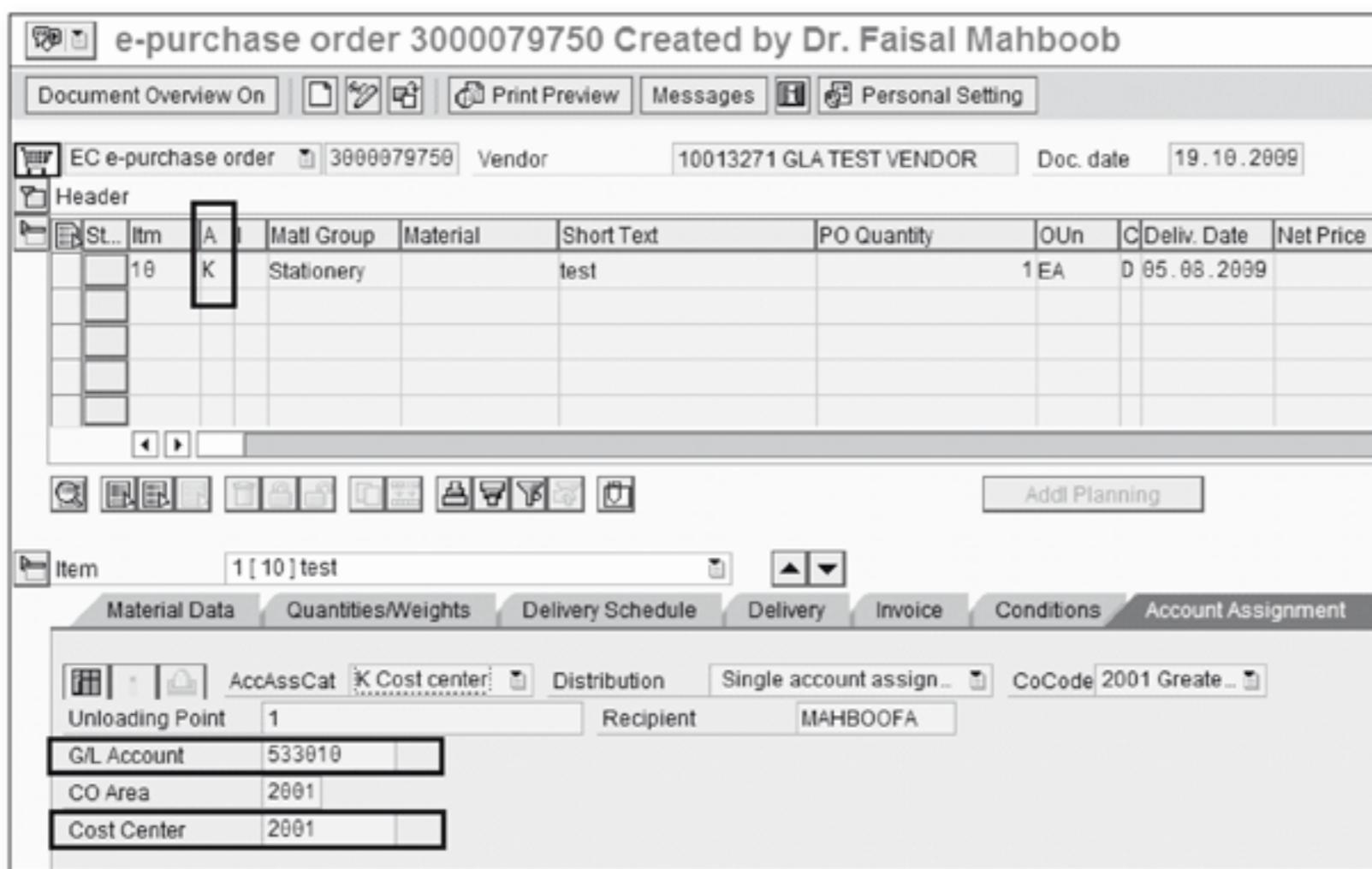


Figure 11.6 Account-Assigned Purchase Order for Consumable Materials

The following values need to be entered because the system isn't able to perform an automatic account assignment at the time of purchase order creation:

- ▶ Account assignment category (for example cost center, WBS element, or asset)
- ▶ The number of the SAP G/L account to be debited
- ▶ The number of the cost center, WBS element, or asset corresponding to the account assignment category
- ▶ The expectation of a goods receipt or invoice receipt
- ▶ The type of goods receipt (valuated or non-valuated)

An accounting document isn't created at the time of goods receipt if the material is non-valuated.

You can configure the system to default the SAP G/L account during purchase order creation for consumable materials. As shown in Figure 11.7, to start with, the system takes the information from the material group.

The valuation class can be maintained for the material group in Customizing Transaction OMQW. You can find it under the Customizing menu path SAP IMG • MATERIALS MANAGEMENT • PURCHASING • MATERIAL MASTER • ENTRY AIDS FOR ITEMS WITHOUT A MATERIAL MASTER.

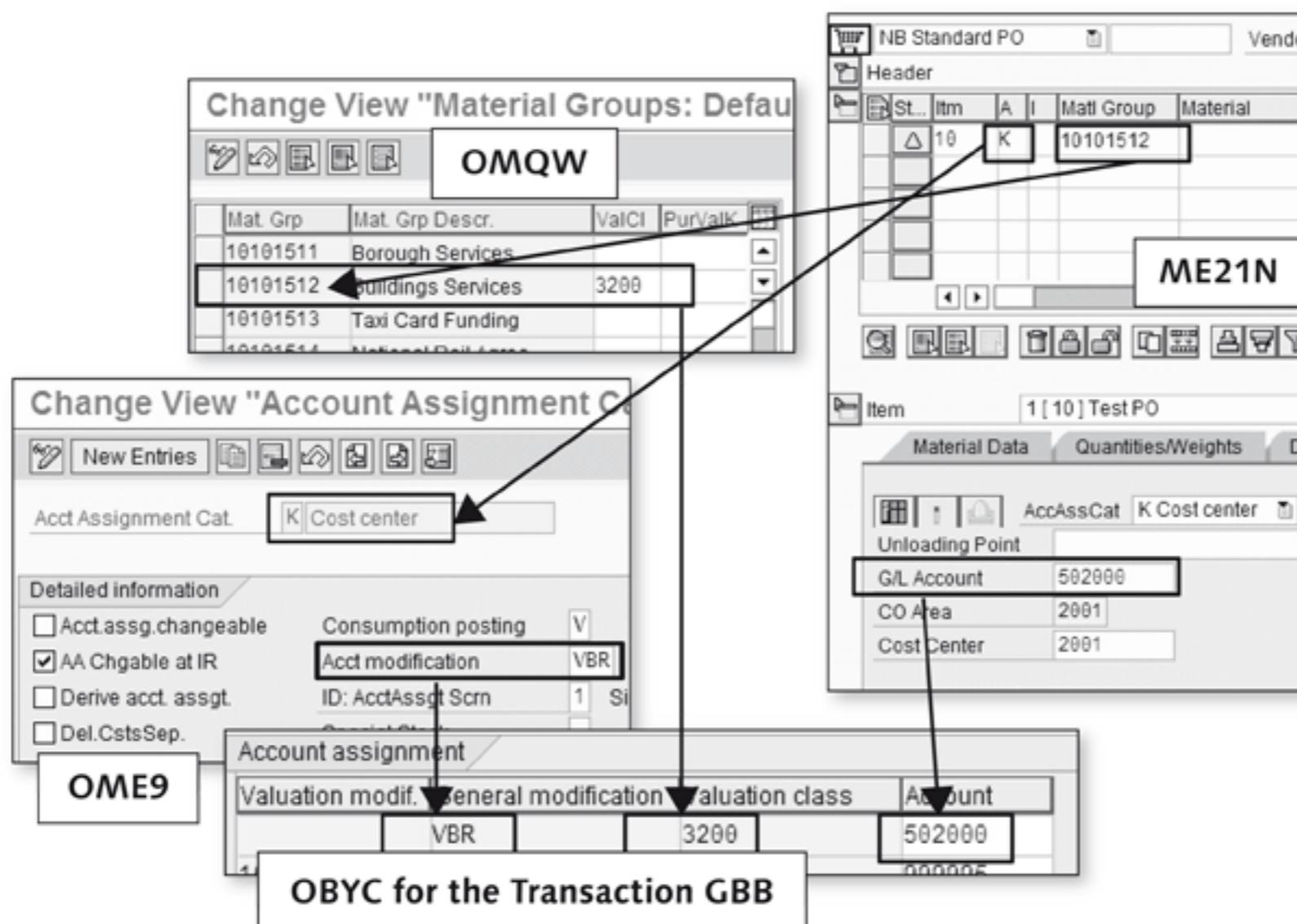


Figure 11.7 Default Value for the SAP G/L Account in Transaction ME21N

From the account assignment category in the purchase order, the system checks Customizing Transaction OME9. You can find the transaction under the Customizing menu path SAP IMG • MATERIALS MANAGEMENT • PURCHASING • ACCOUNT ASSIGNMENT • MAINTAIN ACCOUNT ASSIGNMENT CATEGORIES. The system takes the account modification key from the value maintained in the account assignment category. In our case, it's VBR for account assignment category K.

The system now checks the entries in Customizing Transaction OBYC for the valuation modifier (obtained from the valuation area), valuation class (obtained from the material group), and account modification key VBR (obtained from account assignment category K). You can find the transaction under the Customizing menu path SAP IMG • MATERIALS MANAGEMENT • VALUATION AND ACCOUNT ASSIGNMENT • ACCOUNT DETERMINATION • ACCOUNT DETERMINATION WITHOUT WIZARD • CONFIGURE AUTOMATIC POSTINGS. You must note that Transaction OBYC is checked for Transaction GBB. At this point, you need to be cautious about the nomenclature that's in use in SAP's literature. It mentions the term as account modification at the time of account assignment and as general modification at the time of automatic account assignment. The SAP G/L account that exists in the system in Transaction OBYC for Transaction GBB is defaulted in the purchase order.

We'll now look at how you can simulate the set of configured SAP G/L accounts in Customizing.

11.1.5 Simulation

You can simulate SAP G/L account postings in Inventory Management for the combination of:

- ▶ Plant
- ▶ Material
- ▶ Movement type

As you can see in Figure 11.8, you can simulate the account postings for plant, material, and movement type. When you click on the Account Assignment button, the system displays a list of all SAP G/L accounts. If an entry is missing, the system indicates this by the text Missing in the field for the SAP G/L account. Also note that the system obtains and mentions the following on the simulated list:

- ▶ Company Code
- ▶ Chart of Accounts
- ▶ Valuation Area
- ▶ Valuation Grouping Code
- ▶ Valuation Class
- ▶ Material Type
- ▶ Value Update indicator

There is no such transaction code for simulating the SAP G/L accounts for invoice verification, because the invoices use the SAP G/L accounts from goods receipts (e.g., GR/IR clearing account and stock account). The vendor account that's used in invoice verification is dependent on the vendor number and the reconciliation account in the vendor master. The other accounts such as the price differences account or the small differences account are generic in nature.

Now that you know about valuation and account determination, we'll next take a look at the various kinds of automatic settlements within LIV.

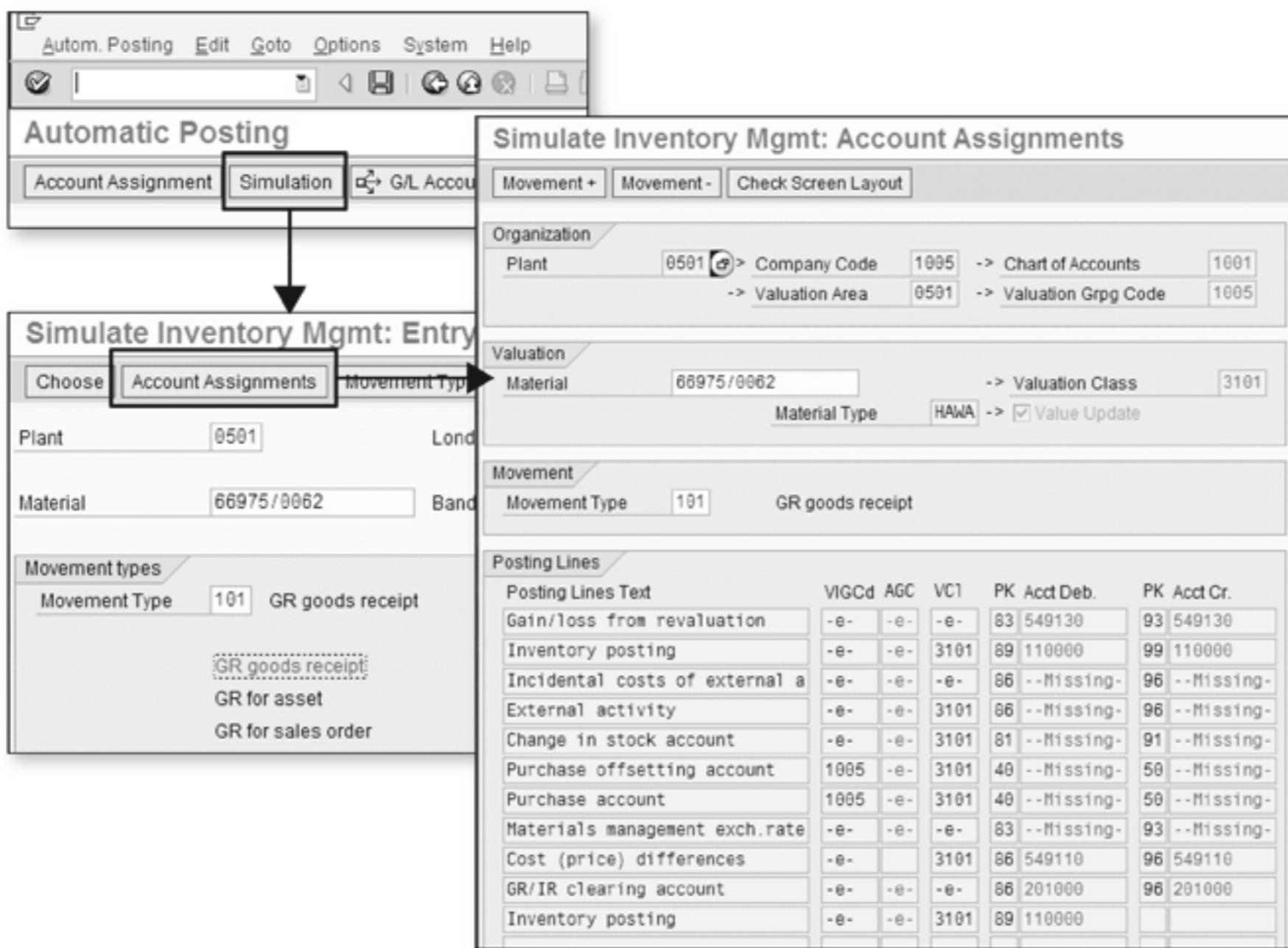


Figure 11.8 Simulation of Account Postings

11.2 Automatic Settlements

The basic concept of automatic settlement in LIV is that rather than the vendor sending an invoice to your enterprise for verification, you create a settlement document and send it to the vendor for verification. You can make the payment if the vendor agrees with the settlement you've suggested. Automatic settlement helps save time for the invoicing department. In addition, the co-ordination between the purchasing and the invoicing department is taken care of automatically by the system. The following kinds of automatic settlements exist in LIV:

- ▶ Evaluated receipt settlement (ERS)
- ▶ Consignment and pipeline settlement
- ▶ Revaluation
- ▶ Invoicing plan settlement

We'll look into each of these topics in the following sections.

11.2.1 Evaluated Receipt Settlement (ERS)

In this section we'll discuss the functionalities and technical aspects of ERS. You can automate the manual entry of invoices and credit memos with the help of ERS. With ERS, you create an automatic settlement based on the goods receipt. Other information – such as tax code – that's required for the entry of invoices is maintained in the purchase order.

Functional Basis

For most invoices based on deliveries, there is hardly any difference between the purchase order amount and the invoice amount and it's time-consuming to keep track of and enter all invoices into the system manually. If the process to settle these documents and send the settlement automatically to the vendor could be automated, a lot of effort on the part of AP could be saved.

SAP Functional Design

You can indicate during purchasing that a particular purchase order is relevant to ERS. This way, you can settle goods receipts directly without receiving an invoice from the vendor by having the system generate and post the corresponding invoices. A vendor invoice is thus no longer required.

Because ERS automatically sends a settlement document to vendors, you need to define a form in Customizing that will carry the relevant information. Depending on the systems settings, the form can be sent to the vendor immediately on posting or at a later time.

The invoice settlement document is created on the basis of the goods receipts; therefore, you need to have the GR-based IV indicator selected in the purchase order. In addition, the tax code that will be used to create the settlement document during ERS has to be maintained in the purchase order.

Automatic settlement of planned delivery costs in ERS

This functionality has been realized as of SAP ECC 6. SAP has provided a transaction code exclusively for the settlement of planned delivery costs in ERS. Thus, you now have the following transaction codes available for ERS:

- ▶ MRRL: ERS for goods items
- ▶ MRRL: ERS for goods items + planned delivery costs
- ▶ MRDC: ERS for planned delivery costs

Figure 11.9 shows the functional design of the ERS process flow.

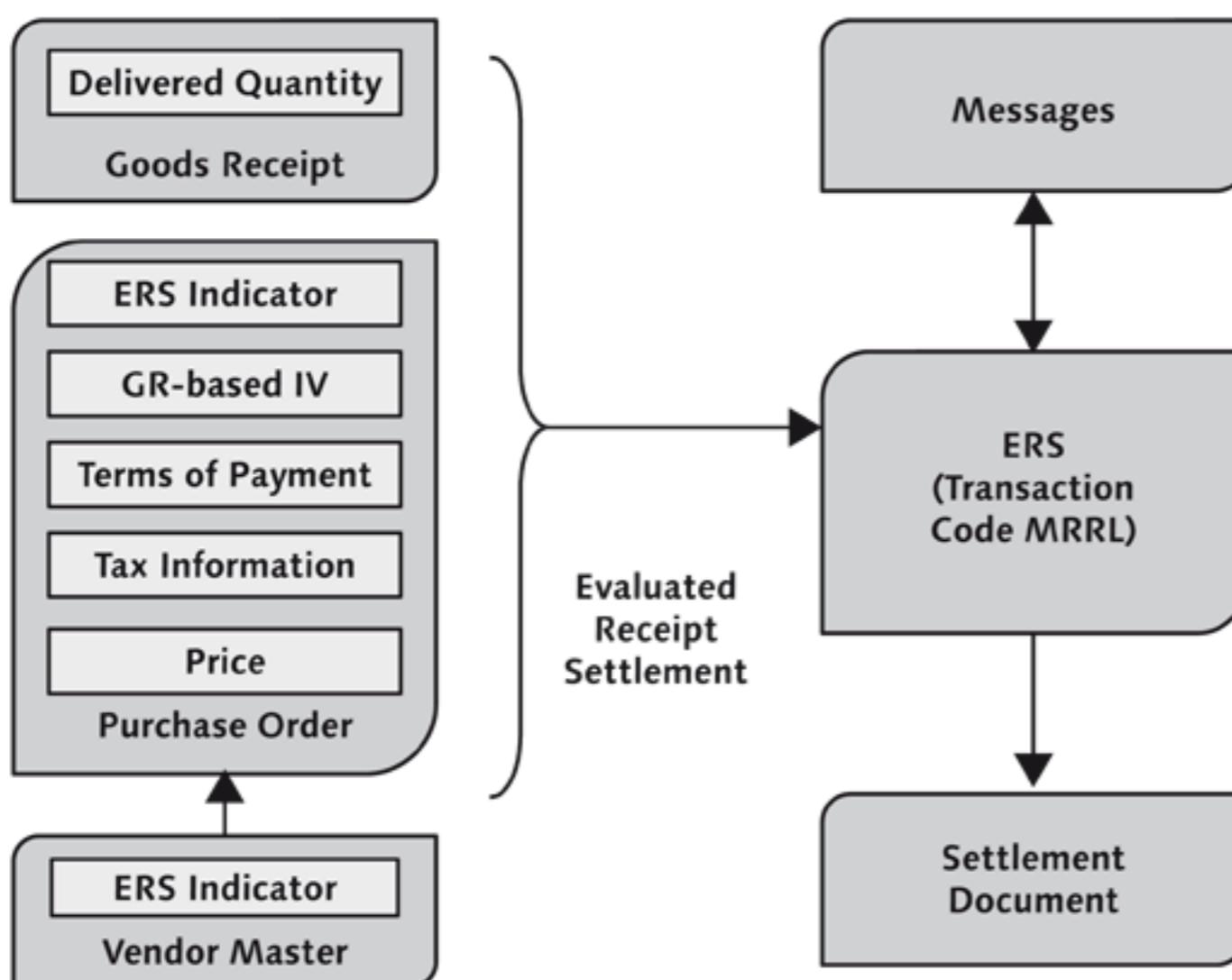


Figure 11.9 SAP Functional Design of ERS

As you can see, the ERS indicator has to be set in the vendor master. Thus, when you create a purchase order for the corresponding vendor, the system displays the checkbox for ERS. Also, the GR-based IV indicator has to be set to make use of the ERS functionality. The terms of payment can also be defaulted from the vendor master or maintained at the time of purchase order creation. You have to enter the tax code on the Invoice tab of the line item detail to use ERS. The settlements in Transaction MRRL are based on the price specified in the purchase order and the delivery quantity of the goods receipt. Finally, the settlement document is created as a result of MRRL and a message is issued to the vendor.

Checkpoints and Real-Time Issues

We'll now take a look at some of the checkpoints and real-time issues associated with ERS:

- ▶ The ERS indicator should be checked for the vendor master.
- ▶ ERS works only with GR-based IV in the purchase order.
- ▶ As of SAP ECC 6, planned delivery costs can be settled through ERS.

- ▶ Because the ERS procedure is an automated process that's executed to a great extent as a background process, authorizations have to be implemented at the level of the job administration or the execution of the report and the transaction. A check on purchasing authorization objects isn't provided for ERS in the SAP ECC standard system. When you branch from the transaction to the purchase order, the system checks the objects in the purchasing application. If you want to implement a customer-specific authorization check, you can use the user exits called from function module "MRM_INVOICE_VERIFICATION_ERS" (enhancement MRMH0001).
- ▶ EXIT_SAPLMRMH_001: Customer exit: ERS – Change Header Field.
- ▶ EXIT_SAPLMRMH_002: Customer exit: ERS – Change Item Fields.

Technical Elements

The technical elements of ERS are summarized in Table 11.2.

Technical Element	Description
EKBE	Database Table
EKRS	Database Table
ME_UPDATE_EKRS	Function Module

Table 11.2 ERS Technical Elements

Troubleshooting Tips

We'll now take a look at a few troubleshooting tips:

- ▶ MRRL is represented by Report RMMR1MRS. This report is generally scheduled in the background to periodically execute ERS.
- ▶ Field IVTYP in table RBKP contains information about the origin of the document (see value range of the domain IVTYP). A value of 1 means an ERS document; a value of 2 means an ERS zero document.
- ▶ If the message determination data for the vendor has been set, the message record is generated (function module MRM_HEAD_MESSAGE_CREATE). The message records can be viewed using Transaction MR90.
- ▶ The ERS report contains enhancement MRMH0001. You can check the following user-exits:
 - ▶ EXIT_SAPLMRMH_001
 - ▶ EXIT_SAPLMRMH_002

You now know about the functional and technical aspects of the ERS functionality. We'll next discuss another form of settlement: consignment and pipeline settlement.

11.2.2 Consignment and Pipeline Settlement

There are categories of materials such as water, electricity, and gas supply that are non-quantifiable and readily available. The liability of such material depends on usage. We classify such materials as pipeline materials. For these kinds of materials, you make a settlement. Another kind of stock material is called consignment stock. This is stock a vendor stores at your company's site and it remains the property of the vendor until you consume it. You then need to settle the amount of the consignment stock you withdraw. In this section we'll discuss the functionalities and technical aspects of consignment and pipeline settlement.

Functional Basis

Consignment material is stored on your company premises but belongs to the vendor. The vendor supplies these goods so that they're available to you at any time but doesn't invoice you for the goods when you receive them. Only when you've withdrawn stock does payment become due for the quantities used. The vendor remains the legal owner of the material until you withdraw the materials from the consignment stores.

Pipeline material flows directly into the production process. The material could be from a pipeline (e.g., oil), from a pipe (e.g., water), or from a cable (e.g., electricity). Payment is due after each withdrawal.

SAP Functional Design

Unlike ERS, where the purchase order is always present, there might be no purchase order for consignment or pipeline materials. If there's no purchase order, however, on what basis should the system settle an invoice for consignment and pipeline material? To solve this issue, it's mandatory to have a consignment and pipeline info record from which the price can be used during settlement. In addition, a message needs to be configured for this process so that the vendor can be informed as soon as settlement takes place.

Goods receipts into consignment stock can be with or without reference to a purchase order. You should use movement type 101 for goods receipts with reference to a purchase order and movement type 501 K for goods receipts without reference to a purchase order.

Withdrawals can be posted in the following manner:

► **Directly into consumption**

The withdrawn material goes directly into the production process; that is, the material isn't posted into your own stock. The consignment stock is reduced by the quantity of the withdrawal.

► **Into unrestricted-use stock**

The withdrawn material first goes into your stock and is available for consumption. The consignment stock is reduced by the quantity of the withdrawal and your stock is increased by the same quantity.

The price defined in the consignment info record is used for the valuation of the material. The transaction code used for consignment and pipeline settlement is MRKO.

Checkpoints and Real-Time Issues

We'll now take a look at some of the checkpoints and real-time issues for consignment and pipeline settlement:

- For technical reasons, only one error message can be saved per invoice document and is output in all of the lines. During Transaction MRKO, the same error message (e.g., M8732 No tax information found) is output in the Information Text column in all lines, which will be grouped together later into one document.
- If you've posted invoices with the help of Transaction MRKO that don't include vendor lines because the total of the item amounts is zero, no message is issued with transaction messages from invoice verification (MR91). This is because no logistics document is generated; only the accounting documents are created during consignment settlement.

Technical Elements

The technical elements of consignment and pipeline settlement are summarized in Table 11.3.

Technical Element	Description
RKWA	Database Table
RMVKON00	Report for MRKO
RKWA-STATUS	Has Value 00 for Unsettled Withdrawal
RKWA-STATUS	Has Value 01 for Settled Withdrawal

Table 11.3 Technical Elements of Consignment and Pipeline Settlement

Troubleshooting Tips

We'll now look at a few troubleshooting tips:

- ▶ You can check the status of the documents for consignment and pipeline settlement in the table field RKWA-STATUS.
- ▶ Transaction MRKO is represented by report RMVKON00. This report is generally scheduled in the background to periodically execute consignment and pipeline settlement.

Now that you understand consignment and pipeline settlement, let's move on to outline the concept of revaluation in SAP ERP.

11.2.3 Revaluation

In this section, we'll discuss the functionalities and technical aspects of revaluation. There's often a need to update the price of the materials present in your stock in accordance with the realistic value of the market price at a given point in time. This is achieved by revaluation.

Functional Basis

You can use revaluation within LIV to determine the difference values on the basis of retroactively valid price changes and to create settlement documents for them. For example, if you have stock of gasoline in your company and its market price changes abruptly, the value of your stock won't reflect a realistic figure. In this case, you need to reevaluate your stock of gasoline based on the current market price.

SAP Functional Basis

For goods and services that have already been settled, the system determines prices different from those possible on the settlement date. Therefore, the system must do the following:

- ▶ Determine the difference values
- ▶ Post settlement documents in the form of an invoice or a credit memo to the vendor's account
- ▶ Send the settlement documents to the vendor

The system determines the difference value as per the following formula:

Difference value = present settlement amount – settlement amount after the retrospective change of conditions for the price determination data

A credit memo is posted for negative difference values and an invoice is posted for positive difference values as per this calculation. The posting in the former case is to the Revenue from Revaluation Account whereas it is to the Expense to the Revaluation Account in the latter case.

Each settlement document from a revaluation is posted as a subsequent debit/credit. During revaluation, the value for a settled quantity is increased or reduced by the difference value determined.

The revaluation can be posted using Transaction MRNB in the SAP Easy Access menu path LOGISTICS • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • AUTOMATIC SETTLEMENT, as shown in Figure 11.10.

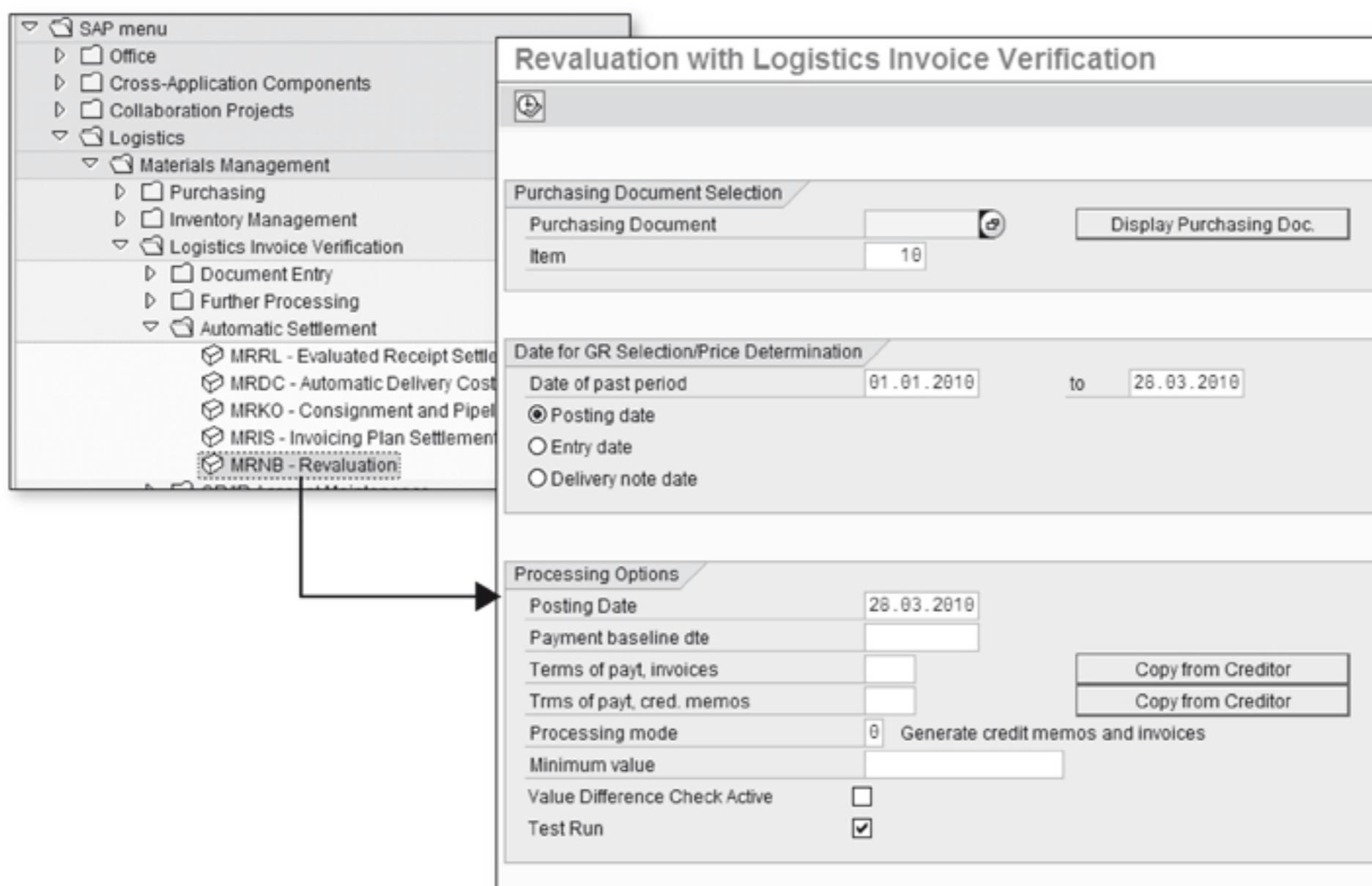


Figure 11.10 Revaluation in LIV

The account postings during revaluation are described in Tables 11.4 and 11.5.

Table 11.4 illustrates a case of an invoice document created during revaluation. This represents a positive difference value after using the formula we discussed.

Purchase Order for 100 Pieces at USD 10/Piece	GR for 10 Pieces	IR for 10 Pieces at USD 10/Piece	PO Changed to 10 Pieces at USD 11/Piece	Internal Transaction Key
Account	GR	IR	Settlement Document - Invoice	
Stock Account	100+			BSX
GR/IR Clearing Account	100-	100+		WRX
Vendor Account		100-	10-	KBS
Revenue from Revaluation Account				RAP
Expense from Revaluation Account			10+	RAP

Table 11.4 Postings for an Invoice During Revaluation

Table 11.5 shows a case in which a credit memo document is created during revaluation. This represents a negative difference value after using the formula we discussed.

Purchase Order of 100 Pieces at USD 10/Piece	GR for 10 Pieces	IR for 10 Pieces at USD 10/Piece	PO Changed to 10 Pieces at USD 9/Piece	Internal Transaction Key
Account	GR	IR	Settlement Document - Credit Memo	
Stock Account	100+			BSX
GR/IR Clearing Account	100-	100+		WRX
Vendor Account		100-	10+	KBS
Revenue from Revaluation Account			10-	RAP
Expense from Revaluation Account				RAP

Table 11.5 Postings for a Credit Memo During Revaluation

Checkpoints and Real-Time Issues

We'll now take a look at some of the checkpoints and real-time issues for revaluation:

- ▶ The GR-based IV field must be flagged in the purchase order item or scheduling agreement item and the Revaluation field must be flagged in the vendor master record.
- ▶ If you want to perform a revaluation, the purchase order history mustn't be aggregated using report RM06EKBE. Furthermore, the invoice documents that result from the revaluation can't be written to an aggregated purchase order history.
- ▶ For each goods receipt for which the system determined a difference value, it creates an item in the settlement document for the revaluation. The system determines the tax code used to post this item from the underlying purchase order item for the period stated.
- ▶ If you don't change the baseline date for payment online, the system sets this to the current date. This sends the document to the work queue for the payment run immediately.

Technical Elements

The following user-exits are relevant for revaluation:

- ▶ EXT_RMMR1MRB_001
- ▶ EXT_RMMR1MRB_002

Troubleshooting Tips

We'll now take a look at some troubleshooting tips for revaluation:

- ▶ During revaluation, if the created invoice or credit memo has many items and the respective Financial Accounting documents have more than 999 items, you may encounter message F5 807 and no documents will be posted. In this case, you may consider implementing SAP Customer Note 1012502 for the modification.
- ▶ For cancelling the invoice documents, the documents resulting from the revaluation must be cancelled before you cancel the invoice. The sequence of the documents is as follows:
 - ▶ 1. Purchase order
 - ▶ 2. Goods receipt

- ▶ 3. Invoice
- ▶ 4. Retroactive price change in the purchase order
- ▶ 5. Revaluation
- ▶ 6. Cancellation of the document that results from the revaluation
- ▶ 7. Cancellation of the invoice document

Now that you understand the concept of revaluation, we'll explain the functionalities of invoicing plan settlement.

11.2.4 Invoicing Plan Settlement

An invoicing plan enables you to schedule invoice creation over a series of future due dates independently of individual procurement transactions and the actual receipt of goods or services. You can inform the vendor when the invoice documents are created.

Figure 11.11 shows the invoicing plan settlement in a purchase order. You can't use it with GR-based invoice verification because it's about scheduling a series of invoices irrespective of the actual goods receipt.

You have the following options for invoicing plan settlement:

- ▶ Periodic invoicing plan
In this case, the total value of the purchase order item is invoiced on each due date set out in the invoicing plan.
- ▶ Partial invoicing plan
In this case, the total value of the item to be invoiced is broken down and distributed over the individual dates in the invoicing plan.

In Figure 11.11, you can see a screenshot corresponding to the periodic invoicing plan. You can enter the invoicing plan when you create the purchase order in Transaction ME21N. On the Invoice tab of the line item detail of the purchase order, click on the Invoicing Plan button. In the pop-up window that displays, you can select the type of invoicing plan you want to create. Because we've chosen a periodic invoice plan, the system automatically populates the Start of Settlement, End of Settlement, Invoice Date, and Invoice Value fields based on the period and the rules of the invoice plan that has been set in Customizing.

The invoicing plan can have the ERS indicator checked or not checked. This indicator is checked for settling the invoices automatically in the system with Transaction MRIS.

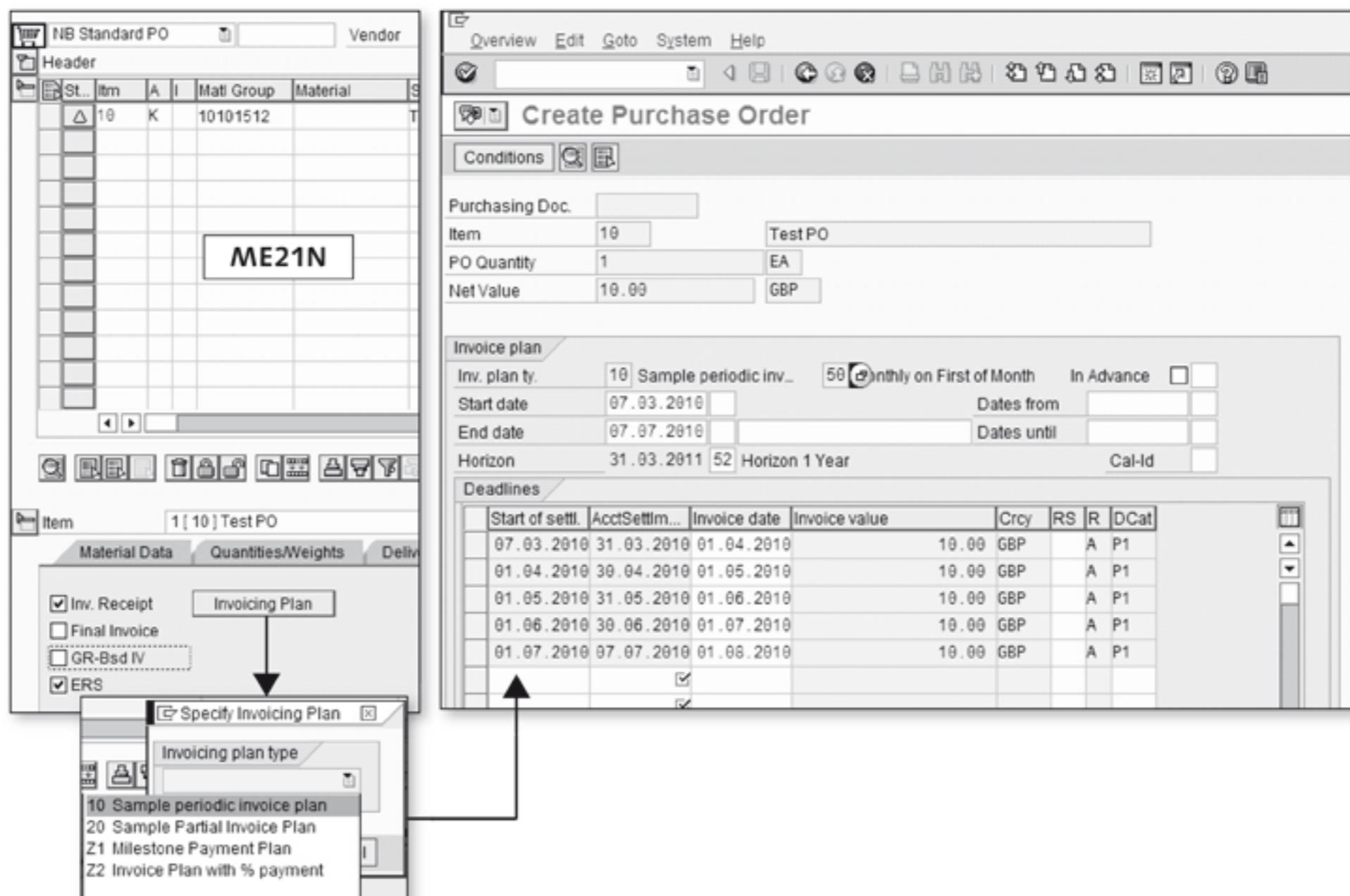


Figure 11.11 Invoicing Plan Settlement in the Purchase Order

The invoicing plan settlement can be performed with the help of Transaction MRIS in the SAP Easy Access menu path LOGISTICS • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • AUTOMATIC SETTLEMENT • REVALUATION.

Now that you know about the different types of automatic settlements, let's proceed to the various types of messages in LIV.

11.3 Messages in Logistics Invoice Verification

You can configure messages for LIV in the Customizing menu path SAP IMG • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • MESSAGE DETERMINATION. With the help of messages, information regarding application documents can be transferred automatically to vendors. The message determination functionality is integrated into the Customizing. Figure 11.12 shows the Customization for the output message of the ERS procedure.

You can associate your own form routines instead of the standard forms to send the message output to the vendor. The forms can be defined in the Customizing

menu path SAP IMG • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • MESSAGE DETERMINATION • DEFINE FORMS.

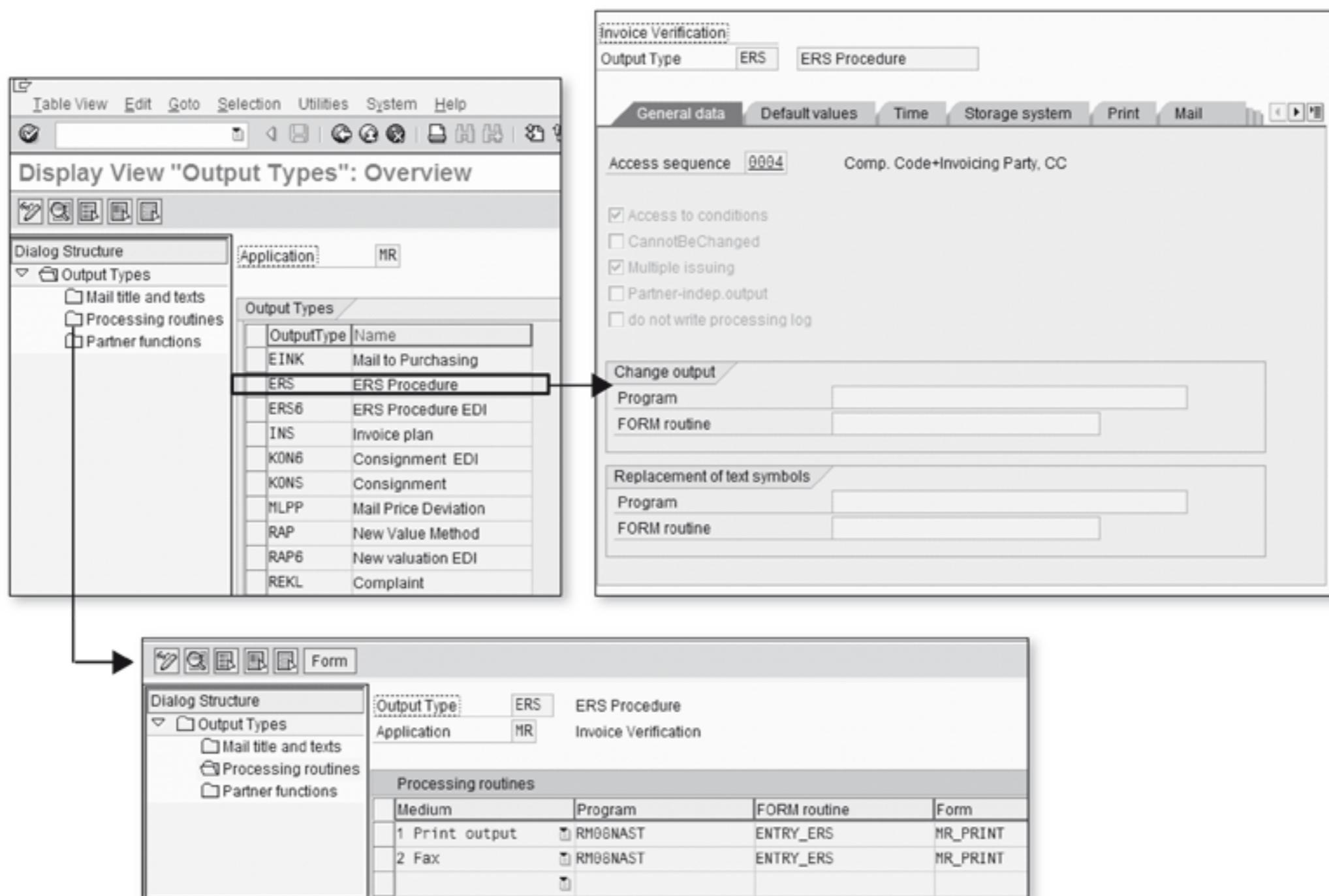


Figure 11.12 Customizing Settings for Message Type ERS

11.3.1 Areas of Messages

In LIV, you can generate a variety of messages, including the following:

- ▶ **ERS**

After you run ERS, you should inform the vendor of the goods receipts you settled to allow the vendor to check the settlement.

- ▶ **Invoice reduction: Correcting quantities or values**

When you reduce an invoice, you should inform the vendor (in a letter of complaint) why you reduced the invoice.

- ▶ **Manual invoice reduction**

If you manually reduce individual items, you can list them in the letter of complaint.

► **Automatic invoice reduction**

If the system automatically reduced the invoice, in the letter of complaint, you can only give the vendor information about the total amount of the reduction.

► **Invoices with variances**

If an invoice is blocked due to a price variance, you can send a mail to the relevant buyer so that he can check the order price and consult the vendor.

► **Consignment and pipeline settlement**

When you settle consignment and pipeline withdrawals, you can send the invoices or credit memos created to the vendor.

► **Invoicing plan settlement**

When you create invoices for the invoicing plan, you can send these to the vendor.

► **Revaluation**

After you carry out revaluation, you should use the settlement document for revaluation to inform the vendor of the difference value determined, in the form of a credit memo or invoice.

11.3.2 Message Schema

In the message schema, you can enter a requirement for the individual message types that has to be met before a message is generated.

The schemas that exist in the standard system are shown in Table 11.6. The various condition types for the messages such as ERS, KONS, REKL, and INS, are maintained in these message schemas. For example, in the standard system, the message schema MR0004 consists of the message types ERS and ERS6. The message types are shown in Figure 11.10.

Procedure	Description
MR0001	Invoice Verification (MR01)
MR0002	Logistics Invoice Verification (MR1M)
MR0003	Consignment (MRKO)
MR0004	ERS Procedure (MRRL)
MR0005	Revaluation (MRNB)
MR0006	Invoicing Plan (MRIS)

Table 11.6 Message Schema in Invoice Verification

11.3.3 Outputting Messages

Messages can be output from Transaction MR90 in the SAP Easy Access menu path LOGISTICS • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • FURTHER PROCESSING • OUTPUT MESSAGES.



Figure 11.13 Outputting Messages for LIV

Figure 11.13 shows how the messages can be output for invoice verification with Transaction Code MR90.

We'll now review credit memos, returns, and reversals in LIV.

11.4 Credit Memos, Returns, and Reversals

A subtle difference exists between credit memos, returns, and reversals in the SAP system. You need to have the following understanding of the context in which these terms are used.

When you post an invoice, the vendor account is credited. A *credit memo* refers to the memo from a vendor whose postings lead to the debiting of the vendor account. Credit memos refer to purchase orders or goods receipts. For example, if

an invoice was too high or if part of the quantity was returned, credit memos are used to correct the purchase order history.

From the point of view of the SAP system, a *return* indicates materials that have physically been returned to the vendor. You can flag items for return in the line items of a purchase order. The system then expects a credit memo from the vendor for the return items as indicated in the purchase order.

A *reversal* refers to the cancellation of an invoice or credit memo document that has already been posted. If an invoice document is reversed, it results in a credit memo. Similarly, if a credit memo is reversed, it results in an invoice document.

After a document is posted during invoice verification in the system, it's classified either as an invoice document or credit memo. This means that either you post a credit memo in the system, or post a credit memo against a return item in a purchase order, or reverse an invoice document. The result in the SAP system is always a credit memo.

When you post a credit memo, the total quantity in the purchase order history is reduced by the credit memo quantity. We'll look at the account postings for a credit memo for materials with:

- ▶ Standard price control
- ▶ MAP control

Table 11.7 represents the account postings during an invoice reversal for materials with standard price control. A credit memo is created as a result of the reversal.

Purchase Order for 100 Pieces at USD 10/Piece	GR for 50 Pieces	Invoice 1 for 50 Pieces at USD 10/Piece	Invoice 2 for 50 Pieces at USD 11/Piece	Reversal of Invoice 1	Internal Transaction Key
Stock Account	500+				BSX
GR/IR Clearing Account	500-	500+	550+	550-	WRX
Vendor Account		500-	550-	500+	KBS
Expense from Price Difference Account				50+	PRD
Revenue from Price Difference Account					PRD

Table 11.7 Sample Posting for Invoice Reversal after Goods Receipt

This represents the sample postings for invoice reversal after goods receipt. Here, two invoices are posted into the system at different prices. The first invoice is posted for 50 pieces of the material at a price of USD 10/piece. Because this invoice was posted after a goods receipt of 50 pieces was posted, the GR/IR clearing account is knocked off by 500.

When the second invoice is posted, there is no goods receipt that already covers the 50 pieces on the invoice. Therefore, the system posts the GR/IR clearing account with the price specified on the invoice.

The system creates a credit memo when you reverse the first invoice. At the time of reversal, the system checks whether a quantity difference remains between the goods receipt and the invoice receipt after the reversal. In this case, the goods receipt was for 50 pieces and the first invoice receipt was also for 50 pieces. The second invoice receipt was for another 50 pieces and this invoice receipt was reversed by 50 pieces. Therefore, there should be no outstanding balance in the GR/IR clearing account. Thus, the GR/IR clearing account gets posted by 550. The vendor account is debited from the value in the first invoice and the difference goes to the expenses from the price difference account.

The amount that posts to the GR/IR clearing account can be calculated using the following formula:

$$\begin{aligned} \text{Quantity} * (\text{clearing value} - \text{goods receipt value}) / (\text{invoice quantity} - \text{goods receipt quantity}) \\ = 50 * (1050 - 500) / (100 - 50) \\ = 550 \end{aligned}$$

We'll now take a look at the postings for invoice reversal without goods receipt, as outlined in Table 11.8

Purchase Order for 100 Pieces at USD 10/Piece	Invoice 1 for 10 Pieces at USD 10/Piece	Invoice 2 for 10 Pieces at USD 20/Piece	Reversal of Invoice 2
Stock Account			
GR/IR Clearing Account	100+	200+	150-
Vendor Account	100-	200-	200+
Expense from Price Difference Account			
Revenue from Price Difference Account			50-

Table 11.8 Sample Posting for Invoice Reversal without Goods Receipt

Because there's no goods receipt, the GR/IR clearing account is posted according to the invoice price. For the reversal of the second invoice, the system uses the same formula for calculation of the amount that should be posted to the GR/IR clearing account.

$$\begin{aligned} \text{Quantity * (clearing value - goods receipt value) / (invoice quantity -} \\ \text{goods receipt quantity)} \\ = 10 * (300 - 0) / (20 - 0) \\ = 150 \end{aligned}$$

Thus, 150 posts to the GR/IR clearing account and the vendor account is debited by the amount specified on the invoice. The difference of 50 is posted to the revenue from the price difference account.

Let's analyze a more complex posting of a credit memo after several goods receipts and invoice receipts for a material with MAP control, as outlined in Table 11.9.

Purchase Order for 100 Pieces at USD 11/ Piece	Stock Account	GR/IR Clearing Account	Vendor Account
GR of 80 Pieces	880+	880-	
Invoice 1 for 60 Pieces at USD 12/Piece	60+	660+	720-
Invoice 2 for 40 Pieces at USD 13/Piece	40+	480+	520-
GR of 10 Pieces	130+	130-	
Credit Memo of 60 Pieces at USD 12/Piece	28.89-	691.11-	720+

Table 11.9 Sample Posting for a Material with MAP control

Because the material is V-Price-controlled, the system makes the postings at the time of the goods receipt for 80 pieces on the basis of the purchase order price. Therefore, 880 is posted to the stock account and the GR/IR clearing account.

When the first invoice is entered at a price different from that in the purchase order, the system checks how much of the quantity on the invoice has already been covered by the goods receipt. In this case, because the entire quantity has already been covered, the system posts the GR/IR clearing account with the price in the purchase order. Thus, 660 is posted to the GR/IR clearing account. The amount of 720 is credited to the vendor account and the difference is posted to the stock account.

When the second invoice arrives, the system checks how much of the quantity has already been covered by the goods receipt. In this case, only 20 pieces are covered

by the goods receipt, because the goods receipt was for 80 pieces and an invoice receipt has already been posted for 60 pieces. Therefore, for the GR/IR clearing account posting, 20 pieces are valued at the purchase order price and the remaining 20 pieces are valued at the invoice price. Therefore, the total amount is 480. In addition, an amount of 520 goes to the vendor account and the difference of 40 is posted to the stock account.

Now, for the posting to the GR/IR clearing account during the credit memo, the invoice quantity is greater than the goods receipt quantity. In this case, the system uses the following formula:

$$\begin{aligned} & \text{Quantity * (clearing value - goods receipt value) / (invoice quantity} \\ & \text{– goods receipt quantity) + quantity * goods receipt value / goods} \\ & \text{receipt quantity} \\ & = 10 * (1140 - 1010) / (100 - 90) + 50 * 1010 / 90 \\ & = 691.11 \end{aligned}$$

In this formula, the quantity of the goods receipt is split into two parts. The first consists of the excess invoice quantity and the second is the remaining credit memo quantity.

You now know how postings to the GR/IR clearing account are done. But what happens if a balance remains on the GR/IR clearing account as a result of a quantity mismatch between the goods receipt and the invoice receipt? We'll discuss this in the next section.

11.5 GR/IR Clearing Account

The GR/IR clearing account links the account postings during goods receipt with those during the posting of invoices. If the goods receipt quantity equals the invoiced quantity and vice versa, the GR/IR clearing account should be completely cleared. However, there may be reasons for an outstanding balance on the GR/IR clearing account, which include the following:

- ▶ Quantity differences between goods receipt and invoice receipt for a purchase order result in a balance on the GR/IR clearing account.
- ▶ If the quantity invoiced is larger than the quantity received, the system expects additional goods receipts for this purchase order to clear the balance.
- ▶ If the quantity received is larger than the quantity invoiced, the system expects additional invoices for this purchase order to clear the balance.

If no additional goods or invoices will be received, you must clear the balance manually. This can be done in a number of different ways:

- ▶ You can return the extra goods to the vendor.
- ▶ You can cancel the invoice and post a corrected invoice or a credit memo for the surplus posted quantity.
- ▶ You can clear the GR/IR clearing account manually.

The GR/IR clearing account is usually cleared at the end of a period or the fiscal year for order items for which no additional goods receipts or invoices are expected. You can do this with the help of Transaction MR11 which can be accessed from the SAP Easy Access menu path LOGISTICS • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • GR/IR ACCOUNT MAINTENANCE • MAINTAIN GR/IR CLEARING ACCOUNT, as shown in Figure 11.14.

Maintain GR/IR Clearing Account

Document Header Data

Company Code	1001	TfL Corporate
Posting Date	15.10.2009	
Reference		
Doc.Header Text		

Choose

Vendor		to	
Freight vendor		to	
Purch. Organization		to	
Purchasing Group		to	
Plant		to	
Purchasing Document		to	
Item		to	
Purchase Order Date	01.01.2009	to	14.02.2010
Purch. Doc. Category		to	
Order Type		to	

Surplus Types

<input checked="" type="checkbox"/> Delivery surplus
<input type="checkbox"/> Invoice surplus

Clear

<input checked="" type="checkbox"/> GR/IR Clearing Account	<input type="checkbox"/> ERS Purchase Orders
<input checked="" type="checkbox"/> Delivery Cost Accounts	<input type="checkbox"/> ERS - Delivery Costs

Last movement before key date: 15.04.2010

Qty Var. Less Than/Equal To: 100.0 Percentage

Value Variance Less Than/= To: GBP

Processing

Automatic clearance	<input type="radio"/>
Prepare List	<input checked="" type="radio"/> Layout
/COST OBJECT	

Figure 11.14 Transaction Code MR11

When you run Transaction MR11, the system creates the settlement documents and updates the purchase order history. The account postings are thus made based on the assumption that the system doesn't expect more invoices or goods receipts against the purchase order in question. As of SAP ERP Release 4.6C, the settlement documents created with Transaction MR11 can be reversed with Transaction MR11SHOW.

For materials with MAP control, the offsetting posting to clear the GR/IR clearing account is made to the stock account, unless there is no stock coverage. If the material stock is smaller than the quantity to clear, the system only partially credits/debits the existing stock. The remaining amount is posted to a price difference account. For a material with a standard price, the system makes the offsetting posting to the price difference account. For a purchase order item with account assignment, the system makes the offsetting entry to the consumption account. You can also clear differences for delivery costs.

You can maintain the user-specific parameters shown in Table 11.10 for Transaction MR11.

Parameter	Meaning
MR11_AUSGL_BZNK	Delivery costs clearing
MR11_AUSGL_WERE	GR/IR clearing
MR11_BEDAT_HIGH	Purchase order date upper limit
MR11_BEDAT_LOW	Purchase order date lower limit
MR11_BUDAT	Posting date
MR11_DPROZ	Quantity variance as a percentage
MR11_KDAY	Key date: last movement
MR11_WTABW	Value variance in local currency
MR11_XERSY	ERS purchase order
MR11_XREUE	Invoice surplus
MR11_XWEUE	Delivery surplus

Table 11.10 Parameters for Transaction MR11

The Qty var. Less than/Equal field (screen field P_DPROZ) holds the default value of 10.0 percent. This value is hard-coded in program SAPRCKM_MR11. Remove this quantity variance so that the selection of the purchase order isn't limited by the amount of the variance.

MR11 calculates only in the company code currency. The Financial Accounting document that's posted with Transaction MR11 contains amounts in only the local currency (the company code currency). The value for the MR11 posting depends on all goods receipts and all invoices posted for the purchase order item. A transaction currency other than the company code currency doesn't make sense for Transaction MR11, because the transaction currencies of the goods receipts and invoice receipts may differ.

If service-based invoice verification isn't active (LEBRE = ' ') with the purchase order for external services, the system posts every goods receipt item and every invoice item with a quantity of 1, regardless of the quantity you entered with the service entry.

Using the Final Invoice indicator, you can control whether partial invoices are entered for the service orders and how the GR/IR clearing account is posted to.

This GR/IR clearing account is a clearing indicator for GR/IR posting for external services. It controls postings to the GR/IR clearing account when you enter invoices for external service purchase orders for which no service-based invoice verification is planned. The system proposes the GR/IR Clearing Account indicator already selected when you enter invoices. If the GR/IR Clearing Account indicator is selected, the GR/IR clearing account is completely balanced when you post the invoice, even if you only post a partial invoice.

If you post partial invoices, and don't want the GR/IR clearing account to be completely balanced, you must deselect the GR/IR Clearing Account indicator. If you enter invoices against purchase orders that aren't external service purchase orders, or that are for external service orders for which no service-based invoice verification is planned, then the system doesn't display the GR/IR Clearing Account indicator in the item list.

If you set the Final Invoice indicator when you enter an invoice for an external service purchase order without service-based invoice verification, the system automatically sets the GR/IR Clearing Account indicator. This means that the commitment is reduced and the GR/IR clearing account is completely cleared for the purchase order item affected.

Update of other modules through MR11

Transaction MR11 doesn't update the value of Commitment, Cash Management, Funds Management, or the Public Sector. For these components, their own reports must be used.

11.6 Summary

You should now be able to analyze and configure automatic account determination based on various influencing factors. You also learned how you can make use of the concept of various kinds of automatic settlements, the real-time issues associated with them, and the various important points to keep in mind while troubleshooting such problems. You also learned about the concept of messages and how they can be configured to send information automatically to vendors. In addition, you're now able to understand the business scenarios in which you should use credit memos, returns, and reversals. Finally, you learned about the significance of GR/IR clearing and how it should be used.

In this chapter, we revisit statements made in each chapter to reflect the original conclusion. Think of this chapter as a reminder of the conclusions we've drawn so far, paired with additional resources to help you develop a solid overall understanding of the topics covered in this book.

12 Conclusion

The success of each chapter in this book depends on the amount of information you were able to draw from each. Throughout the book, our goal was to explore the functional and the technical interface of Materials Management in SAP ERP and SAP ERP Financials. This is why we discussed the individual topics under the subheadings functional basis, SAP functional design, checkpoints and real-time issues, technical elements, and troubleshooting tips. Here, we'll briefly describe the lessons learned throughout the book.

12.1 Lessons Learned

We started the book with an introduction of SAP ERP, where we discussed the concept of business in terms of revenues and expenses. We also introduced you to the concept and interaction of procurement and finance. We then established the purpose and the scope of the book.

In **Chapter 2**, Overview of SAP ERP, we outlined the various building blocks of the SAP system before shifting our focus on understanding the integration of Materials Management in SAP ERP. We then went deeper into Materials Management to help you develop an understanding of various resources that are beneficial to the analysis of the subject matter.

With the understanding developed in the previous chapter, we moved ahead in **Chapter 3**, Overview of the Materials Management and Financial Accounting & Controlling Relationship, to discuss the various elements of Materials Management and those of Financial Accounting. We then explored the relationship between these two elements from the point of view of commitments, Controlling, and vari-

ous accounting documents created at the time of invoice receipt and goods receipt. We then introduced you to debugging techniques.

In **Chapter 4**, you learned about the basics of configuration and the processes in procurement. Here, we described the elements of the enterprise structure for the organizational units of Materials Management, SAP ERP Financials, and the integration between them. We then covered the various processes in procurement, and described the components of the procurement cycle. In this context, we explained the procurement of stock materials, consumable materials, and services. In this chapter, you also learned about the concepts of master data and the material and vendor master, as well as about various master data in purchasing such as purchasing info record, source list, and quota arrangement. We also discussed various documents in procurement such as purchase requisitions, RFQs, quotations, purchase orders, purchasing info records, as well as various kinds of outline agreements such as contracts and scheduling agreements.

In **Chapter 5**, we described the functional and technical interface of SAP ERP Financials Financial Accounting for the procurement of stock and consumable materials. In the procurement of stock material, we discussed the various procurement documents, processes, and functionalities in more detail. You learned about conditions and the calculation schema, material valuation procedures, and stock valuation in Inventory Management and LIV. Furthermore, we described the various documents and the associated process flow for the procurement of consumable materials, for example for purchase requisitions, purchase orders, and blanket purchase orders. We then outlined the procurement of external services, describing the procurement of external services. In addition, you learned about service entry sheets, acceptance, and invoicing with the help of various sample account postings. Finally, you were introduced to vendor subcontracting and its functionalities in Purchasing, Inventory Management, and LIV.

In the **Chapter 6**, you learned about the concepts of conditions and price determination. In this chapter, we discussed the various elements of condition techniques such as condition type, condition records, condition tables, access sequences, and calculation schema. We developed your understanding of how the system determines the price for a material. In addition, we discussed header and group conditions. Finally, special condition types for precious metals were discussed, along with special condition types for planned delivery costs and end-of-period rebates from vendors. Another section of this chapter described the basics of material price changes. We described the system settings and the material master record in

the context of controlling material valuation. The valuation structure for materials was then explained with reference to valuation area, valuation class, valuation category, valuation type, material type, and movement type. Finally, in this chapter, we outlined automatic and manual changes in material valuation.

In **Chapter 7**, Balance Sheet Valuation, we discussed the various balance sheet valuation procedures such as lowest value determination, LIFO valuation, and FIFO valuation. Here, we discussed various kinds of lowest value determination based on market price, range of coverage, movement rate, as well as loss-free valuation. For LIFO valuation, we discussed the quantity and index LIFO valuation procedures in the context of various valuation bases such as average delivered price, price for partial year, price on progressive fill-up basis, and material master price. We then discussed pool LIFO valuation and lowest value comparison. We discussed FIFO valuation in the context of its procedures and configuration.

In **Chapter 8**, Material Price Change, we elaborated on the value changes in Inventory Management and LIV. We also discussed value changes from cash discounts, revaluation, and postings to the previous period. Throughout the chapter, we explained the various kinds of account postings such as those for goods receipt for purchase orders with and without price variance. We also discussed valued changes in transfer postings, initial entry of inventory data, and various goods receipt reversals. We discussed subsequent debits/credits and GR/IR clearing account maintenance for changes in LIV. In addition, we illustrated various scenarios for the different kinds of value changes from cash discounts resulting from gross and net goods receipt and invoice receipt. In the section on revaluation, we discussed price changes in the previous and current period. Finally, we explained the posting of goods movements and invoices to the previous period.

In the **Chapter 9**, Accounts Payable Invoice from Materials Management, we explained LIV in the context of online processing as well as invoice verification in the background. We also discussed the invoice parking and prepayment functionalities. You then learned about invoice verification in the background. Furthermore, the principles of Financial Accounting integration were discussed within the context of account determination. We then explained the postings at receipt value and stock value for Purchase Account Management. Other topics covered in less detail earlier in the book – such as posting of taxes and cash discounts – were elaborated on in this chapter, along with the topic of direct postings.

In **Chapter 10**, we increased your knowledge of invoice verification by explaining variances and invoice blocking in this context. Here, we discussed the different

kinds of variances that can exist such as quantity variances, price variances, quantity and price variances, and order price quantity variances. We then explained invoice blocking and the functionalities associated with invoice release. Planned and unplanned delivery costs were explored further with respect to scenarios and account postings. Also, the concept of total-based differences was explained with reference to sample account postings, which included total-based acceptance and total-based reduction. We then explained invoices for purchase orders with account assignment. Finally, we discussed invoice entries in a foreign currency.

In **Chapter 11**, we covered additional functionalities in LIV, including valuation and account determination for stock and consumable materials. We also discussed the functionalities of ERS, consignment and pipeline settlement, revaluation, and invoicing plan settlements under the section on automatic settlements. We also covered messages in LIV. We then shifted our focus to settling services, subcontracting in invoice verification, invoice reversals, returns, invoices received via EDI, and GR/IR clearing account maintenance.

We'll now take a look at some of the additional resources available for the study of the integration of Materials Management with Financial Accounting.

12.2 Additional Resources

This book is meant to facilitate the study of Materials Management with respect to its integration with SAP ERP Financials Financial Accounting. Although, we tried to provide you with the most up-to-date information available, from time-to-time, there's still a need to check whether the functionality or the behavior of the product has changed. We suggest that you visit the SAP Marketplace for the most recent information regarding the product. It can be accessed from the URL <http://service.sap.com/>. If you have any concerns regarding the standard behavior of the system, you can submit a customer message through the same URL. Generally speaking, for all basic functionalities, you should be able to find informative documentation in the **F1** help, SAP Library (URL: <http://help.sap.com/>), and the documentation in Customizing.

Most of the real-time issues for the integration of Materials Management in SAP ERP and SAP ERP Financials are functional and technical in nature. Thus, in this book, we tried to deliver as much information as possible on both the technical and functional aspects that can eventually make life easier for you. We hope that the information presented in this book will prove useful to you.

Appendices

A Optimizing the Integration between Materials Management and Financial Accounting	403
B Commonly Used Abbreviations	415
C References	417
D Useful Links	419
E The Author	421

A Optimizing the Integration between Materials Management and Financial Accounting

In this appendix, we'll demonstrate and explain a few additional topics helpful in optimizing the integration between Materials Management and Financial Accounting.

A.1 Screen Layout

The default screen layout you see may not display all of the fields available in the scope of the output. In this section, we'll demonstrate how to check the scope of the layout and how to display additional fields relevant in the context of the Materials Management and Financial Accounting interface.

When you display the accounting document corresponding to the LIV document, only a few fields are included. You already know that the output in a screen is nothing more than the values stored in the related database tables. The output for the line items of an accounting document is either from a single table or from a few different tables. Either way, you can check whether you can change the current layout. For accounting documents, you can do so via the menu path SETTINGS • LAYOUT • CURRENT, as shown in Figure A.1. The popup screen that displays contains the fields that are available for the layout. The fields in the left half of the screen are those that are being displayed currently and the fields on the right half of the screen are those that are available. Here, you can remove fields you don't want and add those you want to display in the current layout. You can also right-click on the popup screen to display the context menu. However, the context menu doesn't appear on right-click if you've activated the quick cut and paste functionality.

For example, you might want to output the field Transaction in the screen layout for the line items of an accounting document. This field contains the three-digit key for the posting transaction such as KBS for the vendor account, WRX for the GR/IR clearing account, PRD for the price differences account, DIF for the small differences account and so on. You may then confirm with Transaction OBYC in

the SAP Customizing menu path SAP IMG • MATERIALS MANAGEMENT • LOGISTICS INVOICE VERIFICATION • CONFIGURE AUTOMATIC POSTINGS.

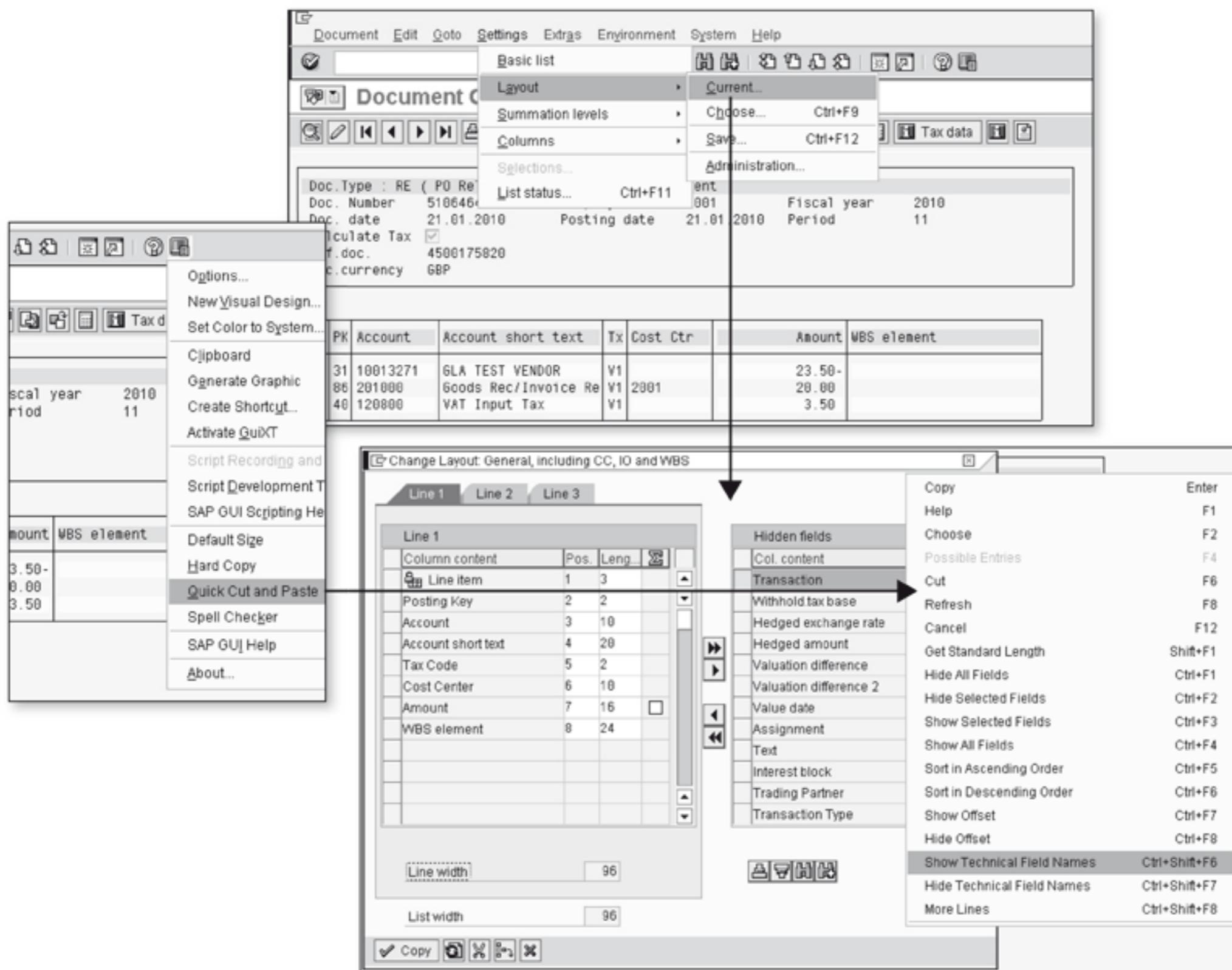


Figure A.1 Screen Layout for an Accounting Document

Although we've discussed the screen layout for an accounting document, the procedure is the same for all transactions for which you can change the current layout. You can also configure a particular screen layout as the default or save it as a new layout.

We'll now take a look at the functionality of validation, its configuration, and its impact on transactions.

A.2 Validation

Validation allows you to define your own checks during a transaction. Although validation is designed for Financial Accounting, it also works for the header of Transaction MIRO because it comes from Financial Accounting. Figure A.2 shows how validations work. Generally speaking, a validation is comprised of the following steps:

- ▶ Application
- ▶ Call-point
- ▶ Definition
- ▶ Relation
- ▶ Activation

The transaction code for Financial Accounting validation is OB28 and can be found under the Customizing menu path SAP IMG • FINANCIAL ACCOUNTING • ACCOUNTS RECEIVABLE AND ACCOUNTS PAYABLE • BUSINESS TRANSACTIONS • INCOMING INVOICES/CREDIT MEMOS • MAKE AND CHECK DOCUMENT SETTINGS • VALIDATION IN ACCOUNTING DOCUMENTS.

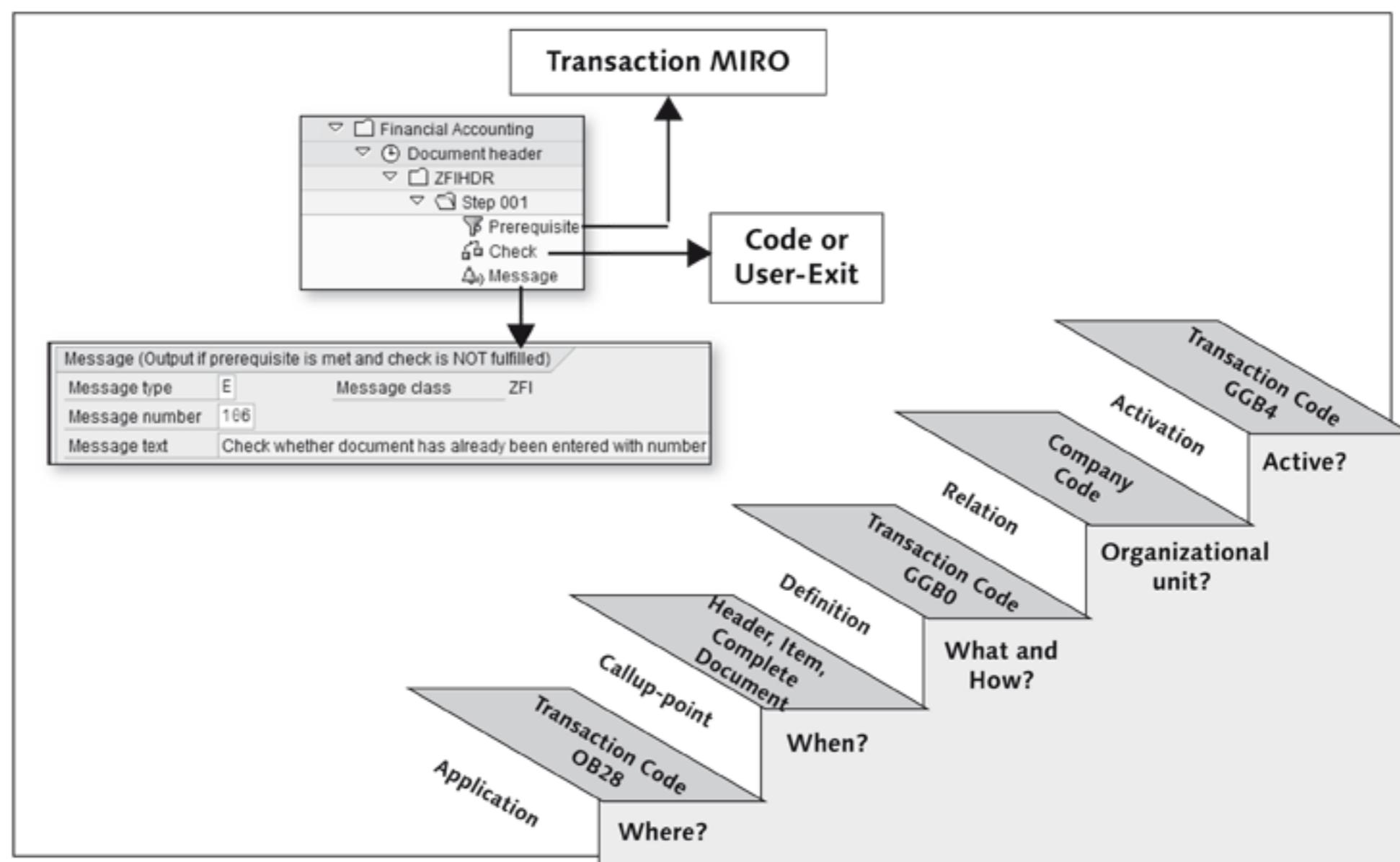


Figure A.2 Steps in Financial Accounting Validation

In Figure A.2, we talk about applications that validation can be used in. For the example, we've indicated Financial Accounting validation using Transaction OB28. You then need to decide the call-point for the validation. The call-point defines when the validation should be called (i.e., header, line item, or complete document). For a call-point corresponding to the header, the system validates the field entries in the header of the document. Similarly, the system validates the entries for the line items if the call-up point is at the line item level. The definition sets up the objective of the validation such as what it should do and how it's supposed to be executed. Financial Accounting validations are maintained at the company code level. Finally, validations are activated in Transaction GGB4.

In Figure A.2, we also included a sample screenshot from Transaction OB28. It represents the general structure in which a Financial Accounting validation works. The prerequisites represent the criteria for triggering validation. Under Check, you can have your own code from the fields available to you or you can have code from one of the user-exits. The Check is coded with the help of the buttons available for coding logical checks. You can use various header and item fields that are available for coding the logical blocks. You can also use a user-exit for the same purpose. Under Message, you decide which message the system should display on the screen as a result of the validation check. The configuration of validation is organized into the following steps:

- ▶ Prerequisite
- ▶ Check
- ▶ Message

The prerequisite can be obtained and the check performed from the fields of the header table BKPF for validations with a header call-point. For validation with a line item call-point, the prerequisite can be obtained from either the fields of header table BKPF or line item table BSEG. However, in this case, the checks can be performed only at the line item level. Finally, a message is output depending on how you configured it in the validation (error, warning, or information).

You now understand how the system can validate various fields with your own messages (in the customer namespace) during a transaction. It's simply a matter of checking the values entered in fields. However, it's also possible to replace the values in the various fields automatically using a technique called substitution.

A.3 Substitution

A substitution changes the value in a field under specific circumstances. This means that you can substitute the value of a field with another preconfigured desired value from the definition of your substitution. For example, you can configure a substitution so that if the SAP G/L account is 400000 and the business area is 2000, the cost center that's used is 1000. A substitution is the process of checking entered values (when they're entered into the SAP ECC system) against a user-defined Boolean statement. If the statement is true, the system substitutes the specified values into the system. The steps for the validation shown in Figure A.2 also apply to substitutions, except that substitutions use different transaction codes. The transaction code for the Financial Accounting substitution is OBBH and can be found under the Customizing menu path SAP IMG • FINANCIAL ACCOUNTING • ACCOUNTS RECEIVABLE AND ACCOUNTS PAYABLE • BUSINESS TRANSACTIONS • INCOMING INVOICES/CREDIT MEMOS • MAKE AND CHECK DOCUMENT SETTINGS • SUBSTITUTION IN ACCOUNTING DOCUMENTS.

Order of validation and substitution in the SAP system

The system performs substitutions before validations so that substituted values can also be validated.

We'll discuss the technical elements of validations and substitutions in the following section.

A.4 Technical Elements of Validation and Substitutions

As a starting point, you can find the entries in database table GB31, which provides an overview of the combinations of call-points and applications. Each combination builds what's called a Boolean class. Table A.1 shows the various entries in database table GB31 for Financial Accounting.

Boolean class

A Boolean class is a unique key based on the application area and call-point of the validation/substitution. For example, the Boolean class is 8 when the application area in question is Financial Accounting and the call-point is document header and it's 9 if the call-point is line item for the application area of Financial Accounting.

Application	Callup	Boolean Class	Validation	Substitution	Description
FI	1	8	X	X	Document Header
FI	2	9	X	X	Line Item
FI	3	15	X	X	Complete Document
FI	5	16		X	Cost of Sales Accounting
FI	6	18		X	Cost of Sales Accounting (New)
CO	1	1	X	X	Line Item
CO	100	100	X	X	Document Header

Table A.1 Combinations of Call-Point and Application in Table GB31

Depending on the Boolean class, you can check the entries in database table GB01. These entries are a list of the fields that can be used in the rule definition of a validation/substitution.

Table A.2 lists some of the entries for Boolean class 8 and table BKPF from database table GB01. Database table GB01 contains an exclusion indicator that specifies whether the field is used in validation/substitution. As you can see in Table A.2, the field transaction code (TCODE) from the system table is available for validation/substitution but the same field from table BKPF is not.

Boolean Class	Table	Field	Exclude
8	SY	DATUM	
8	SY	PAUTH	
8	SY	UNAME	
8	SY	TCODE	
8	BKPF	TCODE	X
8	BKPF	BKTXT	
8	BKPF	BLART	X
8	BKPF	BLDAT	X
8	BKPF	CCINS	
8	BKPF	CCNUM	

Table A.2 A few Entries from Table GB01, which Identifies the Fields you can use in Validation/Substitution

Boolean Class	Table	Field	Exclude
8	BKPF	GJAHR	X
8	BKPF	REINDAT	

Table A.2 A few Entries from Table GB01, which Identifies the Fields you can use in Validation/Substitution (Cont.)

When you save your validation/substitution, the system generates internal coding blocks. Knowing about these coding blocks is helpful for troubleshooting from the technical point of view. Before we explain the coding block that's generated, it's helpful to run a function module in the system. This gives you an idea about the generic structure of the coding blocks. The following function module is run in the system:

Function Module G_CLIENT_ENCODE

We get the following result:

```
Export Parameter = MM
Value = IM
```

For the sake of generalization, we'll represent the value IM we just obtained with variable cc:

```
cc = IM
```

As shown in Table A.3, the various programs are generated depending on the application area and the value of cc. We've also listed the OK code, which you need to enter in the command field to reach that coding block. With this information, life is much easier for a programmer.

The program name in Table A.3 consists of the variables cc and aa. For our example, the variable cc has the value IM. The value of the variable aa is the application area as stored in database table GB31 (see Table A.1). For example, if it's a validation for Financial Accounting, the program name would be GBTIMFID.

Program Name	Description	Entry in the Command Field to Reach the Program
GBTccaa0	Main Program	=SHC0
GBTccaaA	Rules	=SHCA
GBTccaaB	Substitution	=SHCB

Table A.3 Generated Programs and their OK Codes

Program Name	Description	Entry in the Command Field to Reach the Program
GBTccaaC	Substitution Prerequisites	=SHCC
GBTccaaD	Validation	=SHCD
GBTccaaE	Validation Prerequisites	=SHCE
GBTccaaF	Validation Checks	=SHCF

Table A.3 Generated Programs and their OK Codes (Cont.)

Aside from the programs that are generated, the system saves the validation definition in the following tables:

- ▶ GB901: Rules data
- ▶ GB931: Prerequisites and checks
- ▶ GB93: Validation header

You can refer to SAP Customer Note 42615 and its related notes for further information.

Now that you know about the functional design and the technicalities of validations and substitutions, we'll move on to the topic of enhancements.

A.5 Enhancements

Enhancements are the provisions in the standard SAP system to change the standard behavior. They're release-independent; therefore, they don't require adjustments after the upgrade. The following types of enhancements are available in the system:

- ▶ Business Add-ins (BAdIs)
- ▶ Customer exits

BAdIs are the object-oriented approach to accommodate user requirements that are too specific to be included in the SAP standard delivery.

Customer exits are a form of enhancement SAP used to deliver prior to SAP ERP release 4.6A. Because customer exits are release-independent, SAP supports them and they're still quite popular among developers.

It's important that you know about the enhancements in your system. As shown in Figure A.3, you can search for them for a particular application component.

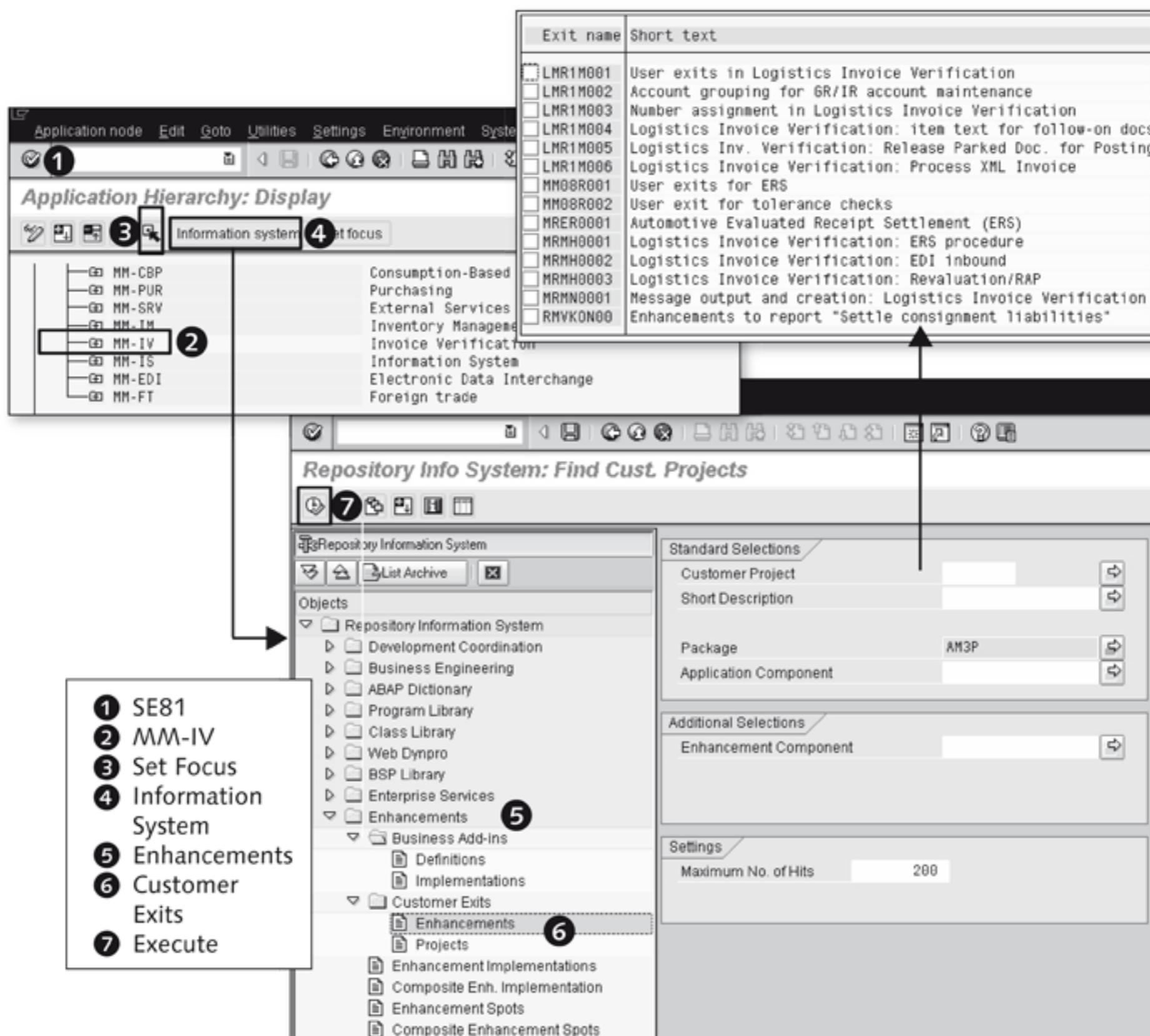


Figure A.3 Component-Wide Search for Enhancements

B Commonly Used Abbreviations

AA	Asset Accounting
AG	Account Grouping
AGS	Active Global Support
ALE	Application Link Enabling
AM	Asset Management
AP	Accounts Payable
APO	Advanced Planner and Optimizer
AR	Accounts Receivable
ATP	Available-to-Promise
BAdI	Business Add-in
BBP	Business-to-Business Procurement
BL	Bank Accounting
BOM	Bill of Materials
BPX	Business Process Expert
BV	Business Volume
C/A	Chart of Accounts
CATT	Computer Aided Test Tool
CPD	Conto Pro Diverse
EAN	European Article Number
eCATT	Extended Computer Aided Test Tool
ECC	Enterprise Central Component
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
ERS	Evaluated Receipt Settlement
EWA	Early Watch Alert
FIFO	First in First Out
FM	Funds Management
FM	Function Module
FM Area	Financial Management Area
GI	Goods Issue
GR	Goods Receipt
GR-based IV	Goods Receipt based Invoice Verification
GUI	Graphical User Interface
IMG	Implementation Guide

IP	Invoice Price
IP	Invoicing Party
LES	Logistics Execution Shipping
LIFO	Last in First Out
LIV	Logistics Invoice Verification
MAP	Moving Average Price
MM	Materials Management
MRP	Materials Requirement Planning
OLAP	Online Analytical Processing
OP	Order Price
OPUn	Order Price Unit
OTV	One Time Vendor
OUn	Order Unit
PC	Pieces
PO	Purchase Order
Preq	Purchase Requisition
RFC	Remote Function Call
RFQ	Request for Quotation
SC	Subcontracting
SD	Sales and Distribution
SDN	SAP Developer Network
SES	Service Entry Sheet
SL	Special Purpose Ledger
SLED	Shelf Life Expiry Date
SO	Sales Order
S-Price	Standard Price Control
TV	Travel Management
UPC	Universal Product Code
URL	Uniform Resource Locator
USD	US Dollars
VAT	Value Added Tax
VM	Valuation Modifier
VP	Value Product
VP	Valuation Price
V-Price	Moving Average Price
WBS	Work Breakdown Structure
WF	Workflow

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D Useful Links

SAP Library

<http://help.sap.com/>

SAP Library for SAP ERP ECC 6

http://help.sap.com/saphelp_erp60_sp/helpdata/en/e1/8e51341a06084de10000009b38f83b/frameset.htm

SAP Library for Materials Management

http://help.sap.com/saphelp_erp60_sp/helpdata/en/9c/df293581dc1f79e10000009b38f889/frameset.htm

SAP Library for Materials Management – Purchasing

http://help.sap.com/saphelp_erp60_sp/helpdata/en/75/ee1fa755c811d189900000e8322d00/frameset.htm

SAP Library for Materials Management – Inventory Management and Physical Inventory

http://help.sap.com/saphelp_erp60_sp/helpdata/en/4d/2ba31643ad11d189410000e829fbcd/frameset.htm

SAP Library for Materials Management – Logistics Invoice Verification

http://help.sap.com/saphelp_erp60_sp/helpdata/en/a8/b99f58452b11d189430000e829fbcd/frameset.htm

SAP Library for Materials Management – GR/IR Account Maintenance

http://help.sap.com/saphelp_erp60_sp/helpdata/en/30/1060387db94003e10000009b38f8cf/frameset.htm

SAP Library for Financial Accounting

http://help.sap.com/saphelp_erp60_sp/helpdata/en/56/df293581dc1f79e10000009b38f889/frameset.htm

SAP Marketplace

<https://www.service.sap.com/>

SAP Support Portal (subject to authorization)

<https://websmp205.sap-ag.de/support>

SAP Community Network

<http://www.sdn.sap.com/irj/sdn>

SAP Forums on SDN

<http://forums.sdn.sap.com/index.jspa>

SAP SDN Forum for Materials Management

<http://forums.sdn.sap.com/forum.jspa?forumID=245&start=0>

SAP SDN – Business Process Expert Community

<http://www.sdn.sap.com/irj/bpx>

E The Author



Faisal Mahboob has been an SAP Materials Management consultant for more than eight years. He currently works as an independent consultant in the United Kingdom.

Faisal started his career as an ABAP developer just less than a decade ago and continued with the technical analysis of SAP Materials Management along with working in the area of the functional consulting and implementation. He has extensive experience and expertise in the functional and technical aspects of Materials Management in diverse areas ranging from consulting to implementation and support.

An electronics and communication engineer by education and an SAP consultant by profession, Faisal has in the past been associated with SAP Labs, Research and Development, and the SAP Global Services & Support Center based in Bangalore, India. He attributes his technical understanding of SAP Materials Management to his role within SAP.

Since 2007, he has been working in the United Kingdom as an independent consultant for the SAP Logistics modules. He has since then been working with SAP Supplier Relationship Management in addition to SAP Materials Management.

His understanding of the products from a functional and technical perspective, along with an understanding of the related business processes, has had a positive impact on his ability to deliver this book, which he hopes you have found informative and helpful.

Index

A

Access sequence, 177, 179
Account assignment category, 153
Account determination, 48, 320, 395, 398
Account grouping code, 402
Accounting1, 129
Accounting document, 284
Header, 290
Accounts payable, 60, 277
Invoice, 277
Accounts receivable, 277
AP Invoice, 277
Application Linking and Enabling, 279
Asset Accounting, 60
Authorization data, 36
Automatic account assignment
Simulation, 407
Automatic account determination, 404
Automatic invoice reduction, 423
Automatic settlements, 408

B

Balance sheet valuation, 209
Lowest value principle, 210
Recognition-of-loss principle, 210
Bid invitation, 100
Bill of materials, 167
Blanket purchase order, 155, 156
Account assignment, 157
BOM explosion, 167
BPX, 44
BSV, 403
BSX, 403
Business area, 80
Business Process Expert, 44
Business volume, 200

C

Calculation schema, 139, 179
RM0000, 140, 174, 181
Calculation Schema, 137
Call Transaction, 281
MIR7, 281
MIRO, 281
Cash Budget Management, 90
Cash discount, 263, 333
Cash discount gross, 335
Cash discount net, 335
Gross goods receipt, 265
Net goods receipt, 266
Net invoice receipt, 266
Value changes, 263
Cash discounts, 138
Change document, 119
Chart of Accounts, 399
Client, 79
Collective number, 135
Commitments, 51
Commitments in Procurement, 62
Company, 80, 90
Company code, 80, 90
Components, 26
Condition, 137, 173
Records, 141, 176
Tables, 176
Time-dependent, 139
Time-independent, 139
Condition technique, 173
Condition type, 139, 175
PB00, 176, 185
PBXX, 185
Configuration, 77
Consignment and pipeline settlement, 412, 423
Consumable materials, 152, 404
Account determination, 404

Contract, 121
 Centrally-agreed contract, 121
 Distributed contract, 121
 Quantity contract, 121
 Technical elements, 122
 Value contract, 121
Contributor recognition program, 44
Controlling, 31
Controlling area, 81, 90
Conventional invoice verification, 279
Credit control area, 90
Credit memo, 261, 425
 Warning and error messages, 261
Customizing data, 36

D

Debugger, 74
Debugging, 73
 Screen, 75
Default SAP G/L account, 391
Delivery costs, 376
Delivery free of charge, 243
Determination of requirements, 94
Direct posting, 324
Documents in procurement, 92, 110
Duplicate invoice check, 300
 Points to remember, 301

E

Effective price, 138
EIN, 403
EKG, 403
End-of-period rebate, 138
Enterprise Resource Planning, 24
Enterprise structure, 77
 Assignment, 83
 Definition, 79
 Financial Accounting, 89
 Materials Management, 86
 Technical elements, 86
ERP Central Components, 30
ERP Financials, 31

Evaluated Receipt Settlement (ERS), 409
 Planned delivery cost, 410
Exchange rate, 393
External services, 158
 Procurement cycle, 158

F

FIFO valuation, 234, 236
 Configuration, 236
 Sample, 235
Final Invoice indicator, 164
Financial Accounting, 31
Financial management area, 81, 90
Financials, 30
Framework order, 155, 157
Freight charges, 138
FRL, 403
FRN, 403
Functional area, 81

G

General Ledger, 59
Goods issue, 251
 Value changes, 251
Goods receipt, 33, 96, 241, 296
 Price variance, 241
Goods receipt reversal, 251
 After goods receipt and invoice receipt, 253
 Purchase order price quantity variance, 255
GR-based IV, 418
GR/IR Account Maintenance, 58
GR/IR clearing account, 262, 396, 430
GR Non-Valuated, 56
Gross goods receipt, 265
Gross price, 138
Group conditions, 194
GR Valuated, 56

H

Header conditions, 194
 HotNews, 44
 Human Resources, 32
Payroll, 32
Personnel Management, 32
Personnel Time Management, 32
Talent Management, 32
Training and Event Management, 32

I

Implementation consultants, 42
 Index LIFO procedure, 229
Example, 229
 Info record, 123, 136, 142
Automatic update, 143
Last purchase order, 143
 Initial entry of inventory data, 249
 Integration of Materials Management, 34
Controlling, 35
Financial Accounting, 35
Human Resources, 35
Logistics Execution, 35
Production Planning, 35
Quality Management, 35
Sales and Distribution, 35
 International Accounting Standards Board, 209
 International Financial Reporting Standards, 209
 Inventory Management, 33, 55, 149, 239
Initial entry of inventory data, 249
Stock valuation, 149
Value changes, 239
 Invoice
Foreign currency, 392
Purchase order with account assignment, 389
 Invoice blocking, 358
 Invoice item amount block, 363
 Invoice parking, 306
Hold, 308
Park, 308

Save as Complete, 308
Substitution, 310
Validation, 310
Workflow, 309
 Invoice reduction, 422
 Invoice release, 368
After goods receipt, 426
Without Goods Receipt, 428
 Invoice Verification, 33, 96, 277
In the background, 315
Online, 290
 Invoice with variances, 339
 Invoicing party, 282
 Invoicing plan settlement, 419, 423
Partial invoicing plan, 420
Periodic invoicing plan, 420

K

KDM, 403

L

Layer, 220
 Layer versions, 223
 Levels of valuation, 48
 LIFO/FIFO, 224
Quantity comparison parameter, 225
 LIFO methods, 223
 LIFO procedures, 226
Progressive fill-up basis, 228
Quantity and index, 226
 LIFO valuation, 220
Layer versions, 225
Models, 223
Sample, 221
 Logistics, 31
 Logistics Execution, 32
 Logistics General, 31
 Logistics invoice verification, 57, 258, 277
Clearing details, 286
Direct posting, 324
Duplicate invoice check, 300

Important tables, 287
Important transactions, 281
Insufficient stock coverage, 258
Messages, 421
Taxes, 327
Value changes, 258
Lowest value comparison, 233
Lowest value determination, 210
 Based on market prices, 211
 Base price, 219
 Range of coverage, 214
 Based on movement rate, 217
Lowest value principle, 210

M

Maintenance views, 39
Manual block, 364
Manual invoice reduction, 423
MAP, 148
Master data, 36, 101, 283
 Purchasing, 108
Material document, 284
Material master, 101, 126, 203
 Accounting, 129
 Accounting view, 105
 Database tables, 105
 Organization of, 102
Material master price, 229
Material price change, 173, 201, 239
Material type, 126, 204
Material valuation, 57
 Procedure, 147
Materials Management, 31, 33
ME21N, 406
 SAP G/L, 406
Message schema, 423
MIRO
 Exchange rate, 393
 Header screen, 291
 Layout, 291
 Planned delivery costs, 379
Movement rate, 216
Movement type, 204
Moving average price, 147, 148

Sample Posting, 150
MRBR, 374
 Technical program flow, 374

N

Net goods receipt, 266
Net invoice receipt, 266
Net price, 138
Non-validated goods receipt, 61

O

Offsetting entry for inventory posting, 402
One-time vendor, 296
Operating concern, 81, 90
Optimization, 24, 25
Order price quantity variance, 354
Order unit and the order price, 254
OSS Message, 43
OSS Note, 43
Outline purchase agreements, 121

P

Parking workflow, 309
Partial invoicing plan, 420
Payment block, 367
PB00, 176
Periodic invoicing plan, 420
Planned delivery cost, 151, 197, 242, 376, 410
 Account postings, 242
Plant, 81
Plant Maintenance, 32
Pool LIFO valuation, 232
 Merging, 232
 Splitting, 232
Pool number, 233
Posting to previous period, 270
 After a price change, 273
 Posting goods movements, 272

Posting invoices, 272
PRD, 403
 Precious metal condition, 195
 Prepayment, 311
 Price change, 268
 Previous and current period, 269
 Previous period only, 268
 Price determination, 139, 173
 Price variance, 344
 Pricing in ME21N, 190
 Processes in procurement, 77, 91
 Procurement cycle, 33, 34, 94, 95
 external services, 97, 100
 services, 97
 Procurement of consumable materials, 98, 152
 Procurement of external services, 158
 Procurement of stock material, 97
 Procure-to-pay, 33
 Production Planning, 32
 Product Lifecycle Management, 31
 Purchase account management, 322
 Postings at receipt value, 322
 Postings at stock value, 323
 Purchase commitments, 51
 Purchase order, 113, 153
 Database tables, 117
 Elements of Financial Accounting, 115
 monitoring, 96
 processing, 95
 Service, 160
 Technical elements, 115
 Purchase order-based invoice verification, 294
 Purchase order history, 289
 Chronological order, 289
 Purchase order with account assignment, 389
 Purchase requisition, 33, 110, 153
 Technical elements, 111
 Purchasing, 50
 Purchasing documents, 110
 Purchasing info record, 109, 123, 142
 Technical elements, 123
 Purchasing organization, 83
 Cross-company code, 88

Cross-plant, 88
Plant-specific, 88

Q

Quality Management, 32
 Quantity and price variance, 349
 Quantity update, 56
 Quantity variance, 340
 Account postings, 341
 Quota arrangement, 109
 Quotation, 111, 134, 135

R

Recognition-of-loss principle, 210
 Reconciliation account, 68, 108
 Request for quotation, 111
 Technical elements, 113
 Return, 425
 Return delivery, 255, 257
 Purchase order price quantity variance, 257
 Revaluation, 207, 267, 414, 423
 Account postings, 268
 Credit memo, 418
 Invoice, 417
 Reversal, 425
 RFQ, 134, 135, 136
 Collective number, 135
 Technical elements, 137
 RM08RELEASE, 373

S

Sales and Distribution, 31
 SAP Best Practices, 42
 SAP Customer Messages, 43
 SAP Customer Notes, 43
 SAP Customizing, 36, 38, 39
 SAP Developer Network, 44
 SAP Easy Access, 36, 37
 SAP ECC, 32

- SAP ERP, 23, 24, 26, 29, 47
 Building blocks, 29
 Expenses, 23
 Financials, 30, 33
 Human Capital Management, 32
 Introduction, 23
 Logistics, 31
 Revenue, 23
- SAP ERP Financials, 26, 77, 277
 Financial Accounting, 77
- SAP G/L, 127, 406
- SAP HotNews, 44
- SAP Library, 36, 41
- SAP Service Marketplace, 42
- SAP Support Portal, 43
- SAP TopNotes, 44
- Scheduling agreement, 122
 Technical elements, 123
 Without release documentation, 122
 With release documentation, 122
- SDN, 44
- Service acceptance, 101
- Service entry, 101
- Service entry sheet, 162
 Acceptance, 162
 Entry, 162
 Field selection, 166
 Final Invoice indicator, 164
 Invoice reversal, 164
 Partial invoice, 163
- Service Marketplace, 42
- Service purchase order, 160
- Services
 User exit, 166
- Source determination, 94
- Source list, 109
- Split valuation, 49, 182
- Standard price, 147
- Stochastic block, 363
- Stock material, 33, 125, 398
 Account determination, 398
 Database tables, 133
 Material master, 126
- Stock overview, 145
- Stock shortage in the current period, 274
- Storage location, 82
- Subcontracting, 167
 Account postings, 169
 In Inventory Management, 168
 In Logistics Invoice Verification, 169
 In Purchasing, 167
 Technical elements, 170
- Subledger accounting, 68, 108
- Subsequent debit
 Account postings, 261
- Subsequent debit/credit, 259
- Subsequent settlement, 198
- Supplementary conditions, 186
- Support consultants, 42
- Support Portal, 43
-
- T
- Taxes, 327
 Customizing, 331
 Deductible taxes, 327
 Non-deductible taxes, 327
 Proposal logic, 330
- Technical naming convention, 93
- Time-dependent Condition, 109, 139
- Time-independent Condition, 139
- Timesheets, 32
- Tolerance keys, 359
- TopNotes, 44
- Total-based acceptance, 386
- Total-based differences, 385
- Total-based invoice reduction, 386
- Transaction, 39, 401
 ME41, 136
 ME47, 135
 ML81N, 97
 MM01, 105
 MMBE, 145
 MR11, 431
 MR11SHOW, 431
 MRKO, 413
 OMED, 141
 OMWB, 40
 SM30, 40
 SPRO, 38
- Transaction data, 36, 284

Transfer postings, 244
Consignment to company-owned stock, 246
Material to material, 247
Valuation type to valuation type, 248
Value changes, 244
Types of data, 36
Authorization data, 36
Customizing data, 36
Master data, 36
Transaction data, 36

U

UMB, 403
Unplanned delivery cost, 151, 152, 381
Update allocation, 308
User parameter
EFB, 188
EVO, 187
User Parameter, 187, 188

V

Valuation, 395
Valuation area, 49, 82, 146
Valuation Category, 204

Valuation class, 129, 204, 391, 400
Valuation grouping code, 399
Valuation level, 49, 82, 146
Switching, 82
Valuation modifier, 399
Valuation price, 153
Valuation Structure, 204
Valuation Type, 204
Lowest value, 213
Value added tax, 278
Value-based commitment, 64
Value creation, 24
Value string, 402
Value update, 56
VBR, 406
Vendor evaluation, 109
Vendor master, 106, 199
Company Code Data, 107
General Data, 107
Purchasing Organization Data, 107
Subsequent settlement, 199
Transactions, 107
Vendor selection, 95
Views, 39

W

WRX, 403