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# Procurement Cycle Implementation in SAP S/4HANA and Accurate Online: An Accounting Information Systems Perspective

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## Abstract

**Purpose**: This study aims to conceptually compare how different accounting information systems accommodate the procurement cycle, with a specific focus on SAP S/4HANA and Accurate Online. The analysis is conducted from an accounting information systems perspective to examine how system design influences process formalization, internal control, and governance across procurement activities.

**Design**: This research adopts a qualitative and conceptual research design. The study is based on a structured review of accounting information systems literature and a comparative analysis of system functionalities related to five main stages of the procurement cycle, namely demand identification and purchase requisition, supplier selection and evaluation, purchase order issuance, receipt of goods, and invoice verification. The comparison is supported by illustrative system interfaces and accounting process representations.

**Findings**: The study finds that both SAP S/4HANA and Accurate Online are capable of supporting the core functional requirements of the procurement cycle, including document linkage, transaction recording, and accounting recognition. However, the two systems differ significantly in how procurement controls are embedded. SAP S/4HANA emphasizes system enforced controls, structured workflows, and enterprise-wide integration, whereas Accurate Online prioritizes simplicity, usability, and transaction-oriented flexibility, with greater reliance on organizational procedures to achieve control objectives.

**Originality/Value**: This study contributes to the accounting information systems literature by providing a stage based conceptual comparison of procurement cycle implementation across enterprise and cloud-based accounting systems. The findings offer practical insights for organizations in selecting accounting information systems that align with their procurement governance requirements, organizational scale, and control orientation, while also considering usability and operational efficiency.

**Keywords**: Accounting Information Systems; Procurement Cycle; SAP S/4HANA; Accurate Online; Internal Control; Three Way Matching; ERP Systems; Cloud Accounting Systems

## 1. Introduction

As rising demand creates opportunities for firms to expand production capacity and increase sales volumes, effective procurement becomes a critical business process for maintaining cost control, operational efficiency, and the reliability of financial reporting [1], [2]. In accounting information systems (AIS) literature, the procurement or expenditure cycle is described as a recurring set of business activities and information processing operations associated with acquiring

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and paying for goods and services. An effective design of this cycle helps minimize acquisition costs while ensuring accurate and timely recording of financial events [3] [4].

Organizations adopt different software approaches to support procurement activities, reflecting broader decisions in the buy versus build dilemma in corporate accounting information systems [5], [6], [7]. Some organizations rely on comprehensive enterprise resource planning (ERP) systems that embody standardized best practices, while others adopt lighter cloud based accounting applications or develop tailored solutions to meet specific operational needs [3][8]. ERP systems such as SAP are designed to integrate procurement with inventory management, finance, and other enterprise functions, offering formalized transaction flows, multi-level authorizations, and automated document linkage across purchasing, receiving, invoicing, and accounting processes [9]. Cloud accounting platforms such as Accurate Online, by contrast, prioritize usability, rapid deployment, and cost efficiency while providing essential purchasing, receipt, and payable functionalities that are commonly suited to small and medium sized organizations [6],[7]. These different system design choices create distinct implications for process integration, control, and governance within the procurement cycle [10].

From an accounting information systems perspective, procurement is viewed not merely as a sequence of purchasing transactions, but as an integrated business process that requires appropriate documentation, authorization, internal control, and auditability. AIS analysis therefore focuses on how systems structure procurement activities, embed control mechanisms, and support governance across the procurement cycle, rather than on system performance or user interface features alone.

In AIS literature, the procurement cycle typically comprises five main stages: demand identification and purchase requisition, supplier selection and evaluation, purchase order issuance, receipt of goods, and invoice verification [11], [12]. Each stage is closely linked to transaction recording, documentation, and internal control, making the procurement cycle a core component of an organization's accounting information system [13].

As organizations increasingly seek to adopt procurement best practices, these stages are expected to be implemented in a structured and consistent manner. However, accounting information systems may differ in the extent to which these stages are embedded as system driven processes or remain dependent on procedures conducted outside the system.

Accordingly, this study conceptually compares how SAP ERP and Accurate Online accommodate the five main stages of the procurement cycle by examining differences in process formalization, control mechanisms, and system integration from an accounting information systems perspective.

## 2. Literature Review

This section reviews relevant literature to establish the conceptual foundation for analysing the procurement cycle from an accounting information systems (AIS) perspective. In AIS literature, the procurement or expenditure cycle is commonly described as a sequence of interrelated activities that transform purchasing needs into authorized transactions, documented events, and recorded accounting information [14]. Each activity within the cycle serves a specific role in transaction authorization, documentation, and internal control, and together they form an integrated process that supports reliable financial reporting [15].

Figure **1** presents a commonly used representation of procurement activities in enterprise resource planning (ERP) systems, illustrating how procurement processes are operationalized within an integrated system environment.

As illustrated in

Figure **1**, SAP presents procurement activities in a more granular manner, reflecting detailed operational steps within the procurement process. However, this study adopts a higher-level conceptualization by consolidating these activities into five main procurement stages commonly discussed in accounting information systems literature. These stages comprise demand identification and purchase requisition, supplier selection and evaluation, purchase order issuance,

receipt of goods, and invoice verification. In this conceptualization, payment processing is treated as an integral continuation of invoice verification within the accounts payable process, while accounting recording is viewed as an integrated outcome of the latter stages of the procurement cycle rather than as a separate procurement stage.

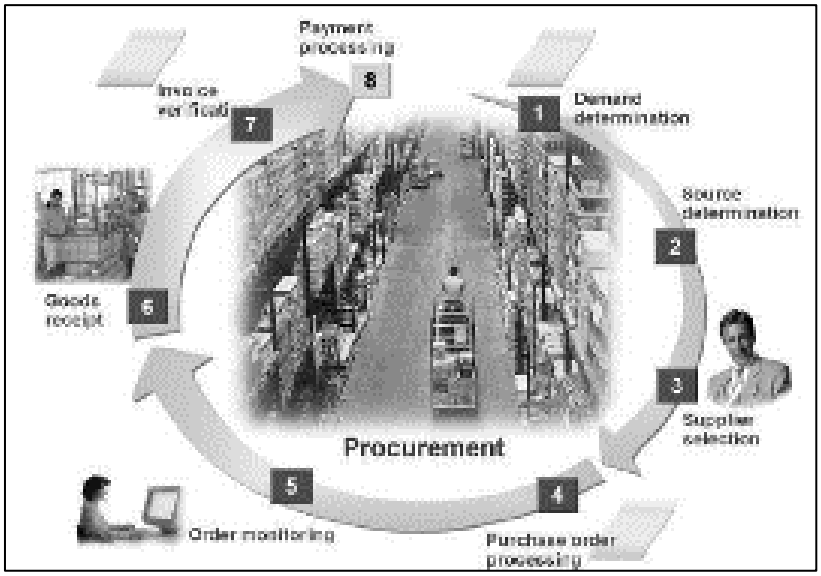


**Figure 1** Procurement Cycle (SAP AG:2006) [16]

SAP S/4HANA and Accurate Online represent two contrasting approaches to accounting information system design. SAP S/4HANA is an enterprise oriented ERP system that integrates procurement and financial accounting through structured and system enforced processes, whereas Accurate Online (https://account.accurate.id/) is a cloud based accounting system that provides core procurement and accounting functionalities for small and medium sized organizations through a web based platform[11].

## 3. Research Method

This study adopts a conceptual comparative approach to examine how different accounting information systems accommodate the standard stages of the procurement cycle. The analysis is conducted from an accounting information systems (AIS) perspective and does not rely on empirical transaction data or field observations.

The objects of comparison are SAP ERP and Accurate Online, which represent two distinct categories of accounting systems: enterprise resource planning systems and cloud-based accounting applications. These systems are selected to reflect different system design orientations commonly adopted by organizations.

The comparison is structured around five main stages of the procurement cycle, namely demand identification and purchase requisition, supplier selection and evaluation, purchase order issuance, receipt of goods, and invoice verification. Payment processing is treated as an integral continuation of invoice verification within the accounts payable process rather than as a separate procurement stage. For each stage, the analysis examines whether and how the system is conceptually designed to accommodate the corresponding procurement activity from an accounting information systems perspective.

Information used in the analysis is derived from accounting information systems literature and publicly available system documentation and demonstrations. The findings are presented as a structured, stage-by-stage comparison that highlights differences in system support for procurement processes.

## 4. Results and Discussions

This section presents the results of a conceptual comparison between SAP S/4HANA and Accurate Online in accommodating the standard stages of the procurement cycle from an accounting information systems perspective.

Figure 2 presents the SAP S/4HANA menu structure related to these procurement stages, whereas Figure 3 presents the corresponding menu in Accurate Online.

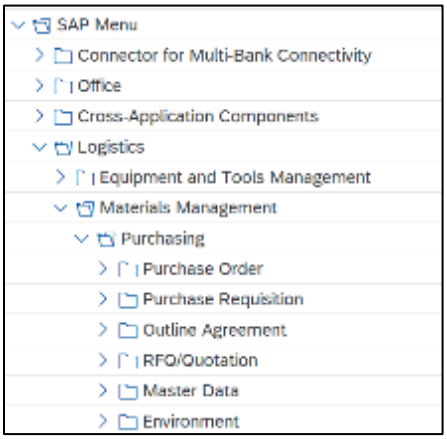


**Figure 2** SAP S/4HANA menu structure related to procurement activities


**Figure 3** Accurate Online menu related to procurement activities

Both Accurate Online and SAP S/4HANA provide system functionalities that are designed to support procurement activities, although they differ in scope, structure, and level of process integration. At a conceptual level, the functionalities available in both systems can be mapped to the five main stages of the procurement cycle commonly discussed in accounting information systems literature, namely demand identification and purchase requisition, supplier selection and evaluation, purchase order issuance, receipt of goods, and invoice verification. While certain supporting or related activities may be performed outside the core procurement menus or through additional modules, the essential stages of the procurement cycle are accommodated within the respective system environments.

Despite this common stage-level coverage, the two systems differ in how each procurement stage is structured, formalized, and integrated within the overall system workflow. SAP S/4HANA organizes procurement activities within a comprehensive materials management and logistics framework, offering granular process segmentation and formalized transaction flows. Accurate Online, in contrast, provides procurement-related functionalities through a more streamlined and transaction-oriented interface, emphasizing simplicity and ease of use.

The following subsections discuss each stage of the procurement cycle in sequence. For each stage, the analysis compares how SAP S/4HANA and Accurate Online conceptually accommodate the corresponding procurement activities, highlighting differences in process structure and system design from an accounting information systems perspective.

### 4.1. Demand Identification and Purchase Requisition

Demand identification and purchase requisition represent the initial stage of the procurement cycle from an accounting information systems perspective [17]. This stage focuses on formally capturing purchasing needs and authorizing procurement activities before any commitment to external suppliers is made. In AIS design, purchase requisitions function as a preventive control mechanism that supports segregation of duties, establishes documentation for audit purposes, and governs the initiation of subsequent procurement transactions. The extent to which this stage is embedded as a system-driven control varies across accounting information systems and has important implications for procurement governance and internal control.

Figure 4 illustrates the purchase requisition user interface in SAP S/4HANA. The interface reflects a process-oriented design in which purchase requisitions are presented as document-based procurement objects rather than simple data entry forms. As shown in the figure, the requisition interface includes document-level elements and source determination functionality that allow the system to propose or assign approved suppliers based on predefined master data, such as fixed vendor and purchasing information records. These features indicate that purchase requisitions in SAP are designed to actively initiate downstream procurement activities, including sourcing and approval workflows. Consequently, the purchase requisition functions as a formal control point that integrates the initial identification of demand with subsequent stages of the procurement cycle prior to purchase commitment.

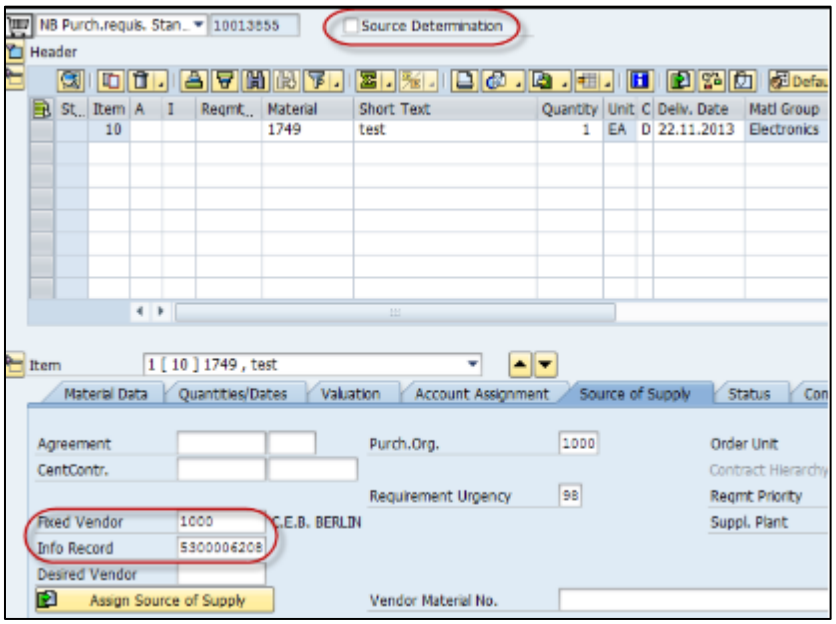


**Figure 4** Purchase requisition interface in SAP S/4HANA

In contrast, Figure 5 presents the purchase requisition interface in Accurate Online. The interface is designed to emphasize simplicity and ease of use, focusing primarily on capturing essential transactional information such as requested items, quantities, and required dates. While the system allows purchase requisitions to be referenced in subsequent purchase order transactions, the interface does not incorporate explicit process-triggering elements or system-enforced controls that embed requisitions within a structured procurement workflow. Consequently, purchase requisitions in Accurate Online function primarily as supporting documents that facilitate purchasing activities, with authorization and process sequencing largely governed by organizational procedures rather than by system-driven mechanisms.

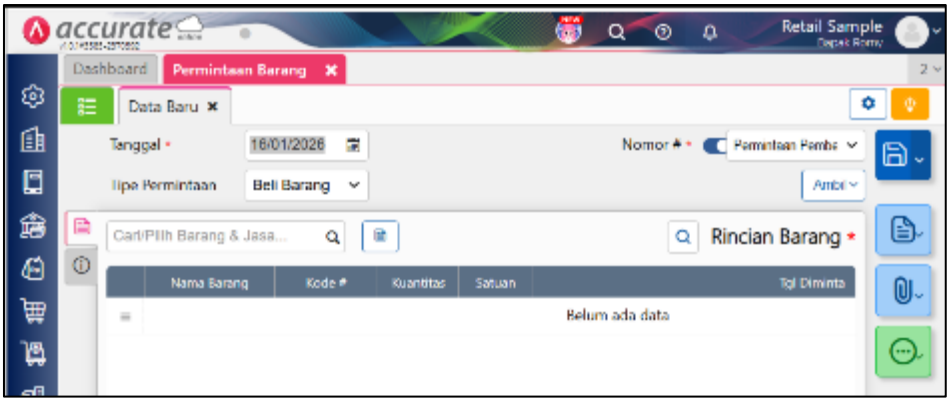


**Figure 5** Purchase requisition interface in Accurate Online supporting simplified demand documentation

From an accounting information systems perspective, these interface differences reflect distinct system design philosophies. SAP S/4HANA frames purchase requisitions as process-driving control objects that are embedded within a structured and configurable procurement workflow. Accurate Online, in contrast, treats purchase requisitions as transaction-supporting documents that prioritize operational flexibility and ease of use. This distinction has direct implications for internal control, procurement governance, and the degree of process formalization at the initial stage of the procurement cycle.

### 4.2. Supplier Selection and Evaluation

Supplier selection and evaluation constitute a critical stage of the procurement cycle, as this stage determines from whom goods or services will be acquired and under what terms [18]. From an accounting information systems perspective, this stage is closely related to governance, transparency, and control, since supplier selection decisions have direct implications for cost efficiency, compliance, and auditability. AIS literature emphasizes the importance of structured supplier information and documented selection criteria to support accountability and prevent opportunistic purchasing behavior.

Figure 6 illustrates the quotation comparison functionality in SAP S/4HANA, where quotations from multiple suppliers are displayed side by side for the same materials. As shown in the figure, identical items such as Sony Xperia Z and Aspen Filter KS Box are quoted by different suppliers (e.g., VENDOR-001 and VENDOR-002), with unit prices, total quotation values, and system-generated rankings presented in a structured comparison table. For example, the system highlights differences in quoted prices and aggregates total quotation values, while assigning relative rankings to each supplier's offer. This presentation enables procurement personnel to evaluate competing supplier offers using consistent criteria. Through this functionality, supplier selection decisions can be documented, ranked, and reviewed within the system, providing a transparent and auditable basis for procurement governance.

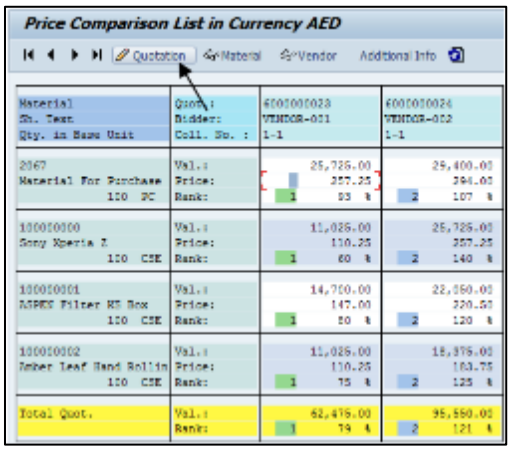


**Figure 6** System-supported quotation comparison for supplier selection in SAP S/4HANA

In contrast, as illustrated in Figure 7, Accurate Online accommodates supplier selection primarily through simplified supplier master data and transaction-level supplier selection during purchase order creation. The figure shows a

centralized vendor master list that enables users to manage and select suppliers efficiently for procurement transactions. However, supplier evaluation and comparison activities are not formalized as system-driven processes within the system. As a result, supplier selection decisions in Accurate Online are largely dependent on user judgment and organizational procedures conducted outside the system environment.

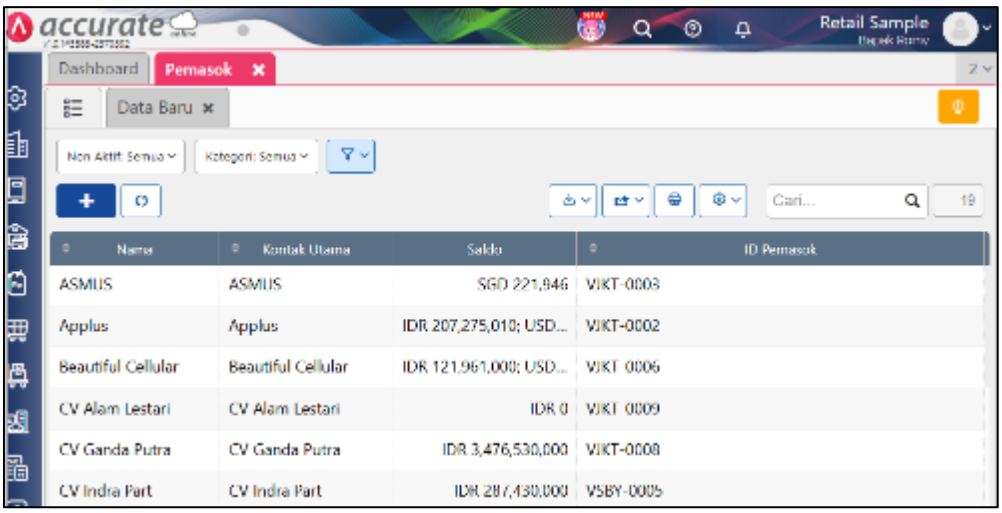


**Figure 7** Supplier master data supporting transaction-level supplier selection in Accurate Online

From an accounting information systems perspective, the key difference at the supplier selection and evaluation stage lies in how governance is embedded within the system. SAP S/4HANA supports structured and centralized supplier governance through system-driven quotation comparison and evaluation mechanisms that enhance transparency and auditability. Accurate Online, in contrast, prioritizes simplicity and transactional efficiency by supporting supplier selection primarily through vendor master data, with supplier evaluation and comparison largely governed by organizational procedures outside the system.

### 4.3. Purchase Order Issuance

Purchase order issuance represents a critical stage of the procurement cycle, as it constitutes a formal and legally binding commitment between the organization and the supplier [19]. From an accounting information systems perspective, this stage is central to procurement control because it transforms authorized purchasing intentions into enforceable obligations. Effective AIS design at this stage emphasizes authorization, documentation, and traceability to ensure that purchase commitments are consistent with approved procurement decisions.

As illustrated in Figure 8, SAP S/4HANA provides multiple purchase order creation modes that reflect different levels of process formalization and control. The system allows purchase orders to be created directly when supplier information is known, generated through requisition assignment lists, or created automatically from approved purchase requisitions. These alternatives demonstrate that SAP S/4HANA supports requisition-based purchasing as a configurable control mechanism. When appropriately configured, the system can enforce purchase requisitions as a prerequisite for purchase order issuance, thereby embedding authorization and governance controls directly within the procurement workflow. The degree of enforcement ultimately depends on organizational governance policies and configuration choices within the system.

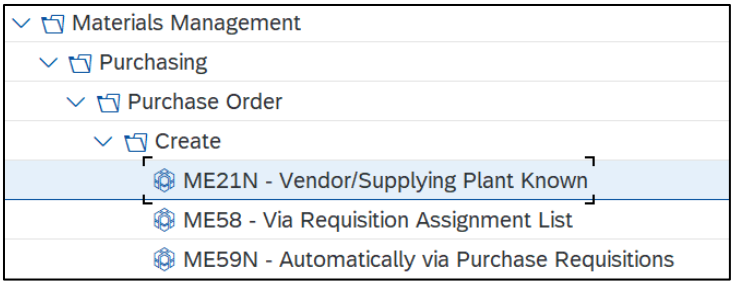


**Figure 8** Purchase order creation modes in SAP S/4HANA, including requisition-based options

SAP S/4HANA further extends procurement control through its ability to support purchase order processing across multiple company codes within a single system landscape. This capability enables centralized purchasing, shared procurement governance, and cross-entity control, which are particularly relevant for organizations operating in multi-company or group structures. Such scalability reflects SAP S/4HANA's design orientation toward enterprise-wide integration and control.

In contrast, as shown in Figure 9, Accurate Online allows users to relate purchase orders to existing purchase requests through document retrieval functionality. This linkage indicates that demand identification can serve as a reference point for purchase order creation and supports basic traceability between purchase requests and purchasing transactions. However, the linkage remains optional and user-driven, as the system does not provide configuration mechanisms to enforce purchase requests as a mandatory prerequisite for purchase order issuance. Consequently, purchase orders may still be initiated independently of prior requests, with procurement control relying primarily on user discipline and organizational procedures rather than system-enforced rules.

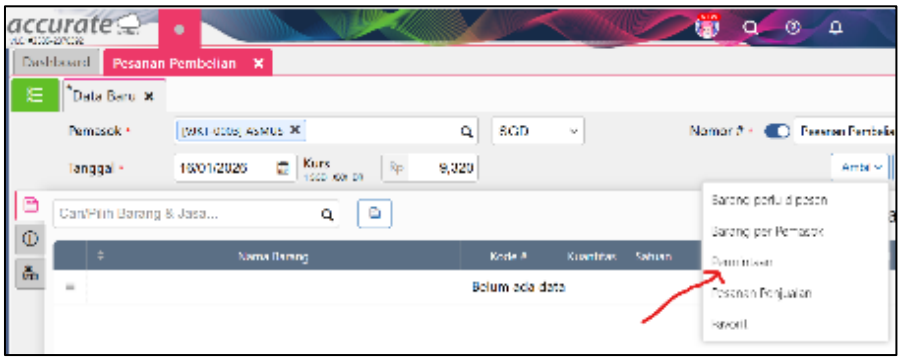


**Figure 9** Purchase order creation with reference to purchase requests in Accurate Online

From an accounting information systems perspective, the key difference at the purchase order issuance stage lies in the degree of system-enforced control and scalability. SAP S/4HANA enables requisition-based and cross-company purchase order processing through configurable governance mechanisms, whereas Accurate Online supports purchase order issuance primarily as a single-entity, transaction-oriented process that emphasizes simplicity and operational flexibility.

### 4.4. Receipt of Goods

Receipt of goods represents a critical stage of the procurement cycle, as it marks the point at which ordered goods are physically received and verified before financial obligations are recognized[20]. From an accounting information systems perspective, this stage serves as a key control point for inventory recognition, segregation of duties, and three-way matching between purchase orders, goods receipts, and supplier invoices. Effective AIS design at this stage emphasizes verification, documentation, and appropriate interim accounting treatment to ensure that financial records reflect verified operational events.

As illustrated in Figure 10, SAP S/4HANA implements goods receipt through a formal and system-driven process using the MIGO transaction. Goods receipt is explicitly linked to the originating purchase order, requiring users to verify quantities, materials, and delivery details before posting the transaction. This design positions goods receipt as an independent verification step that is separate from purchase order issuance and invoice processing, thereby strengthening internal control and segregation of duties.

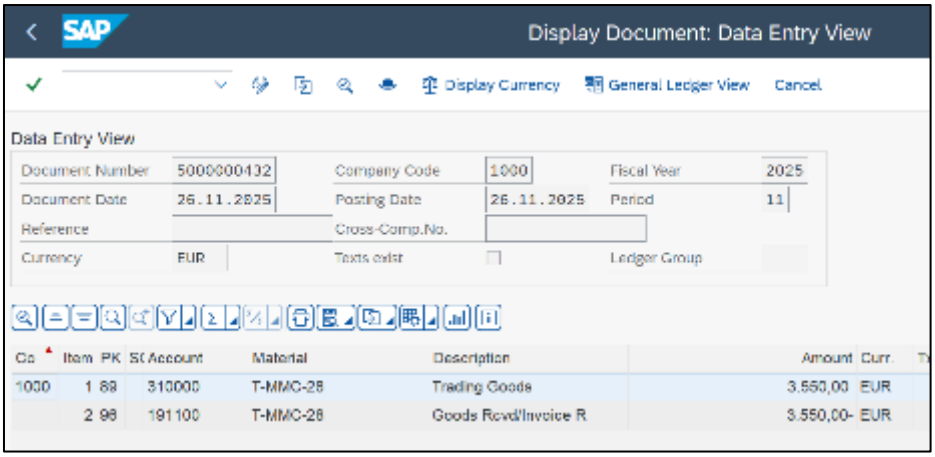


**Figure 10** Goods receipt user interface in SAP S/4HANA (MIGO transaction)

Figure  shows the accounting journal entries generated behind the MIGO transaction in SAP S/4HANA. Upon posting a goods receipt, the system records an increase in inventory while simultaneously crediting a Goods Receipt/Invoice Receipt (GR/IR) clearing account. At this stage, no supplier liability is recognized in accounts payable. The GR/IR account functions as a temporary holding account for goods received but not yet invoiced, enabling systematic three-way matching. Supplier liabilities are recognized only during invoice verification, when the invoice is matched against both the purchase order and the recorded goods receipt and the GR/IR balance is cleared. This accounting design tightly integrates operational verification with financial recognition and institutionalizes three-way matching as a system-enforced control mechanism.

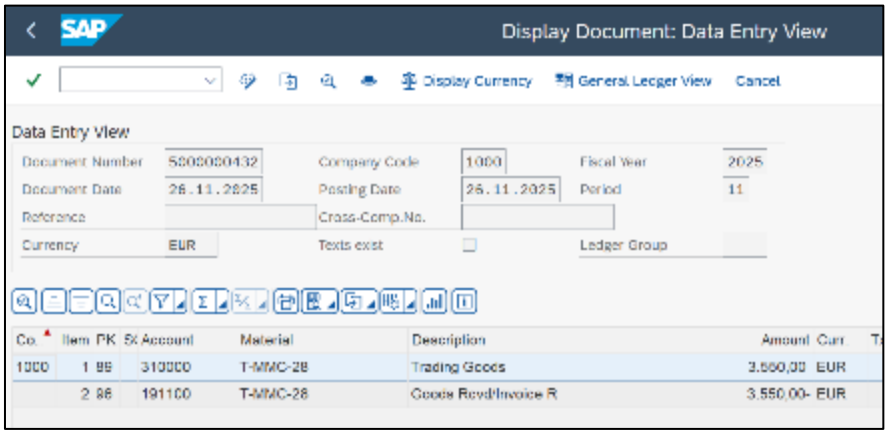


**Figure 11** Accounting journal entries generated from goods receipt in SAP S/4HANA (GR/IR posting)

In Accurate Online, goods receipt is also supported as a distinct transaction, as shown in Figure 12. The system allows users to record the receipt of goods by referencing the related purchase order, enabling inventory balances to be updated and supporting linkage to subsequent invoice processing. This functionality indicates that Accurate Online accommodates goods receipt as part of the procurement cycle and provides the necessary documentation to support three-way matching at the transaction level.

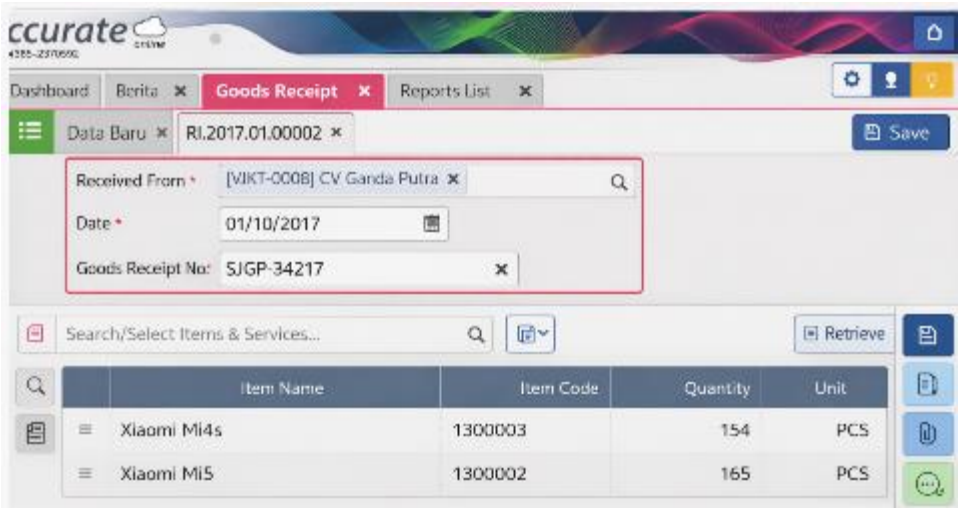


**Figure 12** Goods receipt user interface in Accurate Online

Figure  presents the accounting journal generated from a goods receipt transaction in Accurate Online. Similar to SAP S/4HANA, the system records an increase in inventory and credits a temporary liability account commonly labeled as goods received not invoiced. This accounting treatment demonstrates that Accurate Online is capable of supporting interim liability recognition and basic three-way matching concepts. However, the enforcement of matching between purchase orders, goods receipts, and invoices is largely dependent on user actions and organizational procedures rather than mandatory system controls.

**Date** : 10 Jan 2017 **Transaction No.:** RI.2017.01.00002

**Transaction Type** : Goods Receipt **Description** : Receipt of Goods from CV Ganda Putra

| Account Code | Account Name | Debit | Credit |
|---|---|---|---|
| 115.000-01 | Inventory – Mobile Phones | 2,259,860,000 | 0 |
| 213.000-99 | Goods Received Not Invoiced | 0 | 2,259,860,000 |
| | **Total** | 2,259,860,000 | 2,259,860,000 |

**Figure 13** Accounting journal entries generated from goods receipt in Accurate Online (goods received not invoiced)

From an accounting information systems perspective, both SAP S/4HANA and Accurate Online provide functional support for goods receipt and three-way matching, including the use of interim accounts to defer liability recognition until invoice verification. The key difference lies in the degree of system-enforced control and process formalization. SAP S/4HANA embeds goods receipt and GR/IR accounting within a tightly integrated and mandatory workflow that strengthens internal control and auditability. Accurate Online, in contrast, supports goods receipt and interim accounting in a more flexible, transaction-oriented manner, relying more heavily on user discipline and organizational policies to achieve comparable control outcomes.

### 4.5. Invoice Verification

Invoice verification represents the final control-oriented stage of the procurement cycle, as it determines whether supplier invoices are valid and eligible for liability recognition and payment [21]. From an accounting information systems perspective, this stage plays a critical role in linking operational procurement events with financial accounting, particularly through three-way matching and the clearing of interim accounts created during goods receipt. Effective AIS design at this stage emphasizes verification against prior documents, authorization, and accurate reversal of temporary accounting entries.

As illustrated in Figure 14, SAP S/4HANA implements invoice verification through the MIRO transaction, which is explicitly integrated with both purchase orders and recorded goods receipts. During invoice entry, the system

automatically performs three-way matching by comparing invoice quantities, prices, and values against the corresponding purchase order and goods receipt data. When the invoice is posted, SAP S/4HANA clears the Goods Receipt/Invoice Receipt (GR/IR) clearing account that was created during goods receipt and recognizes the supplier liability in accounts payable. This accounting treatment effectively reverses the temporary GR/IR posting and ensures that trade payables are recognized only after successful verification of procurement events.

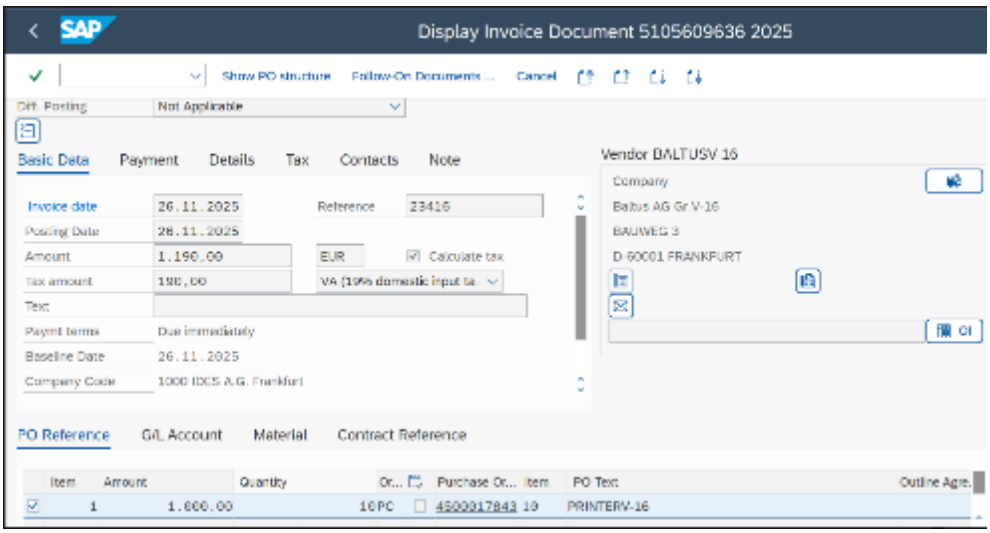


**Figure 14** Incoming invoice (MIRO) user interface in SAP S/4HANA

SAP S/4HANA further supports invoice verification through configurable tolerance limits, invoice blocking procedures, and approval workflows. Invoices that deviate from predefined quantity or price tolerances can be automatically blocked for payment, reinforcing invoice verification as a system-enforced control mechanism rather than a discretionary accounting activity. This design embeds invoice verification firmly within the procurement governance framework and enhances auditability.

In Accurate Online, invoice verification is supported through the purchase invoice interface, as shown in Figure 15. Supplier invoices can be recorded by referencing prior goods receipt or purchase order transactions, enabling the system to maintain document-level traceability across procurement stages. When the purchase invoice is saved, Accurate Online generates accounting entries that reverse the temporary goods receipt posting and recognize trade payables. As a result, the accounting effect mirrors the conceptual outcome observed in SAP S/4HANA, namely the transition from interim liability to recognized accounts payable.


**Figure 15** Purchase invoice user interface in Accurate Online

However, the verification process in Accurate Online is more transaction-oriented and relies to a greater extent on user judgment. While document linkage supports basic three-way matching, the system does not enforce invoice blocking or

tolerance-based controls to the same degree as SAP S/4HANA. Consequently, invoice verification in Accurate Online functions primarily as a procedural control supported by documentation, with governance outcomes dependent on organizational policies rather than mandatory system rules.

From an accounting information systems perspective, both SAP S/4HANA and Accurate Online accommodate invoice verification as a mechanism to reverse goods receipt postings and recognize trade payables following three-way matching. The key distinction lies in the degree of system-enforced control and formalization. SAP S/4HANA institutionalizes invoice verification through integrated matching logic, GR/IR clearing, and configurable enforcement mechanisms, whereas Accurate Online supports equivalent accounting outcomes through a more flexible and user-driven process that prioritizes simplicity and operational efficiency.

## 5. Conclusion

This study provides a conceptual comparison of how SAP S/4HANA and Accurate Online accommodate the procurement cycle from an accounting information systems perspective. By examining five main stages of the procurement cycle, namely demand identification and purchase requisition, supplier selection and evaluation, purchase order issuance, receipt of goods, and invoice verification, the analysis highlights how different system design philosophies shape procurement governance, control, and accounting integration.

Across all stages, both systems demonstrate the ability to support the core functional requirements of the procurement cycle, including document linkage, transaction recording, and financial recognition. Accurate Online provides streamlined procurement functionalities that support end to end purchasing activities and enable organizations to achieve essential accounting outcomes such as inventory recognition, interim liability handling, and trade payable recognition. Its design emphasizes simplicity, usability, and operational efficiency, making it suitable for single entity environments where procurement controls are largely governed by organizational procedures.

SAP S/4HANA, in contrast, embeds procurement activities within a highly structured and integrated system architecture. Across the five stages, the system consistently positions procurement documents as process driving control objects rather than merely transactional records. Features such as requisition-based purchasing, system enforced quotation comparison, configurable purchase order generation, formal goods receipt processing with GR or IR accounting, and integrated invoice verification collectively institutionalize procurement controls within the system workflow. This design supports stronger governance, auditability, and scalability, particularly in multi company and enterprise-wide procurement environments.

From an accounting information systems perspective, the key distinction between SAP S/4HANA and Accurate Online does not lie in whether procurement stages are supported, but in how procurement controls are embedded and enforced. SAP S/4HANA emphasizes system enforced controls and formalized process integration, whereas Accurate Online relies more heavily on user judgment and organizational discipline to achieve comparable control outcomes. These differences reflect broader tradeoffs between control intensity, system complexity, and operational flexibility.

In addition, it is important to recognize that although SAP S/4HANA provides strong control oriented and scalable procurement capabilities, its standard user interface is often perceived as less intuitive and less user friendly compared to modern cloud-based accounting applications. Prior studies and practitioner discussions have frequently noted usability challenges associated with traditional ERP interfaces, particularly for operational users. Consequently, in practical implementations, organizations often deploy alternative front-end interfaces, middleware, or third-party applications to improve user experience, while maintaining SAP S/4HANA as the core backend system responsible for transaction processing, internal control enforcement, and accounting integration.

From an accounting information systems perspective, this separation between front end usability and backend control reflects an important design consideration. While user interfaces may evolve to enhance efficiency and acceptance, the underlying accounting information system continues to function as the authoritative source of financial data, governance, and internal controls. This observation further reinforces the central finding of this study, namely that differences between SAP S/4HANA and Accurate Online are rooted not only in functionality, but also in how procurement controls and system responsibilities are architecturally distributed.

The findings of this study contribute to the accounting information systems literature by illustrating how procurement best practices can be accommodated through different system design approaches. Practically, the comparison provides insights for organizations in selecting accounting information systems that align with their governance requirements, organizational scale, control objectives, and usability considerations. Future research may extend this analysis by

incorporating empirical transaction data, examining user interaction with procurement systems, or evaluating hybrid architectures that combine enterprise grade backends with alternative user interfaces.

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