ANALYSIS OF THE IMPLEMENTATION OF *THE S/4HANA PRODUCT APPLICATION SYSTEM ON THE INPUT OF PRODUCTION RESULTS AS CORPORATE SUSTAINABILITY*

(CASE STUDY ON PT PINDODELI PULP & PAPER MILLS -2 DEPT NCR UNIT COATER & REREELER)

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ABSTRACT

This research analyzes the implementation of SAP S/4HANA in inputting production results for company sustainability at PT Pindo Deli Pulp & Paper Mills, especially in the NCR Department, Coater Unit and Rereeler Unit. With the rapid development of information technology, companies need to update their systems to increase efficiency and productivity. SAP S/4HANA, built on the SAP HANA in-memory database, offers real-time data analysis, better module integration, and a modern user interface. This research uses a qualitative approach through interviews, observations, and document analysis to evaluate the impact of the new system. The results show that implementing SAP S/4HANA significantly increases data accuracy, reduces processing time, and increases operational efficiency. In addition, this system helps reduce human errors and speeds up input of production data. This research provides valuable insight for other organizations considering SAP S/4HANA adoption, emphasizing the importance of training and support for a successful transition.

Keywords: SAP S/4HANA, Production Data Input, Efficiency, Real-Time Analytics, Operational Improvement, Sustainability

INTRODUCTION

The rapid development of information technology forces companies to continue to adapt to remain competitive. This means that companies need to update their information technology systems to improve productivity and quality of work. By using a system that is in accordance with the times, companies can accelerate the process of inputting production products more effectively and efficiently. In the manufacturing sector, the right information systems help companies better manage production data, automate processes, and gain in-depth

insights into their operations. Overall, effective information technology helps companies improve productivity, quality, and competitiveness in the market.

PT Pindo Deli Pulp and Paper Mills, part of Asia Pulp & Paper (APP), is one of the major companies in Indonesia that produces various types of paper, including newsprint, tissue, and packaging. The company relies on advanced information system technology to efficiently manage production data, automates processes by implementing *System Application and product* (SAP) which is now switching to SAP S/4HANA Database, PT Pindo Deli is committed to sustainable practices with a focus on innovation and efficiency, the company continues to face challenges and opportunities in the global pulp and paper industry.

This study aims to analyze the implementation of SAP S/4HANA in the input of production products as corporate sustainability in PT Pindo Deli Pulp & Paper Mills, especially in the NCR Department, Coater Unit and Rereeler Unit. This SAP S/$HANA implementation is one of the company's sutainability, SAP S/4HANA offers improved performance with in-memory databases that enable real-time analysis, IT infrastructure simplification, and integration of previously separate modules, such as SD, MM, and FI. This switch is also important because SAP will end support for SAP Business Suite in 2027. This study uses a qualitative approach through interviews, observations, and document analysis to understand the impact of implementation and provide insights for other organizations considering SAP S/4HANA adoption.

LITERATURE REVIEW

a. Stewardship Theory

According to Delanno and Deviani (2013), Stewardship theory is a theory that describes a situation where managers are not motivated by individual goals but rather shown to the goals of their main results for the benefit of the organization. This theory emerged when there was support from experts

Agency and stewardship theories suggest the need to reconcile these differences. Stewardship theory or also called the theory of service or service is a theory based on the principle of trust in the authorized party, where management in an organization is reflected as a good steward who carries out the tasks given by his superiors with full responsibility.

The theory of stewardship assumes a strong relationship between the success of the organization and the satisfaction of the owner. Stewards will protect and maximize the wealth of the organization with the performance of the company, so that the utility function will be maximized. An important assumption of stewardship is that the manager aligns goals according to the owner's goals. However, this does not mean that stewards do not have the necessities of life (Raharjo, in Jefri, 2018).

In this theory, managers will be more concerned with credibility or public trust. Based on the assumption of stewardship theory which states that managers will try to manage resources optimally and make the best decisions for the interests of the organization and work based on the idea that the profits (fulfillment of needs) of managers or stewards and owners or principals come from an organizationally and economically strong company.

The implementation of SAP S/4HANA in the input of production products at PT Pindodeli Pulp & Paper Mills-2 can be related to the Stewardship Theory in several ways:

1) Commitment to Organizational Success:

   Stewardship Theory expects managers to act in the interests of the organization. With SAP S/4HANA, managers at PT Pindodeli Pulp & Paper Mills-2 can leverage this system to ensure that production results are recorded accurately and efficiently. This reflects their commitment to the success of the organization, reducing the risk of losses due to data errors.

2) Informed Decision Making:

   Stewardship Theory emphasizes the responsibility to make good decisions. SAP S/4HANA provides accurate data and real-time reports, enabling managers at PT Pindodeli Pulp & Paper Mills-2 to make better strategic decisions based on up-to-date and relevant information.

3) Intrinsic Motivation and Sense of Responsibility:

   Stewardship Theory states that stewards have an intrinsic motivation to see organizations succeed. With SAP S/4HANA, managers can optimize production processes and ensure that production data is well managed, reflecting their responsibilities and motivations to support the company's success.

4) Transparency and Accountability:

   Stewardship Theory also emphasizes the importance of transparency and accountability. SAP S/4HANA offers features that enable good data tracking and

auditing. This helps the managers at PT Pindodeli Pulp & Paper Mills-2 to ensure that the production results are recorded transparently and can be accounted for.

By using SAP S/4HANA, PT Pindodeli Pulp & Paper Mills-2 is able to reflect the principles of Stewardship Theory in their daily practice, ensuring that production data is accurately inputted, decision-making is made data-driven, and the organization can achieve its goals more efficiently.

b. System

The term system comes from the Greek word "systema" which means a *complex a whole put together*. According to McLeod, "a system is a group of elements that are integrated with the same goal to achieve a goal" (in Jacob, 2012:1). Thus, the system is part of a network of interconnected supporting procedures and components to carry out a certain activity or goal.

A good system has several system characteristics that affect it,
Including:

a. Flexible
   It is a well-structured and organized system, but it should be flexible enough to be more easily adapted to changing circumstances.
b. Easy to Adapt
   That is, a system that is quick and easy to adapt to new conditions without changing the old system or interfering with its main function.
c. methodical
   That is, the system created will not complicate existing work activities.
d. Functional
   i.e. a system that can help achieve a predetermined goal
e. simple
   i.e. a system that is easy to understand and implementable
f. Optimal resource utilization
   that is, a well-designed system will make the use of resources owned by the organization can be optimized (in Sukoco, 2007)

c. SAP *(System Application and Product)*

SAP *(System Application and Product)* is a *software* developed to support an organization in carrying out its operational activities more efficiently and effectively. SAP is also an Enterprise Resources Planning (ERP) software, which is an IT and management tool to help companies plan and carry out various daily activities. SAP consists of

a number of modules/applications that have the ability to support all transactions that need to be carried out by a company and each application works in relation to each other (Seto, 2013). While the meaning of the module in

SAP is a software unit that stands alone from the model, display, and other supporting (Yii, 2009). So, in conclusion, SAP is a software product or software used by companies to facilitate employee performance in achieving expected goals. With the existence of a

software products, employees will not have difficulty and time in processing data related to personnel or others.

SAP has several advantages, including:

a. SAP consists of a number of modules/applications that have the ability to support all transactions that need to be carried out by a company and each application works in relation to each other;
b. SAP has a netweaver platform, which supports development and logistics software;
c. SAP has ABAP or programmer, which makes it easier for developers to implement business logic;
d. support the integration of business processes of large enterprises;
e. All information stored in SAP can be accessed by the parts of the organization that need it when it is needed (Seto, 2013).

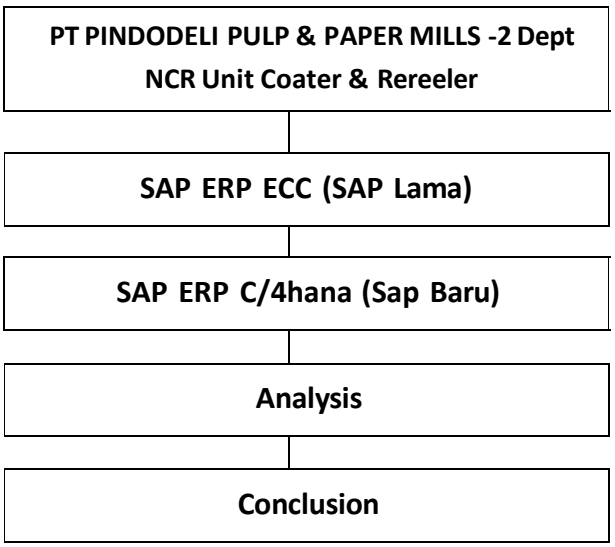
d. Sustainability

Sustainability refers to the ability to meet current needs without sacrificing future generations. In the context of a company, sustainability includes economic, social, and environmental aspects that are often known as the triple bottom line: profit, people, and planet (Elkington, 1997). Information technology, especially ERP systems such as S/4HANA, plays an important role in improving the sustainability of companies. The use of this technology can improve operational efficiency, reduce waste, and increase transparency in the supply chain (Melnyk et al., 2014).

S/4HANA, as the latest generation of SAP ERP system, is designed to optimize business processes, including the input of production results. With real-time data analysis capabilities, S/4HANA helps make faster and more informed decisions, thereby improving manufacturing process efficiency and reducing costs and resource usage (SAP, 2020). The implementation of S/4HANA in the input of production products has a significant impact on the company's sustainability through several benefits, such as process efficiency, waste reduction, and supply chain transparency. Real-time analysis allows for the identification of areas that need improvement, which contributes to more sustainable resource management.

Several case studies show that companies that have implemented S/4HANA have experienced improved sustainability performance. Research by Müller et al. (2018) revealed that companies that adopt modern ERP technology note improvements in resource management and reduced carbon footprints. Thus, the implementation of application systems such as S/4HANA is not only relevant, but also crucial in achieving sustainability goals in an era that increasingly emphasizes the importance of this aspect. More research is needed to understand the long-term impact of these technologies on sustainability.

FRAME MIND



RESEARCH METHODS

a. Research Design

This study will use a case study approach to deeply understand the implementation of SAP S/4HANA at PT Pindo Deli Pulp & Paper Mills – 2 Dept NCR, Coater & Rereeler Unit

b. Data Collection Techniques

Data will be collected through a combination of interviews. Interviews will be conducted with the Manager, Production admin, and Accounting team to gain an in-depth understanding of the SAP S/4HANA implementation process.

- Name : Suarma
  Position : Production Manager
- Name : Rain Ghias Shreds
  Position : Production Manager
- Name : Fahmi Deniyasa
  Position : Production Admin Leader
- Name : Nor Ardi Ronaldi
  Position : Production Admin
- Name : Eko Hanggoro
  Position : Production Admin
- Name : Riko Purbowo
  Position : Production Manager
- Name : Bagaskara M Kalimasadjie
  Position :Accounting
- Name : Hadi Witanta
  Position : Production Operator

c. Data source

Data will be obtained from two main sources: interviews with managers and team leaders involved in the SAP S/4HANA implementation, as well as employees who use the system.

d. Analysis techniques

Qualitative data from the interviews will be analyzed using content analysis to identify patterns and themes that arise in connection with the implementation of SAP S/4HANA.

RESEARCH RESULTS AND DISCUSSION

Research Results

a. What is SAP S/4HANA

SAP S/4HANA is a business management software platform developed by SAP. The name "S/4HANA" stands for "SAP Business Suite 4 SAP HANA." The platform is designed to assist companies in managing various aspects of operations including finance, logistics, sales, and supply chain management, in a more efficient and real-time way.

SAP S/4HANA is built on SAP HANA's in-memory database, which enables faster data processing and real-time data analysis. Some of the key features of SAP S/4HANA include:

1. Modern User Interface: SAP S/4HANA uses a Fiori-based user interface, which is designed to enhance the user experience with an intuitive and responsive interface.
2. Data Integration and Consolidation: This system allows for better integration between modules and data consolidation, reducing the need for manual processes and reducing the risk of errors.
3. Real-Time Analytics: With in-memory database capabilities, SAP S/4HANA provides real-time data analysis, enabling faster, more up-to-date data-driven decision-making.
4. Cloud and On-Premise: SAP S/4HANA is available in a variety of implementation models, both in the cloud and on-premise, which provides flexibility for companies to choose the model that best suits their needs.
5. Automation and Process Efficiency: The platform supports business process automation and improved operational efficiency through better data integration and processing.

SAP S/4HANA is a solution designed to meet modern business challenges by offering the latest technology and innovative approaches in business management. In this study, researchers limited the functions of SAP S/4HANA to the Production Area at PT Pindodeli Pulp & Paper Mills 2 Department, NCR Unit, Coater & Rereeler.

b. Benefits and Functions of SAP S/4HANA in the Production Area

1. Production Planning

   SAP S/4HANA supports production planning by leveraging real-time data to plan raw material requirements, production capacity, and production schedules. This feature allows companies to optimize resource allocation and respond quickly to changes in market demand. By using integrated analytics data, companies can make more accurate and efficient planning.

"Production teams generally feel that this system makes their job easier by providing faster and more accurate data, although some team members initially need time to get used to the new interface" (Suarma, Production Manager, Interview, September 06, 2024)

2. Order Processing

   This system allows for efficient management of production orders through scheduling and resource allocation. SAP S/4HANA provides tools to monitor the status of production orders, speed up the approval process, and ensure that orders are processed according to the specified time. It helps in reducing lead time and increasing customer satisfaction.

3. Production Control

   SAP S/4HANA provides the ability to monitor and control production processes in real-time. Through dashboards and reports that can be accessed directly, users can monitor production progress, detect problems early, and take necessary actions to maintain production quality and efficiency. The system also allows for more detailed reporting and analysis of production performance.

   "SAP S/4HANA significantly improves efficiency by automating the input process and reducing human error. Data is now more accurate and the process is faster" (Fahmi Deniyasa, Production Admin Leader, Interview, September 6, 2024).

4. Raw Material Management

   When it comes to raw material management, SAP S/4HANA integrates inventory management with production processes. This feature allows companies to effectively manage the inventory of raw materials and components, organize the procurement of materials, and ensure the availability of sufficient materials to meet production needs. By doing so, companies can reduce the risk of material shortages and improve operational efficiency.

5. Reporting and Analytics

   SAP S/4HANA offers real-time analytics capabilities that allow companies to analyze production data in real time. Through comprehensive reporting, companies can identify areas that need improvement, evaluate production performance, and make data-driven decisions to improve production processes.

   "Features like real-time integrations and analytics dashboards are very helpful. This allows us to monitor production results directly and make faster decisions (Rain Ghias, Production Manager, Interview, September 09, 2024)

Discussion

In the development of technology, SAP plays an important role in the business world of every ERP system issued in an effort to maximize business and assist in its managerial SAP itself Established Since 1972 starting from SAP R, SAP R/2 (1979), SAP R/3 (1992), SAP ECC (2004), SAP S/4HANA (2015 -Present). PT Pindodeli Pulp and Paper Mills -2 has started using SAP S/4HANA from 2023, Why should you immediately switch to SAP S/4HANA because SAP S/4HANA itself is a development of SAP Previous and the main reason for the change is because SAP will stop its support for the previous SAP in 2027 so that it is the main step that every company that subscribes to SAP must take to be ready to face future business competition "We measure the success of the Implementation through a reduction in the number of input errors, a reduction in process time, and an increase in production team satisfaction. All indicators show a significant increase" (Riko Purbowo, Manager, Interview, September 09, 2024).

a. Advantages and Disadvantages of SAP ECC and SAP S/4HANA

Here is a comparison of the advantages and disadvantages between SAP ECC (ERP Central Component) and SAP S/4HANA:

1. **SAP ECC**

Excess:

- Stability and Reliability: It has been tested and widely used in various industries for many years.
- Flexibility: Supports a wide range of modules that can be customized according to business needs.
- Compatibility: Easy to integrate with many existing third-party systems.

Deficiency:

- Analytical Limitations: Data processing is often done in batches, which can lead to delays in reporting and analysis.
- User Interface: A more rigid and less intuitive user interface compared to S/4HANA.
- Maintenance Costs: Maintenance and updates can be more expensive and complex.

2. **SAP S/4HANA**

Excess:

- Real-Time Processing: Uses HANA in-memory technology that enables real-time data processing, accelerating analysis and decision-making.
- Modern Interface: Fiori's intuitive and responsive user interface, enhancing the user experience.
- Better Integration: A design that allows for easier integration with cloud applications and other digital solutions.
- Innovative Features: Provides the latest features and advanced analytics capabilities out-of-the-box.

Deficiency:

- Implementation Costs: The initial cost of migrating to S/4HANA can be high, especially for companies already using ECC.
- Migration Process: Migrating from ECC to S/4HANA can be complex and requires careful planning.
- Limitations in Special Features: Some features present in ECC may not be fully available or differ in S/4HANA.

3. **Summary**

SAP ECC offers stability and flexibility, but it has limitations in analytics and interfaces. SAP S/4HANA, on the other hand, offers innovation and real-time processing, but at a higher cost and migration challenge.

b. SAP S/4HANA Implementation Process in Production Input

"Before using SAP S/4HANA, we faced problems with data accuracy and long runtimes. Our old system often had input errors and took a long time to process data" (Ega Ardi Ronaldi, Interview, September 6, 2024).

The presence of SAP S/4HANA helps in Facilitating the Input Process and Reducing the Impact of *Human Error* For its implementation, there needs to be training guided directly from SAP Consultants so that the implementation and adaptation of the new system runs smoothly.

"We held intensive training for the team, including practical sessions and ongoing support from SAP consultants. Adaptation is carried out gradually to ensure a smooth transition" (Hadi Witanta, Production Operator, Interview, September 06, 2024).

"Examples of changes after implementation One of the real changes is the reduction in the time for input of production data from a few hours to a few minutes, which greatly increases productivity (Eko Hanggoro, Production Admin, Interview, September 6, 2024).

1. *FLOW PROCESS MATRIAL MOVEMENT PRODUCT*

PPIC OTIF Control refers to the control and monitoring process related to *On Time In Full (OTIF)* in the context of *Production Planning and Inventory Control (PPIC).* That is, it is a system or method used to ensure that the production and delivery of products is carried out according to the specified schedule and meets the complete requirements as per the customer's orders.

In the *PPIC OTIF CONTROL* process in SAP S/4HANA there are several stages, namely:

a. *Create BOM (Bill of Materials*): This process involves creating a list of materials needed to produce a product. The BOM mentions the raw materials, components, and quantities required. In SAP S/4HANA. The BOM is the foundation for the production process as it provides information about all the necessary materials and their stages of production.

b. *Production Version*: A production version is a specific combination of BOM and routing used to produce a specific item. It specifies the version of the BOM and routing to be implemented in the production process. In SAP S/4HANA, *the production version* is linked to the material master to ensure that the appropriate version of the BOM and *routing* is used according to the product specifications and production processes.

c. *Work Center*: A Work Center is a location or facility where production operations are carried out, such as machines, production lines, or departments. Each work center has a different capacity and cycle time. In SAP S/4HANA, *this* information-managed work center is used to plan production schedules and ensure production resources are available as needed.

d. *Production Routing*: *Routing* is the sequence of operations or steps that must be carried out to produce a product. It includes information about the work center used, the time required at each step, as well as the materials used at each stage of production. In SAP S/4HANA, *routing* is defined to efficiently plan and control production processes.

e. *Production Order*: A Production Order is a document created to start production. It contains instructions on what to produce, how much, and when to complete. In SAP S/4HANA, a production order includes information about the BOM, routing, work center, and required materials. Production orders also help in monitoring production status, controlling costs, and managing production resources.

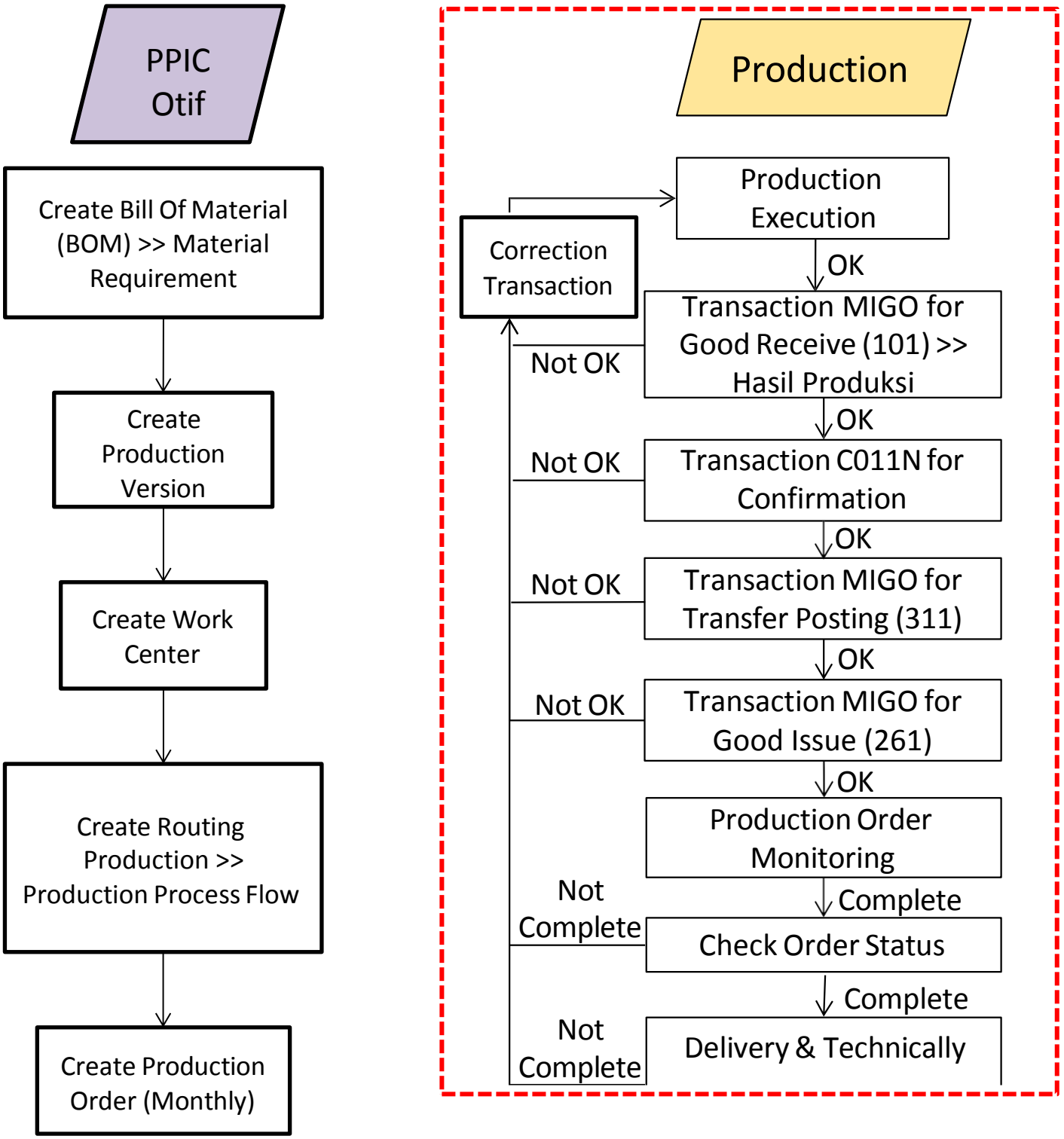
These processes are interconnected in SAP S/4HANA to ensure that production runs smoothly, materials are available as needed, and products are produced according to specifications and schedules.

After the Production Order has been created by PPIC, the production process can be carried out as follows:

1) *Good Received (GR):* The process of receiving goods that refers to the receipt of raw materials or components used in production. Once the item is received, the inventory status is updated in SAP.
2) *Transaction for Confirmation*: A confirmation process to record that production steps have been completed, such as work on a specific work center or operation. It is usually done through a transaction (CO11N) in SAP to confirm the completed operation.
3) *Post Transfer*: The process of moving goods between locations or types of materials in the system. For example, moving raw materials from the warehouse to the production area or finished goods to the finished goods warehouse after production is completed.
4) *Good Issue*: The process of removing raw materials or components from the warehouse for use in production. It reduces the stock of raw materials and records the use of materials in production.
5) *Production Order Monitoring*: Monitor the production status and progress of production orders. SAP provides dashboards and reports to monitor material usage, cycle times, and work progress in production.
6) *Check Order Status*: Check the status of a production order, whether it is in progress, completed, or there is an issue such as a delay or shortage of materials. This can be done within SAP through transactions or status reports.
7) *Delivery and Technically Completed*: The process of delivering finished goods to customers after production is complete. After that, the status of the production order is changed to "Technically Completed" in SAP, which indicates that the

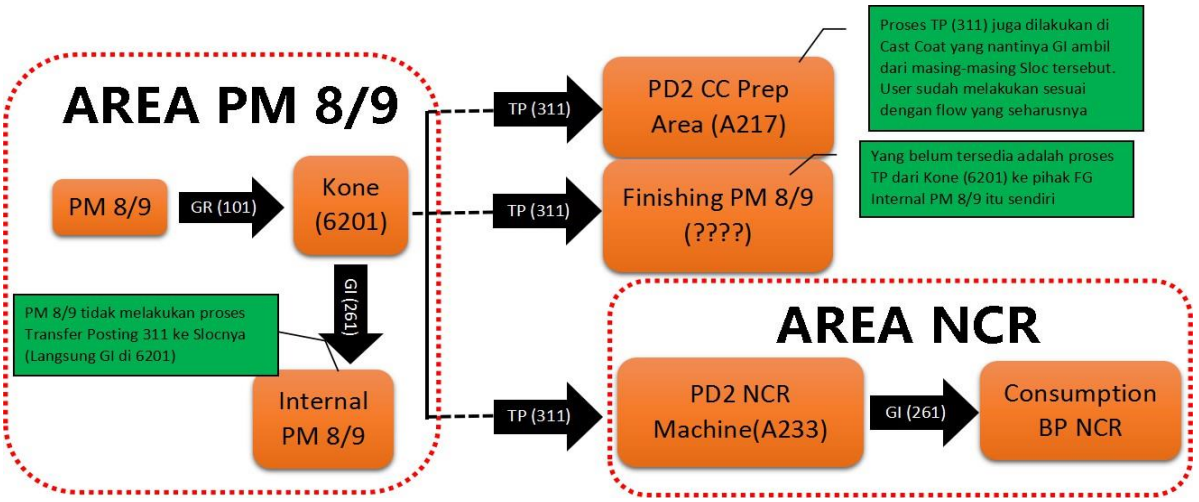
production has been completed and no further activities need to be done on the order

These processes help ensure that all production steps are accurately recorded, materials are available on time, and products can be completed and delivered as planned, here is the process flow:


PPIC
Otif
Create Bill Of Material (BOM) >> Material Requirement
Create Production Version
Create Work Center
Create Routing Production >> Production Process Flow
Create Production Order (Monthly)
Production
Production Execution
OK
Transaction MIGO for Good Receive (101) >> Hasil Produksi
Not OK
Correction Transaction
OK
Transaction C011N for Confirmation
Not OK
OK
Transaction MIGO for Transfer Posting (311)
Not OK
OK
Transaction MIGO for Good Issue (261)
Not OK
OK
Production Order Monitoring
Complete
Check Order Status
Not Complete
Complete
Delivery & Technically
Not Complete

2. *TRANSFER BASE PAPER*

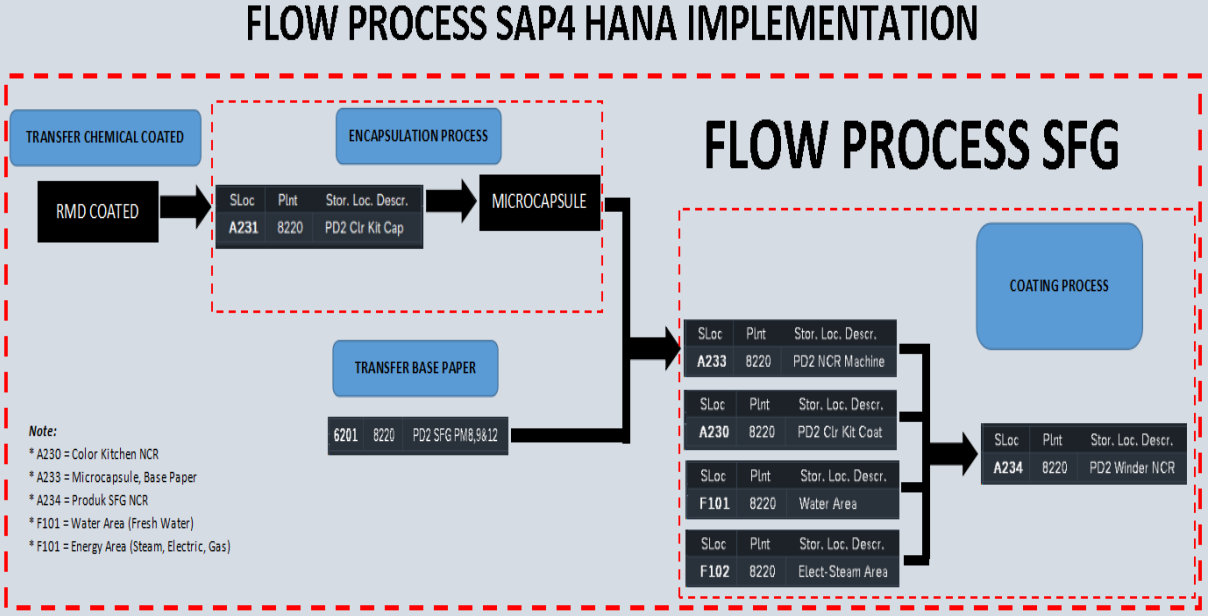
The PM 8/9 area is the department that produces semi-finished goods that will be coated in the NCR department to become finished goods or products that are ready to be marketed in addition to making semi-finished materials for NCR, PM 8/9 makes for the Cast Coat department and goods that have been produced from PM 8/9 are distributed by KONE here is the process flow:



3. *FLOW PROCESS SFG*

In the Semi Finish Good process there are several stages in the process, namely Rolled Matrial Deposit (RMD) coated provides the Chemicals/coating materials needed for the Color Kitchen which will later be supplied to the Coater to coat the semi-finished Base *Paper (Peper No Coating)* material into products, the same as the Fresh Water & Cogen Department they supply water, steam, gas.

The following is the SFG Process Flow:



4. *GI PROBLEM*

GI (Goods Issue) issues in SAP S/4HANA can be caused by several things related to processes and configurations in the system. Here are some common GI problems that often occur and ways to overcome them:

1. *Errors in the Goods Issue (GI) Process:*
   - Unable to do a Goods Issue: This can happen if there is a problem with the document or material you want to process. Check that the documents are complete or that the status is correct.
   - Solution: Check the master material configuration, material type, and stock status. Make sure the material to be removed is available in the correct location and has been registered in stock.

2. Problems with *Movement Type*:
   - Each GI uses a specific type of movement to move goods. If the type of movement used is not configured correctly, the system can fail to perform GI.
   - Solution: Make sure that the movement type used is correct and connected to the right process in the SAP configuration.

3. Problems with Unfulfilled Stock:
    - If the number of goods to be released (GI) is greater than the available stock, the system will generate an error.
    - Solution: Check the stock level of the material and make sure that the goods to be issued are available in sufficient quantities.

4. Problems with Order Status or Delivery:
    - GI is often associated with ordering or delivery. If the order or delivery status is invalid (for example, it has not been confirmed), the GI cannot be processed.
    - Solution: Make sure that the order or delivery already has a valid status for further processing.

5. Problems with Document Flow:
    - If there is an error in the document flow (for example, Sales Order, Delivery, or Purchase Order), the GI process will not be successful.
    - Solution: Check that all related documents have been created and have the appropriate status in the SAP system.

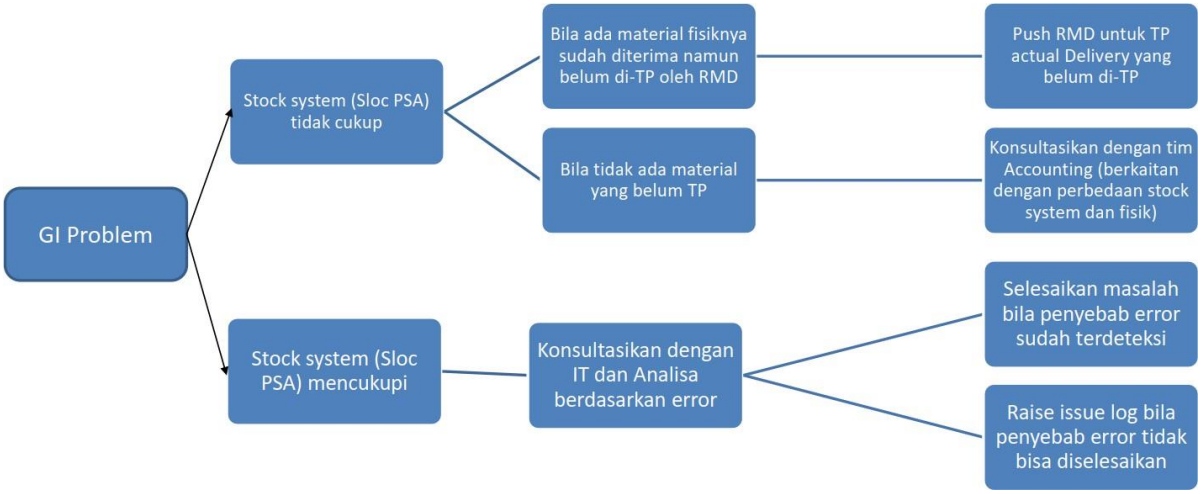
6. Problems with Master Data:
    - Incomplete or misconfigured master material or other master data can lead to failures in the GI process.
    - Solution: Check the master data material to ensure that the associated data (such as plant, storage location, etc.) is correct and as needed.

7. Authorization Setup Error:
    - Sometimes, GI issues occur due to inappropriate user access rights. Users may not have access rights to perform GI at a certain level.
    - Solution: Check the permissions settings and make sure the user has the appropriate authorization to perform the Goods Issue.

8. Errors Related to Batch Management:

- If the material uses batch management and there is no batch available for use when GI, an error may occur.
- Solution: Make sure the required batch is in the system and has been allocated correctly.

Here are some scenarios of GI Problems and their solutions:



5. *ADD MATERIAL BOM PROBLEM*

Problems related to Material BOM (Bill of Materials) in SAP S/4HANA, especially related to PRO (Production Order) that does not yet exist or already exists, can arise in various scenarios when you are trying to create or manage BOMs in the context of production, Here is one of the scenarios add Material BOM Problem and its solution:

CONCLUSION

The implementation of SAP S/4HANA at PT Pindo Deli Pulp & Paper Mills has brought a significant transformation in the management of production results. With SAP HANA in-memory databases, the system enables faster data processing and real-time analysis, which improves data accuracy, process efficiency, and decision-making. Features such as module integration, process automation, and Fiori-based user interfaces provide convenience and speed that was not previously available.

From this study, it is clear that switching from the legacy system to SAP S/4HANA reduces input errors, shortens process times, and improves overall productivity. A commitment to successful implementation, including intensive training and support from SAP consultants, plays a critical role in ensuring a smooth transition. The company has experienced significant benefits in terms of operational efficiency and better management of production data, making it well-prepared to face the challenges of the pulp and paper industry in the future.

Overall, the adoption of SAP S/4HANA reflects a strategic move to leverage the latest technologies to improve the company's competitiveness and productivity

SUGGESTION

In this study, of course, the researcher realizes that there are still many shortcomings in this scientific work and there are many more that can be developed from this title, the researcher hopes that this research will be developed so that all forms of information related to this research are more accurate and complete, therefore here are suggestions for the next researcher:

1. Deepening the Sustainability Aspect (Sustainability):

Researchers can further explore how the implementation of SAP S/4HANA directly contributes to the sustainability aspect of the company, be it in terms of energy efficiency, waste reduction, or increased productivity. This can include the study of how the system supports the company's long-term goals related to the environment and society.

2. Case Studies of Companies of Various Sizes:

The research can be expanded by comparing SAP S/4HANA implementations in large and small companies. This will provide a broader insight into how the size of the company affects the success of the implementation as well as the challenges it may face.

3. Cost-Benefit Analysis:

Researchers can further explore the initial costs and long-term benefits of SAP S/4HANA implementation, especially in the context of production efficiency and operational cost savings. The calculation of ROI (Return on Investment) and its impact on the company's financial sustainability can also be the main focus.

4. Challenges in Implementation and Solutions Found:

Research can be more in-depth on the technical, operational, and human resource challenges faced during SAP S/4HANA implementation. It can also include recommendations to address these barriers and improve the efficiency and success of implementation in the company.

5. Influence on Employee Performance:

The influence of SAP S/4HANA on employee performance, especially in production and logistics, can be analyzed. Researchers can see if this implementation speeds up the work process, improves data accuracy, or increases employee satisfaction in carrying out their duties.

6. Comparison with Other ERP Systems:

The next research can compare SAP S/4HANA with other ERP systems used by companies in production management, to see the advantages and weaknesses of the system in supporting the company's sustainability.

7. Security and Data Management Aspects:

The focus on more secure and structured data management through SAP S/4HANA can also be a topic. The study could examine how the system helps improve data transparency and integrity, which is critical for sustainability-based business decisions.

8. Feedback from System Users:

Conducting interviews or surveys with SAP S/4HANA system users in companies that have implemented it can provide a clearer perspective on the advantages and disadvantages from the perspective of the end user, as well as useful insights for long-term sustainability improvements.

9. Related Technology Trends:

Researchers can also examine the latest technology trends related to SAP S/4HANA, such as the use of AI, IoT, and big data, and how these technologies can further improve efficiency and sustainability in the company's production process.

With a broader and deeper focus, further research can make a significant contribution to the development of a more optimal and sustainable SAP S/4HANA implementation.

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