

## Customization in Standard Hierarchy Report for Improving Activity Based Costing Process

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### ABSTRACT

Activity based costing process is a process to accurately manage the cost allocation process for a product. With the development of technology, the activity-based costing process has been integrated with the ERP system so that it can relate to all business processes as a whole and can reduce expenses to manage the flow of information systems within the company. It is necessary to determine a fast business process for the allocation of these costs so that a product can be produced. A standard hierarchy is needed which serves as the center of the business process for determining the activity-based costing process. This process is still done manually so that it slows down the business determination process in the activity-based costing process. This research will implement the search function in the ABC system by creating a reporting system that can search business processes in the standard hierarchy in SAP S/4HANA. This research will use SEEM embed with SDLC method where this method pays attention from the perspective of the user and the company to produce an efficient ABC process with the company's objectives.

Keywords:  
Activity based costing; Cost allocation; Service engineering methodology; Find function; Standard hierarchy report.

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## 1. INTRODUCTION

In this digital era, one of the most needed is a system that can allocate costs accurately and effectively so that this cost allocation can be evenly distributed throughout all business processes in the company. One system that can accurately allocate costs is activity-based costing. Activity-Based Costing (ABC) provides a process-oriented view [1]. Due to the development of processes in this digital era that are increasingly complex, have a short-term life cycle of the products made, and the many kinds of products produced have led to the development of the ABC process [2]. Moreover, most of the growing companies and organizations are moving towards Enterprise Resource Planning (ERP) systems, to integrate their cross-functional business processes. ERP systems promise more and better information, which can lower costs and improve management performance.

Therefore, combining ABC and ERP systems has the main advantage that the integration of ABC into ERP can improve organizational efficiency and improve cost control and decision making and the use of modern IT technology encourages the adoption of ABC into ERP systems to improve overall success and performance. [3]

The importance of the ABC process in the company is because this process not only allocates production costs to products like traditional costing systems, but also assigns other costs, such as administrative costs, marketing costs, and so on, to cost objects, which include activities, products, and customers. [4]. ABC can obtain more accurate product costs that management can use for effective decisions about product mix and pricing [5]. The process of allocating costs with the ABC process requires three main components which are illustrated in Figure 1.

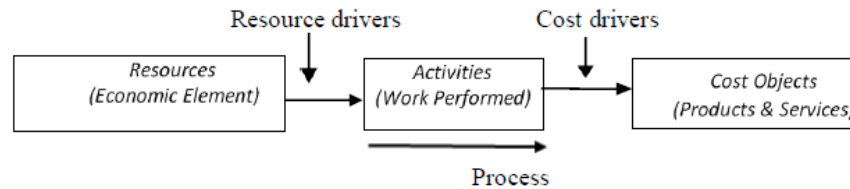


Figure 1 – Activity Based Costing Illustration in Companies [3]

Figure 1 illustrates the activity-based costing process in a company which consists of three main components, which are resources, activities, and cost objects. Where each allocation requires a basis that is used to allocate costs to cost objects, which is called the allocation base or cost driver [6].

The ABC process is widely applied in large ERP software, which is very different from the traditional period cost allocation [7]. One of the largest ERP applications that implements activity-based costing is SAP S/4HANA. SAP S/4HANA is a next generation SAP Business Suite application built specifically for the SAP HANA Platform. The main characteristics of SAP S/4HANA include simplification of business processes, significantly increased transaction efficiency, faster analytics, intuitive modern user interface (SAP Fiori), and planning and simulation options in many conventional transactions [8]. SAP S/4HANA has an additional edition with several different functions. Where there is the on-premise SAP S/4 HANA built and provisioned on an annual cycle with new functionality and the SAP S/4HANA Cloud built from a quarterly cycle with the latest functionality and content [9]

In this paper, the author raises the topic of activity-based costing problems at PT XYZ, which is one of the largest telecommunications companies in Indonesia that uses SAP S/4HANA to integrate the ABC process. The activity-based costing process that runs at PT XYZ can be illustrated in Figure 2.

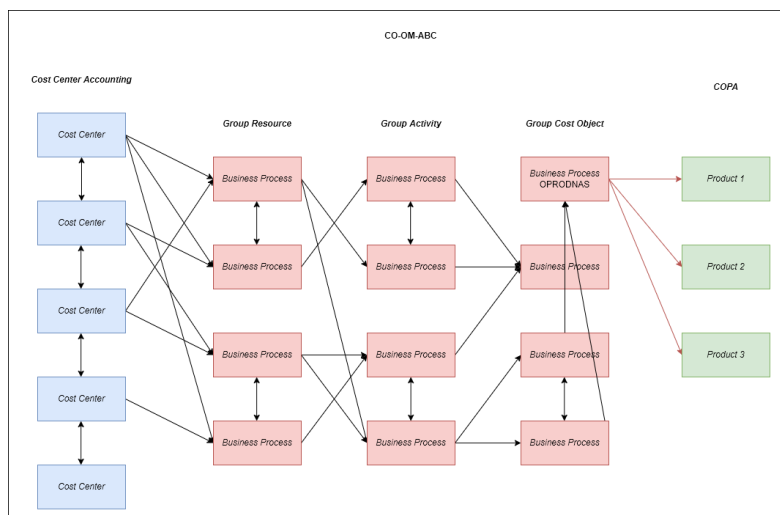
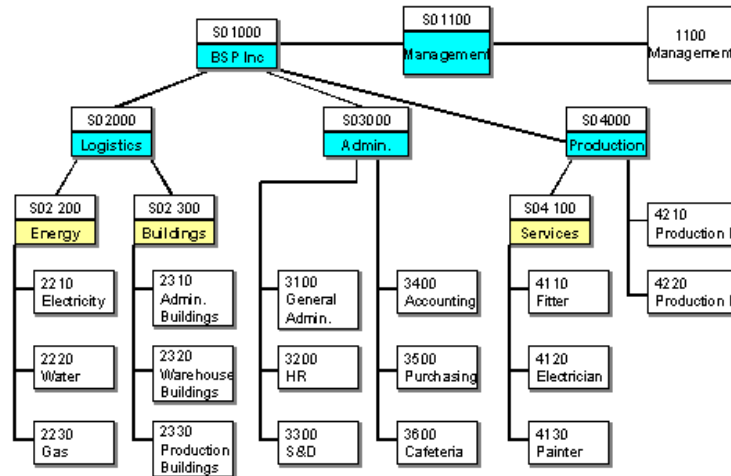


Figure 2 - Activity Based Costing Process [10]

The activity-based costing process used at PT XYZ is similar to the illustration in Figure 1 which has three main processes, which are resource, activity, and cost object. Figure 2 explains how the activity-based costing process runs in PT XYZ which has been integrated with the ERP system, called SAP S/4HANA. The cost allocation process begins when checking the cost center report before the allocation is made to see the amount of costs that will be allocated from the cost center to the resource group. If the activity-based costing process runs as it should be, then the ABC process will gradually allocate costs into the activity group, group cost object, and will produce a product. But if it doesn't work, then a re-allocation of costs is needed by assigning the business process to the ABC process.

Cost allocation is the process of assigning costs when there is no direct measure for the quantity of resources consumed by a particular cost object. To allocate costs, a business process is needed that will receive an allocation from the cost center. To find the right business process, the user must open the standard hierarchy. Standard hierarchy is a tree structure that is used to manage business processes from the controlling area. The standard hierarchy contains all cost centers and must represent the organizational structure [11].



**Figure 3 - Structure of a Standard Hierarchy [12]**

Figure 3 shows a standard hierarchical structure that is divided by each cost center group that contains a business process or group. The standard hierarchy can contain more cost centers depending on how the company customized the standard hierarchy which correlated as mentioned earlier that the standard hierarchy represents the organizational structure of a company. The problem starts when user want to search for business processes where it must be searched manually. So that the integration of the ABC process with SAP S/4HANA is not optimal because there is no find feature in the standard hierarchy. So, the author will make an improvement in the activity-based costing process by adding the find feature in the standard hierarchy.

In this improvement process, the author will use SAP ABAP as a programming language to improve the standard hierarchy because SAP ABAP is the only programming language that can be used in the SAP program. SAP ABAP (Advanced Business Application Programming) because it is a special programming language for SAP. SAP ABAP contains innovative features when a new SAP version is announced [13]. The performance of ABAP programming solutions plays an important role because actual code may reflect version-specific performance recommendations when the program was created [14]. Therefore, the development phase (ABAP - in the case of SAP) is a very important phase [15].

By using SAP ABAP, researchers can create a custom ABAP List Viewer (ALV) reports for standard hierarchy reporting for business processes. ALV provides us with a standard list format and user interface for all ABAP reports. ALV is created by a set of standard function modules provided by SAP [16]. ALV provides many built-in functions for reports and some of its functions are sorting records, filtering records, and downloading report output to excel/HTML. Because it has multiple functions, ALV substantially reduces report development time. ALV takes care of rendering the list, and can only concentrate on the data retrieval part. Some of the function modules used to generate ALV reports are listed below [17]

**Table 1 – ALV Modules**

<b>Function Module</b>	<b>Description</b>
REUSE_ALV_LIST_DISPLAY	Displays an ALV list
REUSE_ALV_GRID_DISPLAY	Displays an ALV grid
REUSE_ALV_COMMENTARY_WRITE	Outputs List header information
REUSE_ALV_VARIANT_F4	Displays variant selection dialog box
REUSE_ALV_VARIANT_EXISTENCE	Checks whether a variant exists
REUSE_ALV_FIELDCATALOG_MERGE	Creates a field catalog from dictionary structure or internal table

To help the researcher customize the standard hierarchy report, the researcher chose the service engineering methodology (SEEM) embedded with SDLC as the method of choice for this study. The reason why researchers use the service engineering methodology is because it has been developed to support companies during the engineering of their service offerings considering the perspectives of customers and companies [18]. SEEM supports companies in engineering and reengineering while balancing customer perceived value with internal efficiency and productivity of service delivery processes [19]. So, this method is vital in the analysis and designing process of the customized report based on the customer needs because the existing process lacks customer value.

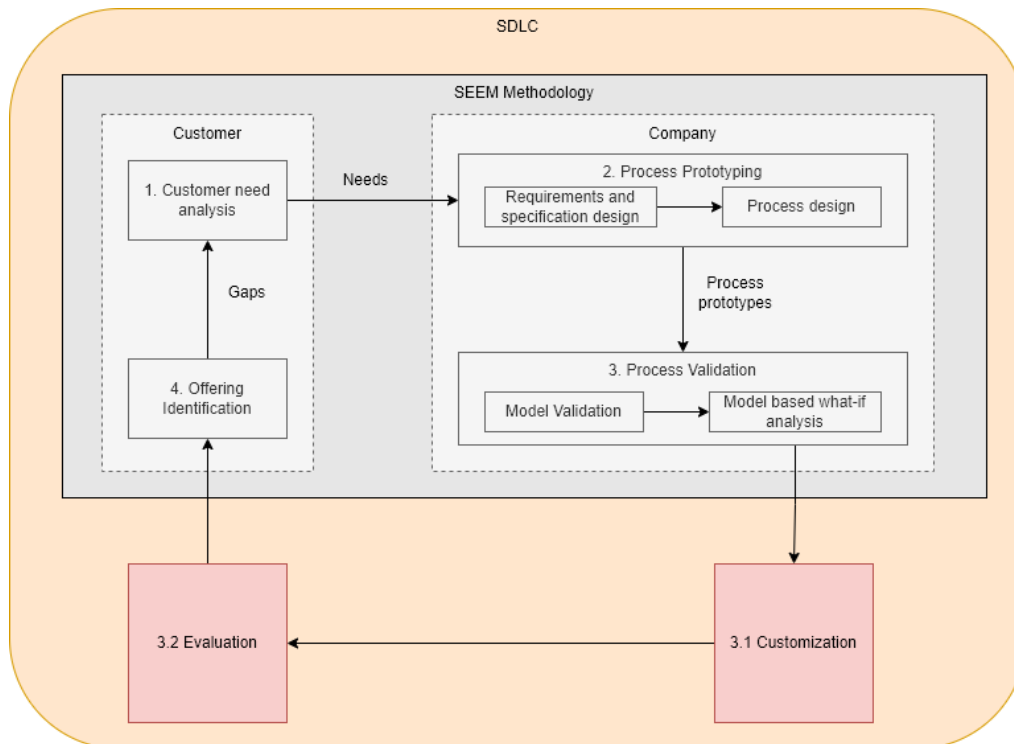
To help carry out this research, there are several relevant previous studies that will be used as references as basic concepts to carry out this paper which consists of service engineering methodology, activity based costing, SDLC, and black box testing. Table 2 below presents the relevant previous research.

**Table 2 – State of The Art**

<b>Title</b>	<b>Year</b>	<b>Object</b>	<b>Author</b>	<b>Method and Result</b>
Service Engineering Methodology in Practice: A case study from power and automation technologies	2015	Power and automation technologies	Alice Rondini, Fabiana Pirola, Giuditta Pezzotta, Mohamed-Zied Ouertani, Roberto Pinto	The result in this study is to re-engineer the service side of complex PSS offerings by ABB Low Voltage Breakers and Switches in Italy which is complex in nature and requires careful capability by using SEEM methodology.
Integrating Activity Based Costing (ABC) with Enterprise Resource Planning (ERP) for Effective Management: A Literature Review	2020	ABC and ERP integration	Thomas Kitsantas	The result in this study is about the effectiveness of using activity-based costing with ERP systems while considering its weaknesses.
Balancing Product-Service Provider's Performance and Customer's Value: the Service Engineering Methodology (SEEM)	2014	Customer satisfaction	Giuditta Pezzotta, Roberto Pinto, Fabiana Pirola, Mohamed-Zied Ouertani	The result in this study is to re-engineering the most suitable and complete PSS solution to increase the company's competitiveness and profitability by using SEEM methodology.
Portuguese AcinGov Portal requisition for procurement: SAP project implemented in ABAP module	2021	ABAP module	Rameez Qasim	The result in this study is to deliver an ALV report by using SAP ABAP module to support customer requests by using agile methodology.
Comparative Analysis of Software Development Life Cycle Models (SDLC)	2020	SDLC Method	Jide E. T. Akinsola <sup>1</sup> , Afolakemi S. Ogunbanwo, Olatunji J. Okesola <sup>1</sup> , Isaac J. Odun-Ayo, Florence D. Ayegbusi <sup>1</sup> , and Ayodele A. Adebisi	The result in this study is to identify the correct SDLC models to be used in a project.
A Comparative analysis on Black Box Testing Strategies	2016	Black box testing	Pramod Mathew Jacob, M. Prasanna	The result in this study is to test the functionality of the program to get the desired result.

## 2. METHODS

In the ERP customization process in improving the ABC process, the author will adopt the service engineering methodology embedded with SDLC in helping the ABC improvement process in the PT XYZ ERP system. This methodology is divided into two areas, namely the customer area and the company area. These areas have the following stages: [22]:



**Figure 4 – Service Engineering Methodology**

Figure 4 explains that there are four phases in this SEEM methodology. The first stage is Customer need analysis. This stage begins by analyzing customer needs which is the finance department at PT XYZ. At this stage the researcher conducted a structured interview with a list of questions that had been made by the author along with two representatives from the Financial Division who had the task of checking cost allocations and the IT Division manager as an SAP engineer to analyze their problems when assigning business processes to the cost center so that strategic planning can be generated.

The second stage is the process prototyping where customer needs have been identified and used as input for development which is divided into several parts. The first is the requirements and specifications design, where the aim is to find out the relationship between customer requirements and SAP S/4HANA components that can be used for ABC process development based on the results of interviews. Next is process design. At this stage, the author will create a service requirements tree (SRT) based on the results of the requirements and specifications design to perform decomposition and analysis of requirements to design specifications.

The third stage is process validation where the author makes an application architecture diagram which will provide a high-level description of the application architecture used and can help identify applications, sub-applications, components, databases, and their relationships [23]. from this application architecture diagram will be used as a model based what-if analysis based on questions [24]. Furthermore, the author adds two additional stages, which consists of customization and evaluation. The reason for adding these two stages is because SEEM has stages similar to those in SDLC, namely analysis and design [25]. So, after doing the analysis and design stages, the author will customize the report using SAP ABAP and evaluate it

The evaluation method that will be used is black box testing to test the functionality of the program that has been made, so this evaluation method focuses on what the software does [26]. In this evaluation process, the author uses cost center data that will be tested in the reporting that will be made. The results of this evaluation will be compared again by conducting end-to-end testing to check whether the reporting results made can speed up the ABC process. After

evaluation and comparison, the last stage in this paper is offering identification where the author will provide the results of the customization of the standard hierarchy used for business process searches.

### 3. RESULT AND DISCUSSION

The first phase in this paper is customer need analysis, which allows initial planning and preparation for customizing the standard hierarchical reporting system by interviewing the Finance Division. The results of this interview produce a strategic plan which will be used as the scope of this paper.

**Table 3 – Strategic Planning**

<b>Environments</b>	<b>Developments</b>	<b>Basic Concepts</b>
The process business in standard hierarchy structure at PT XYZ cannot search automatically because there is no find button to find the correct business process for ABC.	Customize the standard SAP ABAP Programming, Activity based costing process by add a find feature	

Table 3 explains that the environment of the problems at PT XYZ is the absence of a find function in the standard hierarchy to search for business processes in determining cost allocation. So, it takes development in the form of a search feature that goes into the development section. To carry out this development, the basic concepts of SAP ABAP programming are needed as a programming language in developing reporting and basic knowledge about activity base costing to find out the cost allocation process that occurs.

Next, the second phase is the prototyping process. The phase allows for the preparation of data collection in the actual-based costing process by creating the requirements and specifications based on the strategic planning to help researchers find the solution to this problem.

**Table 4 – Requirements and Specifications**

<b>Requirements</b>	<b>Descriptions</b>
Standard Hierarchy for Business Process	To display all the business process from the existing report
ALV Report	To show finished report in form of ALV Report
Find Function	To find the business process in standard hierarchy

After creating the requirements and specifications, the author makes a process design using SRT based on the results of interviews which is to realize the development of the ABC process with a standard hierarchy for business process reports.

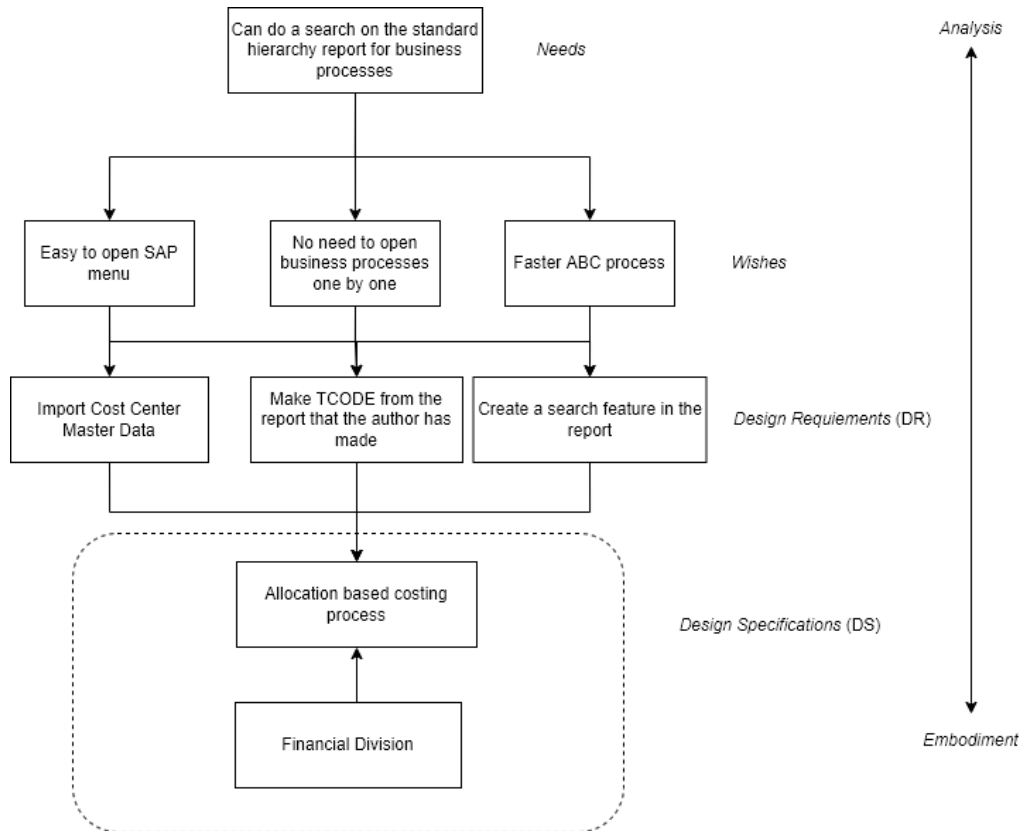


Figure 5 – SRT for Standard Hierarchy Report [18]

Figure 5 illustrates the service requirement tree which is sourced from the interview with the Financial Division. Based on the SRT, it states that the financial division wants a function that can perform searches in the standard hierarchy report in the hope that it can easily open the SAP menu, no need to open business processes one by one, and faster ABC processes. So those components are needed to fulfill these wishes, which consists of cost center master data, making TCODE to open standard hierarchy reports, and creating search features in the customized standard hierarchy report. So that the design specifications to speed up the allocation-based costing process can be carried out by the financial division.

### 3.1. Process Validation

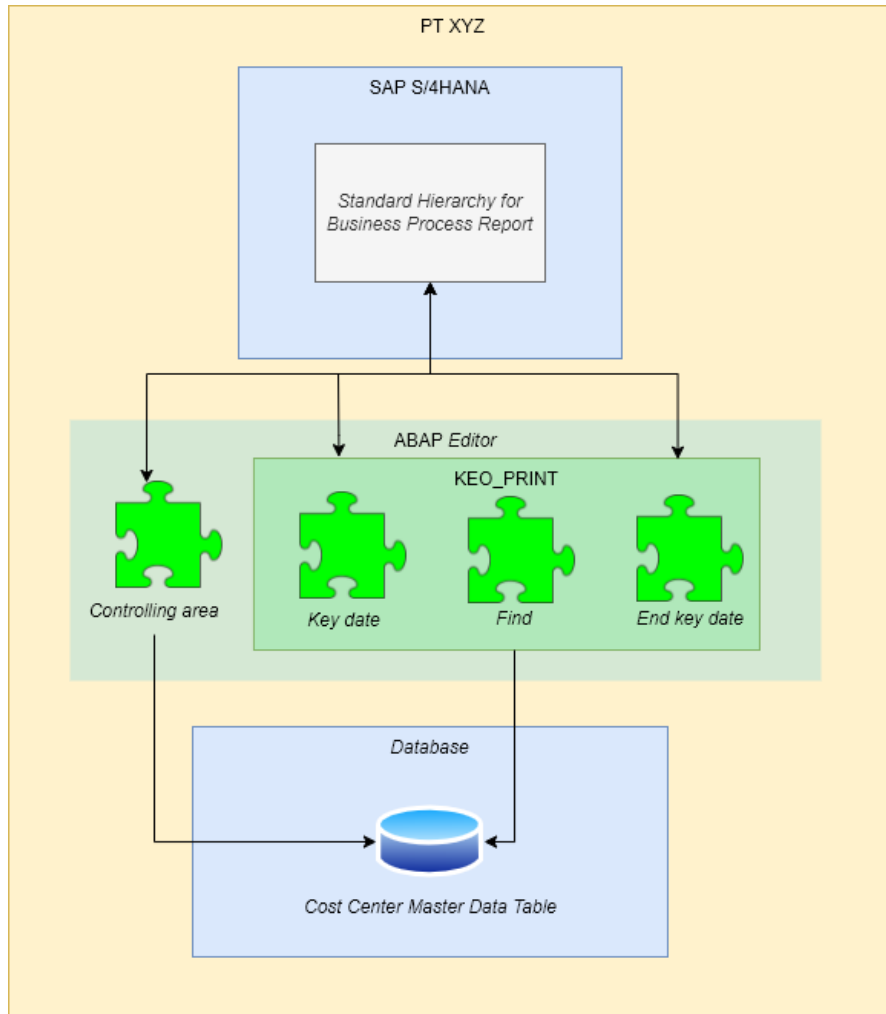
In the third stage, after making the SRT to assist the solution identification process, the author validates the model which will later be validated by the financial division. In this model validation, the writer uses the CSKS table to retrieve the cost center data that will be used, uses the KEO\_PRINT function to retrieve the KEO\_KEYDATE function to retrieve the start date used at PT XYZ, and KEO\_DATBI to retrieve the end date for the standard hierarchy for business processes. Table 5 is a list of required fields that will be used by the author as a selection parameter to display the standard hierarchy.

Table 5 - Standard Hierarchy for Business Process Report Field

Requirements	Technical Name	Source	Description
Controlling area	kokrs	CSKS Table	To retrieve cost center data that used by PT XYZ
Key date	keydate	KEO_Print function	To retrieve the day user open the report program
End key date	datbi	KEO_Print function	To determine the validation date from the standard hierarchy

Based on Table 5, the author uses these fields to display the standard hierarchy. The controlling area acts as the main component for displaying business process data in the cost center. Next, the author will make an application architecture diagram as a design of the relationship between data in PT XYZ which will be used by the financial division.





**Figure 6 - Standard Hierarchy Application Architecture Diagram**

Figure 6 shows the application architecture diagram of the standard hierarchy report that will help the ABC process with the find function to search for business processes. The author needs a master data of cost center as the main component for customization in the ALV report by importing all business processes using the controlling area. The researcher uses the ABAP editor to implement the KEO\_PRINT function to activate the find function in reports. As a result of customization with SAP ABAP, researchers will create a new standard hierarchy for business process reports with standard hierarchical master data displayed in ALV reports with the find function. So, the result of this implementation is a standard hierarchy for business process reports that will help the ABC process in the allocation of costs that have not been fully allocated.

After the validation model has been made in the form of an application architecture diagram, the author will perform a what-if analysis with the Financial Division through interviews. The following are the results of interviews based on what-if analysis.

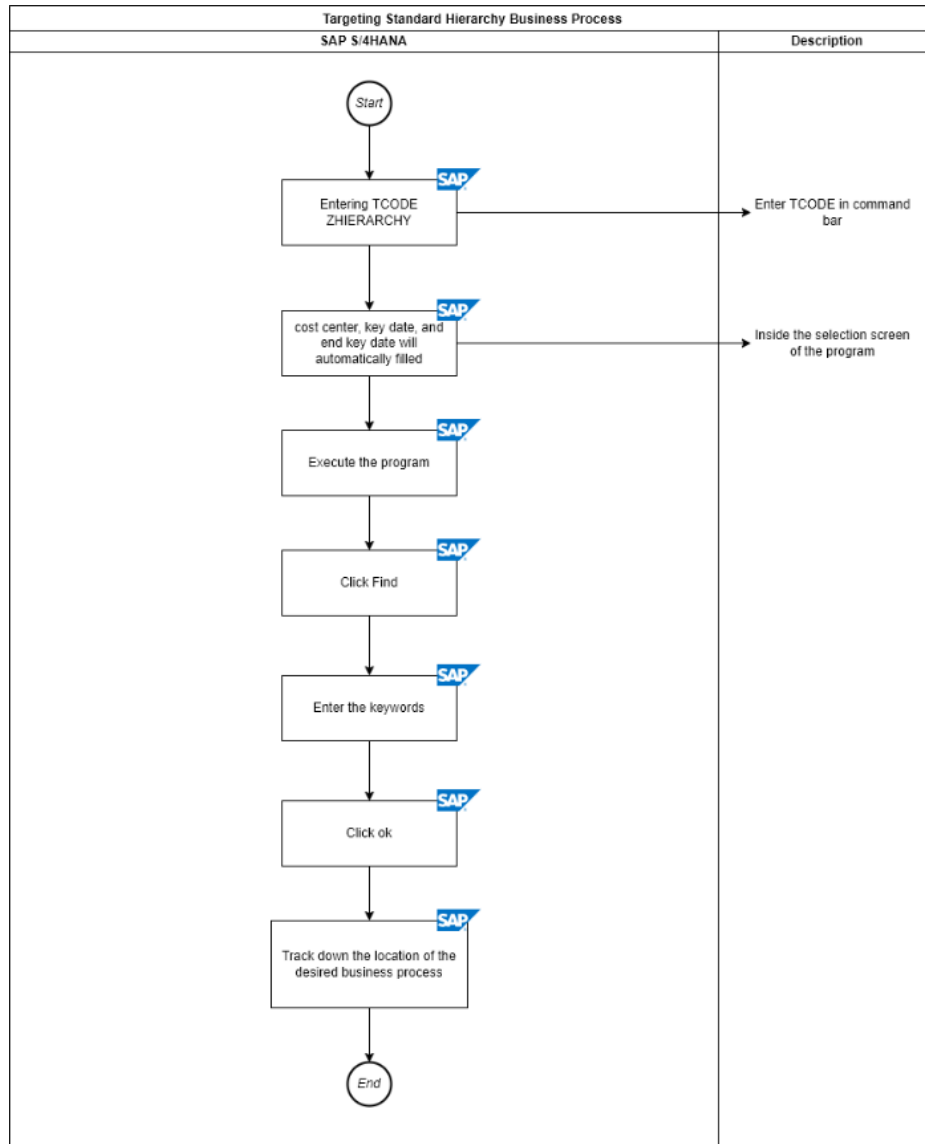
**Table 6 – What-If Analysis**

Question	Answer
If the user forgets the name of the business process that he wants to use, can he search with the keywords he remembers?	Yes, because the find function used from KEO_PRINT can search for all keywords contained in the standard hierarchy that contain those keywords.
Can keywords detect the description of the business process code if the user forgets the code?	Yes, because the find function can search for keywords that are in the standard hierarchy either the code or the description.

What if the user forgets the cost center that he wants to open? The cost center can be set automatically with an obligatory function in the ABAP Editor so that users can directly run the program.

What if the user forgets how to open the program? The author will create a TCODE that is easy to remember so that it can be accessed via the SAP command bar.

Based on the results of what-if analysis, the design has been fully answered and validated. The author can create a solution as business process targeting that will assist the financial division in finding business processes in carrying out the ABC process.

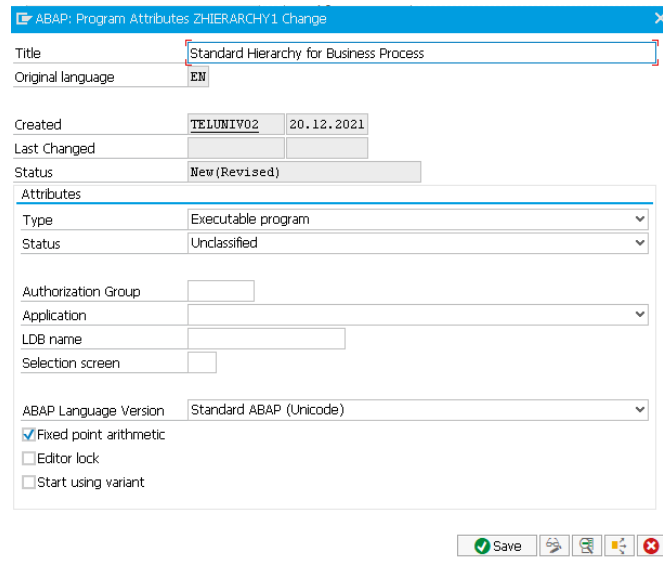


**Figure 7 - Targeting Standard Hierarchy for Business Process**

Figure 7 illustrates the solution that the author made. Where the standard hierarchy reporting program can be accessed by entering the ZHIERARCHY TCODE. After the user enters the TCODE, the user will be directed to the program selection screen where all fields consisting of cost center, key date, and end key date will be automatically filled to reduce the user's time to fill in the TCODE. field. Once the program is run, reporting will be displayed with the same structure as the standard hierarchy opened from existing business processes. However, there is an additional feature which is the find button to track the keywords that the user wants. When the user has written the keyword and clicked ok to find the business process, it will track the business process and open the sub process to know the detailed location of the business process itself.

### 3.2. Customization

In this stage the author will customize the reporting by implementing SAP ABAP in the ABAP editor (SE38).



**Figure 8 – Creating the ABAP Program**

Figure 8 shows that the author created this program with the executable type program so that this program can be run. Next, the author will save this program and will customize it by hard coding in the ABAP Editor.

```

6  REPORT ZHIERARCHY.
7
8  INCLUDE keo_constants.
9
10 PARAMETERS: p0ca TYPE cks-kokrs MEMORY ID cac.
11 PARAMETERS: p1keydat TYPE keo_keydate DEFAULT sy-datlo OBLIGATORY.
12 PARAMETERS: p2enddat TYPE datbi          DEFAULT sy-datlo OBLIGATORY.
13
14 SELECTION-SCREEN SKIP 1.
15
16
17 DATA: gd_type      TYPE hrarraytyp,
18       gd_std_grp   TYPE keo_stdhier,
19       gd_mode      TYPE sy-ucomm.
20
21 *Initialization
22 INITIALIZATION.
23   p2enddat = sy-datlo + 91.

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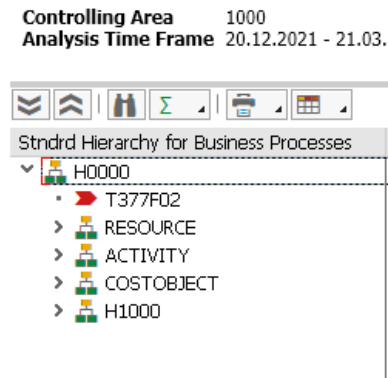
**Figure 9 – ABAP Code for Standard Hierarchy Report**

Figure 9 shows that the author makes the cost controlling parameter (P0ca) set using MEMORY ID so that the controlling area can be filled automatically by 1000 so that there is no need to fill in the controlling area of PT XYZ. Key date (p1keydat), and end key date (p2enddat) use DEFAULT sy-datlo to display the date automatically when the user opens the program. For the end date, user add 91 days more from the date of the user open the program to validate the end date of the business process.



**Figure 10 – Selection Screen for Customized Standard Hierarchy Report**

Figure 10 gives an initial view of the selection screen consisting of a controlling area, key date, and end key date which will be filled in automatically to shorten user entries. Key date itself will be filled automatically with the same date when the user runs the ALV Report program.



**Figure 11 – Customized Standard Hierarchy Report**

Figure 11 shows that after the user executes the program. In the standard reporting hierarchy there is a search feature symbolized by . So that the search feature can be done with the desired keywords.

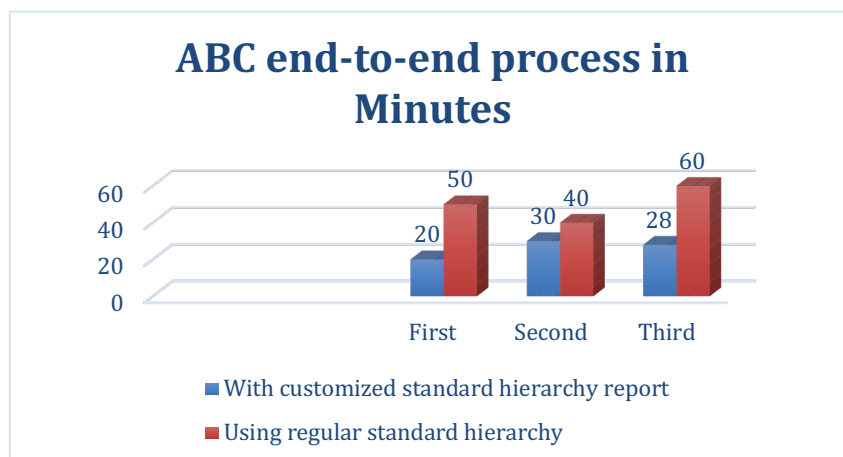
**3.3. Evaluation**

In this evaluation phase, the author uses black box testing to test the functionality of the standard hierarchy for business process report programs on the SAP S/4HANA system. In black box testing there are stages of input, process, and output. The table will explain what processes are carried out in the process column and system task. The input values entered are explained in the testing procedure column and the expected output values are in the indicators of success of this testing column are the system can enter the cost center, key date, and end key date automatically, the system can open the standard hierarchy structure for business processes, and the system can perform business process searches.

**Table 7 – Black Box Evaluation Result**

Process	System Task	Testing Procedure	Expected Output	Status
Displays all business processes in a standard hierarchy	All fields in the standard report will automatically filled	In the Cost center, key date, and end key date will be automatically filled. The user can immediately clicks execute	Displays the standard hierarchy report	Success
Looking for the desired business process	The system will search for the desired business process according to the keywords entered	Use the find function in the standard hierarchy report and enter the desired keywords	Displays business processes according to the keywords used	Success

After doing black-box testing, the author compares the ABC process end-to-end by doing a comparison between before and after the implementation of the customized standard hierarchy report to see a comparison of the time required. In this comparison, the author conducted three tests so that the following comparisons are produced:



**Figure 12 - Comparison of ABC Process**

Figure 12 shows that there is a significant time difference in the end-to-end cost allocation process. By using a customized standard hierarchy report, the average result is 26 minutes to complete the end-to-end process, while using a standard hierarchy report before customization takes an average of 50 minutes. So, from this comparison it can be proven that the reporting made by the author can help the financial division to make the ABC process almost twice faster in SAP S/4HANA. So that the results of this evaluation are in accordance with the ability of the activity-based costing process to measure performance [3].

### 3.4. Offering Identification

In this last stage, the author offered the identification of the customization that have gone through the testing phase to be given to the Functional Division.

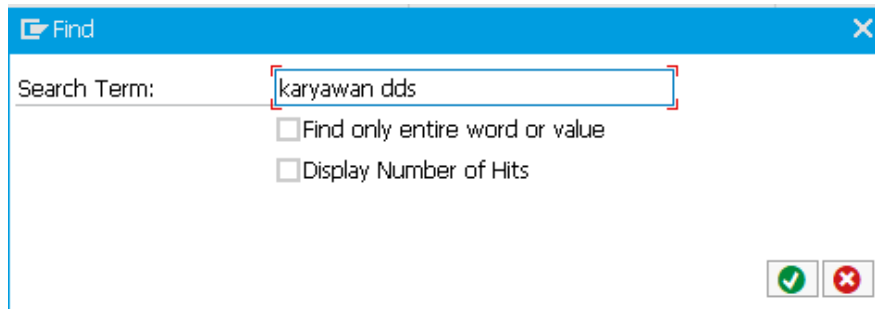


Figure 13 – Using Keywords

Figure 13 shows that the find function can be used and the author uses the “karyawan dds” as an example that this find function is already running.

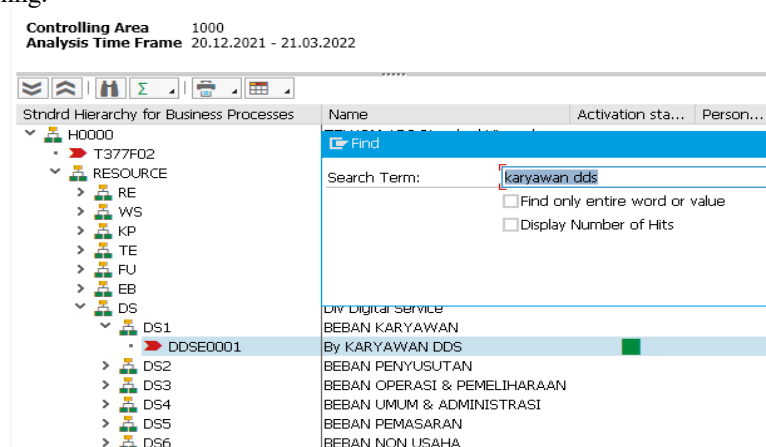


Figure 14 – Finding the Result

Figure 14 shows that the business processes used as the keyword can be traced so that the user knows the exact location of the business processes. With the implementation of the find function which can search for the business processes in detail, it can support the theory that ABC in the company can provide more accurate product costing [27], a positive impact on business performance [28], and a basis for strategic decision making, and measuring continuous improvement and performance [29]. After the find function works, the author creates a custom TCODE from SE93 so that users from PT XYZ can access the program easily. Researchers chose TCODE ZHIERARCHY as a shortcut to open a custom standard hierarchy report.

## 4. CONCLUSION

It can be concluded that customization using the ALV Report can be a solution to find business processes in the standard hierarchy to help balance the cost allocation process that still has residual costs in it. The activity-based costing process can be completed more quickly where the average speed in three testing processes is 26 minutes, which is almost twice as fast as using an ordinary standard hierarchy report. So, it is proven that this customization process can speed up the ABC process that has been implemented at PT XYZ. With faster ABC processing time, PT XYZ gets benefits in terms of time management to manage the cost allocation process, business impact, and a measured performance.

Suggestions from the author for the future work from this research is to develop when searching for cost allocations that have not been fully allocated. So, it can be easy to track which cost centers still have remaining costs because in this research the author needs to open cost centers one by one to find cost centers which has not been fully allocated.

## Disclaimer

The authors whose names are written certify that they have no conflict of interest

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