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**Analysis of Current State of Cost Accounting and  
how Overhead Management can improve  
Profitability**

Case Study

School of Technology and Innovations  
Master's thesis in Industrial Management

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**Tiivistelmä:**

Epäsuorat kustannukset ovat merkittävä osa yritysten kokonaiskustannuksista ja kustannuslaskentajärjestelmistä. Toiminnan aiheuttamia kustannuksia pyritään kattamaan kohdistamalla kustannukset valmistettavien tuotteiden kustannusrakenteille ennalta määriteltyjen allokointisääntöjen mukaisesti. Kustannusten kohdistamisella on suorat vaikutukset kannattavuuden seurantaan, sekä päätöksenteon luotettavuuteen.

Tämä pro gradu -tutkielma on toteutettu tapaustutkimuksena teollisuusyrityksessä, ja siinä tutkitaan yhden tuotantolinjan yleiskustannusten kohdistamista. Tutkimuksen tavoitteena on selvittää yleiskustannusten hallinnan nykytila, sekä arvioida miten yleiskustannusten hallinnan kehittämisellä voidaan parantaa kannattavuutta. Tutkimusaineistona käytettiin yrityksen sisäisestä toiminnanohjausjärjestelmästä saatua määrällistä aineistoa, jonka avulla verrattiin todellisia ja allokointisääntöjen kautta kerrytettyjä yleiskustannuksia, sekä selvitettiin niiden välisiä eroja. Aihetta on tarkasteltu kirjallisuuslähteiden kautta, missä kustannuslaskennan ja yleiskustannusten hallinnan on todettu olevan keskeisiä tekijöitä toiminnan kannattavuuden arvioinnissa.

Tutkimuksen tuloksena syntyi kuvaus tuotantolinjan yleiskustannusten hallinnan nykytilasta, sekä mitä vaikutuksia nykyisellä menetelmällä on. Löydökset osoittivat, että kokonaisuudessa yrityksen yleiskustannusten kohdistamissäännöillä pystytään kattamaan epäsuoria kustannuksia melko hyvin, mutta kuukausikohtaisessa tarkastelussa tuotantolinjatasolla toteutuneiden ja kerrytettyjen välillä havaittiin suuria eroja.

Tulosten perusteella voidaan todeta, että tarkempi yleiskustannusten hallinta ja tuotantolinjakohertainen seuranta voisivat olla keinoja, joiden avulla pystytään parantamaan kustannusten läpinäkyvyyttä, sekä tuotteiden ja toimintojen kannattavuutta.

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**UNIVERSITY OF VAASA****School of Technology and Innovations**

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**ABSTRACT:**

Indirect costs form a significant part of companies' total expenses and cost accounting systems. The costs generated from operations are covered by allocating them to cost structures of manufactured products according to predetermined allocation rules. The allocation of costs has a direct impact on profitability monitoring and the reliability of managerial decision-making.

This master's thesis was conducted as a case study in an industrial company, studying the allocation of overhead costs within one production line. The objective of the study was to clarify the current state of overhead management and to evaluate how improving the overhead management could improve profitability. The research data consisted of quantitative information obtained from the company's internal enterprise resource planning system, which was used to compare actual and calculated overhead costs and to identify differences between them. The subject was studied through literature review, in which cost accounting and overhead management were identified as key elements in assessing operational profitability.

The results of the study produced a description of the current state of overhead management in the production line and of its effects on company's cost accounting system. The findings indicated that overall, the company's current allocation rules can cover indirect costs reasonably well, but monthly analysis at the production line level revealed notable differences between realised and allocated overhead costs.

Based on the results, it can be concluded that more accurate management production line level monitoring could be effective means to improve transparency and to enhance the assessment of product and operational profitability.

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**KEYWORDS:** Cost Accounting, Overhead Management, Profitability, Case Study

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### Abbreviations

|            |                                     |
|------------|-------------------------------------|
| <b>ABB</b> | Asea Brown Boveri                   |
| <b>CAS</b> | Cost Accounting System              |
| <b>ERP</b> | Enterprise Resource Planning System |
| <b>OH</b>  | Overhead                            |

**WIP**

Work-in-Progress (Semi-finished goods)

# 1 Introduction

In today's global business environment, manufacturing companies operate in an increasingly competitive landscape where success for profitable business depends on the ability to combine price, quality, and agility. Companies must balance efficiency with responsiveness, and ensure that they can adapt to rapidly changing customer demands and market conditions.

To succeed in such an environment, organizations must be able to rely heavily on their decision-making processes and management systems. Among these systems, cost accounting plays a particular role. Cost accounting processes produce reports, analyses, and performance indicators that support both operational control and strategic decision-making. Through these processes the operational and managerial leadership gain insights into product profitability, cost structures and the efficiency of resource utilization.

A critical part of cost accounting is the overhead management. Unlike direct costs, which can be assigned directly to products, overhead costs require allocation through cost drivers or predetermined rates. The accuracy of this allocation has a direct impact on reported profitability and on managerial decisions such as pricing, and investment.

This study investigates cost accounting with a particular emphasis on allocation and management of overheads by focusing on one specific production line within the case company. The study examines how overhead absorption affects profitability reporting and explores the potential consequences of under- and over-absorption in practice.

## 1.1 Background of the Study

The motivation for this study comes from the case company's need to enhance the accuracy of its profitability reporting and overhead management, as overheads form a

considerable share of total costs, and the way in which these are allocated directly shapes the perceived performance of products and processes.

This study is conducted in response to the company's need to evaluate the current state of its overhead managing system. The finance and accounting function has identified lack of dedicated tools for systematically monitoring and managing overhead allocations. While overhead absorption rates are in place there is limited transparency regarding the assumptions behind these rates and the extent to which they reflect actual cost behaviour. It has been observed, in this specific studied production line, that actual overhead costs often exceed the amounts absorbed into product cost through the current allocation model. This discrepancy could raise a concern about the reliability of reported profitability figures and could lead underestimating overheads.

By analysing the gap between absorbed and actual costs, this study aims to provide insights that will help the case company to improve the accuracy of its cost accounting practices.

## **1.2 Research Questions and Objectives of the Study**

The purpose of this study is to analyse the competency of the current overhead allocation practices in the case company's cost accounting system. The analysis focuses on one specific production line, where discrepancies have been observed between Actual overhead costs and the amount of overhead costs Applied into product costs. More specifically, this study aims to examine the current methods and absorption rates used for overhead absorption, assess how well these practices reflect actual coverage of overheads, and to analyse the impact in under- over-absorption on reported profitability and inventory valuation.

To address these objectives, the study is guided by following two research questions:

1. *How are overheads currently managed as a part of cost accounting in the case company?*
2. *How can managing overheads improve profitability in the case company?*

### **1.3 Structure of the Study**

This study follows five main chapters. The first chapter introduces the topic by presenting the background of the study, the research questions and objectives, as well as limitations of the work. The second chapter develops the theoretical framework by reviewing relevant literature on cost accounting, overhead absorption, and product profitability to establish a basis for the empirical analysis. The third chapter outlines the research methodology and empirical setting, describing how data is collected and analysed to investigate the current state of the overhead management. The fourth chapter presents the results of empirical analysis, focusing on the observed differences between actual and absorbed overheads and their implications in profitability analysis. The fifth chapter discusses the findings and gives conclusions of the study and highlights possible managerial implications and avenues for future research work.

### **1.4 Limitations**

Limitations for this study are both organizational and data related. The research is restricted to a single case company and focuses only on one specific production line. This narrow scope allows for detailed analysis, but it reduces the generalizability of the findings to other companies, business units, or production lines with different cost structures. The study relies exclusively on internal data extracted from company's enterprise resource planning (ERP) system, SAP. The results therefore reflect the reporting practices and assumptions built into that system. Because of these limitations, the findings interpreted primarily as insights for the case company, while their broader applicability remains restricted.

## 1.5 Case Organization

ABB is a global technology leader in electrification and automation, employing approximately 110,000 people in more than 100 countries with annual revenues of around 33 billion dollars. ABB's operations are organized into four business areas: Electrification, Motion, Process Automation, and Discrete Automation (ABB, 2025). The company operates more than 170 production sites worldwide, providing technology solutions that improve energy efficiency, productivity, and sustainability across industrial sectors.

The case company examined in this study is part of ABB's Motion business area, specifically the IEC LV Motors located in Vaasa, Finland. The company manufactures electric low voltage motors for global industrial markets and forms one of ABB's key production units in Europe. Approximately one third of the motors produced in Vaasa are custom designed to meet specific customer requirements.

The empirical analysis focuses on one specific production line in the case company, that manufactures a defined range of electric motors. The production line is relatively new in the factory, and the products manufactured are standardized with fixed configurations and limited customization. The production line was selected as the focus of this study because its simpler product structures allow a clearer analysis of overhead absorption mechanisms. The findings from this study can potentially be applied to other, more complex production lines within the factory.

The following sections describe the cost accounting system and overhead management practices in this production line.

## **2 Theoretical Background**

This section of the study reviews the theoretical background relevant to the study. The aim is to explain the key concepts of cost accounting, overhead management and overhead absorption, profitability, and how these link to the case study. In addition, the chosen research approach is discussed to explain why a case study research approach is suitable for this study. The literature provides foundation for later analysis of the production line studied in this thesis and helps to understand how overhead management affects profitability in practice.

The chapter is divided into five parts. Section 2.1 introduces cost accounting as the broader framework that provides information for decision making. Section 2.2 discusses the overhead management as one of key elements in cost accounting, since allocation methods can significantly influence reported costs. Section 2.3 examines relationship between overheads and profitability, highlighting how misallocated costs can distort managerial conclusions. Section 2.4 discusses the absorption of overheads. Lastly, section 2.5 presents the summary of this theoretical background.

The one specific production line in the case company, which is the focus of the study, connects the theory with practice. This production line currently experiences under-absorption of overheads, and this practical situation emphasizes the challenges described in the literature and indicates why accurate overhead management and allocation methods are important for reliable profitability analysis.

### **2.1 Cost Accounting**

In business, regardless of the industry, the fundamental objective is to produce goods or services so that the revenues cover the resources consumed in their production. In the optimal situation, the sales of the goods or services generate profit, enabling the company to sustain and develop its operations. To support this objective, reaching operations

into an optimal situation, various systems and methods have been developed to analyse and evaluate costs. These systems and methods are collectively referred as to cost accounting. According to Boyd (2022), from an economic perspective, the profitability of a product is largely determined through this system.

Cost Accounting System (CAS) is the basis of information for managerial decision-making processes. Despite all the criticism over the years for its lack of accuracy, since the supporting data is based on financial postings that has already taken place, the system has evolved and remain one of the most common and trusted information-tool for managerial purposes (Yaser Saleh et al., 2023).

Cost accounting acts as a supporting spine for managerial decision-making, operational control and strategic planning, and performance monitoring by providing information and insights how resources are consumed and what is the outcome of it. To plan future and improve current operations, management must rely on reliable information about existing activities and their cost implications. According to Drury (2018), cost accounting can be viewed as a tool of information for management that enables managers to plan, control, and make decisions. Likewise, Kohli (2009) describes cost accounting as an informer for management, that not only identifies costs bult also helps reducing them.

## **2.2 Overhead Management**

In its simplest form, managing overheads means the ability to differentiate costs into direct and indirect costs. Direct costs are expenses that can be directly assigned to the produced goods, where indirect costs can't be directly assigned (Boyd, 2022). Meaning that all the expenses, such as materials and labour, that are directly consumed to the goods are direct costs. On the other hand, all the costs around that production, such as electricity, rents, and logistics that can't be directly assigned to a single product, are indirect costs. These indirect costs are known better as overheads.

In a broader perspective, overhead costs can be divided into different categories that reflect the organization's structure, functions, and activities. By breaking down the overall overhead cost base into smaller, more specific classifications by its nature or variability, a clearer picture of operational efficiency can be obtained. The recognition of the variability of overheads is one the key parts in overhead management. By categorising overheads into variable and fixed costs, it enables the flexibility in the overhead managing process by giving the ability for costs to be decreased or increased directly in relation to the volume of production (Bragg, 2011).

Through systematic overhead management, efficiency can be measured and improved, which, according to Periasamy (2009), leads to a positive managerial outcome including enhanced cost control, more effective decision-making processes, and even improved total profitability.

In today's global market environment, business success requires efficiency in every function and operations in the company. Overheads have become increasingly significant share of total production and operational costs. However, when overheads are properly managed and controlled through systematic planning, the total cost of operational cost can be reduced significantly and make the whole operational system profitable (Kohli, 2009).

### **2.3 Profitability and Overheads**

According to Bragg (2013), the most harmful thing for a company is unreliable information behind decision-making. This occurs, when all the information provided for the management isn't as accurate as it should. Many times, this area of faulty information is about indirect cost, or clearer, overhead costs. As overhead costs represents a significant share of all costs in many companies, its importance for cost management and profitability analysis is crucial, and the accurate allocation of these costs is important.

Cost accounting as a cost information system has a considerable role in decision-making processes and one of the most complicated issues in it is the allocation of overheads (Arora, 2009). According to Reka et al. (2010), the focus of all manufacturing organizations should be on developing of products with tolerable cost structures to make profit. Drury (2018) further emphasizes that the primary goal of commercial organizations is to maximise profits in the future, which underlines the importance of accurate cost control.

For tolerable cost structures that ensure that all indirect costs are properly absorbed into the product structures, the distribution of overheads is crucial. In modern manufacturing organizations, the costs of supporting functions have increased significantly (Cooper & Kaplan, 1988). According to Bragg (2013), indirect expenses, such as labour, has an extensive effect on product costs. Covering these costs by absorbing them into has become an integral part of cost accounting practise.

This relationship between overheads and profitability is also evident in section 2.3, where the effects of under- and over-absorption were discussed, particularly their impact on inventory valuation and the potential over- or under-statement of products. Saleh et al. (2023), also highlights, that the total cost of a single product can be resolved only, when all the costs are added into the cost structure. These effects demonstrate how inaccuracies in overhead allocation can distort both cost information and the overall assessment of profitability. According to Terzioglu (2012), cost allocation could act as a motivator for management and lead into greater economical decision-making.

## **2.4 Overhead Absorption**

As stated earlier, overhead costs have significant affect to the whole operating system in organizations when the efficiency is measured through costs. To manage these effects, organizations must manage overheads, which is why overhead management plays a crucial role in the cost accounting system.

One way of measuring the results of effective overhead management is examining absorption of overheads. Meaning, that how truly the actual overhead costs are absorbed by the manufactured goods in the organization (Arora 2009). In other words, absorption can be described how indirect costs are distributed into cost structure of products.

According to Kohli (2009) and Arora (2009), the absorption of overheads can be measured with value of Under- or Over-absorption, which indicates how the absorbed costs from products reflects the actual indirect costs in the company. Under-absorption is a situation where the absorption of overhead costs from the produced goods is lower than the amount of incurred actual overheads, when over-absorption represents an opposite situation where the absorbed overheads are higher than actual overheads.

Situation, where absorbing overheads leads to result of either Under- or Over-absorption, is result of the overhead allocating rules and rates used. Overhead rate is a value which is used to absorb costs through product structures. The unit of rate is a percentage which is used to multiply costs from a base of actual overheads into product's cost structure. There are primarily six different overhead rates to be used for absorption, but the choice of used rate it is often based on structure of the organization (Periasamy, 2009). For example, Actual overhead rate, which means that actual incurred overheads are divided with actual realised units of measure. Actual overhead rate is never resulting either under- or over-absorption, meaning that no difference occurs between actual incurred overheads and overheads absorbed through the rates.

As mentioned earlier, the choice of used overhead rate is based on structure of the organization or production plant. Using the Actual overhead rate may lead to ideal situation, where neither under- nor over-absorption occurs, method has its disadvantages being unflexible compared to Predetermined overhead rate. According to Arora (2009), the predetermined overhead rate, which is based on estimated number of actual

overheads divided on estimated outcome of operations. This predetermined rate is flexible in changing situations where estimated situations on production volumes, product pricing and cost control occurs.

Observing the overhead absorption through the results of under- and over-absorption is beneficial because the result has a significant impact to the outcome of company's cost accounting system and profitability of the operations. There are certain outcomes of under- or over-absorption, such as the impact on inventory valuation. The inventory value roughly consists of the materials used and finished- and semi-finished products (WIP). The impact of overhead absorption in inventory is seen on the valuation of finished and semi-finished products, as they also include the indirect costs from the production, and because raw materials don't include overhead costs (Bragg, 2011). The impact of overhead absorption in inventory value can lead either over- or undervaluation of the inventory. If under-absorption occurs, it underestimates the value of products (finished or semi-finished), since all the real cost are not distributed correctly, the inventory value becomes undervalued. If over-absorption occurs, then the valuation of products is overestimated, which leads to overvaluation of the inventory. Boyd (2022), indicates, that all the costs of semi-finished and finished products remain in the inventory until they are handled (sold) over.

## **2.5 Summary of the Theoretical Background**

This section summarizes the theoretical background of this study. The chapter reviewed the key theoretical concepts of cost accounting, overhead management, and overhead absorption. These topics describe how cost structures are formed and how managerial decisions are influenced by cost information on manufacturing environment.

Cost accounting was described as central framework for managerial decision-making processes, for collecting, analysing and reporting cost information. The accuracy of the

cost accounting system defines the quality of cost information available for management and how it has direct impact on operational planning and control.

Overhead management was discussed as one of the key components of cost accounting, because indirect costs, overheads, represents a large share of total expenses in manufacturing organizations. The reviewed literature emphasizes that systematic management of overheads improves efficiency, cost control and therefore the profitability of the company.

The relationship between overheads and profitability was studied through the cost allocation and absorption. When the indirect costs are incorrectly allocated, the reported cost structure of products and profitability of the company may become distorted. Accurate absorption of overheads into products is essential to make sure that costs reflect the consumption of resources. Measuring the overhead allocation through under- and over-absorption provides an indication of how efficiently overhead management operates in practice.

Based on the theoretical framework, it can be concluded that accurate overhead allocation and management, as well as reliable cost accounting are essential for understanding and improving the product and overall profitability in manufacturing organizations.

### **3 Methodology and Empirical study**

#### **3.1 Research Approach**

The strategy behind the case study approach is to understand the present dynamics within a single research setting, where the analysed data could be either quantitative, qualitative, or both (Eisenhardt, 1989; Feagin et al., 2016). This approach was particularly suitable for this study, because the examined issue in the case company could be observed both numerically (quantitative) and visually reflections (qualitative).

Although this study focuses on relatively small scale industrial case, the case study approach has been shown to be fully adaptable to much larger context, including multinational and cross-cultural studies (Nishiwaki and Oe, 2023). This underlines how flexible the case study approach is and supports its use in these smaller-scale research, although the method is not particularly popular in accounting research (Baker et al. 2023).

In defining the research design, the case study approach offered a natural framework because the studied phenomenon was examined within a single production line in a single production unit. While the topic could be discussed qualitatively with company representatives, the actual data analysed for this research was numerical from company's ERP system. The approach enabled a combination of practical, specific information with detailed qualitative discussions.

According to Dul and Hak (2008), when a case study approach is implemented in business-related research, the analysed data is often numerical, but the outcomes can be qualitatively observed and reasoned. This is also visible in this paper, where the analysed overhead and cost data is analysed quantitatively, but the results and their implications for the case company is made mainly qualitatively.

As Rashid et al. (2019) emphasize, that the strength of the case study approach as a research method is its ability to view phenomenon in its natural surroundings. The ability

is seen in this study, where the cost structures, system configurations and managerial practices happen in real industrial environment of the production line. The case study approach allowed the phenomenon to be studied considering both numerical data and the operational context influencing it.

According to Yin (2009), the selection of a research method is directly related to phenomena the researcher is trying to explain and solve, and how much control the researcher has over the event occurring. When the purpose of the study is to explain contemporary events and researcher has very limited capabilities to control these events, a case study approach becomes particularly appropriate. Yin (2009) also notes that case studies are best suited to answering questions that are trying to discover “what is happening” and “why it happens”.

In the context of this paper, the objective was to understand why differences occur between actual and applied overheads, and how these differences develop in the case company’s cost accounting system. The events under this analysis were under internal organizational processes in the company’s operational and accounting routines, and therefore beyond researcher’s control.

Even if the event is temporary, Baškarada (2014) further emphasizes, that case studies are effective when the phenomenon is broad or complicated, events must be understood together. In situations where overall picture is visible, but the drivers require closer examination, an in-depth case study enables the researcher to assemble small pieces together that explain the whole system and the phenomena. This reasoning fits the current methodological setting well: while the company’s overall overhead absorption could be seen on higher level, a deeper understanding of the absorption system required detailed analysis of cost structures, overhead rates, and allocations at the production line level.

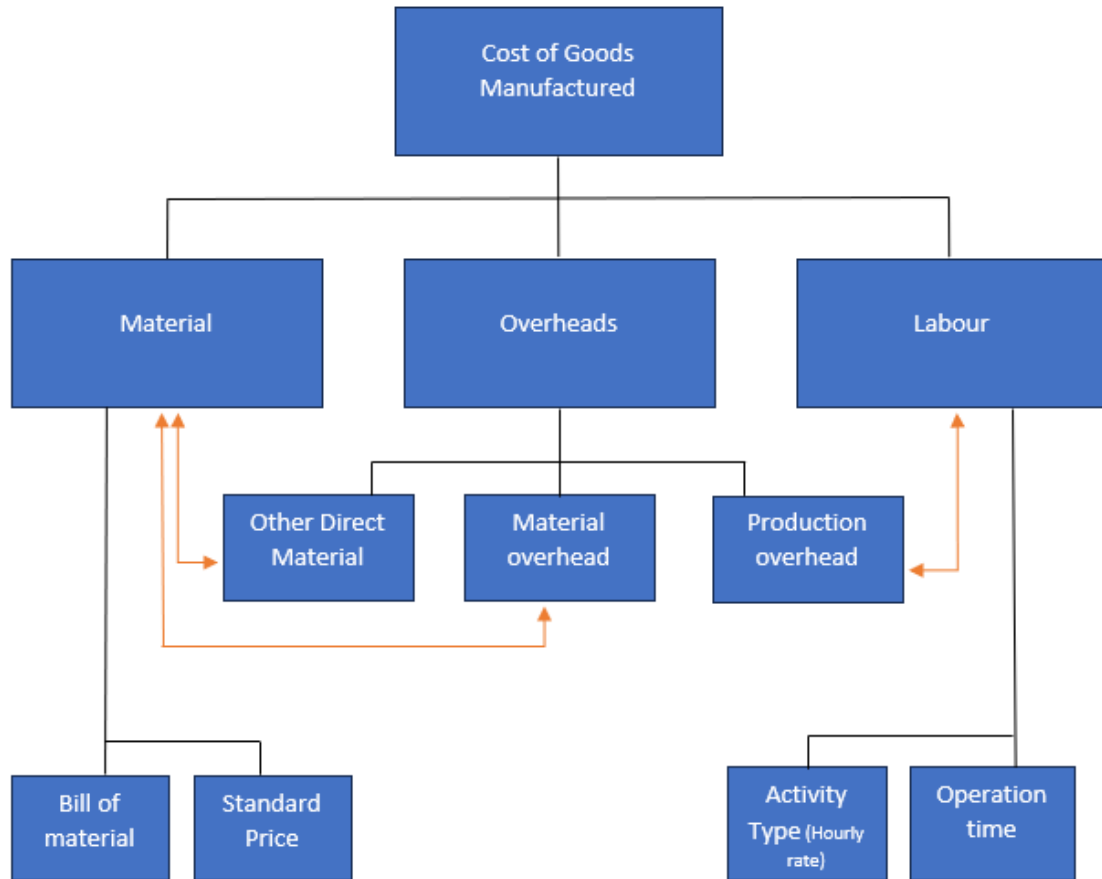
To summarize, the case study approach gave a practical way to examine the issue in the studied production line. It allowed the topic to be analysed from several sides by numbers, different reports, and by understanding how the surroundings in the production line work in its natural environment. Using both numerical SAP reports and discussions with representatives helped to connect the theory with what is really happening in the operations. Even if this study focused only on one production line, the analysed results could give ideas for similar situations in other production lines in the case company.

### **3.2 Current State of Cost Accounting and Overhead Management**

The cost accounting system at the case company's production unit is managed through the company's enterprise resource planning system (ERP), SAP, and is primarily based on product specific cost models. Enterprise resource planning system is a modular software system which connects company's different internal functions and processes into one source of information (SAP, n.d). Each product is defined through a detailed structure and is then adapted to reflect the customer specific requirements with variant codes. Approximately one third of the products are tailored to customer needs (ABB, 2024).

In the cost accounting, costing is generated by assigning direct material, direct labour, and indirect costs to the cost centers along the product's cost structure.

At the factory level, the cost accounting system distinguishes between direct and indirect costs. *Direct* costs include direct material and direct labour costs, where material costs are specified in bill of material and includes all the costs related handling and sourcing the material. Direct labour costs are calculated from assembly times and cost center specific hourly rates. This process where cost of labour (direct labour) is assigned to a product, is called Routing (SAP, n.d). *Indirect* costs are allocated to cost structures through allocation rules that aim to capture expenses that are not directly attributable to a single product. At this level, the cost structure of each product combines direct cost elements with overheads that are applied according to standard rules.



**Figure 1.** Hierarchical structure of product cost elements (author).

The Figure 1. illustrates the hierarchical structure of product costs in studied unit. The total cost of goods manufactured consists of Material (direct material costs), Overheads (indirect costs), and Labour (direct labour costs). Direct material costs derive from the bill of materials and standard prices, direct labour costs from operation times and hourly rates (Activity Types), and overheads are allocated through three different overhead rates: Material Overhead, Production Overhead, and Other Direct Material. This structure represents the standard cost model applied in the SAP environment and serves as a foundation for the empirical analysis.

At the studied production line, the same cost accounting logic is applied. Overheads are absorbed through three predetermined overhead rates: Production Overhead which is 25 % of direct labour costs, Material Overhead is 15 % of direct material costs, and Other Direct Material is 1 % of direct material costs. In Figure 1, these relations are displayed with orange arrows.

In the SAP cost accounting system, each cost center is assigned an Overhead Key, which determines the overhead rate used to apply indirect costs to direct materials and direct labour. These rates form the operational basis for overhead absorption on the production line and are used in the empirical analysis presented in the following sections.

Currently, under- and over-absorption of overheads are monitored only at factory level. The standard reports provide monthly data, while percentage variances are typically reviewed on a quarterly and annual basis. Line-level monitoring is not in use, meaning that the accuracy of overhead absorption cannot yet be systematically evaluated for individual production lines.

### **3.3 Data Collection**

The primary data for this study were collected from company's ERP-system (SAP). Transaction used for data extraction was KSB1 ("Display Actual Cost Line Items for Cost Centers"), which provides detailed realised costs recorded on specific cost centers. In practice, a company-specific variant of the transaction was applied, including the cost center group relevant to the studied production line. One criterion was posting date, as the report is generated for the previous month after each month-end closing. This ensures that the dataset contains both timely and complete cost records for the production line under analysis. The data was extracted for the period of January to August 2025.

The collected dataset was then exported from SAP to Microsoft Excel, where it was organized for analysis using pivot tables. Two separate pivot tables were created: one structured at the cost center level (Pivot 1), another at the cost element and cost element group level (Pivot 2). Pivot tables were used to group costs by month, group description, and cost center. This structure allowed a clear separation between overhead categories of Actual and Applied overheads. Actual overheads represent the realized costs recorded directly on the production line's cost centers, while Applied overheads refers to the calculated overheads derived from the predetermined rates described earlier.

In the SAP cost accounting structure, a Cost element represents the account to which the expenses are posted. Each cost element is assigned to a broader category known as Group description, which groups similar accounts into higher level cost classifications such as maintenance or energy. In Excel, the VLOOKUP (vertical lookup) function was used to automatically match each Cost element with its corresponding Group description. The Group description is available in separate file called Overhead Database, which is not included in the analysis. This database contains a categorization of Cost elements, which allowed the data to be grouped consistently in the pivot tables. The Group description information was used in a secondary pivot analysis, Pivot 2, which enabled a more detailed review of realized costs by cost element category. This facilitated the identification of exceptional cost items or one-time events that could cause visible monthly variations in overhead costs.

Pivot table 1 ("Pivot 1") was constructed by grouping the cost centers with their overhead costs: Actual overhead ("Actual OH") and Applied overhead ("Applied OH"), with periodical columns presented as year-month. In pivot table 2 ("Pivot 2") the data was grouped by Group description with periodical year-month columns. Both pivot tables have a Grand Total row, which summarizes both Actual and Applied overheads by monthly and accumulative values.

To ensure completeness and reliability of the dataset, the cost data extracted from the KSB1 report was validated and complemented with cost data from the GR55 overhead report. The KSB1 report includes the realised costs recorded directly on the production line's cost centers, while the GR55 report provides a broader view of all cost centers within the case company's cost center group. From this dataset, the cost centers that allocate part of their costs to the studied production line were identified, and their costs were calculated according to the predefined allocation percentages.

During data validation, the extracted cost elements were reviewed to ensure that each posting corresponded to a correct cost center and fiscal period. It was confirmed that no postings were missing or duplicated in the dataset. The dataset was then standardized into a monthly format to maintain comparability between Actual, Applied, and Allocated overheads. These steps ensured that the final data used in the analysis represented accurately the full cost structure of the production line and the supporting functions effecting it.

The resulting dataset provided a complete monthly view of overheads for the studied production line. The dataset formed the basis for the subsequent analysis, which evaluated the accuracy of overhead absorption.

### **3.4 Data analysis**

The purpose of the data analysis was to examine the accuracy of the current overhead absorption model applied to the studied production line. It was previously known that the realised overhead costs tend to exceed the costs accumulated through the predetermined absorption rates. However, the exact degree of this difference had not been previously measured, and the reasons behind it had not been examined in detail. The analysis therefore aimed to determine the extent of the variance between the actual and applied overheads and to identify potential factors contributing to this gap, such as the adequacy of the rates.

The analysis was conducted using the dataset described in the previous section, covering the period from January to August 2025. Actual and Applied overheads were compared both monthly and cumulative levels using Excel pivot tables. The difference between the two cost categories was calculated both as an absolute value and as a relative difference expressed as a percentage of the realised overheads.

In this study, the term variance refers to the difference between realised (Actual) and calculated (Applied) overhead costs. The variance was measured both in absolute (€) and relative (%) terms, with the relative variance indicating how large the difference is in proportion to the total realised overhead costs. This percentage-based variance is used throughout the analysis to assess the accuracy of overhead absorption and to compare results with the factory-level average.

A positive variance indicates under-absorption, meaning that realised overheads were higher than the applied overheads, while a negative variance indicates over-absorption. Monthly comparisons were used to identify potential irregularities or one-time events effecting the cost distribution.

The results of this analysis are presented in Section 4, where the observed variances and their underlying drivers are discussed in detail.

### **3.5 Validity and Reliability of the Study**

As this study can be described as a combination of data analysis and qualitative context, where the quantitative data is extracted from the case company's ERP system, validity and reliability are important to ensure that all the collected data and interpretations are as accurate and believable as they could. However, as Taylor (2013) indicates, every research process includes the possibility for inaccuracies.

In this study, the main research instrument was company's ERP system (SAP) which provided numerical data from the company's cost accounting system. The data used in this research was extracted from system's standard reports KSB1 and GR55, which are available in most SAP environments. This increases the repeatability of the study as it could be repeated by another researcher using same reports with identical report settings. However, since every company's SAP configuration is always configured for company needs, the generated data always reflects the specific company structures such as cost centers, accounts, allocation rules and routings.

As Taylor (2013) observed, it is not always about the accuracy of the instrument and numerical results, but about if the results are consistent with the data collected. For validity perspective, the dataset extracted from the ERP system will give the information needed to examine the given issue of overhead absorption.

For reliability perspective, in every study and in every dataset collected for the research, there is always small probability for errors. It is also noticed, that on major possible errors in the study could be in measurements, or unexpected events, that causes the errors in the study (Litwin, 2012). As in this paper, the measurement or unexpected random errors could have its influence, although the extracted dataset was carefully examined to rule out possibilities for measurement errors, but not the possibility of unexpected errors that may occur.

As Litwin (2012) described, reliability of the study is the measurement that how repeatable the dataset extracted from the instrument is. For this study, the reliability of the findings can be considered strong, since all the data were extracted from traceable records in the ERP system and analysed with consistent reporting logic. The validity of the study is also evident within the case company context, as the dataset represented the cost accounting environment that was studied.

## 4 Results

### 4.1 Overview of Results

This section of the study presents the results of the overhead management analysis in the studied production line. The analysis covers the period between January and August 2025 and is based on SAP cost data. The purpose of the analysis was to assess how accurately the existing overhead rates reflect the actual cost behaviour of the production line's cost centers and to identify possible gaps between actual and applied overheads.

The analysis is based on three key overhead categories illustrated in Table 1: *Actual*, *Applied*, and *Allocated* overheads. Actual overheads refer to the realised overhead costs recorded directly to the production line's cost center, while Allocated overheads denote overhead costs transferred from cost centers of supporting functions. Applied overhead costs represents the calculated costs determined from production line's rates of material, direct labour and other direct material costs.

**Table 1.** Overhead categories.

| Overhead category | Nature of Cost  | Purpose in Analysis                     |
|-------------------|---|---|
| Actual            | Directly realised overheads on the production line cost centers     | Baseline for comparison                 |
| Allocated         | Realized overheads internally allocated from other cost center      | Completes the total realised overheads  |
| Applied           | Calculated overheads from cost structures using predetermined rates | Represents expected overhead absorption |

The following subsections describe the findings of the analysis, including comparisons between the three overhead cost categories.

## 4.2 Comparison between Actual and Applied Overheads

Studied production line consists of two different cost centers MLTXXX and MLWXXX that together form the operational entity analysed in this study. MLTXXX represents the assembly operations and includes all the production-related overheads and MLWXXX represents the logistic activities directly supporting the production line's operations. It accumulates realised overhead costs relating mainly on internal logistics and material handling costs. When combined, these two cost centers provide a complete view of the total overhead structure of the production line and is essential for understanding the overhead structure in following analysis.

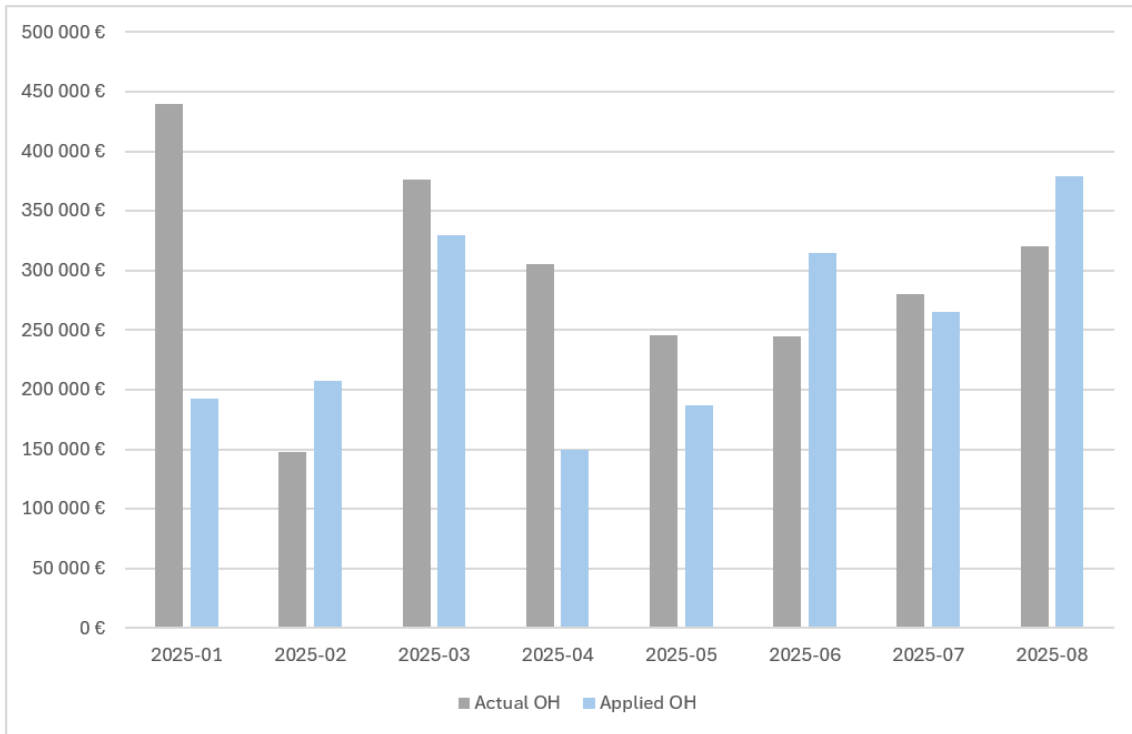
During the first stage of the data analysis, the comparison of realised (Actual) and absorbed (Applied) overheads was conducted to evaluate how accurately the current overhead rates reflect the production line's real cost behaviour. Figure 2. illustrates the monthly development and cumulative result of Actual and Applied overheads for the period between January and August 2025.

| Sum of Total       | Column Labels     |                   |                  |                   |                  |                   |                  |                   |                   |
|--------------------|-------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|-------------------|-------------------|
| Row Labels         | 2025-01           | 2025-02           | 2025-03          | 2025-04           | 2025-05          | 2025-06           | 2025-07          | 2025-08           | Grand Total       |
| MLTXXX             | 190 005,16        | -65 392,17        | 10 663,74        | 116 612,48        | 31 124,97        | -96 703,06        | -13 407,61       | -86 895,23        | 86 008,28         |
| Production line    | 190 005,16        | -65 392,17        | 10 663,74        | 116 612,48        | 31 124,97        | -96 703,06        | -13 407,61       | -86 895,23        | 86 008,28         |
| Actual OH          | 382 342,44        | 141 983,07        | 340 482,43       | 266 369,47        | 217 816,64       | 218 504,81        | 251 930,22       | 292 310,02        | 2 111 739,11      |
| Applied OH         | -192 337,29       | -207 375,24       | -329 818,69      | -149 756,99       | -186 691,67      | -315 207,87       | -265 337,83      | -379 205,25       | -2 025 730,83     |
| MLWXXX             | 57 403,89         | 5 433,53          | 35 809,71        | 38 792,18         | 27 884,02        | 25 972,44         | 28 259,07        | 28 201,32         | 247 756,16        |
| Logistics          | 57 403,89         | 5 433,53          | 35 809,71        | 38 792,18         | 27 884,02        | 25 972,44         | 28 259,07        | 28 201,32         | 247 756,16        |
| Actual OH          | 57 403,89         | 5 433,53          | 35 809,71        | 38 792,18         | 27 884,02        | 25 972,44         | 28 259,07        | 28 201,32         | 247 756,16        |
| <b>Grand Total</b> | <b>247 409,05</b> | <b>-59 958,65</b> | <b>46 473,45</b> | <b>155 404,66</b> | <b>59 008,99</b> | <b>-70 730,62</b> | <b>14 851,46</b> | <b>-58 693,90</b> | <b>333 764,44</b> |

Figure 2. Pivot 1: Monthly summary of Actual and Applied overheads.

The results show that in most months, Actual overheads exceeded the Applied overheads calculated through the overhead rates. The difference fluctuated notably across the period, with the largest deviations occurring in January and April, while May and July showed smaller monthly gaps. In contrast, in February and June, the Applied overheads slightly exceeded Actual overheads, indicating months of temporary over-absorption.

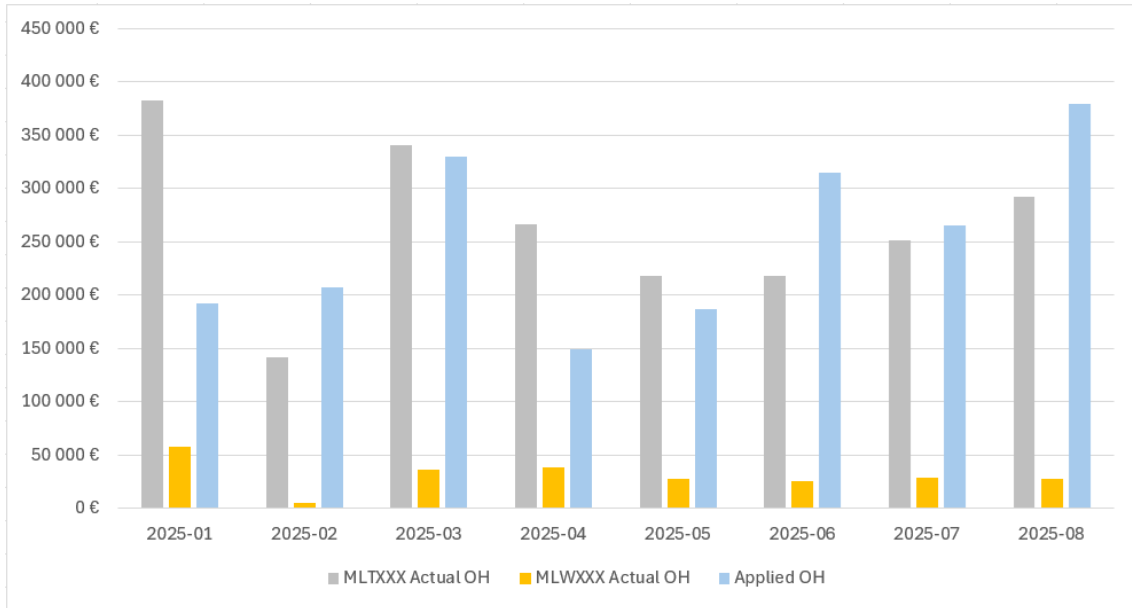
Over the studied period, the total Actual overheads recorded for the production line and its logistics amounted to 2 359 495,27 €, while the Applied overheads calculated through the predetermined rates were 2 025 730,83 €. The cumulative difference between Actual and Applied overheads was 333 764,44 €, which corresponds to approximately 14% of the total Actual overhead costs. This means that Applied overhead covered 86% of the total Actual overhead costs. When this is compared to the factory-level variance of roughly 10%, this gap can be considered moderate and within reasonable range for the production line.



**Figure 3.** Comparison between Actual and Applied overheads (author).

Figure 3. compares the realised (actual) overhead costs with the absorbed (applied) overheads for the production line. The illustrates that the predetermined overhead rates capture the production lines overall cost level reasonably well, still most months display under-absorption, with the largest gaps in January and April.

The comparison between the two cost centers in the production line provides further insight into the observed variance. Their main cost center is the MLTXXX which accumulates all production related overhead costs, including the Applied overheads absorbed through the rates for Production overhead, Material overhead, and Other Direct Material. In contrast, the logistics cost center MLWXXX accumulates only realised material overhead costs related mainly to material handling and internal logistics. Because the applied overheads are posted to cost center MLTXXX, its cost behaviour shows greater fluctuation, while cost center MLWXXX remains relatively stable over the examined months. This difference explains why most of the observed under-absorption originates from the production cost center rather than logistics.



**Figure 4.** Comparison between Cost centers MLTXXX and MLWXXX and Applied OH (author).

The Figure 4. compares monthly overhead development between the production line's cost centers MLTXXX and the logistics cost center MLWXXX, and the overheads absorbed through the predetermined rates. It highlights that most realised overhead costs are accumulated to the cost center MLTXXX, while the logistics cost center MLWXXX remains relatively stable over time. The applied overheads follow the same general trend as the actual costs in MLTXX but in lower level. This visualization supports the numerical finding that under-absorption originates mainly from the production line's operations-related cost center MLTXXX.

It was later observed that the initial analysis based on the KSB1 report included only the overhead costs recorded directly to the production line's cost centers. It was incomplete, missing the overhead costs allocated from supporting functions, even though the predetermined overhead rates were originally intended to cover both production lines own, and allocated costs. This resulted in a situation where the gap between Actual and Applied overheads was only slightly above factory-wide level. The

next section extends the analysis by incorporating these allocated costs to evaluate their impact on the overall variance.

### 4.3 Inclusion of Allocated Overheads

To achieve a complete picture of the costs, the analysis was extended by using the overhead report GR55 in SAP. This report contains all the realised costs in every cost center in the case company's cost center group. The overheads allocated to the analysed production line were calculated according to the predetermined allocation percentages, reflecting how the costs of supporting functions are distributed to the production line.

Table 2. presents the allocations from supporting functions to the production line. The total amount of costs to be allocated for the period of January to August 2025 was 590 486,50 €, which was then divided equally into monthly values to maintain the consistency with the analysed time frame. The highest individual allocations originated from White Collar (155 652,91 €) and Operations (111 101,24 €) cost centers. These together represent almost half of all allocated costs. Other significant contributors included Order handling, Production Development, and Quality, which collectively form an essential part of the whole cost structure. These allocations represent the expenses related to administrative work, engineering, and quality activities, all of which are necessary to sustain production operations but are not directly visible in the cost centers within the studied production line.

**Table 2.** Allocations from Supporting Functions.

| Cost Element | Allocation [%] | Allocation [€] |
|--------------|----------------|----------------|
| White collar | 6,5            | 155 652,91     |
| Operations   | 5,0            | 111 101,24     |

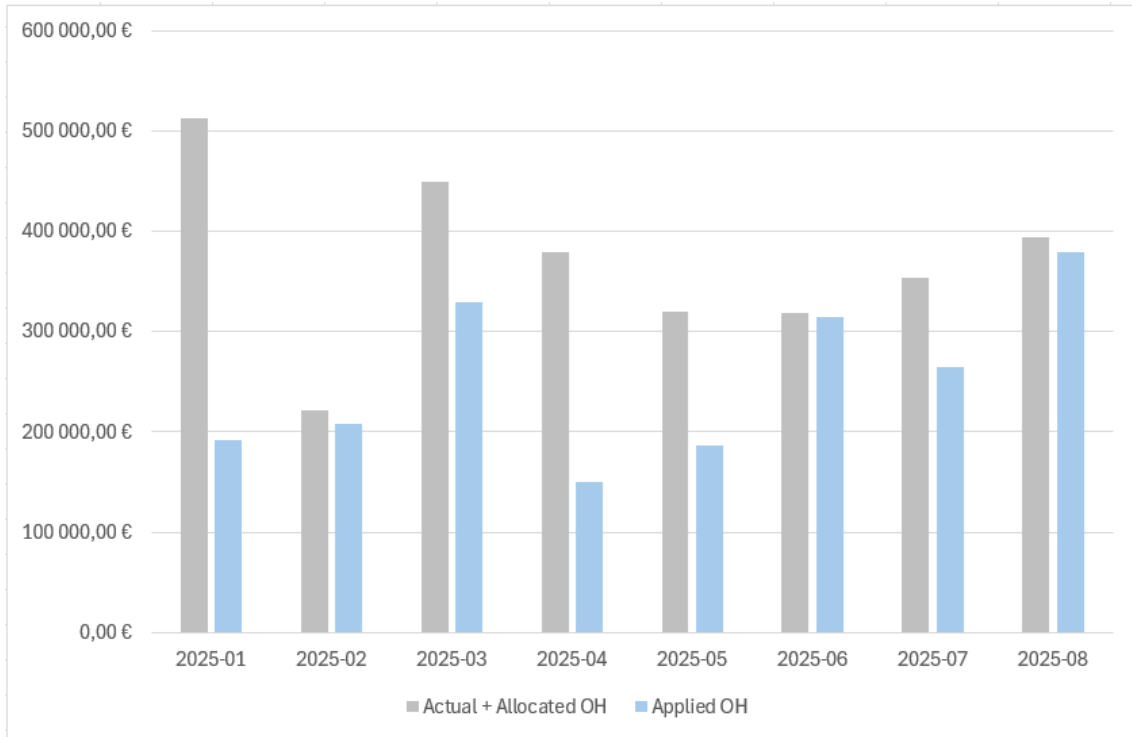
| <b>Cost Element</b>      | <b>Allocation [%]</b> | <b>Allocation [€]</b> |
|--------------------------|-----------------------|-----------------------|
| Safety & Operations dev. | 6,5                   | 4 854,49              |
| Orderhandling            | 5,0                   | 101 807,00            |
| IS                       | 6,5                   | 601,09                |
| IT-costs                 | 6,5                   | 689,50                |
| Production Development   | 6,5                   | 60 816,85             |
| Procurement              | 1,0                   | 20 058,67             |
| Purchasing               | 2,0                   | 23 151,10             |
| Production planning      | 2,0                   | 14 908,94             |
| Continuous Improvement   | 2,0                   | 19 809,30             |
| Quality                  | 2,0                   | 60 450,41             |
| Maintenance              | 2,0                   | 39,05                 |
| Product Testing          | 1,0                   | 16 545,95             |
| <b>Total</b>             |                       | <b>590 486,50</b>     |

Once these allocated overheads were included in the dataset, the overall overhead profile of the production line significantly changed. As illustrated in the Figure 5. below, the inclusion of allocated overheads increased the total Actual overheads each month by 73 810,81 €. Before the inclusion, the total Actual overheads were 2 359 495,27 €, while the Applied overheads remained at 2 025 730,83€, resulting in a 14% variance. After inclusion of the Allocated overheads of 590 486,50 €, the total Actual overheads increased to 2 949 981,77 €, resulting in a cumulative difference of 924 250,94 €.

| Sum of Total       | Column Labels     |                  |                   |                   |                   |                   |                  |                   |                   |
|--------------------|-------------------|------------------|-------------------|-------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| Row Labels         | 2025-01           | 2025-02          | 2025-03           | 2025-04           | 2025-05           | 2025-06           | 2025-07          | 2025-08           | Grand Total       |
| <b>MLTXXX</b>      | <b>263 815,97</b> | <b>8 418,64</b>  | <b>84 474,56</b>  | <b>190 423,29</b> | <b>104 935,78</b> | <b>-22 892,25</b> | <b>60 403,20</b> | <b>-13 084,41</b> | <b>676 494,78</b> |
| Production line    | 263 815,97        | 8 418,64         | 84 474,56         | 190 423,29        | 104 935,78        | -22 892,25        | 60 403,20        | -13 084,41        | 676 494,78        |
| Actual OH          | 382 342,44        | 141 983,07       | 340 482,43        | 266 369,47        | 217 816,64        | 218 504,81        | 251 930,22       | 292 310,02        | 2 111 739,11      |
| Applied OH         | -192 337,29       | -207 375,24      | -329 818,69       | -149 756,99       | -186 691,67       | -315 207,87       | -265 337,83      | -379 205,25       | -2 025 730,83     |
| Allocated          | 73 810,81         | 73 810,81        | 73 810,81         | 73 810,81         | 73 810,81         | 73 810,81         | 73 810,81        | 73 810,81         | 590 486,50        |
| <b>MLWXXX</b>      | <b>57 403,89</b>  | <b>5 433,53</b>  | <b>35 809,71</b>  | <b>38 792,18</b>  | <b>27 884,02</b>  | <b>25 972,44</b>  | <b>28 259,07</b> | <b>28 201,32</b>  | <b>247 756,16</b> |
| Logistics          | 57 403,89         | 5 433,53         | 35 809,71         | 38 792,18         | 27 884,02         | 25 972,44         | 28 259,07        | 28 201,32         | 247 756,16        |
| Actual OH          | 57 403,89         | 5 433,53         | 35 809,71         | 38 792,18         | 27 884,02         | 25 972,44         | 28 259,07        | 28 201,32         | 247 756,16        |
| <b>Grand Total</b> | <b>321 219,86</b> | <b>13 852,17</b> | <b>120 284,27</b> | <b>229 215,47</b> | <b>132 819,80</b> | <b>3 080,19</b>   | <b>88 662,27</b> | <b>15 116,91</b>  | <b>924 250,94</b> |

**Figure 5.** Pivot 1: Impact of Allocated overheads in the comparison.

As a result, the variance between Applied overheads and the combined total of Actual and Allocated overheads increased from 14% to approximately 31%, meaning that applied overheads covered 69% of actual overhead costs indicating a substantial level of under-absorption, if compared to the factory-level of approximately 10%. This suggests that the current overhead rates were calibrated under the assumption that these allocations were already incorporated in the KSB1 data, which was not the case in practice.



**Figure 6.** Comparison between total Actual overheads and Applied overheads (author).

The Figure 6. highlights that the largest share of the allocated costs originated from functions that support production indirectly. These activities contribute to the operational efficiency of the production line but are difficult to link directly to a specific product or work order. Therefore, excluding them from the initial dataset understated the production line's true overhead level and led to an overestimation of cost absorption accuracy. The expanded dataset provides a more realistic representation of the production line's actual cost structure and its relationship to factory-level cost behaviour.

Furthermore, if overhead monitoring is to be conducted at the line level, the results with allocated costs included, point to a systematic limitation in the current reporting process. If line-level analyses entirely rely on the KSB1 report without the inclusion of allocations from supporting functions, the resulting cost view may appear more accurate and optimistic than it truly is. This can cover underlying inefficiencies or distort comparisons between production lines. Integrating allocation data into regular monthly reporting would therefore enhance the cost transparency and support more informed

managerial decision-making processes regarding overhead control and profitability analysis.

## 4.4 Observed Monthly Variations

### 4.4.1 Observed Monthly Variations in Cost Center Level

Monthly variance analysis was conducted to examine the temporal behaviour of overhead absorption on the production line. Figure 7. illustrates the monthly variance between the combined total of Actual and Allocated overheads and the Applied overheads from January to August 2025.

The highest variance levels occurred in January (62,5%) and April (60,5%), both showing clear under-absorption, where realised overheads significantly exceeded the Applied overheads. These deviations suggest that there are periods of increased cost accumulation or temporary inefficiencies, such as ramp-up adjustments or irregular cost postings. In contrast, February (6,3%), June (1%), and August (3.8%) nearly balanced absorption, while March (26,7%), May (41,6%), and July (25,0%) showed moderate under-absorption.

| Sum of Total       | Column Labels     |                  |                   |                   |                   |                 |                  |                  |                   |
|--------------------|-------------------|------------------|-------------------|-------------------|-------------------|-----------------|------------------|------------------|-------------------|
| Row Labels         | 2025-01           | 2025-02          | 2025-03           | 2025-04           | 2025-05           | 2025-06         | 2025-07          | 2025-08          | Grand Total       |
| MLTXXX             | 263 815,97        | 8 418,64         | 84 474,56         | 190 423,29        | 104 935,78        | -22 892,25      | 60 403,20        | -13 084,41       | 676 494,78        |
| Production line    | 263 815,97        | 8 418,64         | 84 474,56         | 190 423,29        | 104 935,78        | -22 892,25      | 60 403,20        | -13 084,41       | 676 494,78        |
| Actual OH          | 382 342,44        | 141 983,07       | 340 482,43        | 266 369,47        | 217 816,64        | 218 504,81      | 251 930,22       | 292 310,02       | 2 111 739,11      |
| Applied OH         | -192 337,29       | -207 375,24      | -329 818,69       | -149 756,99       | -186 691,67       | -315 207,87     | -265 337,83      | -379 205,25      | -2 025 730,83     |
| Allocated          | 73 810,81         | 73 810,81        | 73 810,81         | 73 810,81         | 73 810,81         | 73 810,81       | 73 810,81        | 73 810,81        | 590 486,50        |
| MLWXXX             | 57 403,89         | 5 433,53         | 35 809,71         | 38 792,18         | 27 884,02         | 25 972,44       | 28 259,07        | 28 201,32        | 247 756,16        |
| Logistics          | 57 403,89         | 5 433,53         | 35 809,71         | 38 792,18         | 27 884,02         | 25 972,44       | 28 259,07        | 28 201,32        | 247 756,16        |
| Actual OH          | 57 403,89         | 5 433,53         | 35 809,71         | 38 792,18         | 27 884,02         | 25 972,44       | 28 259,07        | 28 201,32        | 247 756,16        |
| <b>Grand Total</b> | <b>321 219,86</b> | <b>13 852,17</b> | <b>120 284,27</b> | <b>229 215,47</b> | <b>132 819,80</b> | <b>3 080,19</b> | <b>88 662,27</b> | <b>15 116,91</b> | <b>924 250,94</b> |
| Monthly Variance   | 62,5 %            | 6,3 %            | 26,7 %            | 60,5 %            | 41,6 %            | 1,0 %           | 25,0 %           | 3,8 %            | 31,3 %            |

Figure 7. Pivot 1: Monthly variance.

In addition to variations in Actual overheads, the data also revealed noticeable fluctuations in the level of Applied overheads. The months showing the highest total variance,

such as January and April, corresponded with periods of unusually low absorbed overheads. This indicates that the variance was not completely driven by increasing realised costs, but also by lower-than-expected absorption through the applied rates.

These months are known to have had lower production volume compared to the rest of the period. As the production overhead is calculated as a percentage of direct labour costs, which in turn depends on the standard operation times defined for each production stage, reduced output directly decreases the number of overheads absorbed through the rates. Consequently, while the indirect costs remained largely unchanged, the lower production volume resulted in smaller applied overheads and higher under-absorption rates during these periods.

#### **4.4.2 Detailed Analysis by Cost Element Category**

To gain more detailed understanding of the cost behaviour behind the observed monthly fluctuations, the analysis was extended to the cost element level. This level of analysis made it possible to identify which specific cost categories contributed most to the variance between Actual and Applied overheads. The result indicate that the main monthly deviations were linked to timing differences, exceptional cost postings, and system-related factors rather than continuous structural changes in the cost base. Figure 8. presents the cost distribution by Group description and cost elements.

| Group_desc.                      | Cost element | Cost element name    | 2025-01     | 2025-02     | 2025-03     | 2025-04    | 2025-05    | 2025-06     | 2025-07     | 2025-08     | Grand Total   |
|----------------------------------|--------------|----------------------|-------------|-------------|-------------|------------|------------|-------------|-------------|-------------|---------------|
| #010.OH_500 OVERHEAD MATERIAL E  | 1435000000   | Tools and moulds     | -98 003,88  | 21 282,45   | 7 530,51    | 27 361,26  | 12 061,31  | -15 014,47  | 26 144,15   | 5 612,00    | -13 026,68    |
|                                  | 1431001000   | Aux Mat- mfg-type1   | 641,83      |             | 89,46       |            |            |             |             | 17,55       | 748,83        |
| #050.OH_204 WAGES, BLUECOLLAR    | 1460000107   | Overtime comp. bluec | 23 325,16   |             | 12 354,47   | 42 424,60  | 15 743,81  | 7 106,96    | 198,06      | 5 608,58    | 106 761,64    |
|                                  | 1460000200   | Wages, bluecollar    | 72 826,17   | 49 963,81   | 61 980,34   | 93 249,52  | 58 242,05  | 73 300,54   | 61 583,67   | 61 954,20   | 533 100,30    |
|                                  | 1460003101   | Accr wages bc direct | 48 077,41   | -62 425,77  | 25 742,29   | -26 718,92 | 4 244,01   | -7 369,12   | 5 924,75    | 12 695,93   | 170,57        |
|                                  | 1471018100   | Holiday pay, bluec   | 4 845,23    | -5 546,54   | 8 188,25    | 6 692,91   | 10 370,29  | 11 688,52   | 13 845,19   | 11 394,71   | 61 478,55     |
| #060.OH_206 PENSION EXPENSES     |              |                      | 28 499,98   | -3 358,33   | 20 692,35   | 21 289,35  | 16 666,57  | 16 114,99   | 15 747,58   | 17 575,91   | 133 228,39    |
| #070.OH_208 OTHER SUPPLEMENTARY  |              |                      | 21 419,76   | -2 283,37   | 15 544,22   | 12 748,19  | 10 376,99  | 11 778,87   | 11 936,06   | 13 224,91   | 94 745,63     |
| #080.OH_210 OTHER PERSONNEL EXPE |              |                      | 11 780,14   | 5 821,54    | 1 794,76    | 4 738,02   | 4 956,93   | 1 205,46    | 2 873,55    | 3 483,74    | 36 654,16     |
| #090.OH_130 EXTERNAL SERVICES/CO | 1421099300   | Suppl factory jobs   | 1 128,95    | 1 948,95    |             |            |            | 2 694,10    |             |             | 5 772,00      |
|                                  | 1515000000   | Ext.pers-subcont nOR | 4 237,52    |             |             |            |            | 3 272,28    | 37 718,64   | 71 269,43   | 116 497,87    |
|                                  | 1518000000   | Exp-SS agrg.Std-ABB  | 72 827,16   |             |             |            |            |             |             |             | 72 827,16     |
|                                  | 1545000000   | Warehousing exp.     | 42 210,55   | 37 357,02   | 81 881,95   | 23 386,94  | 35 228,08  | 44 369,59   |             | 30 382,42   | 294 816,56    |
|                                  | 1517001000   | Cleaning services    | 1 722,32    | 1 511,23    | 2 034,21    | 2 210,52   | 1 493,48   | 1 248,22    | 1 543,15    | 1 587,20    | 13 350,32     |
|                                  | 1517099000   | Infrastr.exp.-other  | 1 324,02    | 1 153,78    | 1 061,26    | 978,04     | 1 790,21   | 1 428,76    | 973,45      | 1 467,85    | 10 177,38     |
|                                  | 1519004000   | Notary,registry fees | 8,23        | 0,00        |             |            |            |             |             |             | 8,23          |
| #100.OH_100 RENT AND TENURE, LEA | 1512002000   | Rent/leas.exp-flats  | 11 489,98   | 0,00        | 8 544,27    | 0,00       | 0,00       | -5 041,57   | 0,00        | 0,00        | 14 992,69     |
|                                  | 1512004000   | Rent/lease exp-Alloc | 10 377,97   | 10 377,97   | 10 377,97   | 10 377,97  | 10 377,97  | 10 377,97   | 10 377,97   | 10 377,97   | 83 023,75     |
|                                  | 1513004000   | Rent/lease exp-mach. | 163,11      | 241,49      | 189,69      | 182,43     | 32,52      | 198,42      | 260,09      | 165,53      | 1 433,29      |
|                                  | 1513099000   | Rent/leas.exp-oth.eq | 487,23      | 812,16      | 710,19      | 705,82     | 1 410,51   | 34,02       | 1 374,48    | 688,17      | 6 223,59      |
| #150.OH_180 REPAIRS AND MAINTEN  | 1553000000   | Repair&maint.build.  | 6 744,76    | 11 476,77   | 15 126,36   | 8 329,37   | 5 145,71   | 8 355,44    | 5 412,19    | 7 416,99    | 68 007,60     |
|                                  | 1553001000   | Repair&maint.pr.mach | 14 228,65   | 39 557,90   | 47 933,10   | 24 722,76  | 7 762,92   | 39 737,80   | 25 342,62   | 10 549,36   | 209 835,11    |
| #160.OH_190 OFFICE SUPPLIES      |              |                      | 32,09       | 46,01       | -0,20       | 52,09      | 82,72      | 99,60       | 16,71       | 82,61       | 411,63        |
| #200.OH_240 FINANCIAL DEPRECIATI |              |                      | 22 450,21   | 23 871,27   | 25 568,56   | 29 008,79  | 30 147,76  | 32 328,98   | 40 216,20   | 41 860,62   | 245 452,40    |
| #240.OH_700 CREDITS FROM LABOUR  | 91100        | Labor                | -56 998,45  | -71 308,31  | -102 548,48 | -79 906,38 | -74 397,49 | -105 283,46 | -93 031,03  | -126 569,30 | -710 042,89   |
| #250.OH_770 CREDITS FROM PRODUC  | 95100        | Production overhead  | -14 249,75  | -17 827,25  | -25 637,33  | -19 976,92 | -18 576,49 | -26 321,30  | -23 258,18  | -31 642,56  | -177 489,77   |
|                                  | 95200        | Material overhead    | -113 521,14 | -110 849,42 | -189 030,60 | -46 756,54 | -87 860,21 | -172 127,64 | -139 733,14 | -207 181,06 | -1 067 059,76 |
|                                  | 95250        | Oth.Dir.Mat          | -7 567,96   | -7 390,27   | -12 602,28  | -3 117,15  | -5 857,48  | -11 475,47  | -9 315,48   | -13 812,33  | -71 138,41    |
| #020.OH_510 ENERGY EXPENSES      |              |                      | 9 571,84    | 9 067,48    | 8 355,00    | 9 588,58   | 8 193,15   | 6 561,88    | 5 862,75    | 5 506,33    | 62 707,01     |
| #140.OH_170 INSURANCE PREMIUMS   |              |                      | 411,05      | 359,41      |             | 77,94      | 25,62      |             |             |             | 874,02        |
| #220.OH_290 OTHER INDIRECT EXPEN | 1574001000   | Use prov-claims-ntx  | 7 099,62    | 6 175,26    |             | 13 755,45  | 5 925,01   |             | 12 838,04   | 7 578,21    | 53 371,59     |
| #190.OH_230 SPECIFIC SALES EXPEN | 1542100000   | Air freight expenses | 119 812,87  | 0,00        |             |            |            |             |             |             | 119 812,87    |
| #110.OH_140 POSTAGE, TELEPHONE   | 1521500000   | Mobile phones exp.   | 6,41        | 6,09        |             |            |            |             |             | 10,13       | 22,64         |
|                                  | 1521099000   | Network install&fees |             |             |             |            | 3,80       |             |             |             | 3,80          |
| #180.OH_220 ABB GROUP MANAGEN    | 1535000000   | R&Dexp pur/shared-3p |             |             | 20 593,14   |            | 5 419,25   |             |             |             | 26 012,39     |
| Grand Total                      |              |                      | 247 409,05  | -59 958,65  | 46 473,45   | 155 404,66 | 59 008,99  | -70 730,62  | 14 851,46   | -58 693,90  | 333 764,44    |

Figure 8. Pivot 2: Monthly variance by Cost Element Group description.

Among the Actual cost elements, the Tools and Moulds account showed the highest volatility. In January 2025, a one-off reversal of accrual from the end of 2024 caused an exceptionally large negative posting, while in February new tool-related expenses and other accruals were booked. These one-time postings distorted the monthly overhead balance temporarily.

Another major contributor to short-term variance was Air freight expenses, which reached 119 812,87 € in January. This exceptional item represents a single air freight expense and its usually classified as a non-recurring cost. These kinds of isolated logistics events are not reflected in the rate-based absorption model and therefore create temporary under-absorption peaks. Within the External Services category, two distinct expenses were detected. First, the Warehousing expenses showed a clear peak in March with amount of 81 881,95 €. These costs originated from outsourced warehousing activities related to the component storage and are posted directly to the production line's cost center MLTXXX rather than under logistics (MLWXXX), which temporarily inflated the Actual overhead. Second, the account of external workforce, 1518000000, recorded amount of 72 827,16 € in January. This is representing external workforce costs gained

during the production line's ramp-up phase in 2024. This one-time cost was a major contributor to the high Actual overhead in January and explains part of the variance peak observed in that month.

Wage-related accounts also contributed to monthly variations. Overtime costs were particularly high in January and April, while no overtime was recorded in February. In addition, the account 1545000000 for Accrued Wages Blue Collar contained temporary accrual postings in February and April. These accruals were reversed in later months, which explains why the cumulative total for this account is nearly balanced by the end of the analysed period.

On the Applied overheads, significant deviations were observed notably in April, when the amount of Material Overhead recorded was considerably smaller than expected and compared to other months. This difference was tracked back to a technical issue in SAP, where background running process called Production Order Closing in transaction SCMA, failed to post all relevant material overheads for that month into production line's cost center. As a result, Applied overheads were understated and the monthly variance increased. System-related irregularities highlight how technical dependencies can temporarily distort overhead absorption accuracy.

All in all, the detailed account level analysis confirms that the most considerable monthly deviations developed from a combination of exceptional cost events in. Identifying such irregularities is essential for improving the accuracy of monthly cost monitoring and for differentiating structural variances from temporary accounting effects.

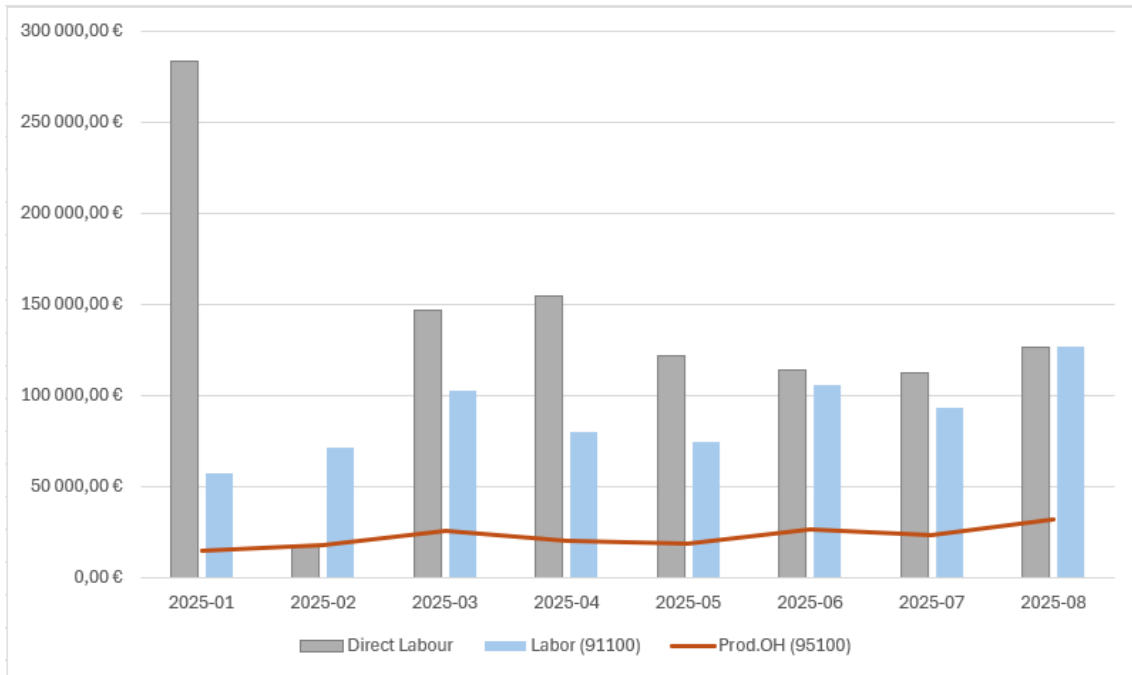
Beyond the monthly fluctuations caused by one-time cost events, a more structural source of variance was identified in the absorption of personnel-related costs (direct labour costs). When analysing all cost elements linked to wages, pensions, supplementary personnel expenses, and external labour, it became evident that a significant share of total labour costs was not transferred to products through the routing structure.

| Sum of Total<br>Group_desc.      | Cost element | Cost element name    | YearMonth         |                   |                  |                  |                  |                 |                  |                |                   |            |
|----------------------------------|--------------|----------------------|-------------------|-------------------|------------------|------------------|------------------|-----------------|------------------|----------------|-------------------|------------|
|                                  |              |                      | 2025-01           | 2025-02           | 2025-03          | 2025-04          | 2025-05          | 2025-06         | 2025-07          | 2025-08        | Grand Total       |            |
| #050.OH_204 WAGES, BLUECOLLAR    | 1460000107   | Overtime comp. bluec | 23 325,16         |                   | 12 354,47        | 42 424,60        | 15 743,81        | 7 106,96        |                  | 198,06         | 5 608,58          | 106 761,64 |
|                                  | 1460000200   | Wages, bluecollar    | 72 826,17         | 49 963,81         | 61 980,34        | 93 249,52        | 58 242,05        | 73 300,54       | 61 583,67        | 61 954,20      | 533 100,30        |            |
|                                  | 1460003101   | Accr wages bc direct | 48 077,41         | -62 425,77        | 25 742,29        | -26 718,92       | 4 244,01         | -7 369,12       | 5 924,75         | 12 695,93      | 170,57            |            |
|                                  | 1471018100   | Holiday pay, bluec   | 4 845,23          | -5 546,54         | 8 188,25         | 6 692,91         | 10 370,29        | 11 688,52       | 13 845,19        | 11 394,71      | 61 478,55         |            |
| #060.OH_206 PENSION EXPENSES     | 1473004000   | Pens-prov-retir.pay+ | -234,83           | 47,75             | -173,82          | -173,64          | -3 643,13        | -864,19         | -1 022,67        | -1 072,89      | -7 137,42         |            |
|                                  | 1473007000   | Pens-prov-other pay+ | 28 734,81         | -3 406,08         | 20 866,18        | 21 462,98        | 16 793,26        | 16 246,90       | 15 903,68        | 17 739,68      | 134 341,41        |            |
|                                  | 1473005000   | DB pension op cost   |                   |                   |                  |                  | 3 516,45         | 732,27          | 866,56           | 909,11         | 6 024,40          |            |
| #070.OH_208 OTHER SUPPLEMENTAR   | 1471000001   | Calc group life insu | 101,54            | -12,03            | 73,72            | 76,03            | 59,42            | 57,43           | 56,19            | 62,67          | 474,96            |            |
|                                  | 1471003001   | Calc social security | 3 102,06          | -369,15           | 2 252,65         | 2 335,59         | 1 819,28         | 1 755,82        | 1 716,39         | 1 915,05       | 14 527,68         |            |
|                                  | 1471004001   | Calc unemployment in | 1 361,86          | -161,51           | 988,94           | 1 018,32         | 796,27           | 770,13          | 753,72           | 840,77         | 6 368,50          |            |
|                                  | 1471005001   | Calc accident insura | 217,98            | -25,90            | 158,29           | 163,65           | 127,67           | 123,32          | 120,61           | 134,55         | 1 020,17          |            |
|                                  | 1471013007   | Luontaisedut         |                   |                   |                  |                  |                  |                 | 848,23           | 376,99         | 1 225,22          |            |
|                                  | 1471013009   | Luontaisedut         |                   |                   |                  |                  |                  |                 | -848,23          | -376,99        | -1 225,22         |            |
|                                  | 1471014101   | Calc extra pay blue  | 3 361,11          | -346,44           | 2 438,69         | 1 849,55         | 1 737,11         | 1 832,90        | 1 876,74         | 2 075,27       | 14 824,94         |            |
|                                  | 1471018103   | Calc mid week hotida | 5 658,29          | -583,22           | 4 105,42         | 3 113,63         | 2 924,35         | 3 085,59        | 3 159,39         | 3 493,62       | 24 957,08         |            |
|                                  | 1471018105   | Calc working hours s | 7 616,92          | -785,12           | 5 526,52         | 4 191,43         | 3 936,64         | 4 153,67        | 4 253,03         | 4 702,96       | 33 596,05         |            |
| #080.OH_210 OTHER PERSONNEL EXPI | 1472099000   | Pers exp-Oth costs   | 6 842,15          | 2 796,63          | 1 932,68         | 1 663,54         | 1 994,93         | 1 573,31        | 797,71           | 1 065,47       | 18 666,42         |            |
|                                  | 1471017000   | Pers exp-Healthcare  | 2 735,60          | 3 024,91          | 3 611,09         | 3 074,49         | 2 962,00         | 3 412,15        | 2 075,84         | 2 418,27       | 23 314,36         |            |
|                                  | 1471017009   | Subvention for occup | 2 202,38          |                   | -3 749,00        |                  |                  |                 |                  |                | -5 326,62         |            |
| #090.OH_130 EXTERNAL SERVICES/CO | 1518000000   | Exp-SS aggr.Std-ABB  | 72 827,16         |                   |                  |                  |                  |                 |                  |                | 72 827,16         |            |
| #240.OH_700 CREDITS FROM LABOUR  | 91100        | Labor                | -56 998,45        | -71 308,31        | -102 548,48      | -79 906,38       | -74 397,49       | -105 283,46     | -93 031,03       | -126 569,30    | -710 042,89       |            |
| <b>Grand Total</b>               |              |                      | <b>226 602,56</b> | <b>-89 136,97</b> | <b>43 748,20</b> | <b>74 517,31</b> | <b>47 226,92</b> | <b>8 542,74</b> | <b>19 077,82</b> | <b>-631,32</b> | <b>329 947,26</b> |            |

Figure 9. Pivot 2: Personnel expenses and Labor in account level.

Figure 9. illustrates, that the account 91100 (“Labor”) collects direct labour costs based on the operations times and activity types (hourly rates) defined in each product’s routing. However, the comparison between these applied labour costs and the actual personnel expenses showed that only a small fraction of total personnel-related costs was absorbed to products. Cumulatively approximately 330 000 € of labour-related expenses remained within the cost center during the analysed period, representing the portion that was not captured through the operation time-based costing.

The analysis revealed an internal imbalance within the overhead structure. Because the Production overhead rate is directly related to the labour cost element, any distortion in labour causes production-related overheads to be proportionally smaller. Meanwhile, material-related overheads remain at their nominal level, which increases their apparent share of total overheads even though the absolute values do not change. As a result, the total cost composition becomes distorted, giving impression that material handling activities consume a higher share of total overheads than they do. Structural imbalances like this may mislead managerial interpretations, particularly when assessing efficiency improvements or cost-saving initiatives.



**Figure 10.** Comparison of Direct Labour and absorbed Labor and Production Overhead (author).

Figure 10. illustrates the monthly relationship between actual personnel-related costs (Direct Labour), absorber Labour (account 91100) and the resulting Production Overhead (account 95100). Throughout the examined period, the absorbed labour remained consistently below the actual direct labour costs, reflecting underestimation in operation times and hourly rates. Since production overhead is calculated as a fixed percentage of the absorbed labour costs, the understated labour base directly leads to proportionally lower overhead absorption. This systematic relationship explains part of the total under-absorption observed in the study and highlights how variations in labour accuracy spreads into the overhead structure.

Addressing this issue requires not only reviewing the current overhead rates but also improving the accuracy of labour-based data that forms the basis. Monitoring the proportional balance between different overhead components could help identify if observed variances are caused from actual operational inefficiencies or from inconsistencies in the cost model itself.

This observation highlights a broader challenge concerning the integration of operational and financial data. In the current reporting setup, production routings, time reporting, and accounting postings are managed by separate functions in the organization, which increases the risk of disparity between recorded operation times and realised labour costs. Establishing clearer range of responsibilities for maintaining routing data and reviewing it regularly with accounting information would help ensure consistency. Better collaboration between functions related to this, such as operation planning, HR, and financial controlling functions would therefore enhance both cost accuracy and the managerial relevancy of overhead analysis as a tool of decision-making.

#### **4.5 Summary of Results**

This section summarises the main results of the overhead analysis conducted for the studied production line for the period between January to August 2025. The purpose of the analysis was to evaluate how accurately the current overhead rates represent the production line's actual cost behaviour and to identify the main factors contributing to the monthly cost variations.

The results show that the present overhead absorption model captures the overall cost structure relatively well, but differences between realised and applied overheads remain. Based on the initial comparison using the KSB1 report, the variance between Actual and Applied overheads was approximately 14%. When the allocations from supporting functions were included in, the total variance increased to approximately 31%. This indicates that a significant part of the total overhead costs originates from allocations outside the production line's own cost centers.

The monthly analysis revealed that the highest variances resulted in January and April, while the smallest differences were observed in the summer months. Months with the largest differences were identified with periods of lower production volume, which directly reduced the absorbed overheads.

Detailed examination of cost elements provided additional information into the nature of the monthly deviations. The most significant variations were caused by one-time or irregular cost items, such as the reversal of year end accruals, or exceptional freight costs. Also, some technical reporting issues, such as the failed posting of material overheads in SAP's Production Order Closing process, affected the results. These observations indicate that short term fluctuations in overhead absorption are mostly driven by timing and posting effects rather than by structural flaws in the cost allocation model.

These results demonstrate that the Applied overhead rates provide a reasonable estimate of the production line's cost level over time, but temporary costs and technical reporting issues can distort the short-term view. By identifying these deviations, the study provides valuable input for improving monitoring overheads.

In addition to these short-term deviations, the analysis revealed a more structural source of variance related to the absorption of personnel costs. The operation times defined in product routing were found to underestimate the actual labour intensity of the production line. As a result, only a limited portion of the total personnel-related expenses was transferred to product costs, while the majority remained within the cost center as unabsorbed costs. Because the Production overhead rate is calculated directly from the same labour base, this underestimation also reduces the amount of production overheads applied to products. Together, these effects form one of the key structural reasons for the total variance of 31% observed between Actual and Applied overheads.

This observation highlights the importance of regularly reviewing the accuracy of operation times and the labour-based overhead rates to ensure that they reflect real conditions. Improving this alignment would enhance the precision of product costing, provide a more realistic view of profitability at the line level and strengthen the transparency of reporting.

## 5 Discussion and Conclusions

### 5.1 Conclusions

The research began by defining the challenges and objectives related to overhead management and cost accuracy in the case company. The main objectives were to provide an analysis of the current state of overhead management, to examine the gap between actual and applied overhead costs, and to understand how improved overhead control could contribute to better profitability. Based on these objectives, the following two research questions were defined: *1) How are overheads currently managed as part of cost accounting in the case company?* and *2) How can managing overheads improve profitability?*

**The overheads in the case company are currently managed a part of cost accounting through and absorption-based model**, where overheads are allocated through allocation rules, which are fixed rates. Production overheads are applied to the cost structures as a fixed percentage of direct labour costs and material overheads as a percentage of direct material costs. This standardized model provides consistency in reporting and simplifies cost monitoring in the factory level. However, as overheads are currently monitored only at the factory level, it hides potential differences between individual production lines. In the analysed production line, it can be said, that overhead costs that were not absorbed into line's own cost structure were eventually covered by other cost center, which decreases visibility and might distort the managerial conclusions.

**Managing overheads can improve profitability by increasing the accuracy and transparency of cost allocation.** When under-absorption is evident, as in this studied production line, it means that only minority of overhead costs have been assigned to the product cost structures. As a result, product cost appear lower and therefore the manufacturing process appear more low-cost than it is. This can influence the pricing and

profitability assessments. By monitoring and adjusting overhead rates more frequently, the company could ensure that applied overhead rates reflect better actual operations. Although the analysed dataset did not include direct information on inventory values, the results indicate that the accuracy of overhead allocation can also affect the inventory valuation, since the absorption of overheads is reflected in the cost structures of finished and semi-finished goods.

Overall, the findings show that while the company's current absorption-based system work as a practical framework for cost allocation, its accuracy could be improved by line-specific monitoring and periodic reviews of overhead rates. Even slight improvements in overhead management practices van enhance cost accuracy, reveal hidden inefficiencies, and support reliable profitability analysis across production line.

## **5.2 Discussion**

While the conclusions of this study highlighted the structural nature of the deviations between overheads, the practical interpretation of these findings reveal several insights and opportunities for the case company.

One of the key outcomes of this study is the demonstration that a larger cost entity becomes easier to manage when divided into smaller, more specific units of analysis. In this study, viewing overheads at the production line level provided a clearer understanding of factors that drive cost behaviour. Breaking down the total overhead structure into traceable parts improves overall transparency and gives a stronger basis for managerial control and profitability improvement.

The production line studied in this research represents a suitable pilot for this type of analysis in the case company. Its products have simpler structures, and simpler production process. Compared to the factory's other production lines, where the products are more customized, and where additional overhead rates and product variants make the

relationship between actual and applied more complicated. Therefore, if a clear structural and reporting related deviations were identified in this simplified environment, it is believable that similar issues exist on the more complex production lines. This study could be viewed as motivator, or a starting point for implementing line level overhead absorption analysis to the rest of the production lines.

Another key implication relates to the continuous development of overhead management practices. Regularly reviewing and adjusting the overhead rates and drivers behind them against actual production levels would help maintain accuracy in overhead absorption and ensure that the model remains aligned with the real cost behaviour.

Using these findings, further improvement could begin with developing more systematic monitoring rules and tools. Establishing line level variance tracking would enable early detection of deviations and introducing threshold values for acceptable variance could provide a signal when corrective actions are needed. During the process of this research and in the numerous meetings around it, the potential benefits of such line level monitoring were recognised with the case company representatives, as it presents a clearer and more manageable view of the total overhead cost structure.

Potential future research related to this study could explore the connection between overhead absorption and production efficiency. While productivity is often measured through indicators such as output per labour hours, overhead absorption could provide a complementary financial perspective on how effectively production resources are utilised.

The results of this study can be only partially generalized, as the research focused only on a single production line within a single factory. Therefore, the findings represent the specific conditions of the case company. Partially this study can be generalized, because the observed phenomenon of overhead absorption is typical for manufacturing environments using similar absorption-based system. The scope of the data analysed in this

study was relatively narrow, so the trustworthiness could be improved by including data from multiple production lines or a longer period.

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