Antti Kinnunen

Impacts of SAP Implementation on Commercial Operations

Metropolia University of Applied Sciences

Bachelor of Engineering

Industrial Management

Bachelor's Thesis

01 May 2022

Abstract

Author:	Antti Kinnunen
Title:	Impacts of SAP Implementation on Commercial Operations
Number of Pages:	63 pages + 1 appendix
Date:	01 May 2022
Degree:	Bachelor of Engineering
Degree Programme:	Industrial Management
Professional Major:	Supply Chain Management
Supervisors:	Tommi Vallas, Operations Manager Antero Putkiranta, Principal Lecturer Sonja Holappa, Senior Lecturer

This thesis was conducted for Neste Corporation, a Finnish company specializing in renewable diesel and sustainable aviation fuel solutions. The objective of this thesis was to investigate the benefits and challenges of the current SAP environment from the Commercial Operations perspective at the case company.

As a main research method, this thesis was conducted by carrying out a current state analysis on the studied theme. During the current state analysis, qualitative research methods were utilized in interviewing employees of the case company, investigating the company's internal documentation on the studied theme and utilizing the author's personal observations during the thesis writing stage. In addition, relevant literature and best practices of this study were reviewed in order to discuss the key concepts of this study.

The current state analysis identified several benefits and challenges around the current SAP system. The selected areas were categorized and summarized in key improvement areas which were eventually utilized in mapping out the research results and improvement proposals of this study.

The outcome of this thesis is a validated set of key improvement areas around the current SAP environment from the Commercial Operations perspective at the case company. Additionally, improvement proposals for each selected area were provided. The results of this study can be utilized in developing the current SAP environment of the case company accordingly. Moreover, the improvement proposals have the overall potential to improve the user experience around the SAP system and ultimately improve the SAP performance of the Commercial Operations, eventually following up with increased productivity and enhanced customer service.

Keywords: Enterprise resource planning, ERP implementation, SAP

Tiivistelmä

Tekijä:	Antti Kinnunen
Otsikko:	Impacts of SAP Implementation on Commercial Operations
Sivumäärä:	63 sivua + 1 liite
Aika:	1.5.2022
Tutkinto:	Insinööri (AMK)
Tutkinto-ohjelma:	Tuotantotalous
Ammatillinen pääaine:	Toimitusketjun johtaminen
Ohjaajat:	Operations Manager Tommi Vallas Yliopettaja Antero Putkiranta Lehtori Sonja Holappa

Tämä opinnäytetyö on tehty Neste Oyj:lle, uusiutuviin ratkaisuihin erikoistuneelle kansainväliselle öljynjalostusyhtiölle. Opinnäytetyön tavoitteena on tutkia nykyisen SAP-ympäristön vahvuuksia ja haasteita kaupallisten operaatioiden näkökulmasta kohdeyrityksessä.

Päätutkimusmenetelmänä opinnäytetyö tehtiin nykytila-analyysin pohjalta tutkitusta aiheesta. Nykytila-analyysissä hyödynnettiin laadullisia tutkimusmenetelmiä, kuten kohdeyrityksen työntekijöiden haastatteluja, kohdeyrityksen sisäisen dokumentaation tarkastelua sekä opinnäytetyön tekijän henkilökohtaisten havaintojen hyödyntämisestä opinnäytetyövaiheessa.

Nykytila-analyysin pohjalta tunnistettiin useita nykyisen SAP-järjestelmän vahvuuksia sekä haasteita. Valitut alueet luokiteltiin keskeisiksi parannuskohteiksi, joita hyödynnettiin tämän opinnäytetyön tulosten ja kehitysehdotusten kartoittamisessa.

Tämän opinnäytetyön tulokset koostuvat joukosta keskeisiä kehityskohteita nykyisen SAP-ympäristön ympärillä kohdeyrityksen kaupallisten operaatioiden näkökulmasta. Lisäksi kullekin valitulle kehityskohteelle syntyi kehitysehdotuksia nykytila-analyysin sekä kirjallisuustutkimuksen pohjalta. Tämän opinnäytetyön tuloksia voidaan hyödyntää kehitettäessä kohdeyrityksen nykyistä SAP-ympäristöä. Lisäksi opinnäytetyön kehitysehdotuksilla on mahdollisuus parantaa SAP-järjestelmän käyttökokemusta sekä parantaa kaupallisten operaatioiden SAP-toimintoja, mitkä lopulta voivat mahdollistaa kaupallisten operaatioiden tuottavuuden sekä asiakaspalvelun parantumisen.

Avainsanat: Toiminnanohjausjärjestelmä, ERP implementointi, SAP

Contents

Key Concepts and Abbreviations

Allegro: Application for deal entries in sales and supply of Neste Corporation.

DistX: Logistics management system for terminals in Neste Corporation.

ERP: Enterprise resource planning. Integrated software to manage company main business processes real-time.

ROMSS: Refinery management system in refinery sites of Neste Corporation.

SAP: System Applications and Products in Data Processing. Market leader in providing enterprise resource planning softwares for companies.

SCS Sustainability compliance system. System for follow-up, allocation and reporting of biocriteria and bio credits of Neste Corporation.

Spiral: Planning and optimizing tool in Neste Corporation.

SSP: Supplier sustainability portal. Web-based portal in which sustainability assessments are conducted for the supplier supply chains of Neste Corporation.

1 Introduction

As businesses are evolving and becoming ever-more competitive globally, Enterprise Resource Planning (ERP) technologies have become a vital part of modern enterprises. As ERP systems are highly integrated and complex solutions combined with challenging and long-term ERP implementation projects, studying the results of the implementation projects could indicate areas for improvement for organizations and therefore improve the overall performance of the new ERP environment. The existing ERP system research has mainly focused on studying the implementation phase, overshadowing post-implementation research, even though the post-implementation approach offers a throughout evaluation whether the main objectives of the project were met and to ensure that the organization achieves the best possible benefits from the new ERP system. (Gargeya & Brady 2005.)

1.1 Business Context

This thesis was conducted for Neste Corporation over a six-month period from October 2021 to April 2022. The author of this thesis was assigned as a Thesis Worker for this period to work for Neste Commercial Operations team in Espoo, Finland. In addition, the author of the thesis had prior working experience for Neste Corporation as a summer trainee for four months in 2021.

1.1.1 Case Company Neste Corporation

Neste Corporation is a Finnish company founded in 1948 that specializes in renewable diesel and sustainable aviation fuel solutions to accelerate a change to a circular economy and to compete against climate change. With significant transformation from a traditional oil refining company to a global leader in renewable solutions during the 2000s, Neste Corporation is currently the world's leading refiner of renewable diesel, sustainable aviation fuel and sustainable feedstock for plastic and other materials. In addition to the renewable solutions, traditional oil-refining business is still part of Neste Corporation's business as

the company offers high-quality oil products with growing use of recycled raw materials as refinery raw materials. Ranked for the 3rd most sustainable company in the world in 2020, 94% of Neste Corporation's operating profits came from the renewable business in 2020. Alongside its renewable business, Neste Corporation is committed to reaching carbon-neutral production by 2035. (Neste 2021.)

Neste Corporation has operations in 14 different countries with three different production locations and approximately 4800 employees. In 2020, Neste had a revenue of 11.8 billion Euros and comparable operating profit of 1416 million Euros, making Neste the second largest company in Finland. Neste Corporation's businesses are divided into three different business units as shown in Figure 1 below.

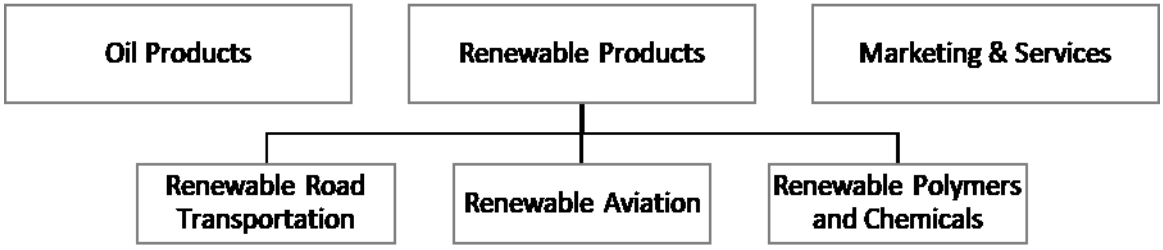

Figure 1. Neste Corporation business units.

Visualized in Figure 1, Renewable Products forms the renewables platform of the company, offering sustainable solutions to customers in Renewable Road Transportation, Renewable Aviation, and Renewable Polymers and Chemicals in domestic and international sales areas. Oil Products platform offers high-quality oil products and related services with low-carbon solutions for road transportation, non-road uses, aviation, marine, oil and petrochemical industries. Marketing & Services focuses on offering a wide range of high-quality products and services through an extensive station network within main market areas in Finland and Baltics. In addition to the business units mentioned above, Neste Corporation also offers researching and engineering services for both internal stakeholders and external customers with its independent

business unit Neste Engineering and Solutions. Commercial Operations team of Neste Corporation is placed under the Renewable Products unit of the company, even though the Commercial Operations is responsible for carrying out operations in both oil and renewable products. (Neste Annual Report 2020.)

1.1.2 Neste Commercial Operations

This study was conducted for the Commercial Operations team at the case company Neste Corporation. Commercial Operations are responsible for carrying out commercial operations in compliance with Neste Corporation's principles and commercial contracts with its suppliers and customers. The main tasks include coordination and execution of commercial operative work on physical cargo movements related to sales and supply of crude oil, renewable products and oil products. Alongside with the cargo operations, Commercial Operations are responsible for real-time and proactive communication with both internal and external stakeholders of the case company, maintaining accurate data entries to IT systems and reporting practices related to Neste Corporation's cargo operations and sales volumes. By these operations, the Commercial Operations team is ensuring that the needs of the customers are met globally. Figure 2 below presents the supply chain of Neste Corporation from the Commercial Operations perspective.

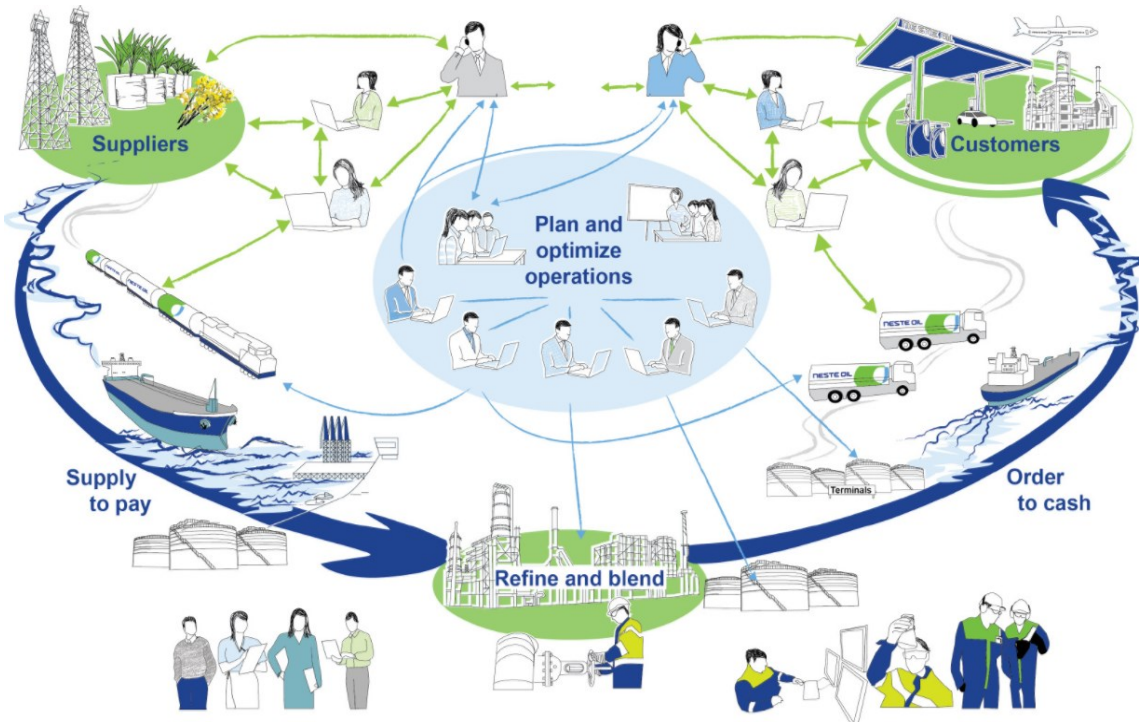

Figure 2. Supply chain of Neste Corporation (Internal material of the case company).

As visualized in Figure 2, Commercial Operations are responsible for managing both supply and sales cargo operations of the case company, starting from sourcing raw materials and feedstocks from the suppliers to loading and discharging operations where Neste's products are shipped to the customers with various different transport methods. Neste Corporation's Commercial Operations team has currently over 80 employees in seven different locations in Finland, Switzerland, Belgium, United States, Australia, China and Singapore. This study was conducted for the Commercial Operations team in Finland, even though the main concepts and results of this study can be utilized amongst all of the Commercial Operations teams globally.

1.2 Business Challenge, Objective and Outcome

Neste Corporation rolled out an implementation project called program Beagle in several phases during 2014-2020 where SAP ERP was deployed in the case company. This program was regarded as a business transformation project,

where the objective was to implement an integrated ERP solution and thus harmonize and standardize the ways of utilizing information and to eliminate fragmentation in business architectures of the case company. Before the program Beagle, Neste Corporation had several outdated IT systems in use which were linked to each other. As one of the main objectives was to implement one, integrated ERP solution, SAP was chosen as the system provider. (Internal material of the case company.)

In addition to the program Beagle, Neste Corporation seeks to continue responding to the rapidly growing business requirements and enhancing user efficiency in the future with adopting a modern ERP system in SAP S/4HANA implementation. This implementation project is regarded as a natural continuum to the program Beagle, as the S/4HANA conversion project is focusing on SAP platform conversion and implementation of new SAP Fiori applications. With the implementation, several business benefits are introduced to respond the future business requirements with latest SAP technologies, simplifying and standardizing SAP processes with removing custom code implementations, better capability to real-time reporting of business performance and to improve user efficiency and experience with the SAP Fiori applications. (Internal material of the case company.)

As a request by the case company, an investigation on how the program Beagle, the implementation of the SAP has affected the Commercial Operations is conducted in this thesis. This post-implementation study is conducted with carrying out a set of interviews in the current state analysis section of the study to obtain a broad knowledge on how the SAP environment is performing currently and what are the main benefits and challenges of the current system environment. In addition to the post-implementation study of the program Beagle, a discussion on how the ongoing SAP S/4HANA conversion could affect Commercial Operations compared to the existing SAP environment is conducted during the current state analysis of the study.

The objective of this study is to investigate the benefits and challenges of the current SAP environment from the Commercial Operations perspective at the case company Neste Corporation.

This thesis therefore focuses on investigating the current state of the SAP environment at the case company Neste Corporation as well as discussing the expected impacts of the ongoing SAP S/4HANA implementation through employee interviews, the author's personal observations and utilizing the case company's internal documentation during the thesis writing stage.

The outcome of this study is suggestion proposals on selected key improvement areas based on the current state analysis in order to improve the current SAP environment of the Commercial Operations. In addition, this study also reflects the results to the ongoing SAP S/4HANA implementation, which has been regarded as a natural continuum to the primary SAP implementation project program Beagle.

1.3 Thesis Outline and Limitations

This thesis is restricted to investigating the main benefits and challenges of the current SAP environment from the Commercial Operations perspective as well as discussing on how the upcoming implementation of a modern ERP system, SAP S/4HANA, could affect the daily work of the Commercial Operations team. This study was carried out by using qualitative research methods, such as interviews with the case company employees, investigating the case company's internal documentation and utilizing the author's personal observations during the thesis writing stage.

The timing of both SAP implementation projects sets certain limitations for this study. As the program Beagle, implementation of integrated ERP solution, has been completed at the case company, this study will be mainly focusing on studying the results of this implementation project from the Commercial Operations perspective. Thus, this study is mainly conducted as a current state

analysis on the current SAP environment. In addition to studying the impacts of the program Beagle, this study also discusses on how the upcoming SAP S/4HANA implementation could impact the Commercial Operations of Neste Corporation. As the SAP S/4HANA implementation project has been ongoing during the thesis writing stage, expected impacts are discussed as a pre-implementation approach.

As mentioned earlier, the implementation of SAP S/4HANA has been regarded as a natural continuum to the program Beagle and this implementation project will not include any implementations of new functionalities, new process changes or new modules to the existing SAP environment. Thus, the expected changes have been regarded as relatively minor to the existing environment. This also sets certain limitations for the study and the main scope was decided to retain in studying the current SAP environment and its performance from the Commercial Operations perspective at Neste Corporation.

This thesis is divided into six sections. Section 1 contains a brief introduction to the study and to the case company of this thesis, Neste Corporation. Section 2 presents the research approach and design, project plan and the selected approach to collecting and analyzing the data of this study. The thesis then continues to section 3, where the current SAP environment of the case company is thoroughly investigated by interviews, author's observations and case company's internal documentation. Section 4 investigates and reviews the relevant literature and best practices around ERP systems and ERP implementations based on the findings from the current state analysis in section 3. Section 5 presents the research results and improvement proposals of the current SAP environment and finally, section 6 includes a summary of the thesis and therefore offers a conclusion for this study.

2 Method and Material

This section provides an overview of how this study was conducted and how the methods and materials were utilized in order to gather a dependable and

extensive study. More specifically, this section consists of four different subsections: Research Approach, Research Design, Project Plan and Data Collection and Analysis.

2.1 Research Approach

This study was conducted by using qualitative research methods. According to Kananen (2017: 32-36), qualitative research approach stands for analyzing the studied phenomenon with non-statistical data. In qualitative research, the researcher directly studies the subject by interviews or observations of the studied theme. Objective of the qualitative research is to generate a deep understanding and extensive description of the studied process.

In this study qualitative research methods were utilized to study the current state of the case company's SAP environment by conducting interviews with stakeholders of the company, studying internal documentation of the studied theme and utilizing author's personal observations during the thesis writing stage.

2.2 Research Design

This subsection illustrates the overall research strategy of this study. Figure 3 below visualizes the Research Design of this study combined with data sources and initial outcomes of each stage of this study. As visualized in Figure 3 below, this study consists of four separate steps in order to make this study extensive and reliable.

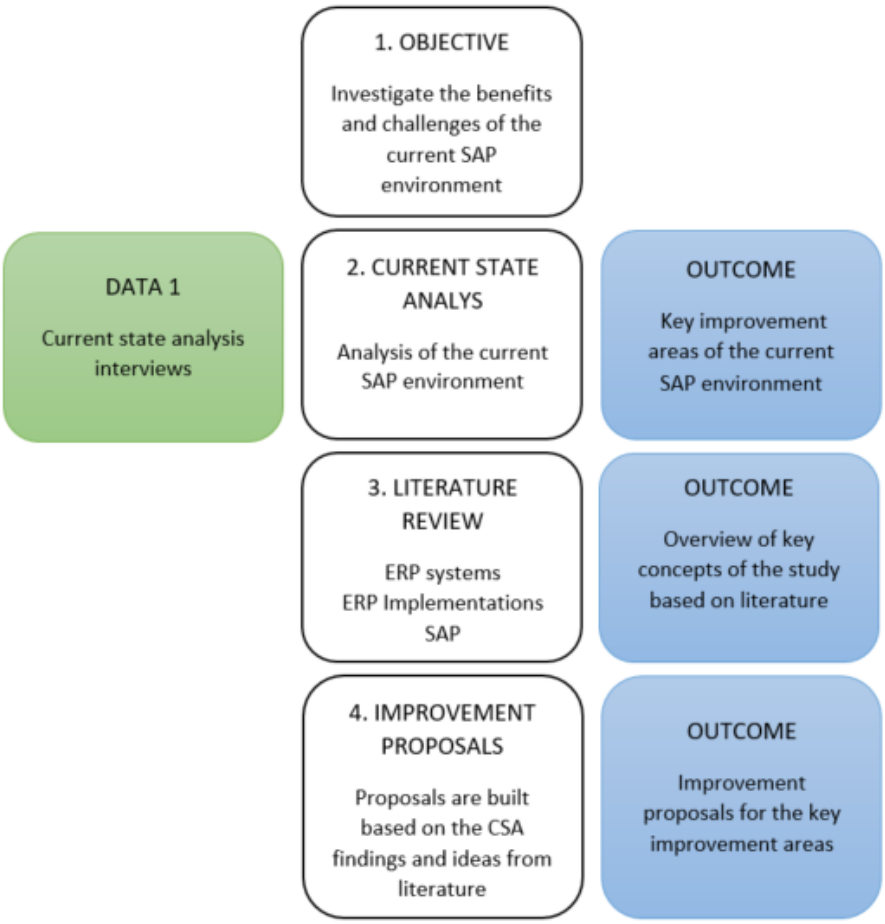

Figure 3. Research design of the study.

As shown in Figure 3, the first step was to set an objective for this study. The objective for the study came from the case company Neste Corporation, where a need to investigate the current state of the SAP environment and possible impacts of upcoming SAP S/4HANA implementation from the Commercial Operations perspective were raised.

With objective being set, next stage of this study was to conduct a current state analysis of the current SAP environment. This stage was carried out by interviewing employees of Espoo Commercial Operations team of the case company. In addition to interviews with Commercial Operations employees, interviews were also expanded to Center of Excellence team of the case company in order gather an extensive scope of material for the study mainly

from the SAP systems perspective. Together these interviews formed data 1 of this study, which were also utilized at the later stage when the research results were gathered in section 5.

After conducting the current state analysis, the study continued to researching the relevant literature and key concepts of this study. This section was based on the current state analysis conducted in section 3 and it consisted from ERP systems, ERP implementations and SAP systems.

Based on the current state analysis and literature review, next step of the study was to gather the research results and improvement proposals together on how the implementation of SAP system has affected the Commercial Operations of the case company and what are the key improvement areas of the current SAP system. Based on this, the research results were introduced for the case company and validated with the key stakeholders of the case company. The outcome of this step also formed the final results of this thesis.

2.3 Project Plan

This thesis was conducted as a Bachelor's Thesis in Metropolia University of Applied Sciences as a part of Industrial Management program. The study was carried out for the case company Neste Corporation from the end of October 2021 until the beginning of April 2022.

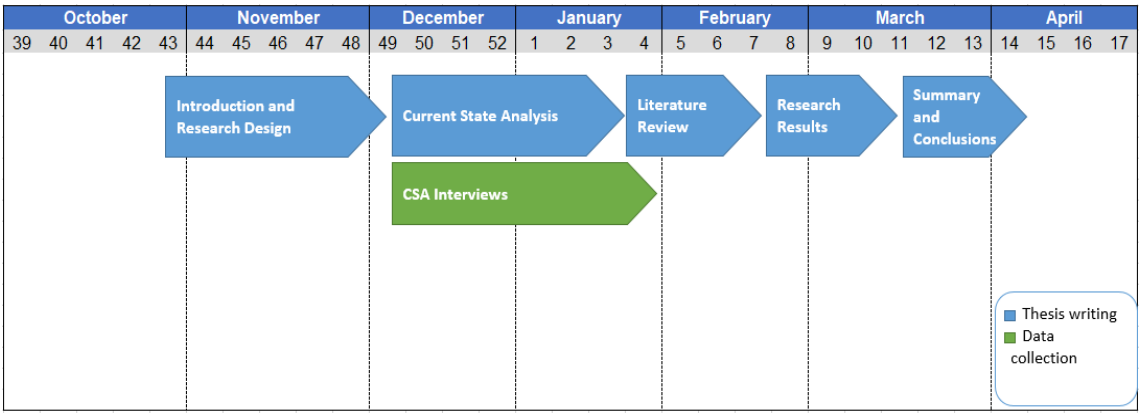

Figure 4. Project plan of the thesis.

In Figure 4 above, the detailed project plan of this study is presented. The schedule in Figure 4 was built according to the steps created in the Research Design subsection of this study, visualizing each individual step and smaller actions that were associated with writing this thesis.

2.4 Data Collection and Analysis

Data collection in this study was focused in Current State Analysis as explained earlier in the Research Design subsection. Data collection was utilized in conducting the current state analysis of the SAP environment from the Commercial Operations perspective in the case company Neste Corporation. During this part, employees of the case company were interviewed. During these interviews, benefits and challenges of the current system and expectations of the SAP S/4HANA implementation were discussed with the interviewees in order to obtain an extensive and throughout picture of the investigated topic. The interviews conducted in current state analysis are listed in Table 1 below.

Table 1. Interviews conducted in Data 1 collection of this study.

Data Collection Overview – Current State Analysis				
Source #	**Role**	**Company**	**Organization**	**Documentation**
Interviewee 1	Operations Coordinator and SAP Key User	Neste Oyj	Commercial Operations	Google Meet, recording and transcription
Interviewee 2	Operations Specialist	Neste Oyj	Commercial Operations	Google Meet, recording and transcription
Interviewee 3	Operations Specialist	Neste Oyj	Commercial Operations	Google Meet, recording and transcription
Interviewee 4	Operations Specialist	Neste Oyj	Commercial Operations	Google Meet, recording and transcription
Interviewee 5	Operations Specialist	Neste Oyj	Commercial Operations	Google Meet, recording and transcription
Interviewee 6	Solution Manager	Neste Oyj	Center of Excellence	Google Meet, recording and transcription
Interviewee 7	Solution Manager	Neste Oyj	Center of Excellence	Google Meet, recording and transcription
Interviewee 8	Solution Manager	Neste Oyj	Center of Excellence	Google Meet, recording and transcription

As shown in Table 1, the current state analysis interviews were constructed as semi-structured interviews where the author had prepared a set of questions beforehand and along with the questions, discussions were held on the discussed topics openly. If needed, clarifying questions were asked by the author in order to obtain the best possible understanding on the discussed topic. In addition to these interviews, the author's personal observations and case company's common documentation on the topic were utilized in the current state analysis section.

The next section describes the current state analysis stage in detail and how it was carried out for the case company's Commercial Operations team.

3 Current State Analysis

This section presents the results from the current state analysis of the SAP environment from the Commercial Operations perspective at the case company Neste Corporation. This section is divided into four different subsections, starting from overviewing the current state analysis of this study, following with a brief description of the current SAP system of the case company. Next, interviews with the case company employees are conducted in order to gather the benefits and challenges of the current SAP environment. Finally, summary of the current state analysis section and interview results are then gathered into key improvement areas in order to outline the results clearly.

3.1 Overview of the Current State Analysis

In order to gain a clear understanding and deep knowledge of the case company's current SAP environment, the Current State Analysis (CSA) was conducted at the case company's Commercial Operations team. As the program Beagle was an extensive transformation journey that took the case company several years, a throughout investigation on how the SAP implementation has affected the Commercial Operations is necessary in order to indicate possible improvement areas of the current system. In addition to the extensive change that took place in program Beagle from the systems perspective, SAP is also regarded as the main information system amongst Commercial Operations employees in their daily work and thus the description on how the system performs currently is seen as essential.

The main objective of the CSA stage was to gather an extensive view of the SAP environment and to define the main benefits and challenges of the current system.

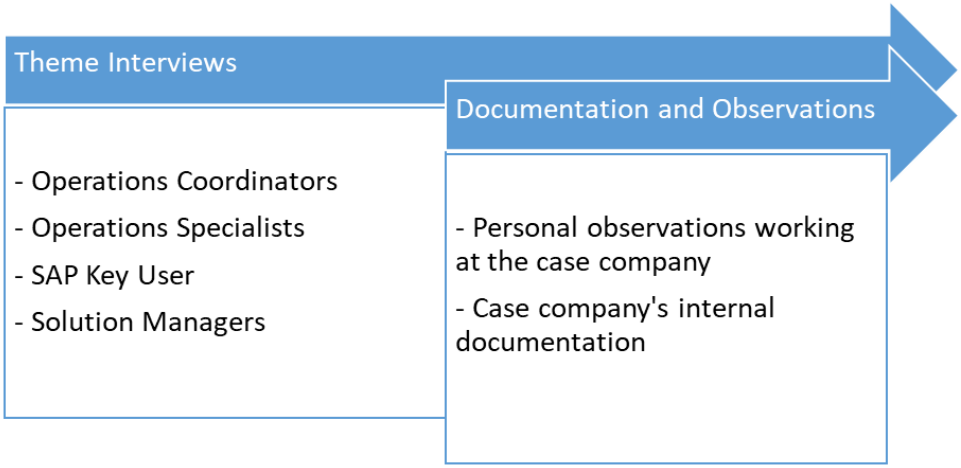

Figure 5. Overview of the Current State Analysis stage data collection.

Visualized in Figure 5, the current state analysis stage included qualitative research methods, mostly consisting from interviews of the case company employees. Theme interviews were held as a semi-structured interviews, where the author posed a set of preliminary questions for the interviewees. During the theme interviews, discussions were let flow freely on the discussed topic and specified questions were asked during the interviews in order to obtain the best possible understanding on the discussed topic. All of the interviews were held via virtual meetings and the interviews were recorded and transcribed in order to make the results reliable and to look back at the results at a later stage of this study. In addition to the interviews, other qualitative research methods used in this stage was author's personal observations during working at the case company and utilizing the case company's internal documentation of the studied theme. Case company's internal documentation on the program Beagle was utilized in order to obtain a broad understanding on the SAP implementation project which has eventually led to the current state at the case company Neste Corporation.

3.2 Description of the Current SAP System

In its current state, the case company Neste Corporation have implemented the following solutions to its SAP architecture as presented in Figure 6 below.

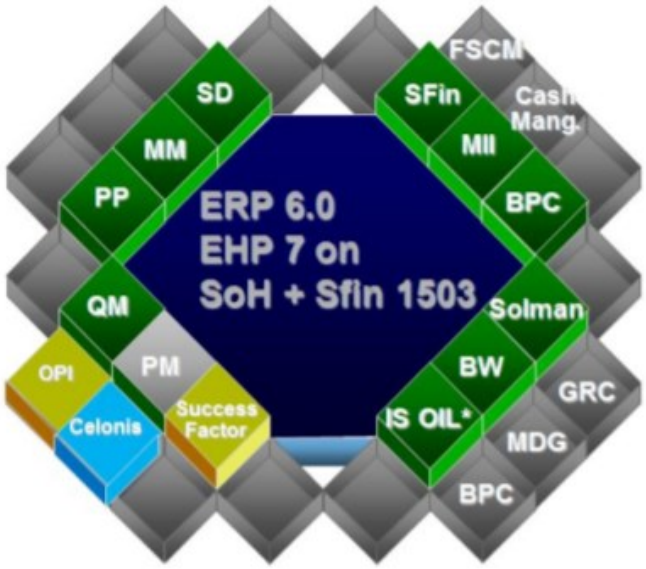

Figure 6. SAP architecture of Neste Corporation (Internal material of the case company).

Visualized in Figure 6, core SAP solution consists from standard SAP partnered with Oil and Gas module, which is tailored for companies especially in oil and gas industry, such as the case company Neste Corporation. Within the solution, SAP architecture consists from the following core modules: SD for sales and distribution, MM for materials management, PP for production planning, QM for quality management, and PM for plant maintenance. Financial modules implemented includes SFin for simple finance, MII for manufacturing integration and intelligence, BPC for business planning and consolidation, FSCM and Cash Management for financial supply chain management. Master data related modules include BW for business warehousing, Solman for solution manager, and MDG for master data governance and GRC for governance, risk management and compliance.

When the current SAP system was implemented in program Beagle, the main objective of this project was to replace several outdated legacy systems and standardize Neste Corporation's ERP systems into one, integrated solution and therefore ensure the case company's competitiveness in the future. From the Neste Corporation's Commercial Operations perspective, SAP implementation meant harmonizing the supply chain of the case company from the system perspective and thus standardizing the planning and optimization of operations into one integrated ERP solution as visualized in Figure 7 below.

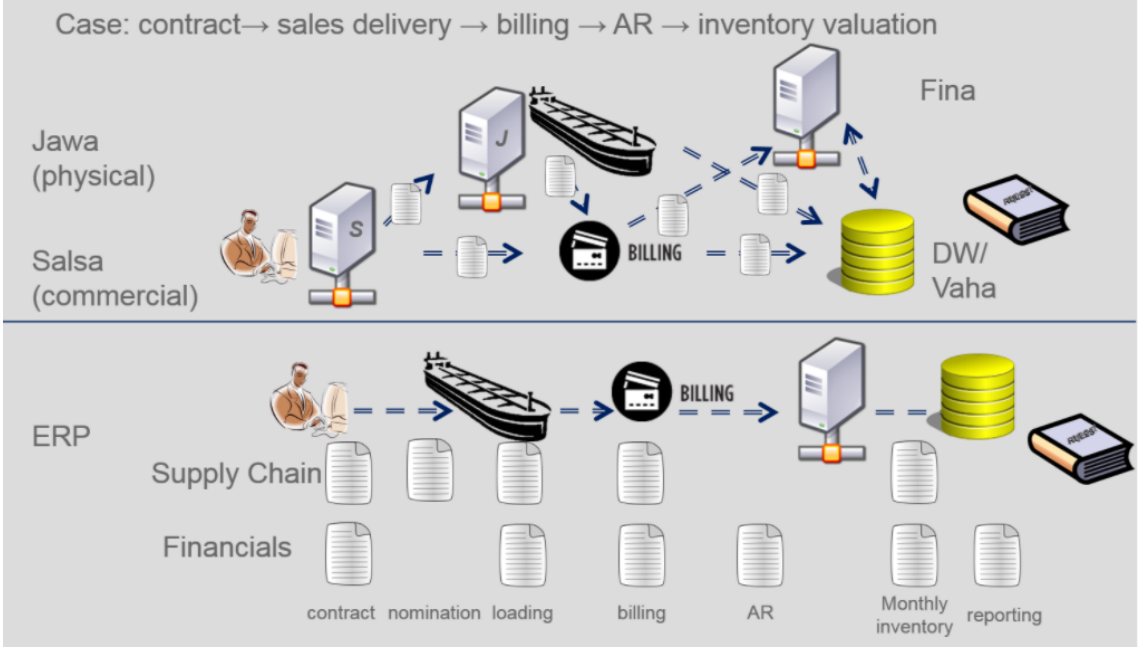

Figure 7. Comparison between the previous ERP-systems and the SAP implemented in the program Beagle at the case company (Internal material of the case company).

Figure 7 above visualizes the differences between the old legacy systems and SAP ERP system implemented in the program Beagle. In this case, the comparison has been visualized in an end-to-end business scenario where the process starts from contract creation between the case company and customer, followed by sales delivery of material, billing, accounts receivable and finishing in an inventory valuation. As mentioned earlier, implementation of the SAP harmonized and simplified the ways of utilizing the ERP systems and reduced the system fragmentation with the different business units of the case company.

The investigation of the current SAP system took place on interviewing the key stakeholders at the case company in order to obtain an understanding on how to implementation project has affected employees of the Commercial Operations team and what are the current benefits and challenges with the system. Interviews were split into two different stages, first stage focusing on Commercial Operations employees and the second stage involved interviews with Neste Corporation's Center of Excellence team. Center of Excellence team is a central organization of the daily operative support of business line organizations and their end-users within the scope of Neste's SAP environment. Thus, the main objective of involving the Center of Excellence employees into the current state interviews was to gather a more extensive view of the current SAP environment and to obtain a different view to the SAP systems compared to Commercial Operations employees which are mostly seen as an end-users of the SAP at the case company.

Interview questions were formed mostly by investigating the current state of the SAP environment and comparing it to the previous ERP environment at the case company before implementing SAP in the program Beagle. At the end of the questionnaire, the ongoing SAP S/4HANA implementation was brought up in order to gather opinions and thoughts of the upcoming SAP S/4HANA conversion. These questions were formed so that the interview results can be utilized in both current state analysis stage and building the research results and proposals stage. For more information of interview question, form of the interview questions is visible in Appendix 1 of this study. The results of the interviews are part of data 1 of this study. The results of the interviews are reviewed and summarized in the upcoming subsections.

3.3 Benefits and Challenges of the Current SAP System

This subsection presents the benefits and challenges identified in the current SAP system based on interviews with the employees of the case company. The main objective of defining the benefits and challenges of the current system is

to help determining the key improvement areas in the later stage and to build up the research results of this study.

3.3.1 Benefits of the Current SAP System

When analyzing the interview recordings and notes, identified benefits based on the discussions with the case company employees were discovered to cover similarities along the interviewees. Findings and comments covered certain areas of studied topic, highlighting specific features and areas where the benefits were mainly focusing on the current SAP system. Table 2 introduces the benefits of the current SAP system environment identified from the data collection of the current state analysis.

Table 2. Benefits of the current SAP system.

Benefit	Comments	Area
Recognized and common ERP system	ERP system that has been widely used globally by both energy companies and other companies. This gives a good foundation where to build and development IT systems in general in Neste Corporation	SAP
Integrations between other IT systems	Given the amount of data that goes through SAP on a daily basis at Neste Corporation, system integrations with the system is crucial and performs well in general	Allegro, SAP, ROMSS, DistX
Defined and clear user restrictions	Clear roles and responsibilities for each internal stakeholder at Neste Corporation in SAP	SAP
Data availability and possibilities to benefit from it even better in the future	A great amount of data is available in the system and it contains different possibilities from the company perspective. Currently, Commercial Operations may not know or identify all the possibilities that the system could offer for operational work	SAP, SAP Celonis, SAP Business Objects
Transparency with other internal stakeholders	SAP forces to determine the roles and responsibilities of each business unit within the company to be limited and clear, meaning that the system as self does not allow one individual employee to do more in the system than what the defined role is	SAP

As shown in Table 2, identified benefits of the current SAP environment were categorized into five different themes. On the first cell, benefits of the current SAP system is mentioned, following by highlighted comment of the benefit based on the interviews. On the third cell, affected area is mentioned.

First identified benefit of implementing SAP from the Commercial Operations perspective was that SAP implementation offers recognized and common ERP system, which has been widely used globally in both oil and gas companies as well as companies in other industrial sectors. This benefit was widely noted by

all of the interviewees, stating that SAP gives an ideal foundation on daily work and general ability to develop the system environment in the future. During the interviews, it became obvious that the program Beagle, implementation of SAP at the case company, was generally a long-waited event amongst the interviewees. Interviewees highlighted that the implementation was a significant change from the previous ERP system which was out-dated and did not serve the purpose and needs of a global company, which core business had changed significantly in recent years.

Second benefit highlighted by the interviewees related to other IT systems in use at the case company and its integrations with SAP. These integrations have been recognized as necessary as the case company runs several other SAP and non-SAP applications which need to be able to communicate with each other. From the Commercial Operations perspective, the most relevant applications integrated with SAP are Allegro, DistX, ROMSS, Spiral, SCS and SSP. Given how many integrations have been linked to SAP at the case company and even though problems occur occasionally with the integrations, interviewees considered the integrations as one of the key benefit that implementing SAP has brought to the company. In addition, interviewee 2 highlighted that the integrations has generally improved alongside with the introduction of the SAP and will be improved and taken into account in the future as well:

> Considering the circumstances, for example how much data flows through the SAP continuously and how many different systems are linked to SAP, the system performs extremely well. (Interviewee 2)

Third theme recognized as a benefit of the current SAP system associated with strict authorization and user restriction of the SAP. Based on the interviews, employees of the Commercial Operations team were generally satisfied with clear user roles and authorization that SAP implementation has brought to the case company. According to the interviewees, with the old ERP system, these rights and roles were hardly determined at system level and basically any user could do anything in the system. Now with the SAP, the system roles are

determined firmly, increasing also the transparency and accuracy of the company in its day-to-day operations:

> SAP forces to determine the roles and responsibilities of each user within the company to be limited and clear, meaning that the system as self does not allow one individual employee to do more in the system than what the defined role is. (Interviewee 5)

Fourth benefit mentioned in the interviews related to the available data in the system. During the interviews, one interviewee mentioned that a great amount of data is available in SAP in order to improve the various different business processes from the Commercial Operations perspective. Interviewee pointed out that currently Commercial Operations of the case company may not utilize the available data efficiently and maximize the possibilities of the available data in the system, pointing out that operational performance could be improved with utilizing different data sources in daily operations.

Fifth and final benefit recognized in the interviews was the transparency with other internal stakeholders of the case company that has generally improved with implementation of the SAP. Transparency of SAP is heavily linked with the benefit of clear roles and responsibilities that was mentioned above, although the transparency can be seen to relate to whole Neste Corporation:

> In terms of how transparent and accurate business operations must be from the perspective of such a large Finnish listed company, the implementation of SAP also gives a much better starting point when there is one big integrated system in use within the company. (Interviewee 5)

From the Commercial Operations perspective, interviewee 3 mentioned that the transparency and system integration that was mentioned earlier affects for example in Allegro and SAP integration, where spot trades are entered by trader and information of the trade then flows from Allegro to SAP:

> Trader is responsible in adding the needed information about the deal into Allegro and when completed, data flows to SAP for us. As a result, we already have the correct and reliable information about

> the details of the trade at this stage, and it is easy to start doing our part of the trade in SAP. (Interviewee 3)

The following subsection summarizes the discovered challenges of the SAP system from the Commercial Operations perspective at the case company.

3.3.2 Challenges of the Current SAP System

Challenges of the current SAP environment were gathered with the same methods as the benefits presented above. Based on the collected data, challenges were categorized into specific themes. Table 3 below presents the identified challenges of the current SAP system.

Table 3. Challenges of the current SAP system.

Challenge	Comments	Area
Integration challenges	In these situations, the general challenge is that information has not flown into the SAP or from the SAP to other IT systems.	Allegro, SAP, ROMSS, DistX
Inflexibility of the system	Modifying existing data is difficult and requires a lot of excessive work. Implementing new business scenarios is demanding and requires excessive work with several internal stakeholders. The inflexibility of SAP is highlighted in the Renewables Platform	SAP, Renewables Platform
SAP customization	Due to highly customized SAP environment, co-operation with system provider is sometimes challenging and fixing existing errors could be time-consuming	SAP
Commercial Operations broad responsibility systems perspective	Commercial Operations broad role and responsibility in SAP requires a lot of knowledge of the system and it is occasionally hard to concentrate on certain expertise	SAP

As presented in Table 3, highlighted challenges from the Commercial Operations perspective were categorized in four different themes. Following the identified challenge, highlighted comment from the interviews is brought up. On the third cell of the table, area where the challenge is mostly impacted is presented. Generally, interview results were similar with all interviewees, although some differences were detected depending on the role of interviewee or whether the interviewee operated in sales or supply or with renewable or oil products.

According to the interviews, the first challenge identified was related to integration challenges between SAP and other IT systems in the case company. As mentioned earlier in the benefits of the current SAP system, the integration possibilities that the implementation of the SAP has offered is generally regarded as a benefit, although challenges that Commercial Operations

employees face often relate to the integrations between SAP and other IT systems. Interviewee 1 summarized the integration challenges as follows:

> Generally it is great that the system (SAP) is linked to several other IT systems in our company, but at the same time this also brings its own challenges when the integrations do not work as they should. (Interviewee 1)

When asked to specify the challenges that system integrations generate for the Commercial Operations, interviewee 1 described as follows:

> The general challenge is that if certain information has not flown to SAP from other IT systems or from SAP to other IT systems, it often requires a lot of work to find out the cause of these errors and to correct these errors. (Interviewee 1)

Interviewee 2 specified that integration errors can be separated into two different causes:

> Some of the integration challenges are purely user related, for example when certain data has not been entered properly or something has been forgotten to confirm in SAP. On the other hand, some of the integration challenges are purely system based, for example quantity conversions between SAP and ROMSS. (Interviewee 2)

As mentioned above, integration challenges can emerge from both user related errors as well as from system based errors. During the interviews, several interviewees mentioned that these integration errors can often be challenging and they often require external help from other internal stakeholders at the case company. According to the interviewees, integration challenges in general are highlighted in complex business scenarios such as intercompany scenarios or in uncommon or completely new business scenarios especially with renewable materials.

When discussing the integrations between SAP and other IT systems at the case company, interviewee 7 pointed out that these integrations have generally brought lots of positives to operative work at the Commercial Operations, although challenges may have occur occasionally between these integrations.

Interviewee 7 highlighted domestic truck operations, where the current truck solution between SAP and other IT systems may not be the best possible:

> Considering domestic truck operations, I think our truck solution from the systems perspective is not the best possible at the moment, even though the system is currently capable to handle massive amount of data reasonably well and the processes are automated when everything goes as planned. (Interviewee 7)

Further discussions concerning the large domestic customers revealed that additional pricing system integration between the case company and its internal stakeholder have also been causing operational challenges:

> There have also been some challenges between the internal stakeholder's own pricing system Ax and our pricing in SAP, and in my opinion there are room for improvement between this integration in the future. (Interviewee 7)

The second theme of challenge raised during the interviews relates to inflexibility of the current SAP system. According to the interviews, this was regarded as the most significant challenge of the current SAP system from the Commercial Operations perspective:

> In my opinion the most significant challenge from the Commercial Operations perspective is the inflexibility of SAP, and in my opinion the inflexibility is highlighted on the Renewables Platform of the company. (Interviewee 5)

During the interviews, it turned out that the inflexibility of the SAP has an effect to both Oil Products and Renewables Platform, although highlighted on the Renewables Platform, which is generally regarded as a growing and developing business where new business models are constantly being developed and implemented. With emerging business of renewable materials, inflexibility occurs in new business models implementations and even setting up new plants or materials in the system. Interviewee 5 summarized the inflexibility in Renewables Platform as followed:

> Implementing new business models is an extremely slow and demanding process. Even setting up a new plant or material in the

> system requires external help and it usually takes up to 2 months to create it in the system. In my opinion, it feels like nothing can be done in agile way from the systems perspective. (Interviewee 5)

Interviewee 3 had similar opinions, adding a following comment:

> Nowadays, it just feels that it is the system that slows done situations where we need to implement new business models and in general make modifications to existing data or add data into the system, such as new plant. (Interviewee 3)

When discussing the inflexibility of the SAP, discussions with the interviewees were mostly focusing on the Renewables Platform of the case company. As mentioned, interviewees had similar opinions that the inflexibility has major impacts on how operations are carried out and how it affects the Commercial Operations employees who operate on the renewables side of the company. Given how growing and developing the renewables business is at the company, interviewees emphasized how important is that the system perspective should be taken into account in the future to keep the systems up with growing demand on the renewable products. When asked to specify situations where the inflexibility of the SAP is significant, interviewee 5 described it as follows:

> We often face situations where we have a new business model and we notice that the system (SAP) does not support it at all. In these situations we spend time to consider the options to make the business model work in systems perspective, and the result is often some kind of a workaround. One example of these situations is our renewable aviation fuel business for customers at airports, where we do not have proper system or module to support this activity from operations perspective. (Interviewee 5)

Interviewee 4 had similar challenges on the renewable products, stating following:

> Regarding the LWP (liquefied waste plastics) side, currently we do not have a functional solution for ticketing these in SAP and it requires a lot of manual work from operations perspective. Given that the volumes of LWP cargoes are projected to triple in 2022, the overall nomination process of these cargoes could be developed from the systems perspective in the future. (Interviewee 4)

The third challenge raised during the interviews was related to current SAP systems customization at the case company Neste Corporation. Due to the current SAP environment being highly customized for serving the case company's needs, the customization also brings its own challenges to Commercial Operations work for example in co-operation with the system provider. When asked to describe these challenges, interviewee 7 described these as follows:

> The system provider has also sometimes difficulties with resolving problems with the SAP. In particular, bio management side in Renewables Platform can be challenging even though the basic modules in our SAP are delivered as is. Due to customization, the ongoing S/4HANA project is also very extensive as the implementation and testing of custom modules can be very challenging and time-consuming. (Interviewee 7)

When discussing on the customization of the SAP and how it affects the Commercial Operations at the case company, several interviewees highlighted that they have faced challenges with customized solution of Scheduling Dashboard in SAP. Scheduling Dashboard is a customized functionality used in Renewables Platform to enter and share the latest information of material movement related information. From the Commercial Operations perspective, Scheduling Dashboard is used in nomination creation in scenarios that include RP material instead of standard nomination transaction used in Oil Products. According to process description of the Scheduling Dashboard, the original objective of implementing the Scheduling Dashboard was following:

> Before implementing Scheduling Dashboard logistics planners and operators were working with separate tools, mainly with different Google Sheets. Collaboration was carried out via Google Sheets and communication was happening verbally, in emails and chats. So Scheduling Dashboard is created to replace Google Sheets used for planning by schedulers, operators and others. It is also integrated with Spiral and BPC so that most of the data is available in one transaction in SAP. (Scheduling Dashboard process description, internal material of the case company)

According to the interviews, even with implementation of the Scheduling Dashboard, Google Sheets are still in use amongst the Commercial Operations

and other internal stakeholders of the case company, thus the solution has not replaced the sheets totally. In addition, the solution itself is currently difficult and inflexible to use, particularly in situations where data needs to be modified or reversed afterwards. Interviewees highlighted that use of Scheduling Dashboard adds excess and manual work for the Commercial Operations team as modifying data requires cancelling the existing nomination and doing the changes in the Scheduling Dashboard instead of just modifying the existing nomination in the nomination module itself. In addition to this, interviewees mentioned that occasionally system errors come up in the Scheduling Dashboard which are not user-related.

As for improving the Scheduling Dashboard in the future, the interviewees agreed that developing the solution would be essential taking into account the growing market of renewable materials and discussions whether the solution will be extended on the Oil Products as well in the future. Interviewees suggested that if the Scheduling Dashboard expands within the case company, extensive introduction and support should be provided at the beginning of the implementation as well as minor system errors that occur in the system should be corrected.

The fourth and final challenge recognized based on the interviews was broad responsibility of the Commercial Operations from the SAP perspective. Due to work responsibilities of the Commercial Operations at the case company, access rights and responsibilities to SAP have been set to considerable extensive scale. With having to operate in various different tasks in SAP from creating master data to maintaining inventories, certain knowledge and expertise was mentioned to be relatively difficult to maintain amongst the employees of Commercial Operations. Interviewee 3 highlighted the fact that the roles and responsibilities are very broad and it can lead to several challenges at the system level within the case company:

> The role of Commercial Operations is very broad from the system perspective and I see this as a clear examination and a scope for improvement in the future. (Interviewee 3)

Interviewee 7 agreed with the strict security and access rights, stating that the from the Commercial Operations perspective the situation can be described as challenging:

> From the Commercial Operations perspective, the strict internal control of access rights within the system is a clear challenge, and I think this may not be fully understood amongst the team. In the future, addressing this situation could be needed or even necessary, especially with the incoming S/4HANA conversion. (Interviewee 7)

The following subsection summarizes the key findings of the benefits and challenges of the current SAP system from Commercial Operations perspective at case company Neste Corporation.

3.4 Summary of the Findings

To summarize the current SAP environment from the Commercial Operations perspective at the case company, it can be described as relatively well performing environment considering how much data goes through the system every day as well as enabler of the current business at the case company. Although at the same time, it is described as inflexible and heavy system to use, being demanding and resource-intensive system as the system itself requires accurate and up-to-date information which is needed to input correctly, and due to that modifying and reversing data afterwards is regarded as inflexible to do in the system. Inflexibility of the system is highlighted on the Renewables Platform, which is regarded as emerging business where new business models are often implemented and system flexibility is often emphasized. Therefore, renewables side of the case company can be seen as challenging in the system perspective as there is no completely functional solutions available that would be able to meet the requirements of the renewables platform.

As Commercial Operations responsibility from the systems perspective has considerably grown after implementation of the SAP, interviewees highlighted the importance of clear roles and responsibilities that the implementation of

SAP has brought into the internal stakeholders of the case company. Although at the same time, broad responsibility of Commercial Operations from the systems perspective was highlighted. Due to wide scale of responsibilities and different functions that Commercial Operations are responsible carrying out in the SAP, it was described as difficult and challenging to maintain a certain kind of expertise and specialization currently. In this perspective, also co-operation with internal stakeholders of the case company is regarded as particularly important and improving and maintaining the co-operation crucial in the future.

With the implementation of SAP, support organizations have also been taken to a new level at the case company, as the implementation has brought in example SAP key users, solution managers and service portal for solving challenging situation that occurs with the system. As a result, there are currently improved capability to answer the problems and offer solutions compared to what the situation was with the previous ERP systems. In addition to internal support organizations, support of the system vendor in the most challenging situations and developing the SAP system to suit better for the case company has been noted as a key benefit to tackle the evermore challenging and changing business environment and processes in the future.

In its current state, it was highlighted that a great amount of data is available and usable in the system and all the possibilities to capitalize these possibilities are a bit unidentified from Commercial Operations perspective currently. Taking into account how broad roles and responsibilities Commercial Operations team have from the systems perspective at the case company, utilizing the data opportunities that the system provides could improve the overall performance of the operational work at the case company Neste Corporation. This aspect is highlighted with the ongoing S/4HANA conversion, as it is generally believed that the system upgrade will provide even better capabilities in data utilization in the future.

In addition to analyzing the current SAP environment, the ongoing SAP S/4HANA conversion project were also taken into account during interviews

with the employees of the case company. Expectations of implementing the S/4HANA resulted in similar findings amongst interviewees as the Commercial Operations employees were mostly expecting smooth transition project with no major changes to actual SAP environment from the end-user perspective. Results are also in line with overall objectives of the project, as no new functionalities, process changes or modules are implemented during the conversion project. This means only minor organizational changes to SAP environment from the Commercial Operations perspective, although most benefits of the S/4HANA conversion could be discovered after the implementation has been completed.

When considering the impacts of implementing the SAP, it should be taken into account that the case company's business in general has also changed significantly compared to period where the previous ERP system was in use or when the program Beagle, implementation of the SAP began. Considering the differences, it is essential to compare and consider what kind of a change is brought by business environment change and what kind of a change is more about system related change. This boundary often seems to be volatile as both of these changes occurred at the same time scale in recent years. As when the SAP project was initially launched in the case company, Oil Products' share of the company was significantly higher. With business constantly developing, it has turned out that the Renewables Platform of the company has grown significantly and continues to grow at a rapid pace in the future, and it has brought its own challenges from the systems perspective at the case company. Interviewee 2 summarized the business environment and SAP implementation transformations from Commercial Operations perspective as following:

> It is essential to draw a line whether the changes are system or business related. Nowadays, it is easy to blame on the system for all of the challenges that occur in daily operations. (Interviewee 2)

In order to map out the key findings from the current state analysis, key improvement areas of the current SAP environment from Commercial Operations perspective are gathered into Table 4 below.

Table 4. Key improvement areas of the Commercial Operations current SAP environment.

Theme	Comments	Area
Integration challenges	In these situations, the general challenge is that information has not flown into the SAP or from the SAP to other IT systems. This often requires a lot of work to find out the cause of these errors or which system is behind the error in general	Allegro, SAP, ROMSS, DistX
System inflexibility	Modifying existing data is difficult and requires a lot of excessive work. Implementing new business scenarios is demanding and requires excessive work with several internal stakeholders. The inflexibility of SAP is highlighted in the Renewables Platform as it is mostly growing and developing business	SAP, Renewables Platform
System roles and responsibilities	Access rights and responsibilities in SAP is seen both as a strength as well as challenge for the Commercial Operations.	SAP
Data availability and utilization	Data is available in the system in order to improve the general performance of operations. In its current state, data is not utilized properly and SAP S/4HANA conversion could also offer more opportunities in this perspective	SAP, SAP Celonis, SAP Business Objects

Visualized in Table 4, key improvement areas of the SAP environment from the Commercial Operations perspective are divided into four separate categories. Starting from integration challenges with SAP and other integrated systems at the case company, all of the interviewees during the current state analysis stage mentioned the existing integration challenges, even though a significant change has taken place with the implementation of the integrated SAP system and most of the data flows through the system integrations successfully.

The second key improvement area chosen was related to the inflexibility of the SAP. During the current state analysis interviews, it was generally noted amongst

the interviewees that SAP in general is not seen as flexible system especially with renewables business of the case company. Highlighted inflexibility associated with modifying or reversing data afterwards in the system, which was described as significantly slow and challenging, requiring excessive work amongst Commercial Operations and other internal stakeholders in the case company.

The third key improvement area was related to system roles and responsibilities, which was mentioned being both benefit and challenge amongst the Commercial Operations employees during the current state analysis. The fact that implementation of SAP has brought clear access rights and responsibilities from the systems perspective was generally mentioned as welcomed transformation compared to the previous ERP environment, although the mentioned broad roles and responsibilities of the Commercial Operations has brought its own challenges to gain and maintain the needed knowledge and skills in various different responsibilities from the systems perspective.

The fourth and final key improvement area selected was related to the SAP system data availability and utilization, as interviewees suggested that a great amount of data is available in the system in order to improve the performance of operative work at the company. In its current state, it was mentioned that the Commercial Operations team itself may not utilize the available data in systems such as SAP Celonis or SAP Business Objects. Considering the upcoming S/4HANA conversion, data availability and utilization of modern ERP system in general could also raise to a new level at the case company and could offer significant opportunities to improve general business performance from the Commercial Operations perspective.

The next section covers the literature review on relevant topics of this study. The identified key improvement areas are covered when discussing the research results and improvement proposals in section 5 of this study.

4 Literature Review on ERP Systems and Implementations

This section discusses the relevant literature and key concepts of this study. The purpose of this section is to give an overview to the main concepts of the studied theme and thus provide a documentation from the perspective of relevant literature for the proposed research results in section five of the study. This section has been divided into two different subsections, in which the main concepts and theory of ERP systems and ERP implementations are discussed, following with presenting and discussing the research results and proposals in section 5.

4.1 ERP Systems

The majority of modern business organizations are supported by several different information systems (IS). These systems can be defined as computer-based systems that process, store, retrieve and generate data to support organizational actions and decision making. An example of the IS systems is for instance enterprise resource planning (ERP) systems, which have been developed since the 1990s. Although foundations for ERP systems dates back to the 1960s, where computers were firstly utilized in resolving business challenges with more simplified material requirements planning (MRP) systems. (Kurbel 2013: 1-2.)

4.1.1 Concept of ERP Systems

The term ERP system itself has various different definitions. According to Ganesh et al. (2014: 6-7), ERP systems can be defined as a system that organizes different business processes within a company into one, integrated database. With this information system integration, stakeholders of the company are benefited with a shared database that provides seamless integration of the key business processes, real-time information flow through the organization and improved control of operations at the company. Ullah et al. (2018) present ERP systems as a software systems that are designed to

improve organizational productivity while generating accurate and up to date information across the company throughout its supply chain. On the other hand, Kurbel (2013: 2-3) states that ERP system can be simply defined as an integrated system that serves as a backbone for all core business processes at the company, thus providing employees an ability to manage and integrate the different business processes in organizations.

According to Davenport (1998), the main concept of the ERP systems is to solve the fragmentation of information amongst companies and to push organizations towards full integration of different business processes. With integrated ERP systems, companies can achieve situation where information is stored in one, integrated database rather than situation where information is spread across several systems and databases.

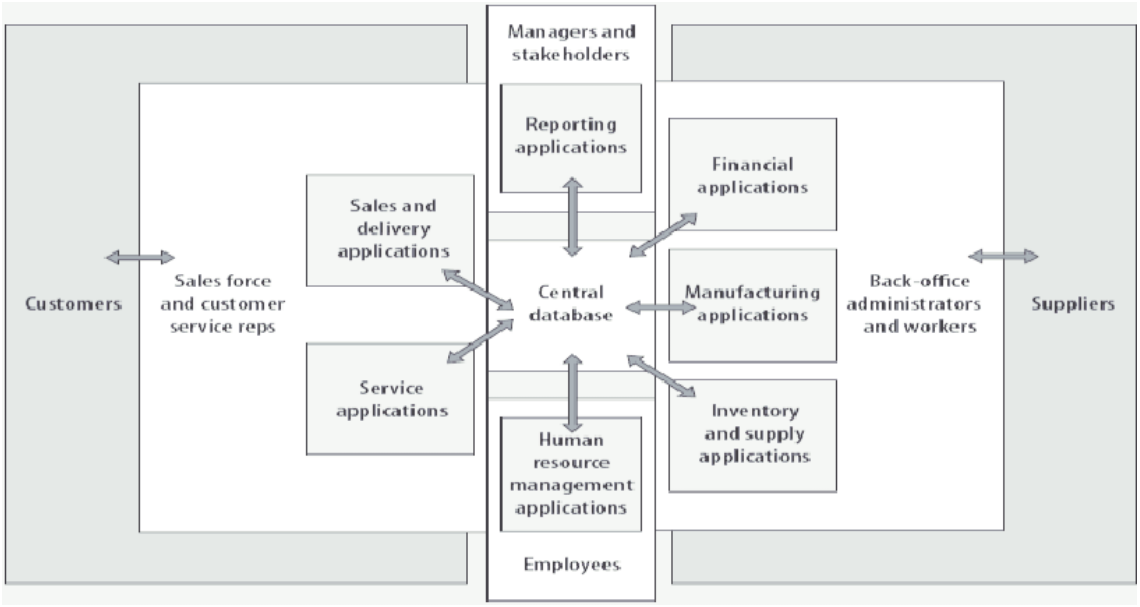

Figure 8. Anatomy of an ERP System (Davenport 1998).

Visualized in Figure 8, Davenport (1998) describes the typical structure of an ERP system to serve as a centralized database for all of the key business processes in organizations, where data is entered in one place, and related information is then automatically updated in several other databases.

During the last decades, alongside with development of information technology (IT), companies all around the world have invested heavily in ERP systems in order to gain organizational benefits, such as improved business process integration, enhanced decision-making and higher profitability (Maas et al., 2018). According to Statistics Finland (2021), 48% of Finnish companies that employed at least 10 persons were using ERP systems in 2021. The usage of the ERP systems amongst Finnish companies were dependent on the size of the company, as ERP systems were used in 38% of smaller companies compared to 86% of use amongst large companies. Amongst the business sectors, ERP systems were used the most in manufacturing industry with 72% usage.

4.1.2 SAP SE

As in the program Beagle, integrated ERP implementation project in the case company Neste Corporation, SAP was selected as the ERP vendor and which have initially led to the existing situation at the case company, SAP as a system is reviewed and studied in this subsection of this study.

Systems, Applications, and Products (SAP) is regarded as the market leader in producing and providing ERP applications and software for large companies. SAP specializes in providing ERP solutions that gather and process data into one, integrated software from all key business areas such as procurement, production, sales and marketing, finance and human resources. With over 105,000 employees worldwide, SAP has been established as one of the largest technology companies in the world and a global leader in cloud-based business software. (SAP 2022.)

Founded in 1972, SAP firstly released financial accounting software in 1973, which then became known as R/1 system. In the beginning of the 1980s, SAP introduced R/2 system, which eventually became the cornerstone of ERP systems throughout the coming decades. During this time, SAP also became notable international company, opening subsidiary companies in Denmark,

Sweden, Italy, and the United States, thereby creating a strong foothold in the international business in the upcoming decades. Newest version of SAP software, SAP R/3, was introduced in the beginning of the 1990s, which has been regarded as a great leap in computer technology in businesses globally. At the beginning of the new millennium, SAP became the world's leading manufacturer of e-commerce and web technologies, integrating them into both internal and external business processes. During the 2000s, SAP has introduced two significant versions of its ERP solutions: SAP ERP 6.0 ECC in 2006 and SAP HANA in 2010, which both of these solutions are addressed several times in this study due to the existing ERP environment of the case company. SAP HANA as a software solution is discussed in the following subsection. These business solutions has made SAP one of the largest software companies in the world with wide variety of business solutions for several different business industries in every market in the world. (Krishnamoorthy & Carvalho 2015: 34-38.)

SAP architecture is divided into several different functional modules, which together support and execute integrated key business processes. The main objective of the integrated modules in SAP is that the business processes and events can run though the system efficiently, enhance business automation and real-time information flow and improve security of end-to-end business processes. Key modules of SAP ERP is presented in Figure 9 below.

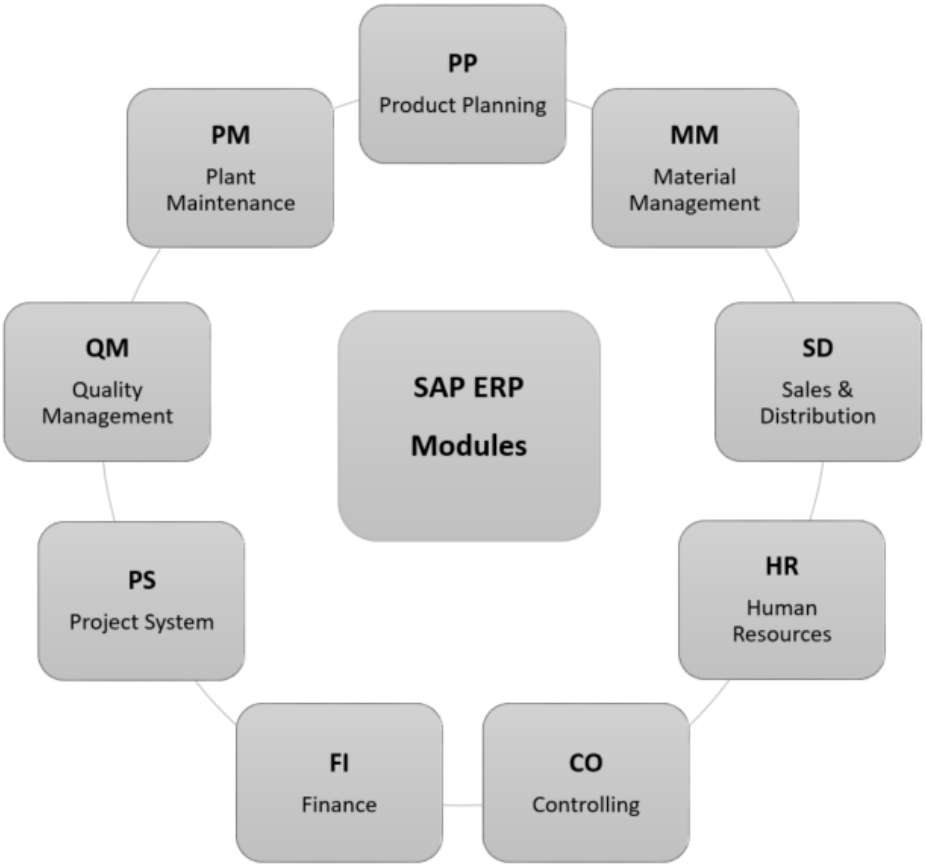

Figure 9. Core modules of SAP ERP system (Modified from: SAP Modules List https://sap4tech.net/sap-modules-list/).

Visualized in Figure 9 above, the SAP system consists of nine core modules: Product Planning, Material Management, Plant Maintenance, Quality Management, Sales & Distribution, Project System, Human Resources, Finance and Controlling. As an example of the integrations between core modules is SAP SD and FI integration, where billing transaction in Sales & Distribution module will eventually result in posting in Finance module.

Even though SAP as an ERP system is often associated with manufacturing industry, SAP offers solutions for several industry sectors. Bardhan et al. (2021: 305) state the different SAP solutions can be divided by following industrial sectors: Energy and Natural Resources, Service Industries, Consumer Industries, Discrete Industries, Financial Industries and Public Services. As the

case company Neste Corporation operates in oil and gas industry, the company has implemented SAP Oil and Gas module from solutions within Energy and Natural Resources to be used as their primary SAP solution. According to Romero et al. (2010), SAP is regarded as the most common ERP system amongst companies in oil and gas industry, stating that most companies have adopted the system between 1990 and 2005. With the Oil and Gas solution, Bardhan et al. (2021: 306) highlight that the companies adopting the solution can be benefited with optimized ERP solution for the industry, with additional support to processes with solutions such as hydrocarbon product management, Trader's and Scheduler's Workbench (TSW), upstream operations management, retail fuel network operations, and secondary distribution management.

Krishnamoorthy & Carvalho (2015: 37-38) underline that during the 21st century, SAP has made a strong progress to meet the needs of today's ever-changing economy, providing cloud-based solutions instead of on premise software and hardware as well as developing mobile applications in order to employees work and access the software anywhere and at any time.

4.1.3 SAP S/4HANA

The purpose of this subsection is to review modern ERP systems and to discuss whether the upcoming SAP S/4HANA conversion could bring a difference to existing ERP environment from the Commercial Operations perspective at the case company. The case company Neste Corporation is currently converting SAP S/4HANA to its primary ERP environment and the theme interviews in section three revealed that impacts and expectations of the S/4HANA conversion were somewhat unclear for employees of the Commercial Operations team on a pre-implementation stage of the project.

Released in 2015, SAP S/4HANA is SAP's latest enterprise application suite and it is considered as the biggest change to SAP's core solutions in ERP systems since the 1990s. Focusing on the intelligent enterprise with S/4HANA

operating as the digital core, SAP is investing significantly on involving artificial intelligence (AI), machine learning, process automation, intuitive user experience and advanced analytics to system environment and thus increasing the IT digitalization in organizations globally. SAP S/4HANA is based on the SAP HANA database, and it can be deployed either as a cloud-based application or as an on-premise application. Forming the core of the modern intelligent enterprise, SAP S/4HANA is intended to improve the user experience with new Fiori applications and to handle larger amounts of data compared to the previous versions of SAP ERP solutions. (Bardhan et al. 2021: 387-395.)

Prior to introducing S/4HANA, SAP launched its newest database management version SAP HANA in 2010 to pick up the need for high-volume and real-time data processing as well as improved transaction processing database. According to Mankala & Mahadevan (2013), HANA stands for High-Performance Analytic Appliance, which is an appliance for storing and performing analytics on a significant amount of real-time and transactional data with an in-memory database. Forrester (2017) defines the in-memory database as a technology to store data in memory on either a single or distributed server to support the transactional, operational or analytical data loads. Without going too much into technical details of the in-memory technology, SAP (SAP Insights n.d.) states that most notable benefits of the in-memory database compared to traditional database are enhanced data model as data can be store in a single database instead of several databases, faster data processing, both online transaction processing (OLTP) and online analytical processing (OLAP) can be run on same database, smaller digital footprint and improved insight for real-time alerts and operational reporting on live transactional data.

From the sales, marketing and commercial management perspective, where Commercial Operations of the case company can be categorized as operating, Bardhan et al (2021: 205-223) state that some of the industry pain points and challenges are lack of real-time data, lack of advanced analytics, integration challenges of different components of the supply chain and collaboration with customers. With SAP S/4HANA, these pain points can be avoided with

increased visibility through sales performance and order fulfilment management with the new Fiori applications, data model simplification, improved sales processes and use of machine learning, predictive analytics, and co-pilot capabilities in sales monitoring and analytics. These new functions can help companies to reduce complexity, improve sales orders visibility and performance, and improve the flexibility when setting up new sales scenarios.

For enhancing the user experience and user interface, SAP introduced new SAP Fiori applications alongside with the S/4HANA. With the Fiori applications, users can achieve an improved user interface and experience for managing the business processes without clicking through several screens or transactions compared to more traditional SAP GUI interface. Fiori applications are also available on any device, such as mobile, table or desktop. Currently, SAP Fiori applications are divided into three different categories: transactional applications for transactional processing, analytical applications for analytical needs and fact sheet applications for searching structured or unstructured data. (Bardhan et al. 2021: 436-437.)

Mathew (2015) explains the difference between Fiori applications and SAP GUI transactions with improved user experience as the key driver of change, as some of the transactions in traditional SAP are designed to perform multiple tasks and therefore the transactions are often regarded as complex with several fields and configurations remaining irrelevant and confusing for certain end-user. With the Fiori applications, SAP simplified its complex user interface by introducing role-based transactions that include only the necessary fields to complete the certain assignment, such as carrying out sales order creation for specific user role.

The main objective of the Fiori applications is to save end-users time and increase user productivity. The key advantages of enhanced user experience with Fiori applications are decreased user errors, minimizing user training costs and higher satisfaction rates with the ERP system. (Mathew 2015.)

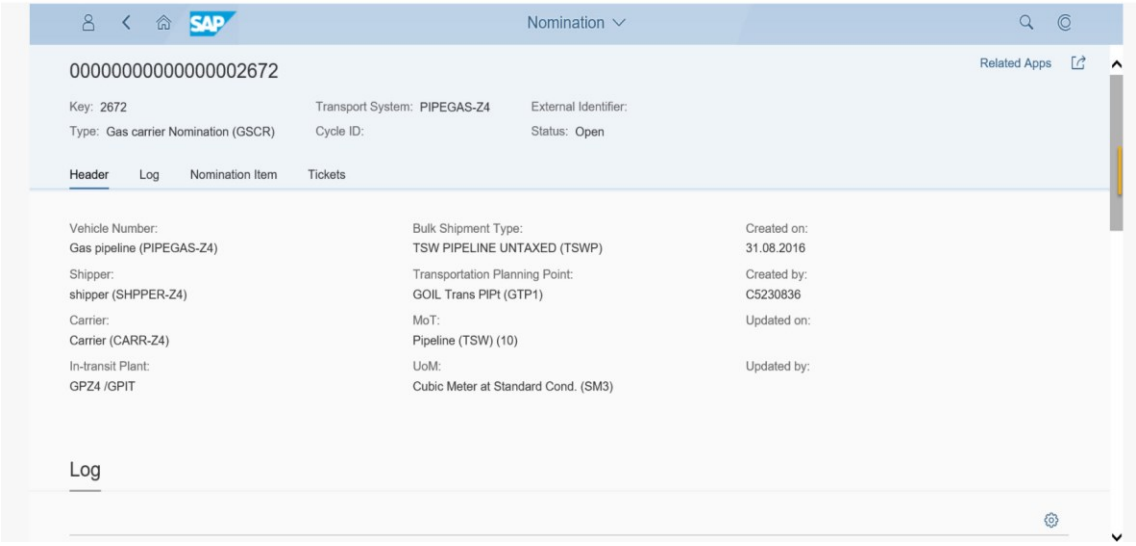

Figure 10. SAP Fiori application for Nomination in SAP Oil & Gas module (SAP Fiori Library n.d.).

Figure 10 visualizes the SAP Fiori application for displaying Nomination in SAP Oil & Gas module, which is regarded as a relevant transaction for Commercial Operations at the case company. Accessed through SAP Fiori Launchpad, compared to managing this transaction on traditional SAP GUI, Fiori application can offer end-user increased productivity, improved mobility and user interface, resulting in improved flexibility and scalability of the system and avoiding user-based errors as data input and outlook is simplified and enhanced with using Fiori applications.

Along with enhanced user experience and user interface with Fiori applications, SAP introduced CoPilot and Conversational AI solutions to provide digital assistance for end-users using SAP systems. Integrated with SAP S/4HANA and accessed through SAP Fiori Launchpad, SAP CoPilot has been regarded as significant transition in user experience for end-users as in the future it could reduce the amount of user errors remarkably. (SAP Help n.d.)

With these solutions, digital assistant and bot integration allow users to carry out tasks efficiently in SAP’s business applications with the help of artificial intelligence (AI) assistance. For instance in sales operations, SAP CoPilot have

been applied to voice commands, predictive analytics and machine learning capabilities for example in monitoring and analyzing delivery performance and gaining reliable insight into order probability and expected sales volumes based on machine learning insights. (Bardhan et al. 2021: 33-34, 210-211.)

4.2 ERP Implementations

ERP systems are complex and highly integrated software packages, where companies around the world have invested heavily during the last decades in order to obtain improved real time visibility and control over their business processes and thus gain significant business benefits compared to their competitors. However, companies have faced costly and even fatal difficulties with ERP implementation projects due to the complexity of the systems and high investment costs of the new systems (Gargeya & Brady 2005). According to Ali & Miller (2017), implementation challenges are often due to the nature of ERP systems, as the development of these systems are often based on best practice models, which often leads to situations where companies have to redesign their business processes around those practices. Gargeya & Brady (2005) highlighted that as much as 70% of all ERP implementation projects fail to be fully implemented on time and in planned budget.

This subsection covers the main concept of ERP implementations, expected benefits of implementing the new ERP system and evaluating the ERP system success once the system is deployed at the post-implementation stage of the implementation process.

4.2.1 Concept of ERP Implementation

The concept of implementation refers to installation and deployment of hardware or software in organizations. In ERP systems perspective, ERP implementations can be described as a process of planning and deploying a new ERP system into organization from project planning and preparations to system training and follow up once the new ERP system is deployed. According

to Shanks et al. (2011), ERP implementation processes can be divided into planning, implementation, stabilization and improvement phases, whereas Ali & Miller (2017) state that ERP implementations can be divided into three essential implementation phases: pre-implementation phase, implementation phase, and post-implementation phase. Figure 11 illustrates the three phases of ERP implementation.

Figure 11. Phases of ERP implementation.

In pre-implementation phase, the strategies adopted have a direct impact on the whole implementation project and activities such as the vendor roles, technology introduction, preliminary training and planning the overall implementation project take place. To summarize the pre-implementation phase, it can be viewed as a starting point which will shape the future of the implementation project. (Ali & Miller 2017.)

The actual implementation phase is a relatively long-lasting phase that could take between 12 and 30 months depending on the size of the company. During the implementation phase, several key activities take place, such as tailoring the new system for company specific needs, testing the ERP system modules and functions to meet the company requirements, training users for the new system and deploying the new ERP system in its target environment in the project company. (Ali & Miller 2017.)

As ERP implementation projects do not end after successful go-live of the implemented ERP system, post-implementation phase concentrates on tackling the challenges that occur once the new ERP is operational at the company.

During this phase, activities such as testing system effectiveness, checking data integrity and system utilization and evaluating the benefits of an implemented ERP system. For realizing the actual benefits of a fully functional ERP system, it can take one to three years to realize impacts and benefits of the new ERP system. According to Ali & Miller (2017), long-term risk factors affecting the success of the implemented ERP system are user resistance, loss of qualified IT experts and vendor support after the implementation, loss of ERP-related know-how, and inefficient integration between ERP modules and other IT systems. Mandal & Gunasekaran (2003) state that studying the implementation performance during post-implementation phase can help organizations to monitor the effects of ERP implementation and help organizations discover the improvement areas in their ERP infrastructure.

4.2.2 Expected Benefits of ERP Implementation

As ERP systems are IT systems that integrate company business processes from supply chain management to human resource management, benefits achieved with ERP implementations are also regarded as multidimensional, ranging from operational improvements through improving decision making for achieving strategic goals in organizational level (Mishra 2008). According to Maas et al. (2018), most significant benefits of implementing ERP are seamless integration of information across company organization, improved integration of business processes, enhanced decision-making and higher profitability of the business. Gargeya & Brady (2005) state that other benefits of successful ERP implementation can lead to improved information visibility, customer responsiveness, standardization of IT systems, improved flexibility to operations and ability to replace inefficient legacy systems. On the other hand, Gargeya & Brady (2005) also suggest that the benefits of ERP implementation can be divided into tangible and intangible benefits, varying if the achieved benefit is measurable in financial terms or if the achieved benefit cannot be measured directly in financial terms, even though having a significant impact on business performance.

Motiwalla & Thompson (2012: 15-16) state that the benefits of implementing a new ERP system can be divided into two different factors: system benefits and business benefits, as visualized in Table 5 below.

Table 5. Benefits of ERP implementation (Modified from: Motiwalla & Thompson 2012: 15-16).

Benefits of ERP implementation	
System benefits	**Business benefits**
Data integration	Increasing agility to respond business changes
Improved system maintenance and support	Information sharing across company organizations
User interface harmonization	Improved customer service quality
Increased data security	Enhanced business process efficiency

Summarized in Table 5 above, Motiwalla & Thompson (2012: 15-16) presented the system benefits expected by implementing ERP system to be integration of data and applications across the organization, leading to improved accuracy of data and the overall quality of data. Improved system maintenance and support is mentioned as an expected benefit as with the ERP system implementation, improved IT support can be achieved as the support organizations are centralized and trained to support the needs of end-users with the system specific challenges. Harmonization of the user interface across the new ERP system is mentioned as one of the key system benefits of ERP implementation, leading to increased productivity and less employee training. Final system benefit mentioned was harmonization and centralization of the hardware and software facilities around the new integrated ERP system, which eventually can lead to improving security of data and applications within the organization.

Increasing agility of the company to respond to changes in the business environment and ability for growth in the industry was mentioned as the first business benefit expected by implementing a new ERP system in organizations.

Secondly, information sharing and data availability across the company is expected to improve by implementing a new ERP system, which is also mostly linked with modern ERP system integration. With ERP system implementation, customer service quality is expected to improve as information is expected to flow both up and down the organization across all business units more efficiently. Finally, efficiency of business processes are expected to enhance due to business process reengineering of organization functions that often occur when the new ERP system is delivered and implemented at organizations. (Motiwalla & Thompson 2012: 15-16.)

4.2.3 Evaluating ERP implementation success

As described in subsection 4.2.1, overall ERP implementation process does not end to the actual go-live date of the system and companies can often end up with either partly unsuccessful implementation or in complete failure with the new ERP system implementation. Ali & Miller (2017) state that avoiding pitfalls in the ERP implementation such as insufficient user training, lack of user support, relying on old legacy systems, excessive customization, organizational resistance and weak understanding of business implications and requirements can help companies avoid challenges with post-implementation phase of the ERP deployment.

Ali & Miller (2017) state that successful ERP system implementation is achieved once the company is able to perform all its business functions and the new ERP system implementation achieves all of the objectives that were set in the pre-implementation stage of the project, leading to the benefits of the ERP system implementation as presented in previous subsection. Authors highlighted that end-user satisfaction of operating the new ERP system is regarded as one of key factors affecting the system success. Maas et al. (2018) agreed on the user related factor, highlighting that the success of ERP implementation vary significantly on how the end-users of the company can adopt and benefit from the new system, although pointing out that during the post-implementation stage, employees rarely use the ERP systems to its full potential. Hietala &

Päivärinta (2021) mentions that during the post-implementation stage, companies can face several challenges on post-implementation development of the ERP systems, such as complexity of the system, workarounds and communication challenges.

Even with successful ERP implementation, organizations can still use the implemented ERP system inefficiently as the systems are complex and unforeseen challenges or issues that need improving are noticed not until the system has been in use in organizations. The benefits of the system implementation can also be difficult to measure, as many of the benefits are intangible benefits that cannot be evaluated in financial terms. According to Gargeya & Brady (2005), ERP implementation evaluation is in general relatively straightforward, as the implementation project either succeed or did not succeed measured by financial terms or by operational standards of the company. However, during post-implementation stage analysis and recommendations on providing knowledge, new insights and practical guidelines to future is seen as important for continuous improvement of the deployed ERP system.

Hietala & Päivärinta (2021) state that the existing research on ERP systems has mainly focused on the implementation stage, leaving the post-implementation evaluation and development understudied, even though the post-implementation development ensures continuing benefits for organizations. In order to tackle the challenges of the new ERP system, post-implementation stage of the implementation process concentrates on realizing the business benefits of the new system and evaluating the possible challenges and difficulties that may have occurred once the new ERP system has been deployed. Therefore, evaluating the post-implementation usage of the ERP systems can ensure that the company achieves the best possible benefits from implementing the new ERP system.

5 Research Results

This section combines the findings from the current state analysis and literature review sections presented in the previous two sections of this study. Moreover, as per the objective of this study, the purpose of this section is to answer the question what are the key improvement areas of the current SAP environment and to propose suggestions on how to improve the discovered challenges in the future. Research results were validated together with the case company's Operations Manager in order to ensure the accuracy of the results.

5.1 Overview of the Research Results Stage

In the research results stage, the research results of this study were presented and improvement proposals were built. During this stage, current state analysis interviews were utilized as the interviews during the CSA stage involved discussions on making suggestions on the discovered key improvement areas. Based on the current state analysis interviews in section 3, the key improvement areas of the current SAP system environment from the Commercial Operations perspective at the case company were identified and selected for further discussions of this study. The literature review in section 4 focused on reviewing and discussing the relevant literature on ERP systems and ERP implementations in order to support building up the research results and proposals in this section of the study. The steps for gathering the research results and improvement proposals are shown in Figure 12 below.

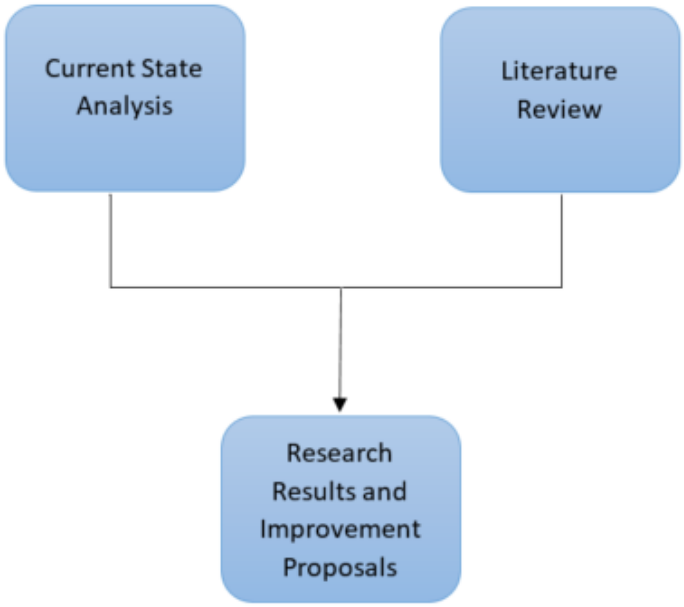

Figure 12. Steps for gathering research results.

As discussed, the key improvement areas of the current SAP environment were divided into four different themes identified in the current state analysis in section 3 of this study:

- Integration challenges between SAP and other IT systems.
- System inflexibility.
- System roles and responsibilities.
- Data availability and utilization.

The following subsection covers and discusses the selected key improvement areas and improvement proposals in detail.

5.2 Summary of Improvement Proposals

This subsection presents the selected key improvement areas in detail and suggests improvement proposals for each of the improvement area accordingly. In Table 6 below the selected key improvement areas are presented and improvement proposals for each area provided.

Table 6. Research results and improvement proposals.

Key Improvement Area	Description	Improvement Proposals
Integration challenges between SAP and other IT systems	Challenges in data flow between SAP and other IT systems	Developing ways to reduce human errors
		Error sheet development
		Improving iDoc monitoring
System inflexibility	Modifying existing data is challenging in SAP and implementing new business scenarios is demanding and requires excessive work	Highlighting that data inputs are correct, in right place and all required information is put to the system
		Implementing Fiori applications in the future
System roles and responsibilities	Roles and responsibilities in SAP are wide for Commercial Operations and maintaining certain knowledge can be challenging	Developing collaboration with internal stakeholders
		Expertise for each mode of transport for every sub-team
		Improve and maintain desk instructions
		Information sharing amongst team perspective in order to improve the system knowledge
Data availability and utilization	Data available from SAP is not utilized the best possible way in its current state	Increase SAP BO and SAP Celonis use amongst Commercial Operations

As shown in Table 6, the key improvement areas consisted of the same themes identified in summary of the section 3 in this study. After validating the selected key improvement areas, improvement proposals for each area were gathered for the case company.

Based on the current state analysis, integration challenges between SAP and other IT systems from the Commercial Operations perspective was regarded as one of the main challenges with the current SAP environment. As per discussed, significant improvement for system integrations has already taken place by implementing integrated SAP system and most of the data flows through the system integrations successfully, although integration challenges still occur frequently amongst the Commercial Operations. For improving the integration challenges in the future, three improvement proposals were gathered in this study. Firstly, developing ways to reduce human based errors in

SAP should be concentrated as some of the integration challenges faced originate from human errors such as incorrect data inputs to the system. Secondly, the role of error messages sheet used amongst Commercial Operations could be assessed and improved in collaboration with internal stakeholders of the case company. Currently, the sheet is utilized for checking various error messages that SAP puts out once errors occur within the system. Based on the current state analysis interviews, importance of the error messages sheet was raised and discussions whether the sheet could be somehow improved and brought up in the future raised. Thirdly, improving iDoc monitoring and general understanding in SAP could improve solving the integration challenges amongst Commercial Operations. SAP iDoc is a document that carries data of a business transaction from one system to another in the form of electronic message, which purpose is to transfer data or information from SAP to other system. In SAP interface, electronic messages get created into iDocs. When the iDocs are automatically processed, they trigger further automated processes in the system such as process SAP documents or carry out inventory postings. If the iDoc processing fails, activities in the SAP also fail, such as loadings are not recorded or inventory balances are not posted. Therefore, iDoc monitoring is essential in order to solve the errors between system integrations in time and correctly. During the current state analysis interviews, Interviewee 7 raised a question whether the iDocs monitoring and general understanding is at the required level amongst the Commercial Operations employees currently:

> Monitoring iDocs documents in situations such as ticketing in Nomination transaction or truck contracts can be challenging for those who are not familiar or do not handle those often in the system. Understanding the process with iDocs and utilizing that in operational work can certainly be challenging and could definitely be improved. (Interviewee 7)

The second selected improvement area related to inflexibility of the SAP. As identified during the current state analysis interviews, modifying and reversing data is regarded as one of the most challenging situations in the current SAP system from the operational perspective in Commercial Operations. Other

mentioned challenge related to the system inflexibility associated with implementing new business scenarios and setting up new entities such plants or materials in the system. As SAP is known for being a relatively strict system and requiring extensive knowledge of the system, two improvement proposals were built up at this stage. At first, drawing attention to the fact that when operating in the SAP, data inputs need to correct, in a right place and all required information is put to the system in a correct way instead of making correction or reversing data afterwards, which is often regarded as time consuming and demanding:

> From the operations perspective, I highlight the importance of co-operation with other internal stakeholders, for example checking with the tax team about the correctness of tax code if uncertain. Therefore we could avoid situations where the incorrect tax code is discovered not until the invoicing stage. In addition, maintaining up to date system instructions and system knowledge is crucial in order to reduce the inflexible situations in the system perspective. (Interviewee 7)

During the interviews, another interviewee agreed on the above, stating the following:

> When making modifications in the system, I would emphasize that the end-user needs to know where to make the modification, whether the modification can be done at all and what the effects of the modification will be on different integrations or systems. In SAP, users need to be pretty careful whether the data flows into other systems correctly. (Interviewee 8)

Along with SAP S/4HANA conversion project, Fiori applications are introduced for the end-users at the case company. For improving the current system inflexibility amongst Commercial Operations, evaluating and examining the need for Fiori applications in the future could improve the user experience and system inflexibility that currently occurs with traditional SAP GUI transactions. When discussing the possibilities of Fiori applications for the Commercial Operations team during the current state analysis interviews, interviewee 8 summarized the Fiori applications and their potential from the end-user perspective as follows:

> Fiori applications are perhaps the most popular thing with SAP currently. Fioris are developed to reorganize the SAP interface, improving it remarkably from the end-user's perspective, which could lead to enhanced user experience and improved flexibility of the system. Alongside with these applications, SAP also include artificial intelligence to guide the users in their processes in order to reduce the number of user-based errors. (Interviewee 8)

Therefore, replacing some of the most common SAP GUI transactions with the new Fiori applications such as master data management Fiori or Nomination Fiori in the future could improve the inflexibility and general user experience as well as reduce user-based errors and thus reduce the integration challenges that were identified during the current state analysis of this study:

> When you currently use for example Nomination transaction in the normal SAP GUI, the system provides an awful lot of different data and fields to fill in, where probably 90% of which are irrelevant for operations perspective. In Fiori, the same view would be much simplified with only relevant data visible for the operational needs. (Interviewee 8)

If these applications can be implemented and utilized in the operational work in the future, benefits especially on the emerging business scenarios in Renewables Platform could be remarkable from the operational perspective. Fiori applications could also provide a more harmonized system environment and some of the Fiori applications could completely eliminate some of the current system integrations at the case company.

In addition to the improvement proposals mentioned above, the role of Scheduling Dashboard solution could be assessed. Based on the current state analysis, several interviewees addressed the current challenges with the solution. As described, Scheduling Dashboard has not fully achieved the objectives that were set before implementing the solution. In addition, Scheduling Dashboard is currently described as inflexible to operate, adding excess workload on Commercial Operations in situations where modifications or reversions need to be done in the system. Taking into account the future expansion of the Scheduling Dashboard to Oil Products side of the case company especially in co-processing materials, evaluation on the solution

performance could be assessed as well as evaluating how operating the solution could be improved from the Commercial Operations perspective.

The third selected key improvement area was related to roles and responsibilities of the Commercial Operations in SAP. Due to broad roles and responsibilities in SAP from the Commercial Operations perspective, the current challenge can be divided into two separate factors: company specific challenges due to user restrictions and security and roles and responsibilities from an end-user perspective. In this study, user-based challenges were mostly taken into account due to the nature of this study. As defined in the current state analysis section, Commercial Operations responsibility from the systems perspective has considerably grown after the implementation of SAP, it was described as relatively difficult and challenging to maintain a certain kind of expertise and specialization at the moment from the systems perspective. For improving the situation, practical proposals such as developing collaboration with the internal stakeholders, improving expertise for each mode of transport for every sub-team, improving and maintaining desk instructions and information sharing amongst the team in order to improve the system knowledge could be assessed. During the current state analysis interviews, the proposal for deepening the expertise within each sub-team in certain mode of transport was highlighted and discussed with possible improvement in the future for improving the operational work within the Commercial Operations team. Interviewee 3 summarized the improvement proposal as follows:

> As system related work has significantly risen after implementing SAP amongst Commercial Operations, one improvement area in the future could be deepening the expertise for each mode of transport for example in a way that each sub-team has its own expert for each mode of transport. Thus, the person could control the latest knowledge and could also be able to share the knowledge amongst other employees in challenging situations. (Interviewee 3)

With sharing of information and knowledge within the team, general system knowledge could be improved and silo mentality reduced that occasionally occurs amongst the Commercial Operations team.

The fourth selected key improvement area relates to data availabilities and utilization that integrated SAP system offers to Commercial Operations. As described in the current state analysis interviews, some of the interviewees recognized that the different solutions that SAP offers for analyzing data itself contains a significant amount of information and possibilities to improve the operational work of the Commercial Operations team. In general, the objective of these process mining solutions is to give an improved visibility to the company's end to end processes, in this case Supply to Pay and Order to Cash processes and possibility to discover deviations in the processes. Currently, these possibilities may not be utilized efficiently or most of the possibilities may not be discovered yet from the Commercial Operations perspective. Therefore, evaluating the potential opportunities in systems such as SAP Celonis or SAP Business Objects could make an impact on operational work with improving the Commercial Operations key performance indicators (KPI) such as ticketing and invoicing lead times. To maximize the benefits, evaluating possibilities to implement the new Celonis views designed for the Commercial Operations as well as evaluating how different process mining tools could be increasingly implemented to the daily work of the Commercial Operations team.

5.3 Expected Benefits of the Improvement Proposals

The objective of this study was to investigate the benefits and challenges of the current SAP environment from the Commercial Operations perspective at the case company by conducting a current state analysis of the studied theme. As described in the previous subsection, key improvement areas and improvement suggestions were proposed to tackle the findings from the current state analysis section.

The expected benefits of the presented research results and improvement proposals are expected to be an improved SAP system environment from the end-user perspective at the case company. The research results will initially indicate the key improvement areas of the current SAP environment and therefore guide the case company which areas should be taken into

consideration when developing the processes in SAP in the future. As an ultimate benefit, it is expected that the development ideas could generally improve the Commercial Operations business processes linked with SAP and improve the SAP based key performance indicators of the Commercial Operations, such as invoice lead times, ticketing lead times and nomination lead times, following up with increased productivity and enhanced customer service of the case company as well as improved user experience with the SAP system.

6 Summary and Conclusions

This section presents and discusses the summary and conclusions of this thesis. This section consists of four subsections, in which a brief summary of the thesis is presented, following with suggestions for next steps and further research. Thirdly, an evaluation on the whole thesis process is made, ending up with final words of the study.

6.1 Summary

This thesis was carried out over a six-month period from October 2021 to April 2022 for the case company Neste Corporation. The objective of this thesis was to evaluate the impacts of SAP implementation and to investigate the benefits and challenges of the current SAP environment from the Commercial Operations perspective. The outcome of this study evaluates the key improvement areas of the current SAP environment and proposes suggestions to improve the current SAP system environment from the Commercial Operations perspective.

This thesis was conducted in four different stages as visualized in section 2 of this study. The study started with introducing the business context, following with setting up the business challenge, objective and outcome for the study. In addition, thesis outline and limitations were discussed and defined during the first stage of the thesis.

In the second stage, a current state analysis was conducted using a qualitative research methods to investigate the current state of the SAP environment and to determine how the SAP system performs currently from the Commercial Operations perspective. The current state analysis was conducted by interviewing the case company's employees, investigating the company's internal documentation on the studied theme and utilizing author's personal observations during the thesis writing stage. As a result, the key findings from the current state analysis were drawn together and key improvement areas were determined.

Based on the findings from the current state analysis, this study continued with conducting a literature review on best practices and available knowledge on ERP systems and ERP implementations, the key concepts of this study. As an outcome, a summary of the key concepts of this study were discussed and drawn together.

After conducting the current state analysis and literature review, research results and improvement proposals were presented in the fourth stage of the study. The selected key improvement areas were validated together with Operations Manager of the company and improvement proposals were formed based on the current state analysis and literature review of the study. The selected key improvement areas consisted from four separate areas and improvement proposals eventually related to these identified areas.

The expected benefits of the identified key improvement areas and improvement proposals are to indicate the related areas that need to evaluated and improved from the end-user perspective at the case company. Furthermore, the suggested improvement proposals are expected to improve the user experience around the SAP system and ultimately improve SAP based key performance indicators of the Commercial Operations, eventually following up with increased productivity and enhanced customer service.

6.2 Next Steps and Suggestions for Further Research

This thesis investigated the benefits and challenges of the current SAP environment from the Commercial Operations perspective at the case company. As a result, key improvement areas were defined and improvement proposals for each area were presented. Hence, the next step would be to evaluate the improvement proposals in detail and evaluate whether the proposals could improve the operational work of Commercial Operations in SAP. In addition, the key improvement areas identified in this study could eventually indicate the key stakeholders of the case company in which areas improvements to the existing SAP system environment could be allocated. When evaluating the improvement proposals and recommendations, Commercial Operations employees should be actively involved in discussions with developing the system environment in the future. Considering the growing and changing business of the case company and the comprehensive use of SAP in Commercial Operations, the importance of examination of the system environment and continuous improvement from the systems perspective can be defined as remarkably important.

Furthermore, due to the limitations of this study, suggestions for further research exists. As this study mostly investigated the impacts of the program Beagle, integrated ERP implementation project in the case company Neste Corporation, less attention was paid to the ongoing SAP S/4HANA conversion project. Moreover, further research on the impacts of the SAP S/4HANA implementation or possibilities of the modern ERP system implementation could provide a beneficial views for the Commercial Operations of the case company. Secondly, deepening into one selected key improvement area or limiting the study on a particular area of the Commercial Operations team, such as the Renewables Platform, could provide a more detailed view and description on the investigated SAP environment and therefore continuingly improve the SAP processes at the case company.

6.3 Thesis Evaluation

The objective of this thesis was to investigate the impacts of SAP implementation and to identify the key benefits and challenges of the current SAP environment from the Commercial Operations perspective at the case company Neste Corporation. In addition, key improvement areas of the current SAP system were defined and improvement proposals for the identified challenges were provided in this study.

In general, when comparing the research results and the objective that was set in the beginning, it can be considered that the results meet the objectives of this thesis. The outcome of the study was in line with the objective that was set in the beginning of the study. During the current state analysis section, a group of case company employees were interviewed to obtain an understanding on the studied theme and to map out the selected key improvement areas. The current state analysis interviews were also utilized in building up the improvement proposals, as some of the proposals were obtained during the discussions with the case company employees. Conducting only one round of interviews during data collection of this study could be seen as a challenge for the credibility of the study, but considering that the main objective was to map out the benefits and challenges of the SAP implementation by conducting a current state analysis, it can be considered as acceptable. In addition to interviewing the Commercial Operations employees, interviews were also broadened to the Center of Excellence team of the case company, which certainly made a difference to the results of this study. The thesis was created in close collaboration with the case company's supervisor as well as school's supervisor, who supplied guidance and feedback during the creation of the study, thus strengthening its credibility

Overall, when comparing the research results and proposals created in this study to the objective that was set in the beginning, it can be stated that the results meet the objectives of this thesis. However, the value of the proposals will be determined after they are comprehensively evaluated, selected and

implemented in the case company. In addition, further research on one selected improvement area or limiting the further research on a particular area of the Commercial Operations could be conducted.

6.4 Closing Words

To summarize the study, impacts of SAP implementation have certainly been significant for the case company. The implementation of SAP has assisted and enabled the transformation and growth of the case company into a global leader in renewable solutions and the system in general has made information more unified and visible for several stakeholders of the company. Although at the same time, the implemented SAP system is highly customized and resource-intensive with several system integrations linked to SAP, which has made the system environment relatively complex and inflexible to use amongst Commercial Operations. In this study, two key challenges of the current SAP system are highlighted from the Commercial Operations perspective: system integrations and inflexibility of the current SAP system.

Therefore, as the work of Commercial Operations has become more system related after the implementation, continuous attention should be paid on finding different ways to develop the system environment so that the system itself could support the operational work of the Commercial Operations better in the future. As the core business of the case company is constantly evolving alongside the growing use of renewable solutions, improving the business processes from the system perspective should be assessed and taken into account at the case company. Therefore, continuous development of the system processes and functionalities ensures the competitiveness and support for Commercial Operations in the future.

References

Ali, M., & Miller, L. (2017). ERP system implementation in large enterprises – a systematic literature review. *Journal of Enterprise Information Management*, 30, 666-692.

Bardhan, D., Baumgartl, A., Choi, N., Dudgeon, M., Górecki, P., Lahiri, A., Meijerink, B., & Worsley-Tonks, A. (2021). *SAP S/4HANA: An introduction*. 4th edition. Boston, MA: Rheinwerk Publishing.

Davenport, T.H. (1998). Putting the enterprise into the enterprise system. *Harvard Business Review*, July-August, 121-131.

Forrester. (2017). The Forrester Wave: In-memory database platforms, Q1 2017 by Noel Yuhanna. Forrester research, Cambridge.

Ganesh, K., Mohapatra, S., Anbuudayasankar, S.P., & Sivakumar, P. (2014). *Enterprise Resource Planning : Fundamentals of Design and Implementation.* Cham: Springer.

Gargeya, V., & Brady, C. (2005). Success and Failure Factors of Adopting SAP in ERP System Installation. *Business Process Management Journal*, 11, 501-516.

Hietala, H., & Päivärinta, T. (2021). Benefits Realisation in Post-Implementation Development of ERP Systems: A Case Study. *Procedia Computer Science*, 181, 419–426.

Kananen, J. (2017). *Laadullinen tutkimus pro graduna ja opinnäytetyönä*. Jyväskylän Ammattikorkeakoulu.

Krishnamoorthy, V., & Carvalho, A. (2015). *Discover SAP*. 3rd edition. Bonn: Galileo Press.

Kurbel, K. E. (2013). *Enterprise resource planning and supply chain management: Functions, business processes and software for manufacturing companies*. Heidelberg: Springer.

Maas, J. B., Van Fenema, P. C., & Soeters, J. (2018). Post-implementation ERP usage: a longitudinal study of the impact of control and empowerment. *Information Systems Management*, 35, 330-347.

Mandal, P., & Gunasekaran, A. (2003). Issues in implementing ERP: a case study. *European Journal of Operation Research*, 146(2), 274-283.

Mankala, C., & Mahadevan, G. (2013). *SAP HANA cookbook*. Birmingham: Packt Publishing Ltd.

Mathew, B. (2015). *Beginning SAP Fiori*. Apress.

Mishra, A. (2008). Achieving Business Benefits from ERP Systems. *IGI Global*, 77-92.

Motiwalla, L. F., & Thompson, J. (2012). *Enterprise systems for management*. 2nd ed. Upper Saddle River, NJ: Pearson Education.

Neste (2020). *Neste Annual Report 2020* [Online]. Available at: https://www.neste.com/sites/neste.com/files/release_attachments/wkr0006.pdf [Accessed 8 October 2021].

Neste (2021). *Who we are* [Online]. Available at: https://www.neste.com/about-neste/who-we-are/business [Accessed 13 October 2021].

Romero, J. A., Menon, N., Banker, R. D., & Anderson, M. (2010). ERP: Drilling for Profit in the Oil and Gas Industry. *Communications of the ACM*, 53(7), 118-121.

SAP (2022). *What is SAP?* [Online]. Available at: https://www.sap.com/about/company/what-is-sap.html [Accessed 28 February 2022].

SAP Help (n.d.). *SAP CoPilot 1905* [Online]. Available at: https://help.sap.com/viewer/product/SAP_COPILOT/1905/en-US [Accessed 17 March 2022].

SAP Insights (n.d.). *Real Benefits of an In-Memory Database* [Online]. Available at: https://insights.sap.com/in-memory-database/ [Accessed 7 March 2022].

Shanks, G., Parr, A., Hu, B., Corbitt, B., Thanasankit, T., & Seddon, P. (2000). Differences in Critical Success Factors in ERP Systems Implementation in Australia and China: A Cultural Analysis. *Proceedings of the European Conference on Information Systems*: 537-544.

Statistics Finland (2021). *Liiketoiminnan sähköistyminen* [Online]. Available at: https://www.stat.fi/til/icte/2021/icte_2021_2021-12-03_kat_004_fi.html [Accessed 22 February 2022].

Ullah, A., Baharun, R., Nor, K., Siddique, M., & Sami, A. (2018). Enterprise Resource Planning (ERP) Systems and User Performance (UP*). Journal of Managerial Sciences*, 11(3), 377- 390.

Question form for Current State Analysis interviews

Question	Notes
How often do you use SAP in your daily work tasks?	
How would you describe the current SAP environment from the Commercial Operations point-of-view?	
What are the most significant changes compared to time before the SAP implementation? What were the biggest benefits of implementing SAP from your daily work point-of-view?	
What are the strengths of the current SAP system?	
What are the weaknesses of the current SAP system?	
How well does the current SAP environment enable flexibility to our growing business? Do you feel like the current systems is not flexible enough coping with our business especially on the renewables side?	
Do you have any concerns or expectations about the upcoming implementation of SAP S/4HANA?	
Do you have any other additions or observations regarding to the current SAP environment or upcoming SAP S/4HANA implementation?	