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STANDARDIZING VALUE ADDING PROCESS IN SYSTEM PRODUCT COMPANY

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Bachelor's Thesis
Term year (e.g., Autumn 2023)
Mechanical Engineering, Option of Production Engineering
Oulu University of Applied Sciences

ABSTRACT

Oulu University of Applied Sciences
Degree Programme in Mechanical Engineering, Option of Production Engineering

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Title of the thesis: Standardizing Value Adding Process in System Product Company
Thesis examiner: Juha Männistö
Term and year of thesis completion: Autumn 2023 Pages: 33

The company discussed in the thesis is SR-Instruments, which offers advanced online inspection and quality measurement systems for strip and web processing industries. The core goal of this thesis was to describe SR-Instruments' order-to-delivery process, identify possible problems and propose improvements. The thesis includes visualization, analysis, and the description of the order-to-delivery process. A key aspect of the work is standardizing the documentation to ensure that data retrieval is possible in the long term.

SR-Instruments currently lacks an Enterprise Resource Planning (ERP) system. The secondary goal was to create a foundation for requirement specification for ERP system acquisition, which could significantly improve the order-delivery process. The starting point was that the company managed orders through a computerized file system on their server, which was somewhat organized but not interconnected. This decentralized approach posed challenges in maintaining version control and proper documentation, necessitating a more standardized and systematic approach.

The standardization of the process was crucial due to the presence of multiple system products and several teams involved in order fulfillment. This situation had resulted in orders being executed in different ways, with associated documents stored in various file locations, which led to a chaotic server environment and challenges in locating specific information from past orders.

Cooperation with the company's employees and openness to innovative development ideas were important approaches in this project. The goals of the project were achieved. The visualization was completed for the main flowchart as well as for more detailed flowcharts, where the work steps can be seen in more detail. The company's wish was a clear visual description of the progress of the process, which includes all the documentation that is created or used in the process, so that it is easy for the employees to check the next steps of the work from the flowchart. After the visualization was completed, it was easy to write a verbal description of the process. This description can be used in the future as a framework for creating work instructions where they are needed.

The secondary goal was achieved by creating a basis for requirement specification for ERP system acquisition and evaluating how it would meet the company's needs regarding the order-to-delivery process. Several methods have been used in the thesis, such as visualization using flowcharts and other maps, open discussion about development ideas, and searching for information from various sources.

Keywords: Order-to-delivery process, Flowchart, Enterprise Resource Planning (ERP) system, Continuous improvement

CONTENTS

1 INTRODUCTION

This thesis discusses the company SR-Instruments' value adding process. SR-Instruments is a company located in Oulu, Finland. They supply advanced online inspection and quality measurement systems for strip and web processing industries.

The subject of the thesis is to deepen the understanding of SR-Instruments' order-to-delivery process (OD-process), identify potential issues, and propose improvements. The thesis includes visualization, analysis, and a description of the OD-process. A significant part of the work is the standardization of documentation utilization and storage protocols to streamline long-term information retrieval. This initiative is prompted by the challenges encountered in version control with some files. The company's operational infrastructure currently relies on a server-based folder system; however, these folders lack interconnection. Therefore, certain files have been duplicated across multiple locations, leading to version control issues. The objective of the thesis is to successfully describe the OD-process, clarify and standardize operating protocols, and build a framework for future work instructions through process description. Furthermore, SR-Instruments currently lacks an Enterprise Resource Planning (ERP) system, and a secondary objective is to lay the groundwork for defining the requirements for the acquisition of an ERP system, which could enhance the order-to-delivery process.

To underpin this research, various sources, including articles authored by experts in the field, have been consulted. The envisioned learning outcomes include fostering innovativeness, deepening the understanding of the company's operations and the production phase, enhancing documentation skills, boosting workplace confidence, and garnering positive evaluations from both the workplace and the academic institution. The project's success criteria are the creation of a comprehensive flowchart of the OD-process, clear and functional step descriptions, the establishment of standardized documentation practices, and the development of a clear framework for defining requirements related to a possible future ERP system specifically tailored to the order-to-delivery process.

2 PROCESS DESCRIPTION

Process is a set of interconnected events and tasks that starts with the customer and their needs. The process ends when the need is fulfilled. The value experienced by the customer is formed in the processes, which is why the different processes must fit together and the processes must be managed and developed. Understanding and optimizing these processes are fundamental to improving efficiency, reducing errors, and enhancing overall productivity. Two valuable tools in achieving this understanding and optimization are process description and process mapping. The process description provides the context, roles, and responsibilities, while process mapping offers a visual representation of the process flow. Together, they provide a detailed, well-rounded view of how a process operates. (1.)

Process description is the primary step in comprehending how a specific task, project, or function is carried out within an organization. The foremost purpose of process description is to provide a clear and detailed account of the process, outlining its objectives, inputs, outputs, roles, responsibilities, and key activities. (2.)

One of the fundamental benefits of process description is clarity. It enables all stakeholders, including employees, managers, and external parties, to gain a common understanding of how a particular process operates. This clarity is essential for ensuring consistent execution and for facilitating communication and collaboration within the organization. (3.)

2.1 Visualization

Data visualization is a beneficial tool in modern business. Its importance comes from its ability to expedite decision-making, clarify data, and reveal connections and patterns. By converting complex datasets into clear and engaging visuals, data visualization enables organizations to unlock the full potential of their information, enabling faster and more informed decision-making processes. This ability to swiftly decipher data not only saves time but also increases the likelihood of spotting trends and relationships that might otherwise go unnoticed. These insights can be critical in understanding the impact of business operations on overall performance, leading to more strategic and effective decision-making. Additionally, the power of real-time data visualization allows businesses

to engage in advanced predictive analytics, providing a competitive edge by optimizing processes and product development. (4.)

Process mapping is a valuable tool for documenting existing processes, which is particularly useful when an organization is considering process improvement, reengineering, or automation. By documenting the current state of a process, organizations can identify bottlenecks, inefficiencies, and areas for enhancement. Additionally, process descriptions and maps can serve as valuable training materials for new employees, helping them quickly get up to speed on how tasks are performed. (2.)

While process description provides a textual narrative of a process, process mapping takes the visualization of processes to the next level. Process mapping involves creating graphical representations of processes, often in the form of flowcharts, diagrams, or other visual aids. These visual representations offer a more intuitive and comprehensive understanding of how a process works. (3.)

Process mapping helps in breaking down complex processes into digestible components. It uses symbols, shapes, and connecting lines to illustrate the sequence of activities, decision points, and the flow of information or materials within a process. Key elements of process mapping include identifying the starting and ending points, defining decision points or branches, and mapping out the steps in between. (3.)

One of the significant advantages of process mapping is its ability to highlight process inefficiencies and redundancies. By visualizing the flow of work, organizations can identify areas where steps can be eliminated, streamlined, or automated, resulting in improved efficiency and cost reduction. Moreover, process mapping facilitates process standardization, ensuring that tasks are executed consistently across the organization. (3.)

2.2 Flowcharts

Flowchart is a visual representation of a process, system, or set of steps using standardized symbols and connecting lines. It is a graphical tool used to illustrate the sequence of activities or decisions within a process. An example of a flowchart is shown in Figure 1. Flowcharts are commonly used in various fields, including business, engineering, software development, and education, to:

- **Visualize Processes:** Flowcharts help in understanding and documenting how a process works, from start to finish.
- **Clarify Complex Procedures:** They simplify complex systems or procedures by breaking them down into manageable steps.
- **Identify Problems:** Flowcharts can pinpoint bottlenecks, inefficiencies, or areas where improvements can be made within a process.
- **Standardize Processes:** They can be used to create standardized procedures that ensure consistency in operations. (5.)

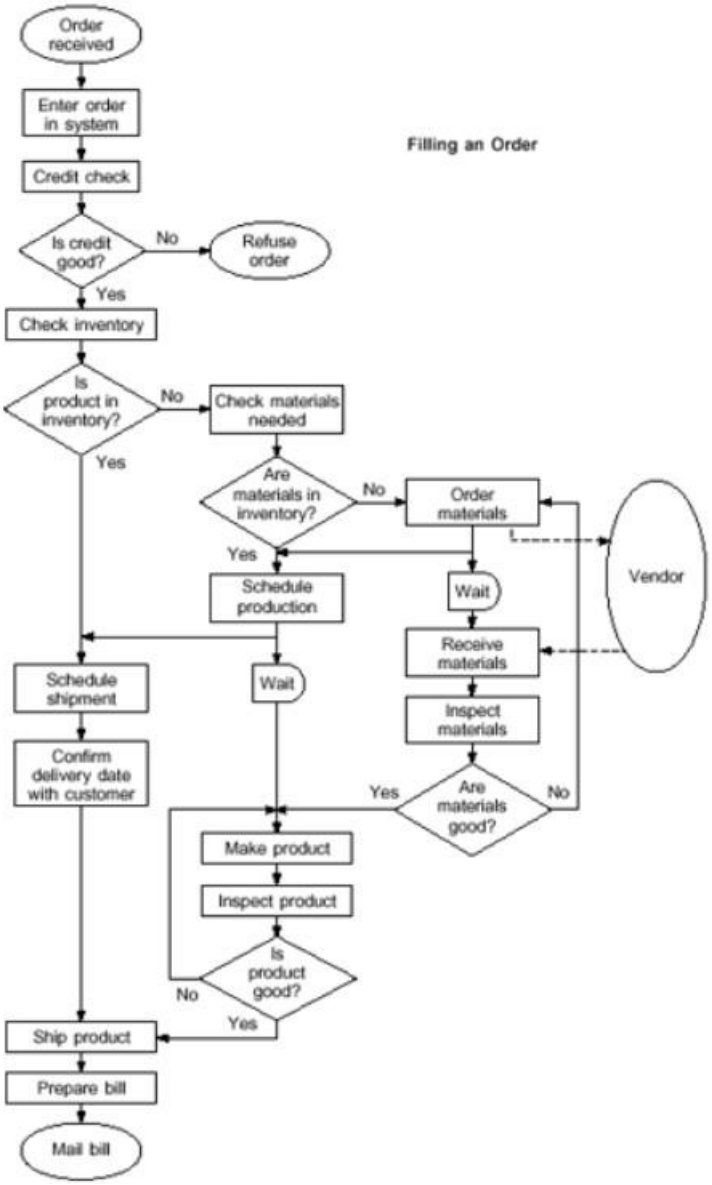

FIGURE 1. An example of a flowchart (5)

In a flowchart, different shapes and symbols represent specific elements within the process, such as rectangles for processes or actions, diamonds for decision points, and arrows for the flow of direction. Lines connecting these shapes show the sequence of activities or decisions. By following the flow of the chart, one can easily understand how a process works and make improvements or optimizations when needed. Flowcharts are a valuable tool for both process analysis and process design. Commonly used symbols are shown in the Figure 2. (5.)

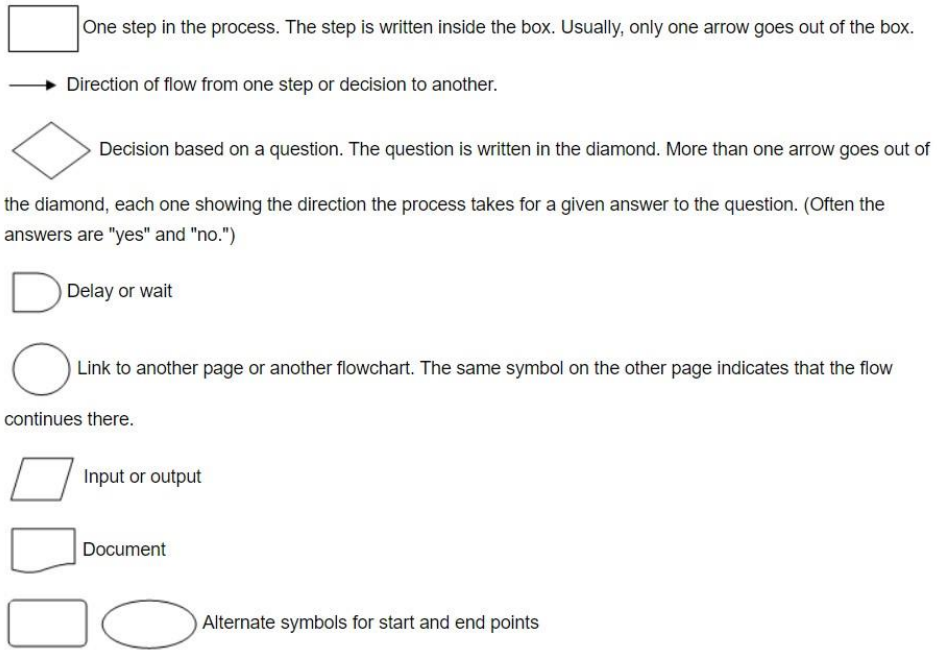

FIGURE 2. Commonly used symbols in flowcharts (5)

2.3 Continuous Improvement

The need to create process descriptions is based on the principle of continuous improvement. Continuous improvement is a principle of business and process management that aims to continuously enhance efficiency and quality, prioritize customer-centricity, involve employees, and maintain competitiveness. Various methods, such as Lean, Six Sigma, Total Quality Management (TQM), and different process improvement techniques, can be applied to achieve continuous improvement. It also requires systematic data collection and analysis to monitor and measure improvements. Continuous improvement is a strategic approach that helps organizations improve their operational efficiency, quality, and customer satisfaction, ultimately enabling them to maintain their competitiveness and thrive. (6.)

2.3.1 Lead Time Reduction

Important part of process improvement is the Lead Time Reduction. It is the process of reducing the time it takes to complete a specific task or a sequence of tasks. The key motivation behind this effort is to eliminate waste, remove unnecessary tasks, and reduce waiting times within processes. This results in a more streamlined and efficient workflow. (7.)

1. Order to Delivery Process

The order-to-delivery process is often the customer's first interaction with a company, and it significantly influences their perception of the organization. By analysing and reducing lead times in this process, companies can improve their delivery speed and, subsequently, enhance their customers' experience. Reducing lead times in the order-to-delivery process is essential for maintaining customer loyalty and improving overall business performance. Additionally, this reduction can positively impact the delivery accuracy, which is another crucial factor in customer satisfaction. (7.)

2. Material Flow throughout the Supply Chain

Efficient material flow is crucial for businesses, especially in supply chain management. It offers several advantages like faster deliveries, quick response to demand changes, lower inventory costs, and faster issue identification. Shortening lead times in the supply chain ensures smoother product movement from suppliers to customers. This agility and speed make organizations more competitive and cost-effective in the market. (7.)

3. New Product Development Process

Innovation is vital for businesses, but launching new products can be slow and complex. Shortening the time, it takes to develop new products can give a competitive edge. It allows companies to introduce products ahead of rivals or leverage newer technologies even if they start later. This speed also saves costs by reducing research and development expenses. Plus, it helps companies adapt faster to changing markets and customer preferences. (7.)

2.3.1.1.1 The Approach to Lead Time Reduction

Process Mapping: Understanding how the process operates is the first step. This involves mapping the process, identifying its various steps, and clarifying the relationships between them. (7.)

Measuring Lead Time: Quantifying the total lead time and its variance is essential. This measurement helps identify where the most significant time gaps exist and where improvements are needed. (7.)

Identifying Reduction Opportunities: By analysing individual steps and tasks, organizations can identify opportunities for reduction. Tasks can be categorized into four distinct points of view: removal, combination, speeding up (e.g., through automation), or parallelization. (7.)

Reducing lead times is a critical part of process improvement with major advantages for organizations. It boosts customer satisfaction with faster and more precise deliveries while also making operations more efficient by cutting waste and unnecessary tasks. Focusing on three core processes: order-to-delivery, supply chain material flow, and new product development, helps organizations stay competitive and agile. The journey to shorter lead times starts with understanding current processes and a dedication to constant improvement. (7.)

2.3.2 Order-to-delivery process

Order-to-Delivery process (OD-process) is a business process that encompasses all the steps involved in fulfilling a customer's order, from the initial order placement to the final delivery of the product or service. This process is crucial for organizations in various industries, such as manufacturing, retail, e-commerce, and services, as it ensures efficient and accurate order processing, which can lead to customer satisfaction and revenue generation. (8.)

Efficiency and accuracy at each stage of the Order-to-Delivery process are critical for customer satisfaction and business success. Many organizations use specialized software systems, such as Enterprise Resource Planning (ERP) or Customer Relationship Management (CRM) systems, to automate and streamline these processes. (9.)

2.4 Enterprise Resource Planning (ERP)

2.4.1 ERP Explained

An Enterprise Resource Planning (ERP) system is a comprehensive and integrated software solution designed to help organizations manage and automate a wide range of business processes across various departments or functions. ERP systems provide a centralized repository of data and

allow for real-time sharing of information, facilitating efficient communication and collaboration among different parts of an organization. (9.)

The most important features and functions of ERP systems typically include:

- **Finance and Accounting:** Managing financial transactions, budgeting, and financial reporting.
- **Human Resources:** Handling personnel data, payroll, employee records, and performance management.
- **Supply Chain Management:** Managing inventory, procurement, and order fulfilment.
- **Customer Relationship Management (CRM):** Managing customer information, sales, and marketing activities.
- **Manufacturing and Production:** Overseeing production processes, work orders, and quality control.
- **Inventory Management:** Tracking and optimizing inventory levels to reduce costs and ensure product availability.
- **Sales and Marketing:** Managing leads, opportunities, and customer interactions.
- **Reporting and Analytics:** Providing insights through data analysis and reporting.

In essence, an ERP system acts as the backbone of an organization's digital infrastructure, allowing different parts of the business to communicate, share data, and work together more efficiently. The goal of ERP is to improve operational efficiency, data accuracy, and decision-making, thereby helping organizations streamline their processes and achieve their business objectives. (9, 10.)

2.4.2 Tailored ERP systems for smaller businesses

ERP systems are customizable and can be tailored to suit the specific needs and processes of different industries and organizations. ERP providers are offering solutions explicitly designed for smaller businesses. These systems are more cost-effective and less complex, making them accessible to smaller organizations with limited budgets and resources. They provide essential features for financial management, supply chain, customer relationship management, and more. Small business ERP tools are typically cloud-based, which means they can be quickly implemented and are easily scalable as the company grows. (10.)

Smaller companies can adopt a modular approach to ERP implementation. Instead of implementing an entire ERP suite at once, they can start with specific modules that address their immediate needs. This phased approach allows for a gradual transition and minimizes disruption. Cloud-based ERP systems are particularly well-suited for smaller companies. They eliminate the need for extensive on-premises infrastructure and reduce the burden of IT management. Cloud-based solutions also offer flexibility, as they can be accessed remotely and are typically more affordable due to subscription-based pricing. Small companies can choose ERP systems that are designed to grow with them. This means the ERP system can accommodate increasing data volumes, users, and business complexity. (10.)

2.4.3 ERP Implementation

Implementing an ERP system can be a significant undertaking, involving changes in processes, training, and possibly even customization or integration with existing systems. However, the benefits often include increased productivity, cost savings, and improved competitiveness in the marketplace. (10.)

There are several guides on ERP implementation but the base structure in all is similar in all of them. The planning for an ERP system starts at the company's existing systems evaluation and identify areas that need improvement. This is the base that helps the company understand what the ERP system can help with. (11.)

After identifying the problems, the company must define what it needs from an ERP system and set clear goals. It is important to make this clear when the plan is communicated to all involved, for example potential ERP system advisors. (11.)

When the base work for the implementation has been done it is vital to choose the best fitting ERP system provider for the company's needs, business, and budget. In some cases, it may be necessary to customize the ERP system to match the company's processes. (11.)

The most time-consuming phase is preparing and formatting the company's data to be transferred to the new ERP system and the training of the company's employees. When moving data to an

ERP system, it must be ensured that the data is in the right format for the new system. This means cleaning, organizing, and converting your existing data to work with the ERP software. Then, it is ready to be loaded it into the new system. Data migration can be tricky and take time, so it's crucial to get ready and convert the data first. Training employees is extremely important for the functionality of the system in the long run. (11.)

3 SR-INSTRUMENTS' OD-PROCESS TARGET STATE DESCRIPTION

In the thesis work, the company's order-to-delivery process was examined in detail, pinpointing its problem areas, and establishing a framework for ERP needs, with a primary focus on the production phase of the process.

3.1 Visualization of the order-to-delivery process

The project was initiated by visualizing the Order-to-Delivery process. It was decided to describe the whole process by illustrating it in its simplest form. After this, more detailed flowcharts were made, which indicate also the responsible person performing the work phase.

The main flowchart includes the whole OD-process as simply as possible. When customer orders any of the company's system products, the process is executed in the same manner. The purchase order is processed, and an order confirmation is sent to the customer. The delivery scope of the order is presented to the employees in the kick-off meeting.

After the first steps, the OD-process progresses to the purchasing process where all the necessary parts and materials are purchased from approved suppliers. The company's internal production includes software engineering and component assembly. Manufacturing of components is out-sourced. When all the necessary parts and components have arrived, the process continues to system assembly and software installation where the whole system is assembled, and software installed to test the system product before in-house factory testing.

After completing the testing, the entire system will be dismantled and packed for the delivery. The OD-process ends when the company has carried out the commissioning of the system product and the scope of supply has been accepted by the customer and the system product has been trans-ferred to customer's maintenance. In the figure 3 can be seen the visualized process.

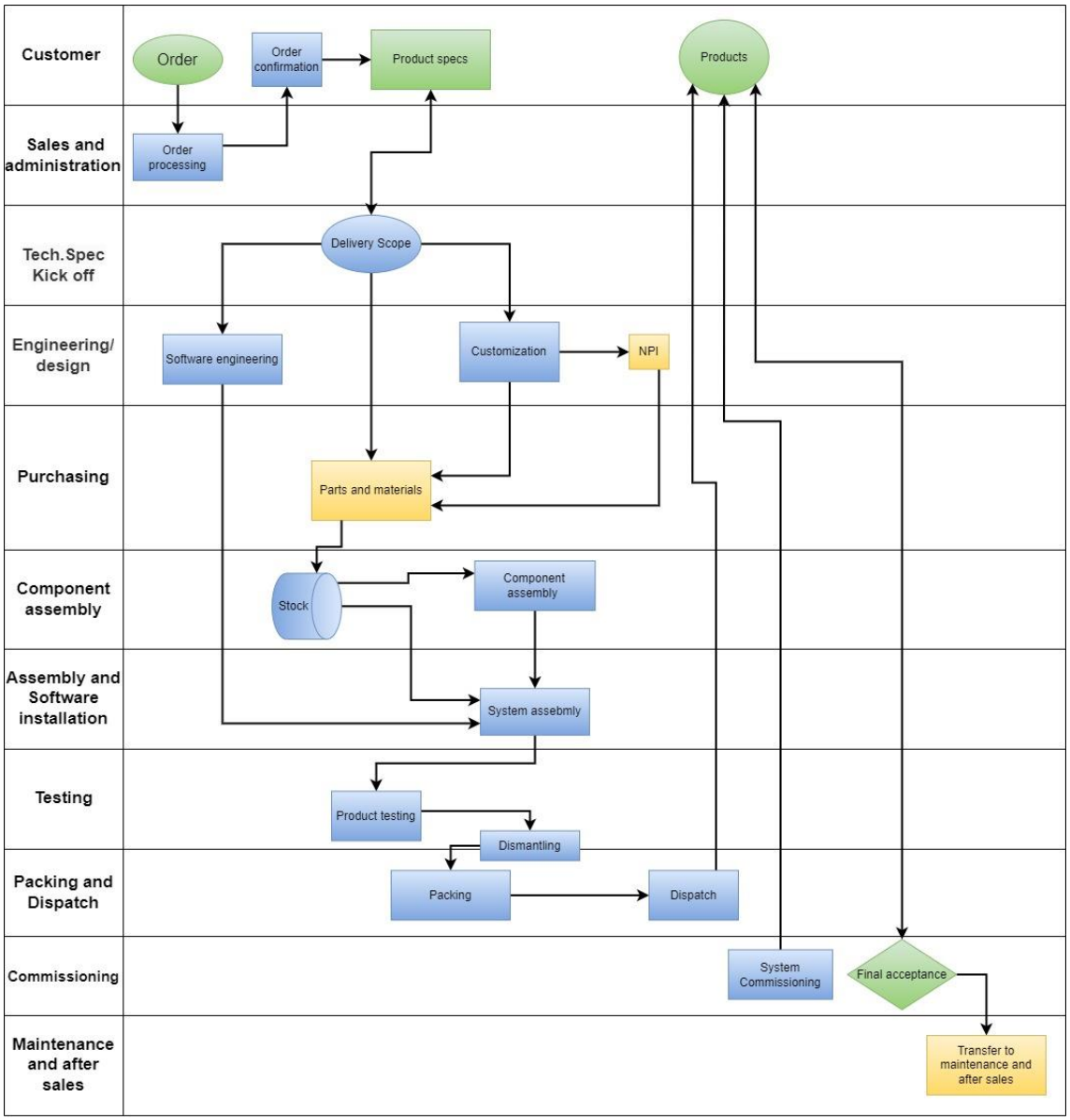

FIGURE 3. The flowchart of SR-Instrument's order-to-delivery process

3.2 Detailed visualization of the order-to-delivery process phases

Due to the nature of the company's products, documentation plays a big role, so we decided to clearly include the documents created in the process in the more detailed flowcharts. This helps the employees to remember all the documents needed in the process and see the status of an order based on what documents have been prepared.

3.2.1 Order to Kick-off

The order-to-delivery process starts from the customers interest to the product. First process is the sales process. In this phase sales communicates with the customer and identifies the customer's needs. After the required product specifications have been agreed the company's salesperson sends a quotation to the customer which leads to commercial negotiations and finally to purchase order on the specific scope. In this phase of the process, technical specification and quotation documents are created. These documents have a template in the company's quality folder on the company's server. The Technical Specification template is registered as SPXXXXXX, the X letters in the name describe the specific customer's order details. And the quotation template is registered as QUXXXXXX.

The Technical Specifications document will be stored in the quality folder, and it can only be referenced in the project folder. This prevents problems arising in version control from multiple document locations. If a file is stored in multiple locations and only one version is updated, the second file can become outdated and still be used. In this phase the technical specifications document reference is added to the MASTER DOCUMENT LIST via hyperlink, and the quotation document is saved to the project folder in PDF file form only. In addition, the technical specification document is copied to PDF form and saved to the project folder, but the original file needs to be in the quality folder to be updated in the future if necessary.

After the customer has accepted the quotation and other commercial terms, they send a purchase order to the company's sales team. Then, the company starts processing the order. The order processing has a standardized working instruction that is to be followed which is titled WI010009X and can be found in the quality folder. The instruction includes opening a new project folder, which is carried out by sales, updating the sales and invoicing reports, issuing a first invoice, updating the cashflow plan and preparing the order confirmation. All these are carried out by administration. The order confirmation document has a template in the quality folder which is titled as OC01008X. The letter X describes the document version. It is important to always use the latest version of a document in every work context in the company. In this phase purchase order, order confirmation and invoices created for the customer are saved to the project folder.

This phase ends with a Kick-off meeting where the knowledge of the agreed scope of supply and requirement specifications are reviewed and passed over to product/project management and production personnel. Because of technical and other reasons certain changes to the scope may occur at this meeting. If the changes are extensive and require work, the customer is requested to make a deviation order. Also, if the customer wants to make changes to the order later, during the process, they make a new deviation order that goes through the same steps as the purchase order, not including the opening of a new project folder. All the documentation created in these steps are saved to the project folder in PDF form. The flowchart of this phase is shown in the figure 4.

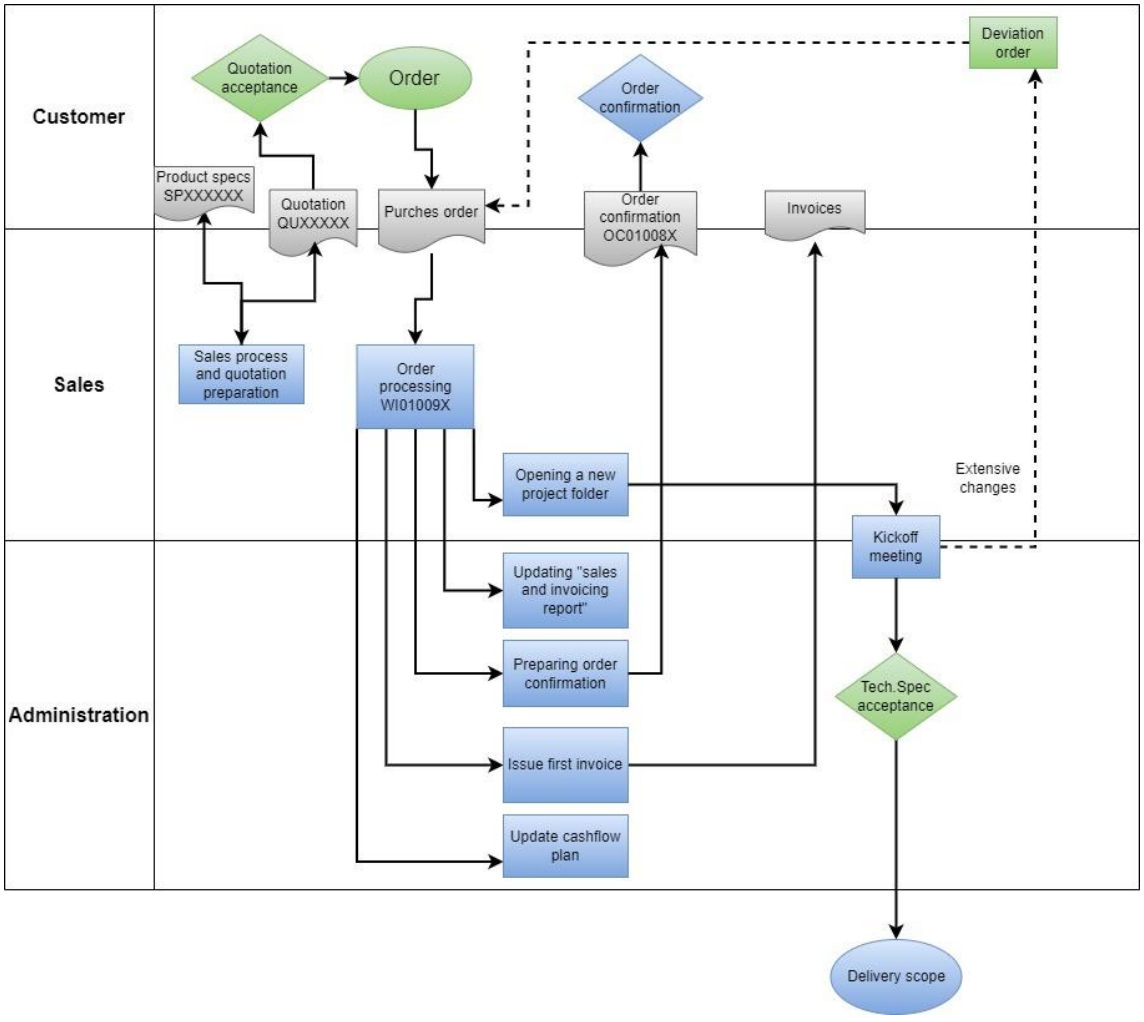

FIGURE 4. The flowchart for Order to Kick-off

3.2.2 Kick-off to Assembly

After the first phase of the Order-to-Delivery process, where the customer is in close contact with the company, starts the production phase of the process. After the Kick-off meeting have been held

the process moves on to either directly to purchasing using the standardized part lists designated for each product, or in case the order needs customized parts the process goes through engineering where the needed parts are designed, and part lists created. In addition, the software standardized for each product needs to be modified by software engineers to suit the needs of each order.

Alongside the company's OD-process, is continuous production planning and purchasing activities. The purchasing process itself takes place as shown in the flowchart, but it is a continuous process alongside the order-to-delivery process because purchases can be made in larger batches based on, for example, sales forecasts and on the arrival times of other parts.

The structure of purchasing operations is as follows:
To compile the part lists for each order, and for purchasing purposes, a standardized part list is used for each product, and customized parts added to it. The purchasing process requires one Master part list where all required parts are collected, based on the agreed scope of supply. In the Master part list parts are defined either with part numbers or as a separate part list with a hyperlink as a reference to that list in the quality folder. This part list created for each order is saved in the quality folder. All the standardized part lists are stored in the quality folder registered as PLXXXXXX, where the X letters describe the specific part list. The Master part list is referenced in the project folder, but the original file is saved only in the quality folder and named according to a separate instruction.

During the purchasing process the parts in the list are marked with different colours to show the status if they have been ordered or not and if the company has them in stock. There is one responsible person for the purchasing operation who compiles the part lists. This person must supervise the Master part list and the parts lists referenced in it, in terms of purchasing activities. After the customer order is completed, the part lists are cleared of colours and extra marks. This avoids version control problems since the part list files are saved only once, in the quality folder, and they can only be referenced in other folders via hyperlinks.

Several employees can participate in purchasing activity, so whenever changes occur, the parts lists must be updated, for example, with the colours, according to the status of the orders or stock. When the part lists are finalized, the process continues to purchase process where purchase orders are made for each subcontractor and distributor. The purchase order is made using a template

titled OR01008X, where the letter X describes the document version. All the OR templates are stored in the quality folder. The template is renamed and saved to Order folder under a specific product in the Purchasing folder. Standardized purchase orders are stored in the Order folder as well. These purchase orders can be used as such, when ordering standard parts. From this process phase any third-party documents, such as quotations, purchase orders, order confirmations and invoices are saved in the Purchasing folder under the product in question. In a situation where parts are ordered by e-mail, the e-mail must be made into a PDF file and saved in the order folder under a new order name.

After the purchasing process the OD-process continues to component assembly. And in the next process stage the system is assembled. At this stage, photos of the product and product components are taken, for possible future needs, and saved in the project folder. The flowchart of this process phase is shown in the figure 5.

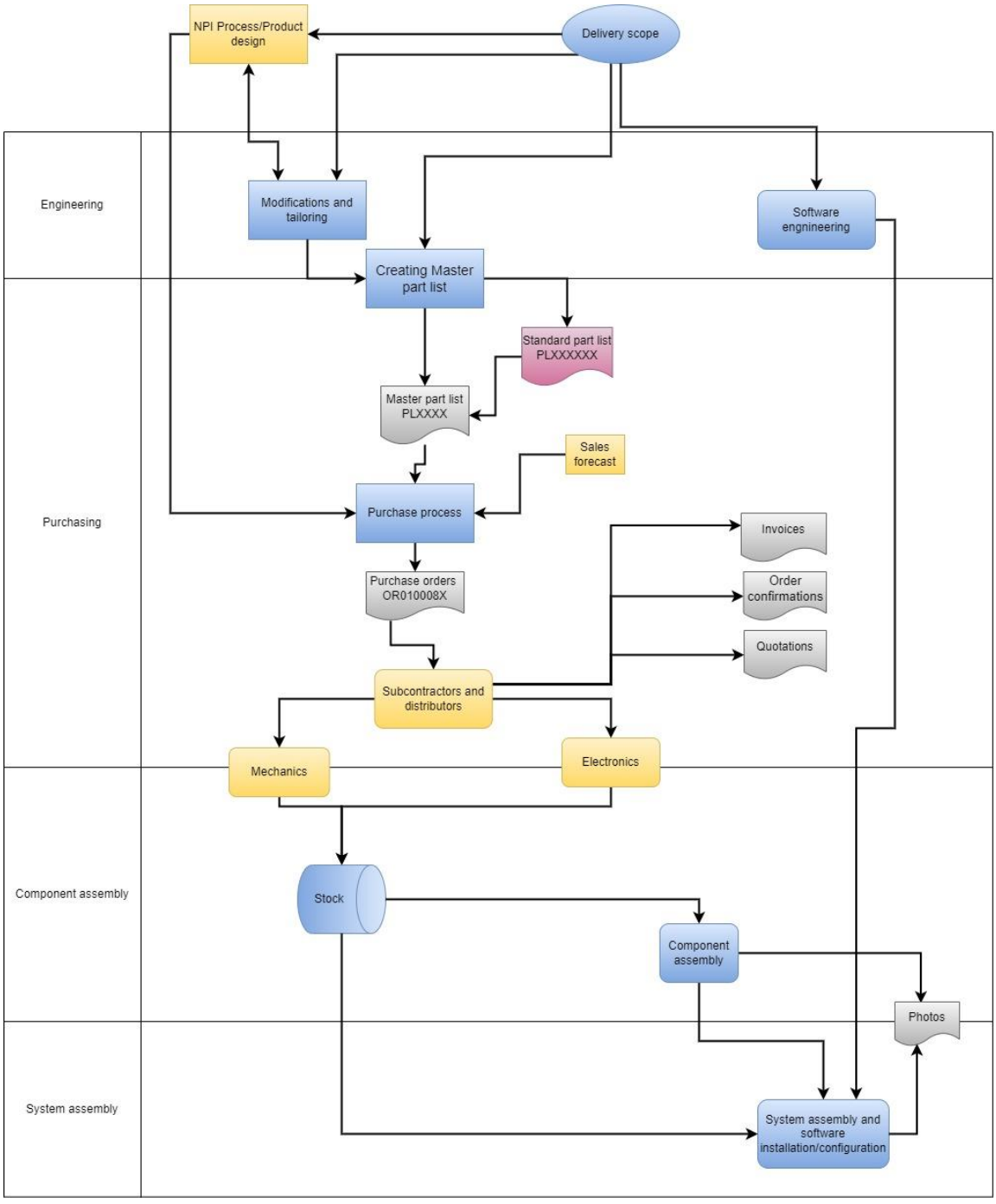

FIGURE 5. The flowchart for Kick-off to Assembly

3.2.3 Testing to Final acceptance

After the system product has been assembled it goes through testing. The testing data and results are gathered and saved in the corresponding project folder. From the testing phase a certificate is made for the customer that indicates that the system product has been tested and it has passed the Factory Acceptance Test (FAT). The certificate template can be found in the quality folder titled

as CEXXXXXX, where the X letters describe a specific certificate. In some cases, the customer may visit the company at this point, in which case the system product is reviewed with the customer and approved. After testing the product documentation process is initiated. In this phase all the documentation for the customer, are gathered which include the following:

1. Manual
2. Spare parts
3. Electrical drawings
4. Pneumatic drawings
5. Mechanical drawings
6. Data interface protocol
7. Attachments

In the next stage the system is dismantled and packed for delivery. This stage includes creating the packing list document. There is currently no template for the packing list, so it is copied from, for example, a previous order and filled out again. Waybills need to be stored in the project folder after dispatching. The final part of the OD-process is the system commissioning. In this phase commissioning service report, software and parameter backups, and final acceptance documents are saved in the project folder. If the product in question is Detmaster RMD, one of the company's system product, preliminary acceptance must be done during commissioning. These documents have templates in the quality folder. Commissioning reports template is titled as TRXXXXXX and Preliminary acceptance and Final Acceptance are titled as certificates, CEXXXXXX, where the X letters describe the specific document.

All the documents produced for each order, are stored in project folder assigned to the specific customer project, excluding Technical Specification and part lists, these can only be referenced via hyperlink, and purchase orders, order confirmations and invoices from purchasing process, which are saved in the Purchasing folder. The flowchart of this phase is shown in the figure 6.

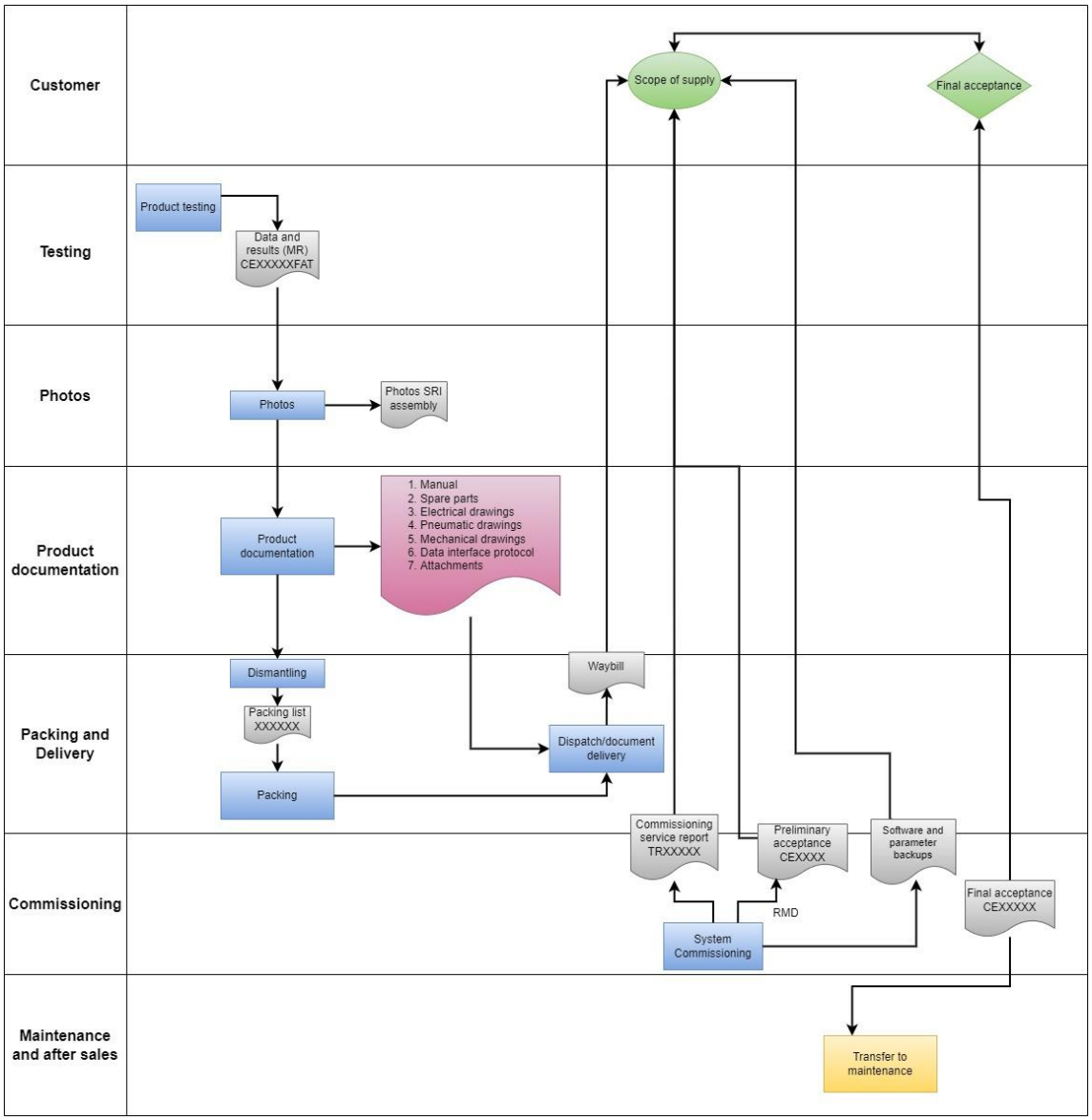

FIGURE 6. The flowchart to testing to final acceptance

3.3 Document locations

Since the company's current operation management works with a folder system on the company's server, it is important that everyone knows exactly where to save files and documents. A separate appendix is in the company's server that shows all the documents created in the process and their file locations in a simple list format.

4 RESULTS AND CONCLUSIONS

4.1 Operation management

In the company's long-term plan, the initiation of the ERP system implementation is intended. However, the acquisition of the system represents a substantial investment and a highly labour-intensive process. The purpose of this thesis was to streamline the current Order-to-Delivery process into the simplest form possible and standardize it to fit every product. While describing the process, the major problematic areas became apparent, which led to simultaneous development of the process, while the visualization and description where done. The primary challenge in the company's OD-process lies in unclear practices. Separate teams executed different projects, each with their own approach to process progress, data collection, and file storage. This led to issues in version control of files and documents.

The company's current operations are managed through the computer folder system on the company's server. Consequently, there are no restrictions on the use, modification, or saving of files and documents, making each individual responsible for tasks such as updating version numbers whenever changes are made. The most significant issue arising from unclear practices is file locations. The folder system consists of two main folders in use: the quality folder and the project folder. The quality folder contains all files related to internal company matters, while the project folder is project specific. Conflict between folders arises, for example, when the same bill of materials and part drawings are used in multiple projects, causing some to save the latest versions of files in the project folder. As a result, in the next project, the same file may be sought in a different location, leading to the use of outdated versions. This problem was addressed by standardizing folder system practices.

The folder system was revamped by restructuring the project folders. In the future, project folders will only contain project specific files such as customer orders, sales phase documents, production phase images, test data and results, packing lists, shipping documents, and commissioning reports, software and parameter backups, and acceptance documents. However, a significant challenge lay in managing part lists and technical specification documents. A MASTER DOCUMENT LIST Excel file is to be compiled in the project folder, listing all project documents. Consequently, part

lists and technical specification documents can be referenced in the document list using hyperlinks, while the file location remains only in the quality folder. Therefore, in the future, it will be easy to locate a specific part list and part drawings used in a particular project, even though the file location is in the quality folder. The key practice will be to save each file only once in one place. The structure of the project folder template is shown in the figure 7.

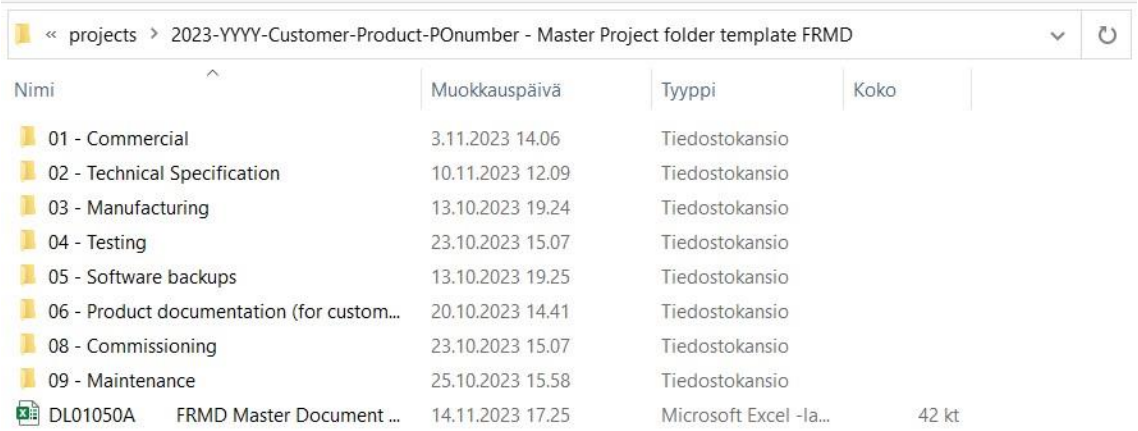

FIGURE 7. Project folder template

Such challenges could benefit from the implementation of a document management system, especially if acquiring an ERP system is not currently feasible. The unique file formats stemming from various drawing programs used in the company pose a particular challenge. The company utilizes multiple drawing programs, each with its proprietary file formats, and some even have their own internal management systems. This diversity adds complexity to the task of implementing these systems.

Implementing an ERP system represents a clear improvement opportunity in the process, addressing the challenges associated with version control. Although, the capability of an Enterprise Resource Planning system to handle diverse file formats and drawing programs depends on the specific features and integrations offered by the ERP solution. While ERP systems excel in managing business processes and data, handling various file formats, and drawing programs might require additional considerations. It would be important to include experts and possibly different service providers in the planning phase of the ERP system implementation.

The purchase process posed a risk as it was predominantly executed by a single individual, and the procedures lacked shared practices and work instructions. In addition storage policies for documents created in the process where unclear. To address this challenge, collaborative meetings were conducted with the staff, resulting in the establishment of clear operational procedures for purchase execution, and a new folder were assigned for the purchase process only, with subfolder for each product. Template for the purchasing folder can be seen in the figure 8 and in the figure 9 can be seen a product subfolder.

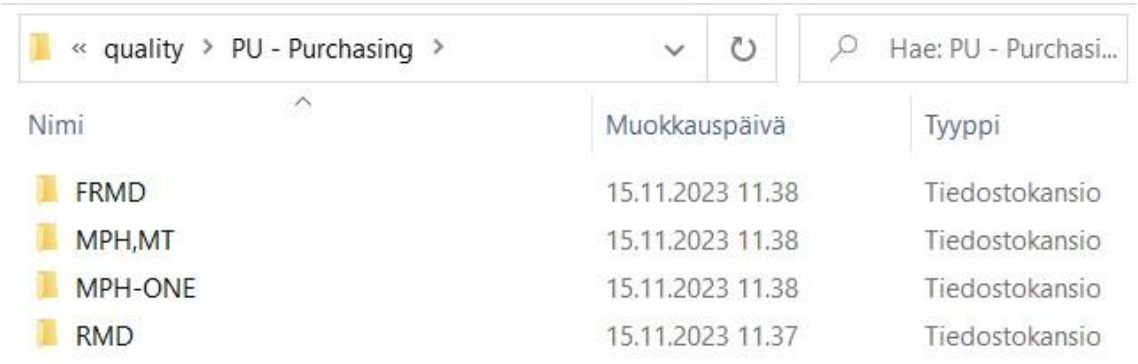

FIGURE 8. Purchasing folder and product subfolder

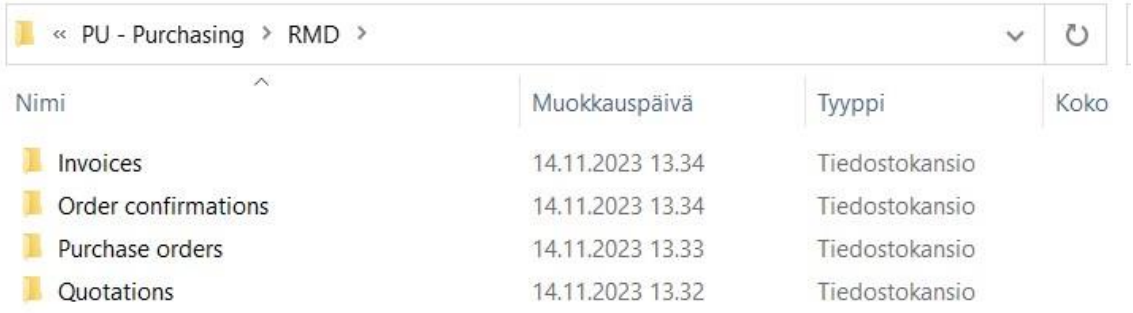

FIGURE 9. Product subfolder

This phase presented a significant risk to the company, given the highly individualized approach to the operation. Relying on a single individual to handle the procurement process introduces various risks for a company. This approach can lead to operational challenges, such as delays in case of the individual's absence, and limited expertise and perspective. It may also result in increased

workload and stress, difficulty in scaling operations, and a vulnerability to unethical practices. Moreover, knowledge and skill retention risks, and the potential for operational bottlenecks during company growth are possible with a purchase process performed by one individual. To mitigate these risks, clear and common practices were made, based on the practices of the person currently performing the purchasing activity and development ideas from other employees.

Implementing an ERP system could also improve the company's purchase process. These systems centralize data from the process, enhances workflow automation, and ensures standardized processes, minimizing errors. Real-time information and reporting features give stakeholders instant access to purchase activities, fostering better decision making. Integration with supplier systems can improve communication. ERP systems budget control, and compliance, reducing manual effort and paperwork associated with procurement tasks. For example, the ordering of standard parts could be automated, and the tracking of orders would be clearer and easier, since the original parts lists would not have to be mixed with the controlling of orders.

4.2 Next steps and development ideas

After the thesis work is finished, the next step is to create work instructions for the purchasing process. It is important that the company makes work instructions for the purchase phase, so they would support the personnel as the process progresses and they would facilitate, for example, the training of new employees. A process description has been made and common practices have been agreed on, but in the long run it is challenging to follow them without clear and standardized work instructions.

Another challenge is in the practices of the document templates. Now, the templates for each document are under the specific folder where the filled documents are stored, or individual employees have their own folders, but it would be more useful to have a separate folder under the quality folder, which contains only document templates. Thus, they would always be easy to find. Most of the documents created in the process, have existing templates, but as the work progressed, it was also noticed, for example, that there is no template for packing lists. In the future, it would be important to go through the phases and the templates, make the missing ones and update the existing ones to fit the standardized process. When the work instructions are made to fit the standardized process, it is important to also include file naming instructions for each process phase. Due to the

company’s nature of operation management regarding documentation, it would be beneficial if every employee had a personal document list, that would allow them to keep track of the documents and files they edit or create. It can be as simple as listing the name and version of each document created.

In the event of the company's ongoing exploration of ERP systems, the next step involves researching and comparing different service providers, initiating contact, and seeking consultation from experts in the field. Prior to the ERP system implementation, there would a requirement specification that needs to be done, with the thesis serving as its framework.

In addition to ERP exploration, it could be useful for the company to research about the ISO 9001 quality management certificate. With the help of this certificate, it would be possible to build a functioning quality management system that could, alongside the company's development, also foster reliability towards customers. It would be good to bring the company's quality manual up to date. The process descriptions produced during this thesis should also be included in the quality manual.

5 DISCUSSION

The thesis was conducted as action research, allowing for the simultaneous development of the process while analysing it. The approach involved interviews to gain an overview of the process, which was visualized in a flowchart. Once the main flowchart was approved, more detailed descriptions of different process stages were undertaken, involving discussions with experts in each stage. This proved to be an effective way to conduct the work, due to a good collaboration from the staff. Employees clearly described various stages, and clarifying questions were asked to refine and construct functional and accurate flowcharts of different process phases in the company's order-to-delivery process. However, it should be noted that the goal was to standardize a generally applicable order-to-delivery process, so individual products may have slight differences to the flowcharts. By interviewing employees, the aim was to achieve an unbiased and truthful process description. The challenge with this approach is the individual perspectives on what aspects should be considered. Some individuals may be meticulous in going through the process, listing even the smallest details, while others may overlook significant factors, assuming they are self-evident.

The main objective of the work was achieved by constructing flowcharts and written descriptions. This was a crucial goal for the current state of the company. While the future aim of acquiring an ERP system remains a critical theme and a development focus, it was important for the present operations and the company's growth to standardize the process. This ensures the continuity of operations and facilitates the training of potential new employees in the company's practices in an easily approachable manner.

Describing and visualizing a company's order-to-delivery process also holds ethical implications. Involving employees in the process of describing and visualizing operations can contribute to a positive ethical environment within the company. It can empower employees by making them aware of their roles in the larger process and promoting a sense of responsibility. Providing a clear and accurate description of the company’s OD-process advances transparency. This transparency is ethical because it helps stakeholders, including customers and employees, understand how the company operates. It fosters accountability by allowing stakeholders to assess whether the company adheres to ethical standards in its processes. In addition, it enhances customer trust. Ethical

business practices often include considerations for environmental impact. Describing and visualizing the order-to-delivery process may reveal opportunities for minimizing environmental harm, optimizing resource use, and adopting sustainable practices.

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