jamk

# Development of Raw Materials and Packaging Materials Management

Annemari Ahonen

Master's thesis
December 2023
Master's Degree Programme in Lifecycle Management

jamk | Jyväskylän ammattikorkeakoulu
University of Applied Sciences

jamk

**Kuvailulehti**

**Ahonen, Annemari**

**Raaka-aineiden ja pakkausmateriaalien hallinnan kehittäminen**

Jyväskylä: Jyväskylän ammattikorkeakoulu. Joulukuu 2023, 96 sivua.

Elinkaaren hallinta (YAMK). Opinnäytetyö YAMK.

Julkaisun kieli: englanti

Julkaisulupa avoimessa verkossa: kyllä

**Tiivistelmä**

Raaka-aineiden hinnat ovat vaihdelleet viime vuosina maailmanpoliittisen tilanteen, pandemian aiheuttamien käyttäytymismuutosten sekä energiamarkkinoilla tapahtuneiden muutosten takia. COVID-19 pandemia nopeutti digitalisaatiota sekä uusien työskentelytapojen käyttöönottoa. Yritykset tarvitsevat korkealaatuista dataa, jotta järjestelmiä pystytään hyödyntämään muuttuvissa olosuhteissa. Yritysten on pystyttävä reagoimaan asiakkaiden tarpeisiin nopeasti, mutta samalla kaikkea hukkaa on vältettävä.

Opinnäytetyön tavoitteena oli tehostaa raaka-aineiden ja pakkausmateriaalien hallintaprosesseja. Tavoitteena oli selkeyttää prosesseja ja vastuualueita, parantaa master datan laatua sekä siten mahdollistaa järjestelmäautomaation hyödyntäminen päivittäisissä työtehtävissä. Toimenpiteiden avulla varastoihin sitoutunutta pääomaa pystytään hallitsemaan entistä paremmin.

Master datan hallinnan näkökulmasta, osittain pohjautuen Essity Way of Winning (EWoW) - digitalisaatioprojektin prosesseihin, uusia toimintatapoja selkeytettiin, implementoitiin ja koulutettiin loppukäyttäjille. Osaa globaaleista prosesseista jatkokehitettiin, jotta ne palvelevat entistä paremmin tehtaan loppukäyttäjiä. Oikeat raportit ja työkalut otettiin käyttöön osana päivittäisiä työtehtäviä. Uusia malleja luotiin huomioimaan materiaalien koko elinkaari materiaalin luomisesta sen poistoon. Hankintatoimen näkökulmasta jokaiselle raaka-aineelle ja pakkausmateriaalille määritettiin oikeanlainen master data teoreettiseen ja käytännön tietoon perustuen. Kehittämismenetelmänä käytettiin Demingin jatkuvan parantamisen PDCA - mallia.

Materiaalinhallintaprosesseja tehostettiin ja työmenetelmiä yhdenmukaistettiin. Kaikille raaka-aineille ja pakkausmateriaaleille pyrittiin saamaan tasainen materiaalivirta, ja kaikki materiaalit saatiin hallintaan master datan, hankinnan, varastoinnin sekä materiaalien poiston näkökulmasta. Uusi prosessi luotiin parantamaan materiaalien kiertonopeuden seurantaa. Muut Essityn tehtaat voivat hyödyntää Nokian tehtaalle luotuja toimintamalleja sekä ohjeistuksia.

**Avainsanat (asiasanat)**

Raaka-aineet, pakkausmateriaalit, data, prosessit, laatu, kiertonopeus, hankinta, vaihto-omaisuus, parantaminen

**Muut tiedot (salassa pidettävät liitteet)**

Luvut 5, 8, 9 ja liitteet ovat salassa pidettäviä ja poistettu julkisesta opinnäytetyöstä. Salassapidon peruste on yrityksen liike- tai ammattisalaisuudet. Salassapitoaika on kymmenen (10) vuotta.

jamk

**Description**

**Ahonen, Annemari**

**Development of Raw Materials and Packaging Materials Management**

Jyväskylä: Jamk University of Applied Sciences, December 2023, 96 pages.

Master’s Degree Programme in Lifecycle Management. Master’s thesis.

Permission for open access publication: Yes.

Language of publication: English.

**Abstract**

Raw materials prices have fluctuated due to the global political situations, behavior changes caused by the pandemic and changes on energy markets in the recent years. COVID-19 pandemic was a forward pushing force for new ways of working and digitalization. A high-quality master data is needed to ensure that companies can utilize systems in changing circumstances. Companies must be able to react quickly to customer needs, but at the same time all waste should be avoided.

The target of the master thesis is to enhance the management processes of raw materials and packaging materials. The aim is to clarify processes and responsibilities, improve the quality of master data, and thus enable the utilization of system automation in daily tasks. All these measures will be kept you under control of the fixed capital in inventories.

From a data management perspective, partly based on the processes of the Essity Way of Winning (EWoW) digitalization project the new ways of working have been clarified and trained for end-users and implemented as part of daily working methods. Some of the global processes have been further refined to serve users even better from the perspective of the factory's end-users. Right reports and tools were deployed. New models were created to consider materials whole lifecycle from material creation to material removal. Old data has been cleaned out and materials have been classified into the right groups. From ordering point of view the right kind of procurement data has been determined for the materials based on theoretical and practical knowledge. Deming's PDCA model of continuous improvement was used as a development method.

Materials management processes were streamlined and working methods harmonized. Materials will have a steady material flow, and all materials are under control from master data, inventory, ordering and material removal point of view. Obsolete materials are not left in inventories. The new process was created to improve the monitoring of materials turnover rate. Other Essity factories may be able to utilize the operating methods created for the Nokia factory.

**Keywords/tags (subjects)**

Raw materials, packaging materials, master data, SAP, quality, slow-mover, dead stock, turnover rate, procurement, current assets, continues improvement

**Miscellaneous (Confidential information)**

Chapters 5, 8, 9 and appendices are confidential and removed from the public master's thesis. The grounds for secrecy are the company's business or professional secrets. The confidentiality period is ten (10) years.

**Contents**

**Figures**

**Tables**

# 1 Introduction

In recent years raw materials and packaging materials prices have fluctuated greatly due to the global political situation, behavior changes caused by the pandemic and changes on energy markets. Companies must be able to react towards changing situations quickly but cost-effectively. At the same time, companies must increasingly take environmental responsibility into account, and all waste generation must be avoided. All operations must be sustainable and efficient, and new saving potentials must be actively sought.

Price fluctuations can have a major impact on product margins, and logistics costs affect the production and storage batches of products. COVID-19 pandemic was a forward pushing force for new ways of working and digitalization. Rapid transformation is needed so that businesses can keep up with the world. All business is built on master data and high-quality data is required to ensure rapid transformation. More efficient, transparent, and easier ways of working are achieved with high-quality master data. Manual work at material management processes does not create value for a company or a customer. Automation releases time for creativity and new innovations. It is also certain that companies cannot succeed alone in the changing global situation. Co-operation and transparency between companies is increasingly needed to increase competitiveness and profitability.

Essity is a hygiene and health company which has a tissue mill located at Nokia, Finland. Nokia's factory has approximately 200 employees. The factory produces both consumer and professional hygiene products. Factory's brands are Lotus Soft Embo, Emilia, Nessu, Tork and Zewa. The mill has operated under the name Essity since 2017. (Essity in Finland, 2023.) Tissue paper is a product which requires plenty of space when stored. Purchasing behavior of both consumers and companies has changed in recent years, and product sales and availability have at time both increased and decreased radically. There are two tissue paper mills located in Finland so competition for customers is fierce. The right raw materials must be available at the right time to meet customers' demands in a changing world. At the same time, it must be noted that warehousing ties up capital.

The target of the master thesis is to enhance the management processes of raw materials and packaging materials. The aim is to clarify processes and responsibilities, improve the quality of

master data, and thus enable the utilization of system automation in daily tasks. All these measures will keep you under control of the fixed capital in inventories.

# 2 Capital Employed in Warehouses

In the most of cases the aim of warehousing is to secure the availability of products (Hokkanen & Virtanen 2021, 67). However, warehousing ties up capital, and it is important to understand content of the warehouse if you want to manage it. The inventory counting is carried out either as required by the accounting act, or for practical reasons. With regular inventory counting it is possible to indicate the quantity of materials, and the quality of the products in stock, to be confident in the availability of products (Ibid. 68.) The turnover rate of inventories can be utilized as a key indicator of the efficiency of warehousing. It indicates the commitment of capital to the inventory in days. (Tunnusluvut - Tehokkuus [Key indicators - Efficiency] 2023.)

Slow-moving inventories are same as materials that take too long to consume. Definition can vary depending on the company and industries. (Jenkins 2022.) At Essity material is a slow-moving item if last consumption has been 90 days ago. Dead stock is the part of warehouse that has not been utilized for a long time or not at all. The value of dead stock is obtained by multiplying the amount of dead inventory by current price. Analyzing the inventory, materials with inefficient quantities are found. (Dead stock 2022.) By following the rotation speed of warehouse raw materials are used more efficiently. Then also change of raw materials into not moving items is reduced. The aim is to keep number of raw materials and stock to a minimum. The material flow is directed through the production process quickly and unnecessary storage is avoided. In this way, the amount of capital tied up in inventory can be minimized (Koski 2023, 74.) The goal is to maximize inventory turnover without compromising security of supply (Ibid. 85).

The target of warehouse management is to reduce the capital tied up in materials, and the costs of handling them, as well as to enable a high level of service both internal and external stakeholders. However, warehouse management cannot be thought of solely in the terms of the costs of materials flows. It must be also taken into account quality and production processes, lifecycle costs and service level, among other things. In addition to material flows, available information, cash flows, service rate, people's way of working and the running of machinery and equipment must be considered. The goal is to balance costs, delivery capability and quality by enabling maximum added

value for both customers and the company. Successful inventory management consist of a balance of three factors: availability, inventory level and workload (Hokkanen & Virtanen 2021, 72.)

On summer 2023, approximately 45 % of Nokia Mill's inventory consists of finished products stock. Spare parts and other process materials consists of approximately 25 %, raw materials approximately 11 % and packaging materials approximately 8 %. Packaging materials part in the production cost of the final product is approximately 9 %. The order sizes of packaging materials have a major role in price formation. A budget is rolling, and for chemicals and packaging materials prices are updated at least once a year. If prices vary greatly, prices are updated always as needed, or at least quarterly. In this case, the actual prices of raw materials can be taken into account in the budget. Depending on the product group, prices have mainly been rising due to the global situation in recent years. For example, pulp and energy prices have fluctuated greatly. When prices decrease, there is more margins left on the end product, and correspondingly when prices increase, the margin is lower (Porkka 2023.)

Target is that there are no scrapping costs, so losses have not been noted separately in the budget. For materials a waste percentage (Scrap Factory %) is assigned for the bill of material. It considers normal process scrap in the manufacture of the product. Raw materials and packaging materials are stored at the mill, which means that separate storage costs are not considered for these material groups. However, raw materials and packaging materials ties up capital (Porkka 2023.) With sustainable procurement companies can influence profitability through sales, margins, materials rotation speed, costs and committed capital. For example, with rotation speed companies makes the invested capital generate profit more often when the inventory turns over faster (Huuhka 2022, 29.)

# 3 Master Data Management

Master data is a company's basic information which is used to get a view of the company's operations, what organization does, where operations can be observed and who are the parties involved in the operation (Väre 2019, 16). Master data is business-critical information. Organization cannot work without it. Master data is distributed throughout the organization as different functions use the same data (Ibid. 23.) Even though it is known that data is business critical, says Global data

management research that 55 % of business leaders do not fully trust their companies' data assets. Organizations thinks that third of data that is related for example to customers is somehow deficient and only 50 % thinks that, for example ERP related data is clean (Experian 2021, 10.) Poor data quality causes waste of resources and additional costs, causes problems to reliability of analytics, affects negatively to companies' reputations, customer experience and customers trust. It has a high impact to slow down digital transformation (Experian 2021, 11.)

Master data management includes various procedures and methods that aim to ensure that master data is intentional in the organization. The aim is also to ensure the rational processing of data and that master data matters for entire organization (Väre 2019, 37.) Master data management processes includes data creation processes, master data editing and maintenance processes, master data deletion or archiving processes (Ibid. 89). At Essity master data is used for example to collect transaction data. For raw materials and packaging materials consumption is monitored and consumptions are based on bill of materials in the most of cases. In bill of material specifies the required quantity of the component. Master data includes time-bound, temporary data, such as material purchasing prices and basic information, such as which supplier each material comes from. Master data is also used in different parts of the organization as a basis for reports.

The data standard is used to define master data concept, attributes, content and quality requirements and business rules which aims to create unified picture of the data throughout the organization. The content of the data standard is determined by the organization (Ibid. 78-80.) The data management model is more about guiding people's behavior with data, object is to change the way people think and act towards data. The data management model focuses on management and strategy, business-driven approach and clear ownership, implementation of responsibility and multi-level in the organization, as well as a clear framework and principles (Ibid. 147-148.)

At the core of high-quality master data are identification and personalization of data, such as a product name or material code, as well as efficient sharing and utilization both inside and outside the organization. Data must be available wherever it is needed. It must always be up-to-date and consistent throughout the organization (Ibid. 199-200.) Data quality is multidimensional, and it can be evaluated for example with following criteria: completeness, accuracy, uniqueness, validity, consistency, integrity, reasonability, and timeliness (Ibid. 204).

Completeness means whether that data exists. Missing data causes problems because business processes might be without needed information. Data accuracy tells if data corresponds to real life and whether the existing data is correct. Data is unique when it appears only once in a system or database. Data does not have same kind of duplicates. Data validity means that data meets both formal and substantive requirements (Ibid. 204-209.)

From material master data management point of view these criteria can be mirrored for example to a new product's master data creation. It is not possible to create a bill of material for a product if components are lacking correct data. If material does not have a material group or a storage location, could be that it is not visible for throughout organization or correctly in reports. Every material has only one material number, and it is used both within the organization and when communicating with external stakeholders. In creation of a new material master data there have been defined certain formalities, such as the length of material number or the unit to be used so that automation can suggest the correct unit when ordering materials.

Data consistency means that data have to be same kind wherever it is visible, or it is used, such as in different systems or databases. If data is not consistent it may cause for example a wrong product to be delivered when ordering. Data integrity aims to ensure that references between different systems are correct. References between systems should be targeted at the right points. Timeliness data refers to timely data or that data is available at the right time. For example, if it is noticed that data has not been updated for more than a year, it may be necessary to consider whether it is up to date. When analyzing the quality of data, it is important to always consider what dimension is useful in a particular situation (Ibid. 210-214.)

Data quality management includes taking care of data quality, steering, monitoring and quality improvement processes. Achieving good data quality requires that organization is aware of the significance of data quality. The aim is to ensure the applicability of data to its intended purpose in a controlled manner and to put continuous improvement processes into practice. A data quality management model is often incorporated into the data management model, where issues are considered when defining roles and responsibilities. Data quality is the responsibility of its owners, and quality requirements and business rules should be defined for the data (Ibid. 191-192.) Good

data quality is achieved when data is viewed as a part of business processes and customer experience, and with the goal of proactively correcting errors. Data quality management must be part of daily practices, which means that attention is paid to data quality already when new data is being formed (Ibid. 193-194.)

Systems sometimes guides operations in data processing. For example, at Essity in many cases SAP system does not allow user to proceed if any relevant data is missing. In these cases, system takes care of data quality because user is not able to enter incomplete data into the system. However, in the material management process, the user must be aware about what information should be added to master data and in what form. For example, it is not possible to utilize automated material requirements planning if system does not know which parameters should be taken into account. In many situations, the system is also unable to perform operations without a command. For example, when cleaning data, the user must be specifying certain parameters in master data so that the system can perform the final cleaning.

Organizations that are struggling with a poor data quality should investigate employee's roles and think about that from data quality perspective. Are there enough professionals with expertise regarding data handling or should there be someone who holds the full picture and how responsibility can be implemented through different roles. Throughout organization there are lot of people who do not have required understanding of the data view. There should also be the right technology that can be utilized when implementing effective data management and a new way of working. Also, agility of new systems should be considered that employees can easily adapt quickly new tools and techniques while conditions are changing. It does not matter if companies have newest tools and technologies if basic things, such as people, training and processes are not clear. There should be clear roles and processes and enough practical training that people understand what, how and why they are doing it (Experian 2021, 16-17.)

In data quality improvement processes, special emphasis should be placed on the fact that improving quality is a policy that must never end. Data usage needs may change, and thus data usage processes may change, but data must be taken care of anyway or it may become difficult to use. It is also good to consider the root causes of quality errors, so that more sustainable changes can be achieved in terms of data quality to support the organization's operating model (Väre 2019, 219-

220.) With up-to-date master data is achieved improved basic data and possibilities to utilize more automated workflows. Productivity will be in a higher lever after improved master data because it would not take so much time to proceed some tasks. (Essity Learning Compass 2023). It is important to implement culture of continues improvement in master data management throughout the organization that high quality of data can be achieved in the future as well. Organizations succeed with the right people, processes, and tools when data will be ready for necessary actions in a changing world (Experian 2021, 18).

# 4 Material Requirements Planning (MRP)

Material requirements planning (MRP) is a part of the process that provides calculations of needed materials and components to produce a product. MRP considers a current stock of a material, identifies amount of material needs and then schedules needed purchase requisitions for appropriate time. (Essex 2020). Calculation is time bound. MRP can count, for example consumption of the week. Planned consumption reduces the amount of stock, and consumption is based on a production plan that uses certain material. The production plan can be based on either forecast or orders. Consumption reduces the inventory level. When the stock level reaches a certain level in the future, the system will suggest a replenishment order by the lead time before this moment. Safety stocks needs to set to correct levels for needed materials. If actual consumption is higher than forecasted consumption or the delivery arrivals late, it is possible that safety stock needs to be utilize before the replenishment order arrivals. With MRP achieves more accurate material control than for example order point method, which only looks at the present. In the order point method replenishment order generates when the inventory level is at or below the order point. The initial master data must be correct so proposals created by the system are correct and automation can be used properly. (Tarvelaskenta - MRP 2023 [Material requirement planning - MRP 2023].) The correct order point can be calculated by determining the consumption at the delivery time and adding safety stock. (Vornanen 2019.)

MRP utilizes bill of materials and material background data such as minimum order quantity or delivery time (Essex 2020). It means that bill of materials must be up-to-date and that system is used as a planning aid that it is possible to run forecast for consumption. MRP notices if there comes unexpected increase of demands. Then it is easily to react and avoid lack of materials at production (Ibid. 2020). Figure 1. shows situation where demand has changed, and material inventory

drops down to negative. Figure 2. shows situation after a MRP run. The MRP run has create a new purchase requisition based on a new demand and a stock situation. In both pictures is shown forecast based production plans.

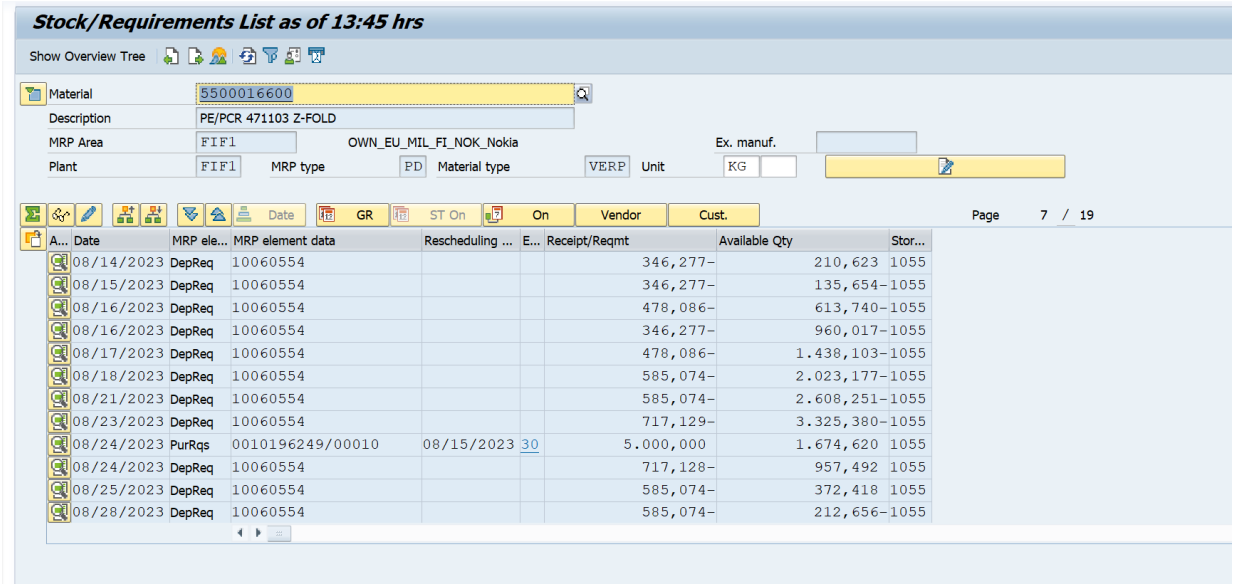


Figure 1. Material's inventory drops down to negative (SAP S/4 HANA, transaction MD04).

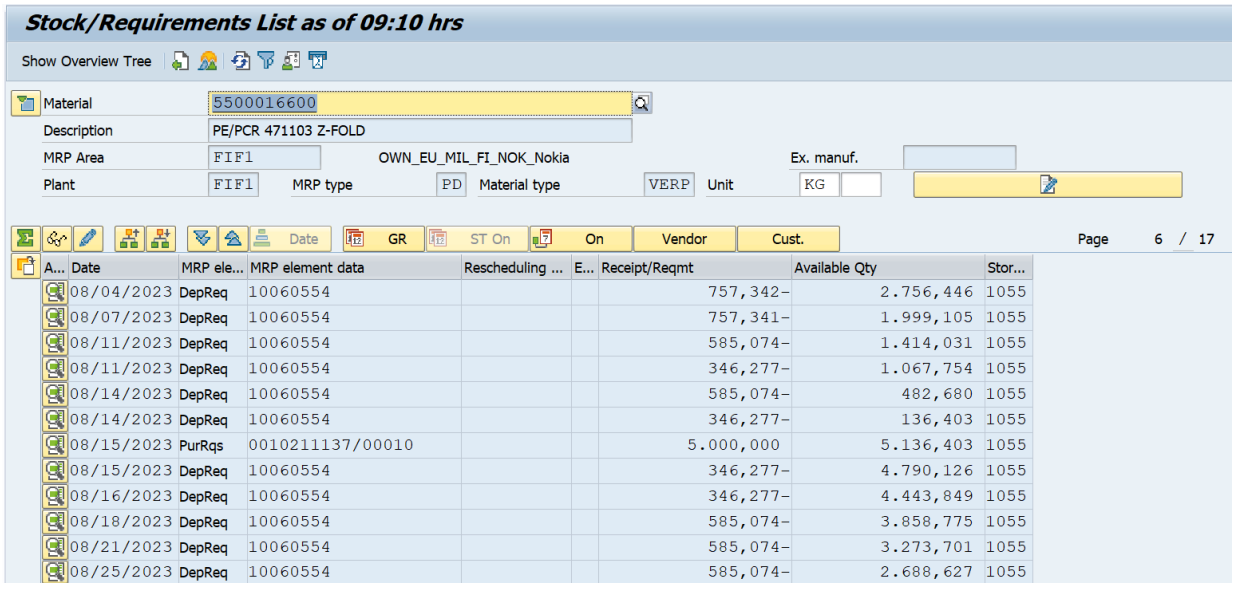


Figure 2. A new purchase requisition created by MRP run (SAP S/4 HANA, transaction MD04).

The basic idea behind MRP is that right materials are available in the right time and at the lowest cost. In purchasing process material planner does not need to think about order sizes or delivery

times separately. MRP provides clear, profitable, and efficient tool for material management processes. Process reduces inventory costs if the recommended purchase requisitions are followed. In the other hand inventory costs might increase if safety stocks are adjusted to materials, MRP counts future demands and anticipates lack of materials sooner (Ibid. 2020.) An economic order quantity can be calculated by the formula $Q(EOQ) = \frac{\sqrt{2PD}}{\mathrm{H}}$. In the formula P is fixed cost of the order, D is an annual consumption and H is an annual cost of one unit. However, prices, fixed costs and annual consumption of the material may vary considerably, and the formula may not give an accurate proposal for an economic order quantity (Vornanen 2019.) With MRP manual working methods are minimized and there should not be variation in procurement process due to employees' competence because working methods are harmonized. It may also be easier for the supplier to react to the need because there is a certain logic behind the ordering process. Order volumes may also be utilized more efficiently in the price negotiations because the predictability of the material is more visible.

# 5 Background (secret)

# 6 Targets of the Master's Thesis

Target of the master's thesis is to define processes and responsibilities and improve utilization of automation in the raw and packaging material's management processes by finding functional master data parameters to support the system. The right reports and tools are deployed, and end-users are trained to become part of their daily work. Existing processes will be defined, and responsibilities clarified, and new processes will be created based on theoretical knowledge and practical experience to efficiently mobilize the capital tied up in raw materials and reduce the amount of rejection caused by raw materials. In an optimal situation, all ordered raw materials can be used, and leftovers are not formed.

The quality of data will be improved to make the use of the system more efficient. Obsolete data is cleaned out, materials are classified into the right groups, and from the ordering point of view, the right kind of procurement data is determined for the materials based on theoretical and practical knowledge. The development method used is Deming's PDCA model for continuous improvement. A steady material flow and ensuring that employees can control the number of raw materials in the stock, and that raw materials and packaging materials that are physically removed are not left in inventories in the system. By improving the quality of master data, the efficiency of operations and harmonized working methods will be implemented. All needed information will be available in the system, and for example paper notes could be waived.

The processes created by the Essity Way of Winning (EWoW) digitalization project, the responsibilities of process roles will be clarified. The organization looks who is responsible for which area. The model that takes a stand on the material number's entire life cycle of master data will be created for master data management. For monitoring raw materials and packaging materials there has been only the inventory process, and material's removal process has been unclear. To speed up the circulation of raw materials, a new process and guidelines will be developed. In this master's thesis material management will be handled especially from the perspective of the logistics department. The focus is on work that takes place mainly in the SAP system. The master thesis's handles topics specially with raw and packaging materials related to converting lines. Deinking process' and paper mill's raw materials have been excluded from the loop because working methods and master data may need to be changed more radically, and it is not possible to carry out within the timeframes of this master's thesis.

# 7 PDCA Model

Deming's cycle is one of the key tools for solving problems and continuous improvement. William Edwards Deming developed the method to see why some products and processes do not work as they should. With PDCA model organizations can create and test theories to support necessary changes. (PDCA (Plan Do Check Act) 2023.) PDCA model's common thread is never-ending improvement, and it can be used to improve the various processes of the organization. The PDCA model is suitable for smaller, incremental changes that improve processes with minimal disruption. It is important to understand that all processes can be improved. With PDCA model organizations can implement plans systematically and see benefits quickly. (Feldman 2023.)

The cycle consists of four successive steps: Plan, Do, Check and Act (PDCA). The stages follow each other time after time (Figure 3.). At the plan stage you need to analyze current situation and problems. It is important to find knowledge to support changes. At the plan stage target is to create a plan and a framework for needed actions and results. At the do stage target is to implement the plan according to a roadmap. Testing is good to start with a limited set. At the check stage target is to monitor the effect of amendments, and where applicable find new measures to further improvement. Reviews needs to be done during the implementation, and after all implementations are done, that full picture of successes and failures are possible to observe. If the result is not as expected, it is necessary to return to the plan stage. At the act stage target is to complete the plan, decide if solution is workable and effective. If it is, then solution and new way of working needs to integrate into standard work methods. Otherwise, solutions are rejected and PDCA cycle needs to start again. In that case it is important to analyze learned knowledge and processes. (Ibid. 2023.)

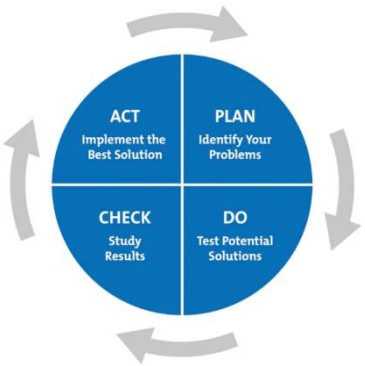


Figure 3. Deming's cycle where stages follow each other time after time. (PDCA (Plan Do Check Act) 2023.)

# 8 Justification (secret)

# 9 Results (secret)

## 9.1 Master Data

### 9.1.1 Cleaning and Grouping

### 9.1.2 Purchase Data

### 9.1.3 MRP Parameters

.

## 9.2 Processes

### 9.2.1 Packaging Material's Phase In

### 9.2.2 Raw Material's Phase In

### 9.2.3 Material Substitution

### 9.2.4 Procurement Process with MRP and Purchase Order Follow up

### 9.2.5 Monthly Inventory Counting

### 9.2.6 Slow-Moving Items and Dead Stock Follow Up

### 9.2.7 Material's Amendment to Obsolete (Phase Out)

### 9.2.8 Material's Blocking

### 9.2.9 Material's Scrapping

### 9.2.10 Raw Materials' and Packaging Materials' Master Data Lifecycle Model

# 10 Reflection

The topic of the master's thesis arose from the amount of waste generated by packaging materials. According to Hokkanen and Virtanen (2021, 184) the most efficient waste treatment is the reduction of the amount of waste generated, which can be influenced by the planning and development of operations, and it may require environmentally friendly product design and changes in production and consumption methods. The factory should further explore the prevention of waste potential, for example by checking whether the number of alternative materials used could be reduced further. This would also allow order sizes to be combined, and prices might be lower.

In recent years, in accordance with the procurement risk management plan, alternative suppliers for raw materials and packaging materials have had to be sought and order sizes increased due to availability problems caused by the global situation. However, the risk management plan should increasingly emphasize taking waste potential into a consideration and also reflect the amount of raw materials to be removed. At the factory, for example the storage shelves for films are limited, so too large quantities should not be ordered either, as it is not safe to store the films on the floor, which may pose a risk of overturning or blocking walkways. In defining MRP master data, an order size was set for each material, allowing the quantity of raw materials to be ordered to be managed. The limited warehouse space has been the one major criteria for determining order sizes. All raw materials and packaging materials are stored at the factory, and for example, packaging films next to converting lines. The master's thesis is a starting point for further development. Sourcing department should provide a stronger guidance on which material groups would be sensible to review regularly from the perspective of capital tied up in inventory. They should identify the most important materials for which optimal batch sizes could be specified and considered whether packaging materials or raw materials could be stored away from production lines without compromising production reliability. Determining optimal batch sizes in a changing product portfolio is not too hard-working if the list is properly defined.

With MRP Type, purchase requisitions can be placed at the right time. Now most of materials are ordered an order by order. There are specific material groups, for example cores, pallets and slip-sheets, where consumption is stable in every month so it would be possible to utilize automatic purchase order creation. It would free up time for more productive work. Some of materials still has set three days goods receival time, probably based on history. Too long goods receival times

extend material's lead time. All materials should be examined whether there is currently a need to keep long goods receival times, or whether the warehouse operators are currently able to handle goods receivals in a one-day window.

Few of mill's supplies does not use SAP Ariba system, even prompt for deployment was sent last year. Suppliers should be more actively challenge about SAP Ariba using, and other ways of managing orders and confirmations should not be allowed. In Finland issue may come because companies might be small and there might be only a few employees. Essity should offer and organize trainings and support to suppliers for change. Employees should also be provided with a refresher of the processes and trainings periodically. Workshop days, for example for cleaning or updating master data, could be functional in order to that company can ensure high data quality. Responsibilities for monitoring data quality should be defined so that someone ensures that competencies remain at a good level. For finished goods safety stock review is carried out globally twice a year. For raw and packaging materials safety stock reviews should also be carried out regularly. In this case, it would be possible to check that the materials do not have unnecessarily high safety stocks to tie up capital in inventories.

The phase in process of packaging materials and raw materials was clarified for end-users, and responsibilities were reviewed. The procurement process was streamlined, and the use of the system was increased, as previously, for example, all packaging materials were browsed one by one, or the warehouse was visited to check whether there was still raw material left. In the new way of working utilizing MRP, the buyer can check which raw materials need to be ordered at any given time, and the system automatically imports the necessary information for the purchase requisition. The material substitution process directs the forecast to a correct material and reduce the risk of ordering the wrong materials. The aim of the inventory process was to find harmonized working methods between the different inventory counters, and to ensure that each inventory officer understands issues that affect material amounts when running the inventory list. However, during the harmonization process, it was noticed that warehouse operators need storage locations to be visible on the inventory list, which means that the same list cannot be used, for example to chemicals. Controlling department must run this list to warehouse operators.

In recent years, material numbers have been closed in the wrong way in the system, which may have left the material number remaining on the material list or the system to generate purchase requisitions. The material's phase out process clarifies what actions need to be done in order for the material to become obsolete in the system. Regarding the raw and packaging material's scrapping process, it has not been clear who needs to do what and who to contact. It has been the reason why unnecessary capital is tied up in stocks. EWoW's figures on the creation of material (Phase In) only comment on the material creation process. The material life cycle model provides the end-user with instructions that other phases of the material life cycle must also be carried out for the system to be used efficiently and the quality of the data to remain high throughout all organizations. The process of monitoring slow-moving items and dead stock is the most essential for the starting point of the project. The aim of the new process is to make the use of ordered materials more efficient and improve the turnover rate and, where possible, prevent the generation of waste, as things are reacted to at several points on the timeline.

Nothing matters if management does not commit to a change. It is important for the management to show an example that things and actions matter. It is often forgotten that quality also consists of data quality. As long as everything works at some level, no attention is paid to it. The management must ensure that the instructions are followed, and actions are taken, as well as intervene in grievances, such as undone work. The management must ensure that there are sufficient resources to carry out the work. In the long term, digitalization reduces the amount of manual work, but to reach that point, a lot of groundwork needs to be done in the system, and resources are needed for this and for implementing the change. Similarly, employees must take their responsibility, and to point out if the quality of the work cannot be kept in high enough. All working methods and resources must be sustainable. Otherwise, we will go back in time, and in a changing, increasingly digitalized world, companies would not be able to survive and keep their competitiveness.

# References

Chan-Pensley, H. 2023. Sharepoint training material. 2.5 Super User Training for Material Master. Essity.

Dead stock. 2023. SAP Help Portal. Accessed on 17 June 2023. https://help.sap.com/docs/SAP_S4HANA_ON-PREMISE/ffc6f18a239e4a49bbb42650d881a99a/a310c453f57eb44ce10000000a174cb4.html.

Essex, D. 2020. Material requirements planning (MRP). Techtarget. https://www.tech-target.com/searcherp/definition/material-requirements-planning-MRP.

Essity in Finland. 2023. Essity Aktiebolag (publ.). Accessed on 23 May 2023. https://www.es-sity.com/company/essity-in-the-world/finland/.

Essity Learning Compass. 2023. Online class. Material Master Data Management for P2P – Module 3: Master Data North Star.

Essity Way of Winning. 2023. Sharepoint training material. Material Master Updates - General Up-date and Outlook. #LearntheeWoW! Your Essity Way of Winning learning journey. Essity.

Experian. 2021. 2021 Global Data Management research - Rapid change in a global pandemic im-pacts data perception and usage. Benchmark report.

Feldman, K. 2023. How the Deming Cycle (PDCA) Can Help Improve Organizational Efficiency. iSixSIgma. Accessed on 18 June 2023. https://www.isixsigma.com/dictionary/deming-cycle-pdca/.

Hokkanen, S. & Virtanen, S. 2021. Varastonhoitajan käsikirja [Warehouse keeper's handbook]. Sho Business Development Oy.

Huuhka, T. 2022. Tehokkaan hankinnan työkalut [Tools for effective procurement]. BoD - Books on Demand, Helsinki.

Jenkins, A. 2022. Slow-Moving Inventory: Identify, Manage & Prevent It. Oracle NetSuite. Accessed on 27 June 2023. https://www.netsuite.com/portal/resource/articles/inventory-manage-ment/slow-moving-inventory.shtml.

Koski, T. 2023. PK-Yrityksen strateginen talousjohtaminen [Strategic financial management of a small and medium-sized company]. Helsingin Kamari Oy.

PDCA (Plan Do Check Act). 2023. Mind Tools. Accessed on 30 June 2023. https://www.mindtools.com/as2l5i1/pdca-plan-do-check-act.

Porkka, M. 2023. Site Controller. Oy Essity Finland Ab. Interviewed on 07 July 2023.

Tarvelaskenta - MRP [Material requirements planning - MRP]. 2023. Logistiikan maailma. Accessed on 30 June 2023. https://www.logistiikanmaailma.fi/tuotanto/materiaalinohjaus/tarvelaskenta-mrp/.

Tunnusluvut - Tehokkuus [Key indicators - Efficiency]. 2023. Taloustutka. Accessed on 15 November 2023. https://product.taloustutka.fi/tunnusluvut-tehokkuus/.

Vornanen, L. 2019. Tilauspiste ja taloudellinen tilauserä (EOQ) varastonohjauksessa [Order point and economic order quantity (EOQ)]. Visma. Accessed on 15 November 2023. https://www.visma.fi/blog/tilauspiste-ja-taloudellinen-tilausera-varastonohjauksessa/.

Väre, T. 2019. Master data [Master data]. Alma Talent.

# Appendices (secret)

## Appendix 1. List of Responsible Organizations

## Appendix 2. List of Trainings and Participants

## Appendix 3. How to Run MRP Manually

## Appendix 4. List of Open Purchase Requistions

## Appendix 5. Converting a Purchase Requisition into a Purchase Order in Material View

## Appendix 6. Converting a Purchase Requisition into a Purchase Order by Vendor

## Appendix 7. How to Monitor Open Purhcase Orders

## Appendix 8. How to Create a List of Slow-Moving Items

## Appendix 9. How to Create a List of Dead Stock Materials

## Appendix 10. How to Update MRP Related Master Data by Material

## Appendix 11. How to Update MRP Related Master Data with Mass Tool

## Appendix 12. How to Create a Change Number

## Appendix 13. How to Amend a Bill of Material

## Appendix 14. How to Re-Explode Plan Orders

## Appendix 15. How to Update and Sync a Recipe

## Appendix 16. Material's Blocking