

# **Improving the order-delivery process by examining the problem points in drop shipping**

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<p>Description</p> <p>Paper business line of the Valmet Technologies Ltd provides technology and solutions for board, tissue and printing paper production. Project deliveries vary from new production lines to paper line rebuilds. Due to lean fundamentals inventories have been minimized and drop shipments are taken in wider use. Valmet has had several issues in drop shipments in form of unnecessary work and waste of resources.</p> <p>Problems in drop shipments were examined to make the order-delivery process more efficient. The main research question was "What are the major issues in drop shipping and what needs to be done in order to improve the order-delivery process?". The question was divided into sub-questions: "What are the different sections where the problems occur?" and "What development proposals can be made from the outcome of the research?".</p> <p>The theoretical framework was based on project shipping, quality tools and lean fundamentals. The data for the study was acquired from structured interviews and from the transportation system. The qualitative data was analyzed by using thematic analysis in order to get broad understanding of the phenomenon. Additionally, purpose was to create development proposals which would follow company's policies and procedures along with the answers of the interviewees.</p> <p>As a result, inaccurate information, inefficient utilization of the resources and inappropriate compliance of the requirements were discovered to be the biggest problem points in all the sections in the supply chain. Therefore, the execution of the order-delivery process could be improved by internal customer ship and transparency as well as by better co-operation with suppliers.</p>		
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# 1 Introduction

## 1.1 Background of the thesis

While logistics industry is growing rapidly it forces companies to adapt to constantly changing world. Processes are rebuilt, and supply chains are changed dramatically from what they used to be. (The history of the supply chain 2017). Like other businesses, Valmet has made changes to their supply chain as well. Major part of Valmet's production comes from various suppliers and items are shipped in Valmet's premises or they are delivered to customers' site. Regular inventories do not really exist due to Valmet fundamentals and philosophy. This underlines even more the importance of the order-delivery process and drop shipping. Drop shipping also known as direct shipping is an effective way to reduce unnecessary movement of products and it enables to quickly react to rapid changes in projects. However, various variables appear in every project, hence creating several problems to order-delivery process. These problems occur in unnecessary work in departments, waste of resources and in additional expenses.

Valmet Technologies's paper business line EMEA logistics have noticed this aforementioned problem. This problem has arisen in lean workshop in summer 2017 (Lean esitehtävä lähetysuunnittelu 2017). Moreover, the year 2017 has been named as a year of quality where one of the prime focuses of the company is quality which means also quality of the processes. Year's focus and general awareness of the problem make subject of the thesis relevant for the company. (The Year of Quality).

## 1.2 Objectives and implementation

Objective of the thesis is to map out problem points in order-delivery process and to find out if there is a way to mitigate or erase those problems. Purpose is to get closer to Valmet's overall goal which is to be the best in serving customers and to achieve this goal, projects have to be delivered on time to the customers under the predetermined budget. All issues that prevent the process to be executed properly, lowers

the reliability, increase costs and waste resources. Thus, little improvements in several sections in the process can have a massive overall effect to reliability of delivery. Even though the processes are thoroughly gone through there is always something to improve, because only way to increase efficiency is continuous developing. Idea behind the thesis is not to dramatically rearrange processes, but to make differences by little changes.

To be able to execute the objective, following primary question was made:

- What are the major issues in drop shipping and what needs to be done in order to improve the order-delivery process?

In order to answer the primary question, sub questions were defined:

- What are the different sections where the problems occur?
- What development proposals can be made from the outcome of the research?

Firstly, the target company who operates as an employer is examined to gather general knowledge of the working environment. Related fundamental concepts to research are gone through to gain deeper knowledge and give instruments to comprehend different sections in a big picture. It is relevant to know the idea behind terms process, project and supply chain to create a solid substructure for research and to gain prerequisite information which is needed for effective business operations. Theoretical basis gives foundation and tools to improve processes and increase the overall efficiency. Lean philosophy and quality centered way of thinking which are included in theoretical basis are familiar to Valmet and various tools related to aforementioned methods are already in use. For example, Ishikawa's diagram is used as a systematic problem-solving method, 5S workplace organization method is in use in Rautpohja premises and CI-Tool works as a common place in all units for quality reporting. Previously mentioned theories also provide knowledge and perspectives to be able to answer to research questions.

The actual research was conducted as qualitative research with quantitative research to support the results of the primary research method. Qualitative research is based on interviews of employees in different geographical locations in different parts in the supply chain to get versatile and wide view of the research problem on hand. Knowledge of the research phenomenon was also gathered by participant observation. Quantitative research was conducted by analyzing data from different sources inside the company.

Research is made for paper business line's logistics unit in Finland, therefore other business units' ways to operate are left out. It is possible that the results of this thesis can be implemented in other units as well. Also, shipments from own production units are left out, since research will focus only in direct shipments. This thesis is done from the logistics point of view and it suggests proposals which can be done from logistics perspective.



## 2 Company Introduction

### 2.1 In general

Valmet Technologies is one of the biggest suppliers in the world of services, automation and technology for the pulp paper and energy industry. Over 12 000 employees around the globe worked together to accomplish net sales of 2,9 billion euros in 2016. The main goal of Valmet is to be the best in serving its customers. Valmet's shares are listed in Nasdaq Helsinki and its head office locates in Espoo, Finland. (Valmet in brief 2017).

Valmet is divided into four segments and to four assisting functions that support the main business lines which are managed by CEO and Board of Directors as presented in Figure 1. Paper business line provides rebuilds and even full paper, board and tissue production lines. Pulp and energy business line projects vary from full pulp mills to solutions for biomass conversion. Pulp and energy and paper business lines are referred to as capital business by employees in Valmet. Dichotomy is often seen as capital business line and service business line. Service business line offers different kind of services such as spare parts, fabrics and mill improvements. Fourth business line automation delivers solutions from analyzers to mill wide process automation systems. (Our businesses 2017). Four assisting functions for these business lines are Finance, Strategy and Operational Development, human resources and marketing and communications as presented in Figure 1.

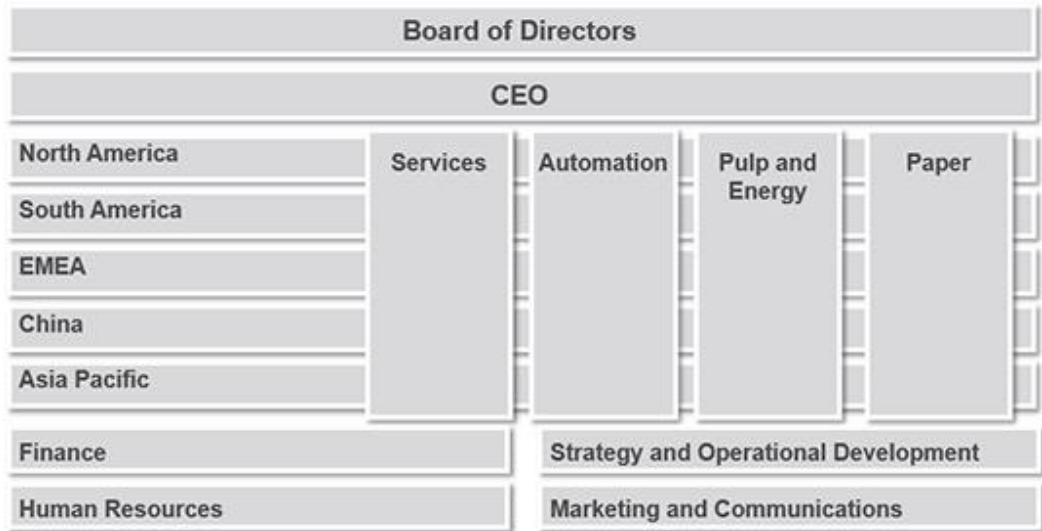


Figure 1 Valmet's operating model (Valmet's management 2017)

Valmet’s market areas are Europe, Middle-East and Africa, North America, Asia Pacific, China and South America as presented in Figures 1 and 2. EMEA and North America cover over half of the 2017 net sales taking their place in the biggest market areas.

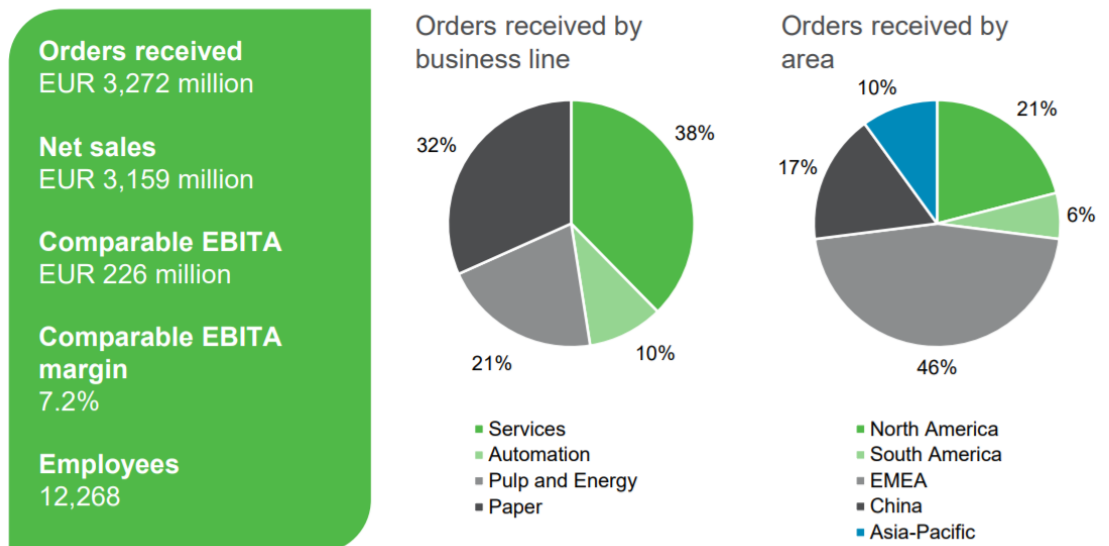


Figure 2 Valmet in 2017 (Valmet's Financial Statements Review 2017)

Hence distribution of Valmet's offices and employees is made in the way it is as presented in Figure 3. Order received by each business line in Figure 2 reflects also to number of service centers, production units and other offices around the world which is seen in Figure 3.



Figure 3 Number of employees and facilities in each market area (Our businesses 2017)

Valmet's history goes back over two centuries when small shipyard in Viapori became part of the state metal factory. During the next century, different companies such as Beloit Corporation, Sunds Bruk, Tamfelt and Karlstad Mekaniska Werkstad were established and the state of Finland acquired their ownership. In the late 40's these metal factories were merged to State Metalworks which is abbreviated as Valmet. (History 2017).

Valmet's paper manufacturing began in early 50's and they decided to cut resources from other business lines to make paper machine manufacturing as their primary business line. Valmet's way to the one of the biggest companies in Finland began when they made their first paper machine in 1954. During next decades, they acquired several companies such as Wärtsilä and KMW to develop their competitiveness in paper manufacturing industry. In late 90's Valmet corporation and Rauma

corporation merged together to form Metso corporation. Metso gained expertise and strengthened their business lines by acquiring Beloit paper machine technology, Aker Kvaerner's pulping and paper business and Tamfelt's technical texting company during the third millennium. In 2013 Metso was demerged into two companies: Valmet and Metso. Valmet acquired pulp, paper and power business, while Metso got mining, construction and automation business. However, Metso's process automation business line was sold to Valmet in 2015. (History 2017).

## 2.2 Paper Business Line

Paper business line provides technology and solutions for board, tissue and printing paper production. Product scale varies from new production line to paper line rebuilds. Valmet is one of the biggest suppliers in this area producing 40% of board, tissue and paper machines in the world. (PM delivery operations).

Paper business lines' paper making machines are delivered as a one project. These project deliveries to customer have defined resources and fixed schedule. Throughput time of the project varies from 12 to 24 months. (Paper business line 2017).

## 2.3 Valmet's strategy and values

Valmet's values and strategies are described in Figure 4. Values are mirrored in Valmet's must-wins and they thrive Valmet to their shared vision to be the best in serving their customers. To achieve this vision continuous improving and monitoring has to happen in these must-win areas. (Valmet's way forward 2017).

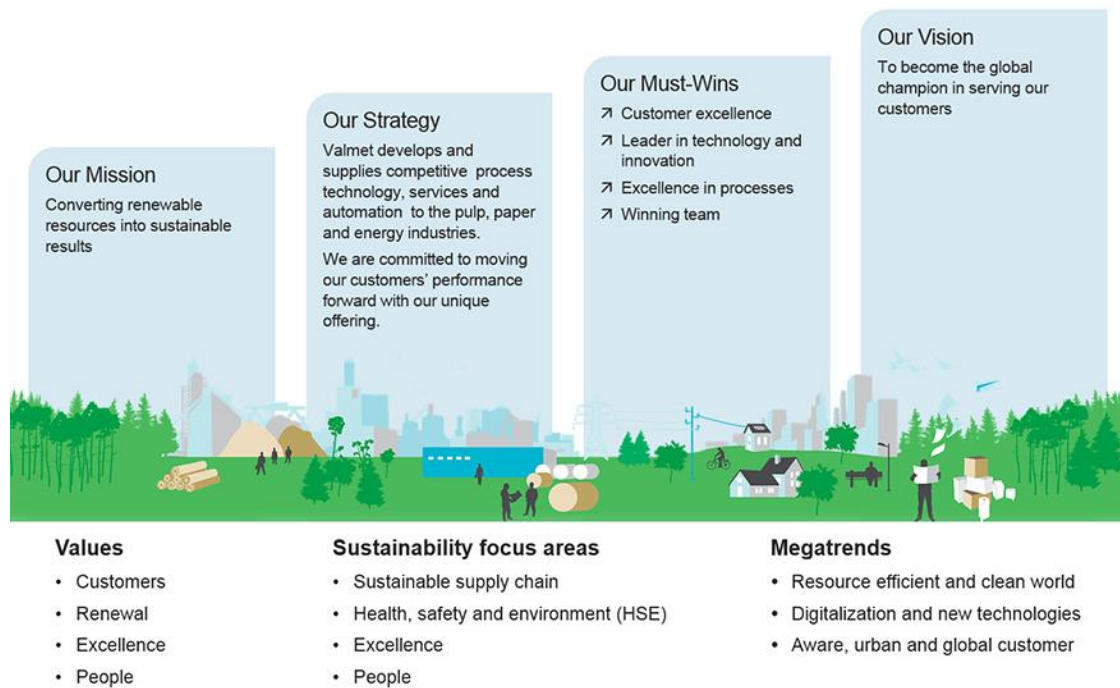


Figure 4 Valmet's strategy (Valmet's way forward 2017)

Especially must-win excellence in processes is relevant because the year 2017 has been named as a year of quality in Valmet. It means that quality is the second highest priority in Valmet after the number one priority which is safety. This must-win is implemented by lean methodology to reduce quality costs and to get rid of waste in processes. (PM delivery operations 2017).

### 3 Fundamental concepts

#### 3.1 Supply chain

There are multiple definitions to what supply chain really is. The most realistic definition of supply chain is network of participants and resources from acquisition of raw materials to delivery of finished product to end customer. All sellers and service providers are different links in the supply chain. It is critical to comprehend that every supply chain is unique. Supply chain can be in its simplest form a linear where a single manufacturer is the only one in contact with consumer. More accurate tableau of the concept is a shape of web where multiple suppliers are linked to each other and they are linked to supplier's suppliers. (Defining the supply chain 2014). This complex network is demonstrated in Figure 5.

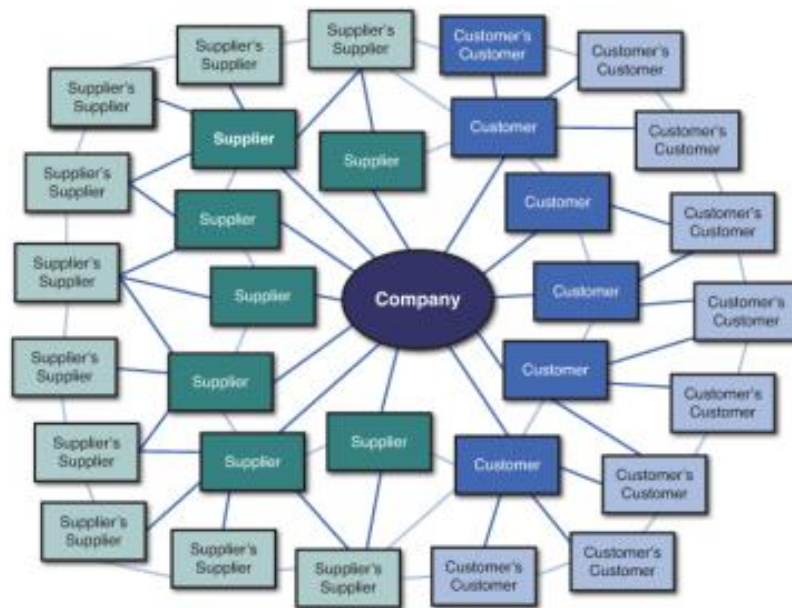


Figure 5 Network representation of a supply chain (Defining the supply chain 2014)

Supply chain can also be illustrated as a value chain which is seen in Figure 6. Purpose of the value chain is to create value in different parts in the supply chain. This theory can be implemented in focal firm, but in order to achieve the highest value it is implemented in the whole supply chain which covers suppliers and customers.

According to the analysis, firm is divided into primary or support activities. Purpose of the primary functions is to generate profit by creating value that surpasses the costs in activity. On the other hand, support functions are considered as a non-value function, but their objective is to support primary functions in a way that creates competitive advantage. While logistics management seeks to optimize the flow inside the company, supply chain management tries to optimize the flow along the entire supply chain in every firm and in each process. This competitive advantage is created when all units in supply chain think themselves as a one entity rather than as an individual. (Grant, D., Lambert, D., Stock, J., and Ellram, L 2006, 15.) According to the value chain theory, inbound logistics, operations, outbound logistics, marketing and sales and service are stated as a primary activity. In this case operations stand for example engineering and inventory management while service means maintenance and services which are done after the final product is delivered. Procurement, technology development, human resource management and infrastructure are support or secondary activities that assist these primary activities. (Michael Porter's value chain analysis 2012). When this theory is implemented it is extremely important to see the supply chain as a one entity as was stated above and analyze how the maximum profit is achieved by not lowering value of other functions. For instance, seller promises to customer shorter lead times can back fire by high inventory levels and procurements by excessive prices. In addition, analyzing the whole supply chain can be time consuming and finding the correct metrics to measure the value can be tricky due to lack of transparency and formation of business information systems.

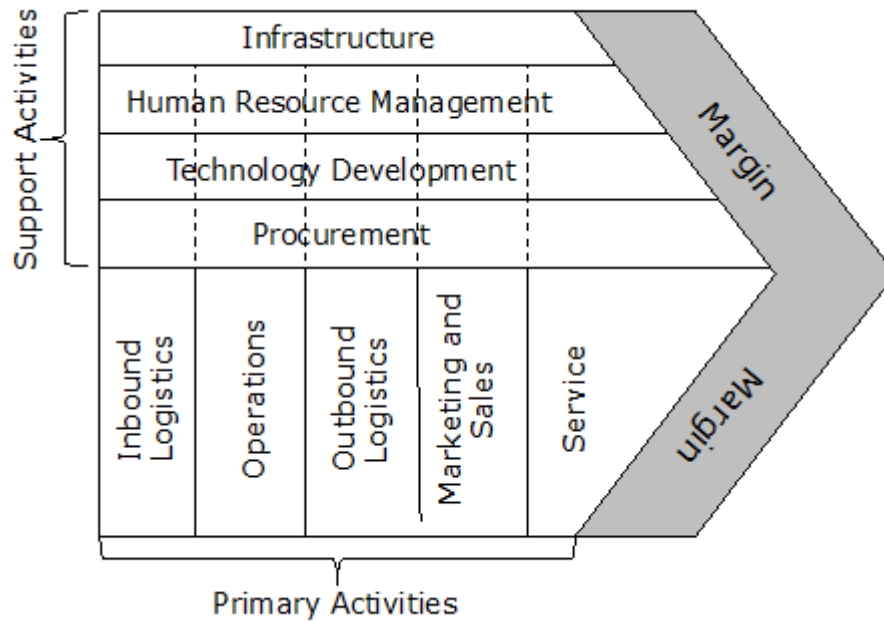


Figure 6 Porter's value chain (Michael Porter's value chain analysis 2012)

Supply chain management is quite modern phenomenon. In early 80's a group of consultants introduced the term supply chain management to the public. This council of supply chain management professionals described it as all the planning and management of all activities in logistics management. Companies used to misunderstand supply chain as activities inside their own company and only later on it was realized that the concept was much bigger. (Grant et al. 2006, 15). According to Chopra and Meindl (2007) objective is to maximize the value in supply chain. Value in this case does not only mean a financial compensation from the final customer. It takes into account the cost which is generated through the supply chain while serving the customer. (5).

All supply chain processes can be divided into three macro processes which are seen in Figure 7.





Figure 7 Supply chain macro processes (Chopra and Meindl 2007, 15)

Three processes mentioned above manage the flow of all the assets which are required to deliver the item through the supply chain smoothly.

Supplier relationship management (SRM) encloses procurement, supplier selection and all processes that focus on collaboration between the company and its suppliers. (ibid., 2007, 15.) Main idea behind SRM is to create value via open communication, joint growth and win-win mentality. While importance of suppliers has increased due to lean philosophy and drop shipping, nowadays supply chain's purpose is to create value in each parts of the supply chain. Valmet has developed their own Valmet SRM program. Basic principle behind the program is to create a strategy for supplier collaboration by supplier managers and their team to selected key suppliers. This particular program was taken in to use in 2016. (Supplier relationship management driving competitive advantage 2016).

ISCM stands for internal supply chain management and it includes all the processes which are happening inside the firm. These processes include production planning and intralogistics. ISCM purpose is to serve the demand which was set by CRM at the minimal cost and on time mindset. (Chopra and Meindl 2007, 15).

Customer relationship management (CRM) includes sales, marketing, management of the company's website and all processes that are related to interaction between the customer and the firm. Stream of impulses is from right to left where CRM sets pace to ISCM and SRM, so it is important that these three processes are well integrated. Process owner as the people in the organization should communicate and coordinate with each other to ensure the capability to meet customer's demands effectively and cost efficiently. (Chopra and Meindl 2007, 15-16)

Supply chain performance has to be measured in order to know what to improve and in which part of the supply chain. Supply chain operations reference model (SCOR) is a management tool which use benchmarking to evaluate supply chain metrics to the best one in the industry. It allows company to measure their own supply chain performance and effectiveness, test process improvements and measure wanted operations. Core idea is a triangle shaped model which is divided into four levels. Level one contains four key processes: Plan, Source, Make, Deliver and Return. In second level 26 core process categories are defined which can configure operations and level three provides knowledge what is needed for planning and setting objectives for supply chain improvements. In other words, level 1 defines scope, level 2 tells how to adjust the supply chain from core process category and level three provides detailed attributes for all process categories in level 2. Level three defines company's competitiveness in its own industry and focuses on the implementation of the actual improvements. (What is SCOR model). There is various metrics in each level to measure the processes. Just like the process elements which are stated above, metrics are more detailed in level 2 or 3. (SCOR overview booklet 2006, 8). These metrics enable a company who for instance compete in quality to be compared to a company who competes with their pricing. Aforementioned numerous attributes make different supply chains as unique as they are.

Benefits from the SCOR model can be seen as better understanding and management of the supply chain. It provides framework where planning, measurements and benchmarking meet with each other. (SCOR overview booklet 2006, 23).

### 3.2 Project

Paper business line's shipments can be described as projects. Each project is engineer-to-order meaning that there is not end product storage. (TILAUKSESTA SUUNNITTELU (ETO)). Machines that are delivered to client are unique, tailor-made and one-time deliveries. When paper or board line or machine is sold, each project get their own project mark. For this project budget is set, schedule is fixed, and resources are named.

According to Artto, K., Martinsuo, M., and Kujala, J. (2006, 24-26) project is a group of objectives which are connected to each in other in complicated way and have limited time, resources and scope. These objectives form a unique entity which have a predetermined goal. The main difference what separates other functions from projects objectives is uniqueness. Perfectly similar projects do not exist; thus, every project is tailormade to different customer and different resources are used as was previously mentioned. The most common characteristics for projects are:

- Flexibility and modification
- Unique solution to fulfill the demand of the customer
- Schedule and resources are fixed
- Budget is tailored according to requirements and objectives
- Uncertain and sensitive (ibid., 28)

The main purpose of the project is to deliver solutions and development. In other words, delivering solutions mean a single entity which can be a product or reorganization of functions whose purpose is to give value to the customer by immediate customer centered solution. Development in this context means indirect value to business operations and customers by efficiency improvements or renewal. These indirect values can be produced by product development where a new successful product model is launched to the market. (ibid., 18-19). There are various types of projects, but these two project categories are the best ones to describe Valmet's paper business line. However, when delivery project is delivered, it can be thought as an investment project by customer.

Term project management is quite often misunderstood. When individuals are working with the project they assume they are using the project management to control their actions. Project management aims to make a better use of the resources what the business already has. Project management can be defined as planning, organizing, directing and controlling company resources to complete a certain objective. Management includes the previously mentioned distinctive terms and to be able to successfully manage the project, objectives which were set at the beginning should be achieved within time, budget and finally be accepted by the client. In every project, a manager is assigned to control business's resources through other managers

and work as a messenger between various sections of the supply chain. (Kerzner 2013, 3-5)

According to continuous improvement of lean philosophy, Valmet has created their own paper machine project execution model to support and improve the project management process. The model creates common structure and language for every project. (Project Management Process 2017). Model sets requirements in “gates” which are checkpoints in different parts of the supply chain. In every gate, the ongoing actions are reviewed and project readiness to proceed is evaluated by defined milestones. By this project model, delivering a project with the right quality and according to schedule and defined budget is ensured. (Project model 2017).

### 3.3 Process

A process is a group of related work tasks which originate in response to fulfil specific result for the customer of the process. (What is a process? 2016). Purpose of the process is to tell what needs to be done and why. Every functions’ main purpose is to work according to defined process. Sakki (2009) defines process as sequentially performed actions producing a certain output. (14).

Improving the processes start from the bird’s eye view. Firstly, the process structure and hierarchy has to be understood. Only after then deeper research shall be conducted and basic characteristics of processes and sub-processes shall be defined. These characteristics can be the point where the process starts and ends or what actions should be done during the process (Lindfors 2012). According to Porters value chain analysis which was introduced before, processes can be divided to core-and support processes. Purpose of the core processes is to create value and sub-processes task it to support primary processes. (Harmon 2011).

Figure 8 demonstrates process chart of Valmet deliver process where processes have been defined. This is upper level overview or bird’s eye view which was mentioned before. These processes were defined in 2016 when benefits from process centered thinking were brought up. They include resource planning, basic engineering, production planning, detail engineering, procurement production warehouse, manufacturing, warehouse, and shipping. In every one of these processes, there is a function

who owns the resources who work in process. Task of the process is to create services and products for customer to fulfill customer's demand. This is the basic frame for every project. (PAP PM delivery operations 2017). To effectively manage process, a process owner has to be assigned. Process owner cannot be the same person who is leading the function which participates most actively in the process. Process owners' task it to make sure that process procedures are followed, measure the process's effectiveness and recognize development areas. (Lindfors 2012).

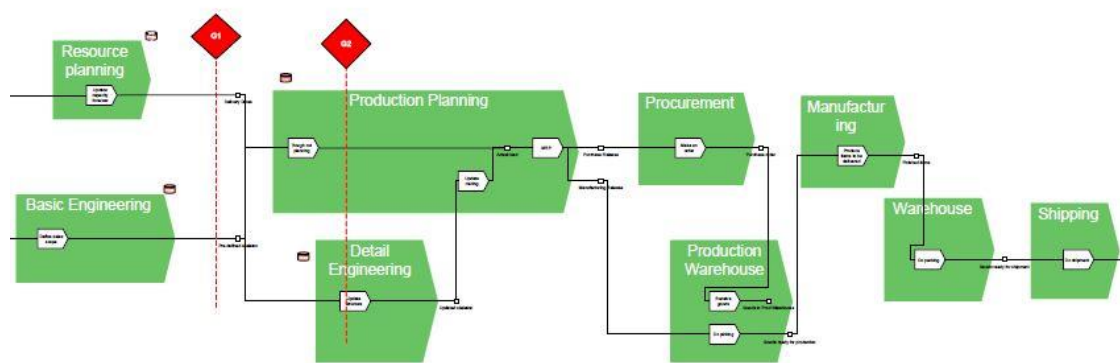


Figure 8 Process Chart (Valmet internal file)

If we would look deeper into these processes, we would find sub-processes inside these processes which are more detailed. However, detailed sub-processes cannot be published. Above-mentioned process chart is in other words ISCM chart which is explained in Figure 7. In Figure 8 diamond shaped boxes are gates which were introduced in the project chapter. For instance, resource planning and basic engineering should be done before a project can move on to detail engineering and production planning. If resource planning is lacking some objectives, then the gate cannot be opened and moving on to the next process is denied. This order-delivery chain can be described as an order-delivery process where personnel from different areas of responsibility work together to carry out different steps. (Sakki, 2009).

### 3.3.1 Order-delivery process

Order-delivery process can be defined as a group of sub-processes or supply chain between two enterprises. During the process flows of information, money and goods are exchanged between each participant in the supply chain. Furthermore, activities which occur during the order-delivery process can be sorted in the following way.

- Request for quotation
- Ordering
- Order acknowledgement
- Sending the goods
- Transportation
- Receiving
- Warehousing
- Quality control
- Sending an invoice
- Payment

These activities are macro processes which were seen in Figure 7. It must be considered case by case that can some of the macroprocesses be left out or combined together to reduce overall logistics costs. (Sakki 2009, 35-37) Ministry of transport and communications published logistic report in 2012 where logistics expenses are divided by segments. Table 1 shows that most of the expenses comes from transportation and warehousing, hence these two areas can offer the biggest savings in the supply chain. (Logistic report 2012).

Table 1 Logistic expenses (Ministry of transport and communications 2012)

	<b>Transportation</b>	<b>Warehousing</b>	<b>Administration and other expenses</b>
<b>Expenses(%)</b>	38 %	46 %	16 %

Even though logistic report is from 2012, data is valid to this day. However, project business line's order-delivery process can vary from the standard process. Usually when following main principles of Lean management, need for warehousing is minimized, thus making percentage of warehousing costs smaller. Subcontractors and final customers can be geographically far away from the Valmet's production units

which makes some steps of standard order-delivery process unnecessary or more difficult. However, as it was said before each shipment must be considered case by case. (Sakki 2009, 38).

### 3.3.2 Measuring the process

In order to gain recognition of the needs of the company and to find out realistic status of performance, processes have to be measured. KPIs or key performance indicators are used to measure, follow-up and manage performance. (Joanne Longo, 2009). With meritocracy driven social system usually the end result only matters and not the steps that have got to that point. Measuring the process should be considered from the point of view that what is manageable. KPI that measures in euros is not usually the best one when compared to the activities or effectiveness that pursuit towards the wanted result. However, there are also exceptions such as ratios when thinking suitable KPI's which has currency in them. (Lynch, S. 2015).

On the other hand, KPI's which are measured in percentage are not completely reliable either. For instance, problems might occur when looking into on-time deliveries which are measured by percentage of customer's order delivered on time. If 99 units from order of 100 units are delivered and customer agrees to close the order even though 100 was not supplied, does on time delivery percentage be 100% or 99%? Furthermore, if customer can accept order few days earlier or few days later, does that interval between early and late count as 100 % on-time delivery late or shall it be penalized? These interpretations indicate that how important it is to define how to measure the activity or effectiveness. (Gary Marion 2017a).

Alternatively, processes can be measured from supply chain perspective using the SCOR model which was informed in chapter 3.1. Rather than just measure one process, SCOR model enables to benchmark the supply chain to best ones in the industry. (What is SCOR model). However, determining the measurement of processes depends on specific needs of the company.

### 3.4 Drop shipping

Drop shipping also known as direct shipping is a shipping service where enterprise does not physically have the objective what they are selling. Instead goods are sent directly from supplier to customer without crossdocking. (Rheude 2016). Drop shipping is used in project's main shipments, but also in warranty, temporary and short shipments. Warranty shipments are shipments that occur in guarantee period and temporary shipments are type of shipments that are sent to customer, but later returned to the point of origin. Short shipments also known as back order are orders that have not been shipped to the customer on time due various reasons. (Marion 2017b)

Standard order-delivery process is similar to drop shipments if warehousing is excluded. It all starts by impulse which is given from engineering, project manager or other position in the supply chain. Purchaser receives this impulse and purchases component or product from the supplier. The supplier sends the package information to shipping engineer who saves the information in the enterprise resource plan system. The engineer sends package labels, packing lists and item labels in return to the supplier. When the package is ready to dispatch, and all the necessary information have been acquired from the supplier, forwarder takes the shipment from the shipment queue and books the transportation for the package. An electronic export declaration is submitted to customs if the goods are exported from the European union. Finally, when the shipment has arrived in the destination, receipt is made by the purchaser.

Drop shipments can be beneficial for a company, but it comes with its own disadvantages. The most common advantages and disadvantages are provided on Table 2. (Rheude 2016).

Table 2 Advantages and disadvantages of drop shipping (Rheude 2016; Chopra and Meindl 2007, 395-396)

Advantages	Disadvantages
Simplicity in terms of operation	Quality control



Minimized warehousing costs	Inventory control is missing
Focal shipment decisions	Transparency
Shipments does not affect to each other	Sourcing from various locations
Reduced lead time	Supplier errors

However even though literature provides the most common problem points in drop shipping it cannot be known that does those theoretical problem points reflect to real-life problems of the case company. Sourcing globally might reduce production costs of the product but increase transportation costs if end customer is foreign. However, transportation costs decrease if the end customer is geographically in the same area as the supplier even though that retailer or middleman is located further away. Every company does have their own operating model and processes meaning that general problems or benefits what one has might not apply to others. That is why every business should be considered as a unique entity and examined more thoroughly in order to find out current state.

## 4 Tools to improve the process

### 4.1 Quality in general

Often idea what is a quality is misunderstood or person's conception of the quality conflicts with another. IBM's definition of a quality is "quality equals customer satisfaction" (Sallis 2002, 2). According to Richard E. Winder and Daniel K. Judd (1996) "Quality is the on-going process of building and sustaining relationships by assessing, anticipating, and fulfilling stated and implied needs". Even though quality of a product exceeds or satisfies customer, quality can still be on poor level due to quality of processes. Primarily, a good quality should occur in each section in the supply chain to be able to successfully deliver a project to customer. If a level of quality is not high enough, it will present itself as extra costs, waste of resources and inefficient processes. (Laatu hyödyttää kaikkia 2017). In addition, some costs are not even considered as quality costs since they are hidden. These hidden quality costs are harder to measure than standard quality costs. For instance, if an engineer does a mistake which causes troubles in later stages and later customer returns a product, visible quality costs present itself as loss of production price or delay of payment. Unmeasurable quality costs are reputation loss, inefficient processing and over production costs. Furthermore, these hidden costs can correlate other hidden or visible costs. (Case study: Hidden Quality costs 2017). In order to decrease overall quality costs Valmet implemented quality management throughout the whole company. Several lean tools and quality management systems were taken in used in all countries where Valmet does operate. (Valmet pyrkii säästöihin laatukuurin avulla 2015)

### 4.2 Quality models

Concepts TQM, Lean, ISO 9000 and Six sigma are similar in several ways and thrive towards the same end result which is to improve quality. However, methods to establish this common output differs from each other, although all theories share some of the same principles. That is why the author divided these similar models and related tools to their own chapters. These particular models and tools are implemented in Valmet. However, only some of the quality management tools which are in use are presented in this chapter. (Martínez-Lorente and Martínez-Costa, 5; Sallis 2002, 22-25; Six Sigma vs Total Quality Management)

#### 4.2.1 TQM

Due aforementioned reasons TQM (Total Quality Management) was taken in use. TQM aims to meet or exceed customers' demand by continuous improvement of company's procedures which include quality of product and quality of services. (Sallis 2002, 17; Total Quality Management-TQM). Successful implementation of TQM requires all individuals inside the company to be involved in the process of continuous improvement. Principle declines that doing things right on first time and every time is more beneficial than to occasionally review if something has gone wrong. (Sallis. 2002, 23).

Thus, continuous improvement is highlighted, affiliated tools have to be implemented. William Deming's Deming cycle is one of these tools which is widely used in total quality management. As a result, this cycle is used in analyzing TQM processes. (ibid., 6-10). Deming cycle also known as PDCA is presented in Figure 9.

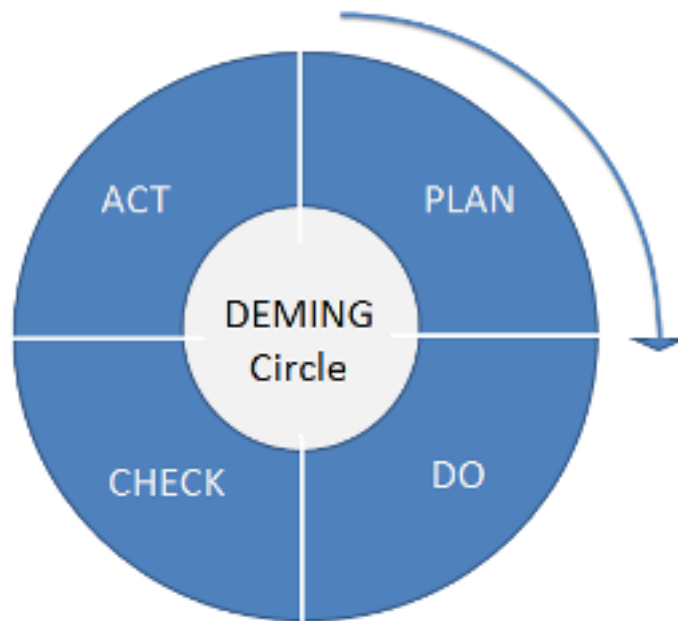


Figure 9 PDCA (Plan-Do-Check-Act Cycle (PDCA Cycle))

The basic principle Of PDCA comes from aforementioned letters meaning plan-do-check-act. Firstly, problem has to be addressed and corresponding plan with expected results have to be established. This particular plan is implemented to practice generating a wanted or unwanted output. At check stage, outcome of the implementation is analyzed against the expected results. If results are not satisfying, necessary arrangements are made to prevent defects or unwanted actions. These arrangements include identifying root causes and noting possible variations. After the changes have been done, cycle is started from the beginning until an expected output is obtained. (Plan-Do-Check-Act Cycle (PDCA Cycle))

#### 4.2.2 Six Sigma

Six Sigma is a method or a strategy which aims to improve processes by reducing the number of defects. Motorola was suffering from high quality costs in the 1980s and in order to react to increasing expenses Six Sigma system was developed by firm's engineers. (Zhang 2009, 1-3)

Basic principle of Six Sigma is to achieve quality standard less than 3.4 defect per million opportunities (DPMO). Term opportunities is sometimes replaced with the unit depending on the context. In the simplest form, Six Sigma is six standard deviations as the Greek letter Sigma refers to. (ibid., 10-13) This defect rate metric is presented in Table 3.

Table 3 Defect rate metric (Sigma Performance Levels – One to Six Sigma, Edited)

Six Sigma Level	DPMO
6	3.4
5	233
4	6210
3	66 807
2	308 537
1	690 000

As it was previously mentioned, acronym DPMO is sometimes replaced with defect per million units (DPMU). In order to calculate the DPMO, process owner has to recognize what are the events that will lead to defects. DPMU only focuses on the final results, unlike DPMO which investigates opportunities that will lead to defected units. However, a company can have a Six Sigma level process when it is measured from DPMO point of view yet still produce faulty products. It is essential to define where does the line between defect and decent quality goes. In other industries, standard quality may vary when it is compared to average quality of all industries combined. (ibid., 11-14)

In spite of Six Sigma's definition as a statistical tool other definition defines Six Sigma as a process improving method. Various tools have been developed to achieve Six Sigma quality and a common six sigma approach is DMAIC which comes from words

Define, Measure, Analyze, Improve and Control. Acronym's letters stand for DMAIC method's five stages. Firstly, scope of the problem and the actual problem is defined before the metrics how to collect the data regarding the problem is established. When tools for measurement are approved, data is collected in order to find out the root-cause behind the problem. In the improve stage validity of solutions is clarified and finally recommendations for solution and implementation methods are presented. DMAIC is very similar to PDCA as Six Sigma is when compared to TQM. However, approach to identical output is dissimilar. (ibid., 15-16)

#### 4.2.3 ISO 9000

ISO 9000 stands for quality management standards which was published by ISO (International Organization for Standardization). People from over 90 countries belongs to technical committee who is responsible for development and maintenance of ISO family standards. These standards are based on seven quality management principles.

1. Customer focus
2. Leadership
3. Engagement of people
4. Process approach
5. Improvement
6. Evidence-based decision making
7. Relationship management

Major ISO 9000 standards in the series are fundamentals and vocabulary, requirements and guidelines for performance improvements. ISO 9000 certificates are given by third party and to achieve certificate audition have to be made to seek if a company does meet the ISO 9000 standards. Emphasis is on the documentation of activities and prevention of quality flaws rather than correcting mistakes afterwards. (Suomen Standardisoimisliitto SFS ry 2016)

ISO 9000, TQM and Six Sigma resemble each other, hence making hard to find dissimilarities between them. If division has to be made between them, ISO 9000 aims to meet common standards for quality, Six Sigma pursues to increase quality be re-

ducing number of defects and TQM seeks to exceed customer's satisfaction by continuous improvement of quality in products and processes with help of every individual in the company.

#### 4.2.4 Lean

Lean way of thinking phrases its philosophy as a continuous improvement method by reducing or eliminating waste in all parts of production processes. Less is more state of mind originates from Toyota Production System (TPS). It was introduced in Womack's and Jones's *The Machine that Changed the World* in 1990's and afterwards rising of Lean fundamentality has only increased. Lean manufacturing emphasizes shorter throughput times, continuous improvement and reducing all forms of waste in the process. Thus, products can be produced in shorter time with lower costs but still maintaining the best possible quality. (Liker, J. and Morgan, J 2006, 5-6)

Continuous improvement is also known as Japanese word kaizen. Theory states at it does not matter if improvements are small, as long as they happen in agreed fixed intervals. (Slack et al. 2010, 544). Valmet has its own continuous improvement tool called CI Tool. It is a common place to create and manage feedbacks and developments proposals. It is transparent for all the employees and it does share information on global scale. (Valmet CI Tool).

According to Professor Deborah Nightingale (2005), fundamentals of lean can be divided in five main principles. Firstly, value of the products and services are defined by customer. It is producer's duty to answer to customer's anticipations by considering what is the value level of information and material what customer is willing to procure. Value and quality are changeable concepts depending on the industry and customer. Hence, making the first principle crucial to successful implementation of lean methodology. (14-16)

After value is defined, all necessary functions related to order-delivery process are identified throughout the supply chain. Steps that add value through the process are kept, while non-value functions also known as waste are removed. However, even though supply chain is segmented to several own departments, the value of the whole supply chain should be considered in this step. Related to Porter's value chain,

which was presented in chapter 3.1, problem is that how to gain maximum value by not lowering value from other functions. Also, all non-value-added activities cannot be fully removed due to constantly changing variables. (ibid., 17-20). Value stream mapping (VSM) is a tool to identify and establish value stream which was presented earlier in another context in Figure 8. It is visual map where current state of process is analyzed and development potentials are evaluated for further improvement actions. VSM provides a visual picture of the flow of materials through supply chain and ties together different functions and departments. (VSM 2017).

When value stream has been established, it is crucial to keep continuous product flow. This particular step highlights just in time mentality where all unnecessary movement of products is removed, and all necessary components are delivered right on time to next section in the supply chain. Possible bottlenecks should be identified in this step (Nightingale 2005, 21-25)

Last steps contain establishing pull system and striving for perfection. Pull control means a way of thinking where work pace, planning and production is triggered by customer. Only after the impulse production starts and other activities are set in motion. As a result, pull control reduces long lead times, queues and excess inventories. (Nightingale 2005, 26-27; Slack et al. 2010 289-290). Professor Deborah Nightingale (2005) defines last stage as a continuous improvement. Aim is to seek improvements and better solutions continuously; a process can never be perfect. (27) Different tools from other quality management systems such as PDCA and DMAIC can be implemented because they all are process improving methods and they all share the same outcome.

Prominent part of lean philosophy is elimination of waste in all forms. Waste identification aims to eliminate all non-value-added activities and 5S organization method support aforementioned theory by reducing waste. Different forms of waste can be classified in the following way:

- Excess inventories
- Waiting time
- Unnecessary transportation
- Non-value-added process
- Stock
- Unnecessary movement



- Quality defects (Slack et al. 2010, 435-436)

5S organization method can be thought as a workplace housekeeping activity. Usually in non-lean environments there are several stacks of paper and searching for correct documents may take time. Therefore, lean philosophy is implemented in places where the people actually work. 5S contains following steps:

1. Sort (Seiri). Only keep what is needed.
2. Straighten (Seiton). Reorganize things in a way that they are easily reachable.
3. Shine (Seiso). Keep things tidy.
4. Standardize (Seiketsu). Keep neatness as a standard.
5. Sustain (Shitsuke). Maintain 5S mentality and implementation

5S organization method was taken in use in Valmet's divisions in mid 2010s. (Lean 5S).

Lean root cause analysis methods are 5Xwhy and Ishikawa diagram. The 5-Whys is a simple tool where general problem has been recognized and "why" question is asked until the root cause of the problem is identified. 5xWhy analysis is preferred to do in teams in order to truly identify the root cause by mutual agreement that the real cause for the problem is identified. If the analysis is done by an individual, outcome can be more uncertain when compared to analyzing as a team which provides more opinions and deeper understanding. (5xWhy).

Fishbone also known as Ishikawa diagram is used to analyze and organize primary causes and sub-causes which influence a problem. Firstly, problem has to be described like in 5xWhy analysis. Example of Fishbone analysis is presented in Figure 10. It demonstrates six different categories where causes for the problem occur. After the identification of categories, reasons for problems are described in primary causes and sub causes. These causes can be for instance old equipment, inefficient layout of the production or poorly performed processes. Fishbone diagram is constantly reviewed and updated until the root cause is uncovered and enables further improvement actions to be made. (Fishbone)

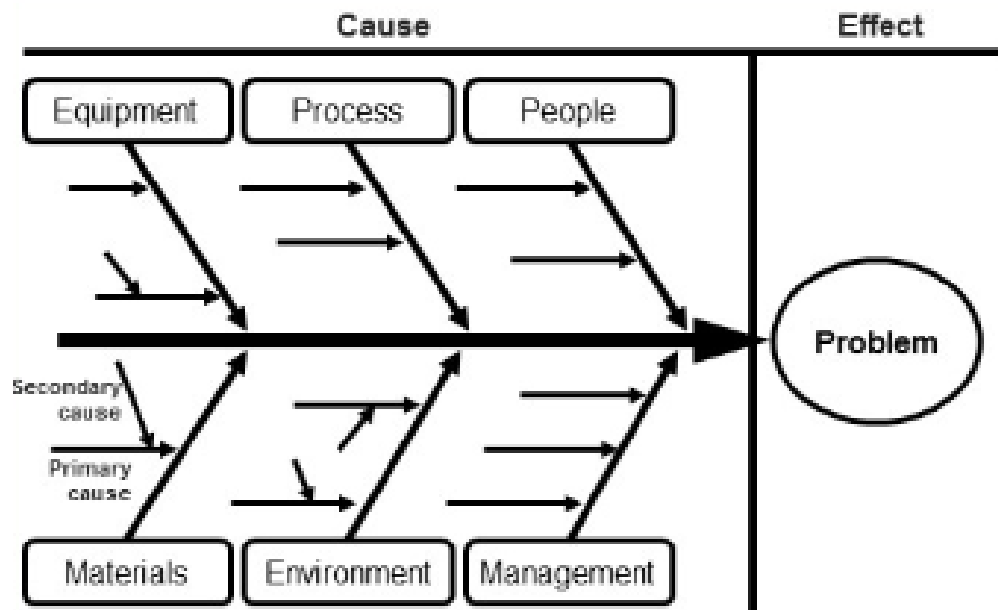


Figure 10 Fishbone (Valmet internal file)

## 5 Research

### 5.1 Research methods

#### 5.1.1 Choosing the research method

Qualitative approach was chosen to be the primary research method. In addition, quantitative research was conducted to support the results from qualitative approach and to find out similarities and dissimilarities between the results, thus increasing the reliability of the research and to gain more in depth understanding.

Quantitative research tends to use numbers as a method in statistical form while qualitative research provides words and interaction with other people as a data collection method. (Braun & Clarke 2013, 4)

Usually order-delivery process or drop shipments are measured by a certain on-time percentage. Other metrics to measure successful deliveries can be as savings in currency or on-time percentage based on transportation mode. However, using only quantitative methods does not answer to question why things occur. Figures only provide the outcome of the process and does not explain what has happened along the way. Hence, qualitative approach is needed to be able to see the big picture behind the idea and to find out causal relationships between problem points. Utilizing both research strategy increases reliability of the results.

Drop shipping is not as well addressed in literature as regular shipments when these two are compared to each other. Moreover, due to Valmet's complex organization matrix and policies it cannot be entirely comparable to similar firms in the same industry. Therefore, research has to be empirical in order to get answers to specific questions. Research type was chosen to be descriptive because it is the most suitable to answer questions "what" enabling to get corresponding answers to research questions "what are" and "what needs to be done". (U.S Department of Health & Human Services). These aforementioned statements along with the uniqueness of the results that cannot be generalized, has determined the research approach to be a case study. Case studies can be characterized as a single and they cannot represent a pop-

ular general opinion. Normally there is an interaction between examiner and examinees while research phenomenon is examined in limited environment. (Case-Tutkimus).

To gain in-depth understanding of the research subject, interviews were held. Interviews provide perspectives and experiences in relation to a particular research topic. Interview types can be structured, semi-structured or unstructured. Structured interviews have predetermined questions which are asked in the same specific order. Semi-structured interviews have key questions, but interviewees can participate in conversation by raising issues that has not been thought beforehand. In unstructured interviews, a list of questions has been replaced with themes and interviewee is leading the conversation. (Braun & Clarke 2013, 78)

Interviews related to this particular research were structured as it mitigates the context effect and interviewer bias. All of the questions were predetermined and typed in a way that reduces the effect of stimulus. One of the key elements in structured interviews is to minimize context effect. In cognitive psychology context effect is explained in a way that person can respond to a stimulus which is caused by environmental factors. (Context effect). In a form of interviews, it does mean that interviewee's answers may vary depending on the sequence of the questions or on the context where questions are asked. Interviewer can subconsciously or purposely lead interviewee towards the wanted answer or rearrange the order of the questions in a way that previous question will work as a stimulus for the next one. Therefore, validity of the questions is compromised. In addition, one factor why structured interviews were chosen, was to reduce interviewer bias. This effect states that facial expressions, interviewers outlook or attitude can have a positive or negative effect in interviews. During the unstructured interview, interviewer can influence to answers by using silence, smiling or even to gender of interviewer can have an effect to interviewee's answers. (Minimizing Interviewer Effects)

Data analysis of research results was conducted as a thematic analysis. Thematic analysis is an analysis method where essential themes or topics are categorized from the data. These categories are later examined more thoroughly. Weakness of this kind of analysis is that individual's opinions can get lost especially if the sample size is

large, hence the most common themes are only categorized. However, if all individuals would have thought in a unique way then the formation of themes would have been impossible since everyone would have different opinions regarding the questions. (Braun & Clarke 2013, 174-180)

## 5.2 Research implementation

Purpose of the research was to find out problem points in order-delivery process and to find out if there is a way to mitigate or erase those problems. Data for the analysis was gathered mainly from interviews to map out the current state of drop shipments and to seek development suggestions. However, information was also gathered from company's databases and from the transportation data. In addition, participant observation was also information gathering method, hence the author was working for the case company during the thesis.

Interviews were held to collect data to answer research questions "What are the major issues in drop shipping and what needs to be done in order to improve the order-delivery process?", "What are the different sections where the problems occur?" and "What development proposals can be made from the outcome of the research?". As mentioned before, interviews were structured interviews to decrease context effect and interviewer bias. Interviews were executed by email and face-to-face interviews. During the face-to-face interviews, silence was used as a method to gain more information from interviewees. The interviews were conducted in Finnish to assure that language barrier will not compromise validity of the results. In addition, anonymity was given to interviewees so that the data would be as real as possible.

Overall 14 interviewees were interviewed from different sections of the supply chain and from different management positions. However, drop shipment is not a well-known subject area which narrowed sample of the interviewees to forwarding, logistics and procurement. Interviewees could have been chosen from other sections of the supply chain but then the validity of the results would have been compromised due to lack of in-depth knowledge.

In order to support results of the interviews and to gain more information regarding the phenomenon a quantitative research was executed. The data of the shipments in

year 2017 was brought to spreadsheet software from case company's transportation system. In addition, data of the key performance indicators was gathered from the Valmet's transportation software. The data was sorted, filtered and edited to gain knowledge regarding the research.

### 5.3 Findings

Thematic analysis was conducted to discover issues in drop shipping. The analysis followed Braun and Clarke's six-step process which can be seen in Table 4.

Table 4 Steps of Thematic Analysis (Braun and Clarke 2006, 35. Edited.)

Phase	Description
Familiarizing yourself with your data	Reading the data and writing down notes
Generating initial codes	Coding data which appears to be interesting
Searching for themes	Gathering data together in different theme groups
Reviewing themes	Find out whether to combine or separate themes.
Defining and naming themes	Generating clear definitions and names for each theme
Producing the report	Transform the analysis into writing

As a result of the analysis, following themes related to problem points were discovered.

- Packaging and loading
- Dispatch
- Knowledge management
- Inaccurate information

## 6 Analysis

### 6.1 Problem points

#### 6.1.1 Packaging and loading

First theme which was arisen from the interviews was packaging and loading. Many of the interviewees said that packages which are sent to customer from supplier do not meet company's requirements. Packages should be sustainable and stackable to achieve maximum capacity of loading and save in transportation costs. Interviewees mentioned that suppliers should have clear instructions how to pack items depending on the transportation mode. However, especially in urgent short shipments, pre-determined transportation mode might be changed. This does not give time to supplier to purchase suitable packing material if they do not have particular package types on hand.

One interviewee stated that packages should be stackable if possible. In other words, this means that pallets should have collars, so packages can be stacked, and boxes should be made from wood hard enough to withstand weight on top of it. Other interviewee specified wood which is used in packages should be ISPM 15 standard. This particular standard requires package material to be manufactured from debarked wood and the wood should be heat-treated. Treated material is labeled with a logo which tells country code, treatment marking, producer's code and it has international plant protection convention logo. Most of the wooden package material is made from heat-treated wood in Finland, but when drop shipment is sent from foreign country manufacture type of the wood should not be taken for granted. (ISPM 15 STANDARD FOR WOODEN PACKAGING MATERIAL 2017).

In addition to abovementioned problems, loading a container is an issue according to interviewees. One of the interviewees mentioned that proper packages will not do much if the loading is unacceptable. Shipper is responsible for loading the cargo and is liable to compensate financial losses to the customer if goods are damaged during the shipment. Many of the suppliers do not load containers and before the actual shipment, shipping engineer should ask from the supplier that can they properly load

containers. However, ability to load containers is not equivalent to excellent loading and often the damages are noticed when the container arrives to customer's site. Supplier should take into account weight distribution, strapping, dunnage and space utilization when loading the container. Furthermore, container types can change to open tops, flat racks or high cubes depending on the quantity and size of the packages.

Interviewees did answer the question "Does some forms of transportation cause more issues than other?". 35,71 percentage of the interviewees highlighted that ocean freight causes more issues than other transportation modes. However, same percentage of interviewees did answer that they cannot tell if one transportation mode causes more issues than other. All the answers can be seen in Figure 11.

### Does some forms of transportation cause more issues than others?

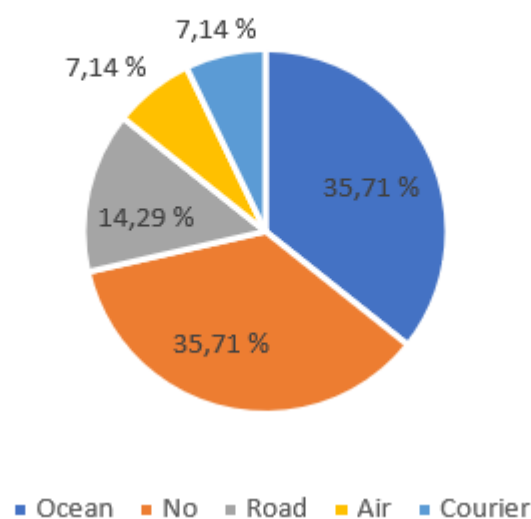


Figure 11 Does some forms of transportation cause more issues than others?

However, personal opinions and experiences can influence on the results of the question. Interviewee might have had recently bad experience with particular transportation mode and answer can come from subconscious thoughts. Nonetheless, pie chart does elucidate the current state.



Problems in this theme lines up against the continuous improvement philosophy if the same mistakes are made from time to time. Interviewees noted that suppliers do need guidance how to properly load and pack according to Valmet's requirements.

### 6.1.2 Knowledge management

According to John & JoAnn Girard (2015) knowledge management is a conscious strategy to get right knowledge to right people at the right time and helping people to share knowledge to create value for the organization. (2). Aforementioned definition summarizes why knowledge sharing is relevant to succeed in organizational goals.

Numerous interviewees mentioned that the information flow within the supply chain is scattered. Lack of information does not center in one part of the supply chain but rather into every section. Interviewees raised following problems in communication:

- Supplier does not inform when the goods can be loaded
- There is no information that have the goods been picked up
- Goods are ordered but workers on site cannot unload the cargo
- One part of the supply chain is left out from the discussion and it is impossible to that person to know what is agreed
- Who takes contact when the goods have been packed?
- A waybill is missing
- Have the goods been shipped according to the selected incoterm?

One interviewee added that clear responsibilities of the departments and suppliers have not been stated clearly enough. Depending on the workload, someone has to do always an initiative in order to set order-delivery process in motion. Other interviewee suggested that can language barrier be an obstacle in the communication process with different countries. The person also added that sometimes goods are shipped to the customer without packing lists and knowledge of the buying company. Hence logistics department does not have tracking number of the package nor the knowledge of the belongings of the package. Furthermore, sometimes delivery address has not been defined in the purchase order because it has been uncertain at the time of the procurement. As a result, packages are sent to Valmet's mill generates long lead time and unnecessary movement of the products.

One of the interviewees noted during the interview uncertainty regarding the right contact persons particularly when products are purchased from new suppliers. Supplier's website might not have information of the contact persons who work in the company. In addition, if the information does not read in the purchase order, then the function have to wait for the information from the other part of the supply chain or from the general email address of the company. The person also told that inquiries of package information can easily get lost among the other emails and vice versa.

During the order-delivery process, transparency is required from all the participants. Proper knowledge management fails without the principle of internal customer ship where every function provides required information to the next participant in the supply chain.

### 6.1.3 Inaccurate information

Theme "Inaccurate information" revolves around the information which is got from the supplier during the order-delivery process. Almost all of the interviewees pointed out that the package information from supplier is inaccurate. Standard procedure in drop shipments is that the supplier sends the package information by email or by excel-import. The information should specify the following details:

- Number of packages
- Name of the package
- Package type
- Storage type
- Dimensions
- Weight
- Purchase order number
- Supplier ID
- Project number
- Parent item name and description
- How many items are in one package
- Position number of the item
- Quantity
- Unit

Above-mentioned information is needed in order to create packing and export documents to ensure the shipment to go flawlessly. Some interviewees highlighted that the suppliers usually mix the parent item with the item. Parent items describe larger

entities or bill of materials and items are different parts of this bill of material. Nonetheless, one interviewee noted that sometimes products are purchased by their bill of material name. Interviewee continued that this confuses also shipping engineers since all the items are not common, and an engineer can mistake to think name of the bill of material as a single item. In most cases without detailed instructions, supplier accidentally informs these bill of materials as items, especially if the purchase order is made by the name of the bill of material. This creates issues with the customs, since in some countries most of the shipments are opened and investigated. If the packing lists does not match to the items inside the package, package is sent back to place of origin. Due to increased transportation time caused by the returned package, on-time percentage and customer satisfaction is decreased. The interviewee highlighted that one returned package can make the whole plant's shutdown to be rescheduled because an essential missing component did not get to the site on time.

One interviewee said that inaccurate information occurs as a wrong pick-up date. There is a gap between delivery date in purchase order and the actual delivery date. Interviewee continued that if the delivery date is not changed to purchase order then the reliability of delivery is distorted. Consequences of the distortion can be seen in key performance indicators which provides falls information.

However, in a project business line inaccurate information can happen vice versa. Projects are sensitive to changes; hence recent modifications might be left uninformed to the supplier. For instance, revision of the item drawing can be changed due to addition or deletion of a part to the component. However, if these changes are not informed to the supplier it will appear in inaccurate information from the supplier even though the root cause is elsewhere

Interviewees mentioned that supplier's own products create also problems. Purchases are usually based on Valmet's own technical drawings; thus, the bill of material can be found in product data management software. Interviewee gave an example that company might not have authorization to supplier's item data. Hence all the item info related to the loose items and assembled parts are based on the word of a supplier. Supplier and buyer might have different definition regarding assembled parts and loose items, thus one loose screw can be left out from packing list which is important to the buyer. Other interviewee added that identification issues will occur

if the packing lists does not match to the items. Information on customer's site is based on the packing lists, common names and item numbers which helps to recognize products inside the packages. Whenever there is an unlisted item inside a package which is not engineered by the buying company, means that there is no information regarding the particular item. As a result, resources are wasted when the position number or usage of the part is searched in reverse supply chain.

Interviewees noted that issues with inaccuracy occur in shipments from foreign suppliers rather than from domestic suppliers. One person noted that supplier can be new, and they do not know specific standard procedures in drop shipping process, hence the inaccurate information is gain. Interviewees did answer to question "Does problems in drop shipping occur more with domestic suppliers or foreign suppliers?". Over half of the interviewees answered that problems occur with foreign suppliers. Answers can be seen in Figure 12.

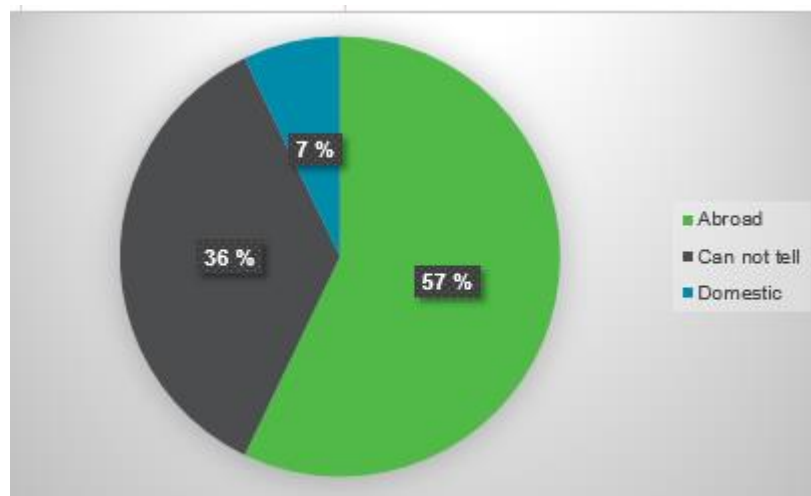


Figure 12 Does problems in drop shipping occur more with domestic suppliers or foreign suppliers?

In addition, data from the shipment data supports this statement. All the shipments from air, courier, road and ocean in 2017 were taken into spreadsheet software. Totally 19 191 shipments were sent from domestic suppliers and on-time delivery performance rate was 92,15 percentage. Division of on-time percentage between transportation modes can be seen in pareto diagram in Figure 13.

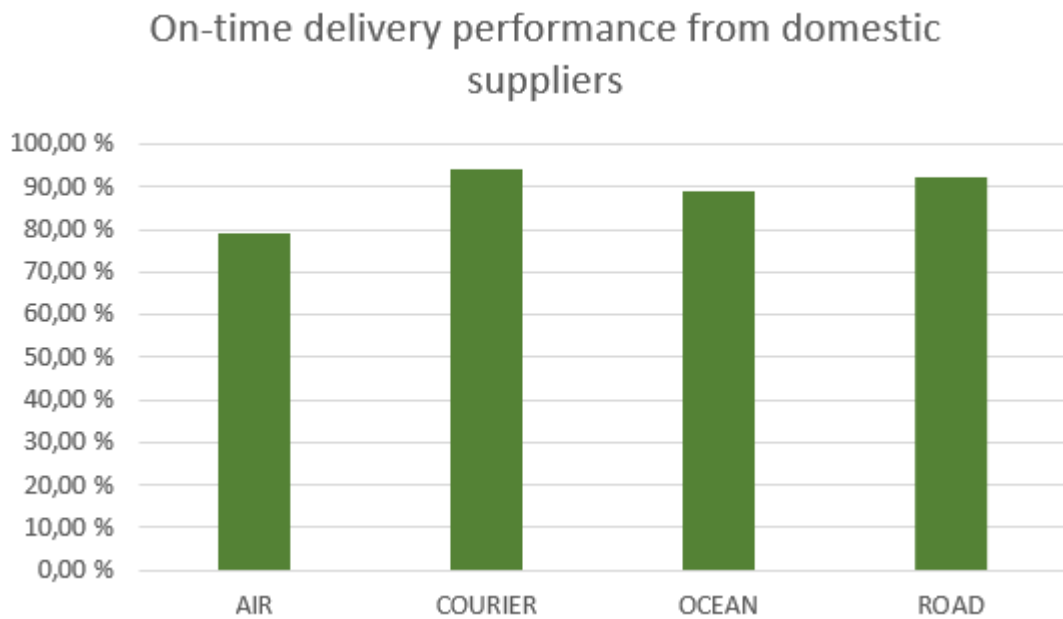


Figure 13 On-time delivery performance from domestic suppliers

On other hand, 4 659 shipments were only sent from suppliers aboard. This group of suppliers had on-time performance of 85,69 percentage and detailed on-time percentage can be seen in Figure 14.

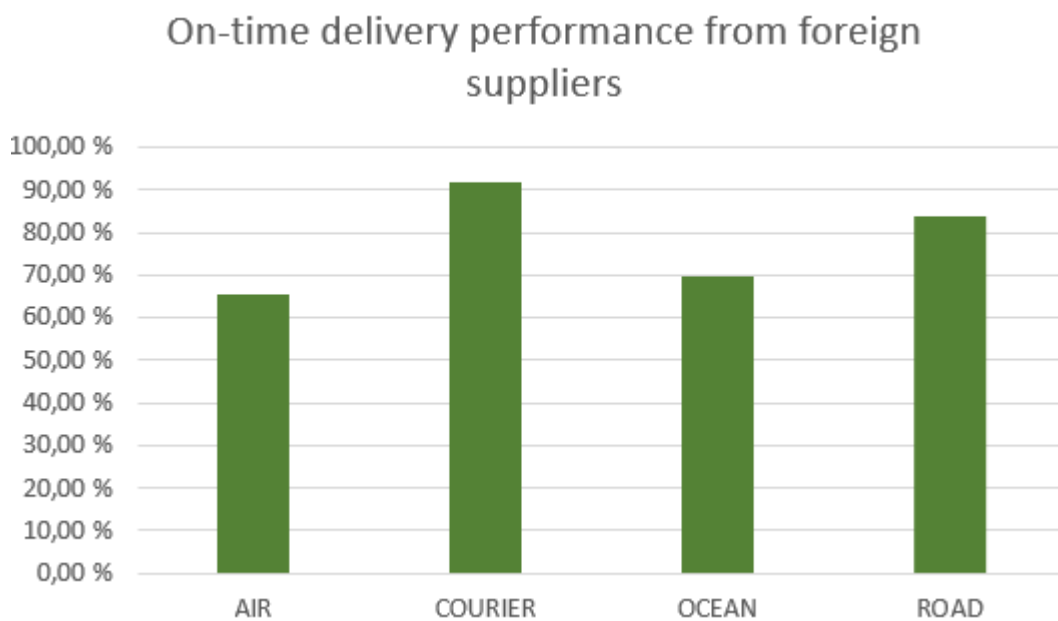


Figure 14 On-time delivery performance from foreign suppliers

However, data from the transportation system does not take into account shipments which are booked by e-mails or by face-to-face. Therefore, data is only for illustrative purposes. Nevertheless, on-time delivery performance rate is connected to supplier's performance. Wrong information causes delays which can be seen in on-time delivery performance rate. Furthermore, according to case company's lean philosophy all waste in the processes should be reduced or eliminated.

Mutual feature among the answers was that operating procedures are not standardized. It is based on engineer or forwarder that what is the percentage of inaccuracy what is allowed when it supposed be 100 percentage. Same standardization can be reflected to suppliers. There is not detailed-or mutual instructions for suppliers rather process is dependable on resources who are handling the shipment. Due to aforementioned reasons interviewees stated that standardized procedures should be made for the suppliers.

#### 6.1.4 Dispatch

Answer from the interviewees shared the mutual theme regarding the dispatching. Interviewees stated that responsibility of doing export declaration is an issue. Generally, export declaration must be submitted to customs if the goods are shipped from the European union. The export declaration should declare specific details of the shipment including the price of the goods and destination country. Even though in incoterms it is stated that export declaration is seller responsibility, occasionally supplier does not do it. One person added that if the customer is located in the free-trade area getting the verification of the country of origin will be an issue. Country of origin of the components of the shipment has to be verified by the seller in order to ship the goods to destination country under the reduced trade barriers and tariffs.

Many interviewees also stated that asking if the seller can do the export declaration is an issue. Due to various suppliers in different project constant waiting for the answer regarding the export declaration is time consuming and wastes resources. One person suggested that sometimes it is quicker to import goods to Finland and send to final customer.

Additionally, interviewees stated that receiving of the goods is problematic after the dispatching. In standard order-delivery process Valmet's workers in reception mark the goods as received, however in drop shipments it is purchaser's duty to mark the shipments received based on the waybill or invoice. Interviewees also mentioned that sometimes there is a delay in getting the documents, as a result reception will occur in weekly report where delayed deliveries are listed even though the goods have been in destination on time. One interviewee added that according to the external accountant, receiver and purchaser cannot be the same person, therefore separate control regarding the receipts had to be created.

## 6.2 Overview

As a result, analysis provided knowledge of the issues regarding drop shipments. Themes of the issues were packaging and loading, dispatch, knowledge information and inaccurate information. According to the interviewees, problems occurred in all sections in the supply chain. However, ocean freights from foreign suppliers were highlighted. Furthermore, transportation data of the foreign suppliers provided information that over half of the all costs related to transportation comes from ocean freight. Division of the share of spend can be seen in Figure 15.

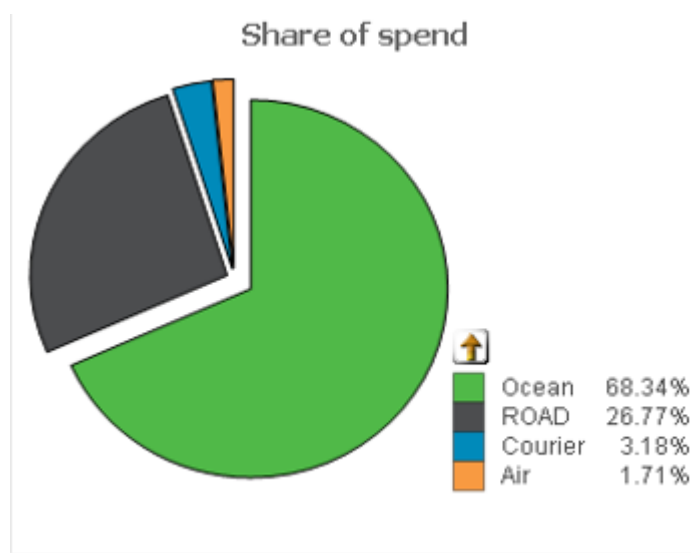


Figure 15 Share of spend

This does illustrate even more the importance of sharing the knowledge and right information to all participants in order to have efficient processes and to follow lean fundamentals. Another observation from data is that all the problem points are connected to each other. In the worst-case scenario, all the issues can happen during a single shipment. In addition, problems can have cause and effect relationship. Lack of the information in the supply chain can cause inaccurate information which causes inefficient packing.



## 7 Development Proposals

Development proposals are presented in order to improve the order-delivery process. Purpose is to mitigate or erase issues according to fundamentality of quality in Valmet. Suggestions are done from the logistics perspective and following proposals can be executed without expensive or complex changes in the supply chain. Independence of system has been taken in account. Proposals are based on answers from the interviewees while following on lean-and quality principles.

### 7.1 Create and update guidance for the suppliers

First development proposal is to create and maintain guidance of the necessary practices and relevant programs of the case company. At the moment, supplier's handbook exists where the Valmet's requirements are stated. Due to occurrence of the same issues, handbook should be updated. Requirements for the supplier are stated in the portal which is usable of suppliers. However, translations of the words in English are inaccurate which can lead to confusion among the supplier's especially if their mother tongue is not English. In addition, texts in some cases can be open to interpretation which can occur in misunderstandings. Among the supplier's files there is a notification that the goods must be packed in the package which is suitable of export. It is uncertain that does all the suppliers know what the corresponding package mean. Therefore, guidance should include information that how to pack to different modes of transportation and how to properly fill the excel-import sheet which is used in getting the package information from the supplier. Guidance could be improved by detailed pictures of the procedures, since visual instructions are better than just the text especially if the language is foreign to supplier. Additionally, instructions should be sent directly to supplier or guidance related to Valmet's requirements should be mentioned in during the procurement process.

If the use of excel-import is continued in the future, adequate instructions should be made. Many mistakes or errors in package information verifies that instructions at the current state are not enough. Additionally, Valmet has an authorized economic operator status meaning that subcontractors should follow the AEO standards if they are part of the supply chain when goods are being shipped outside of the European

Union. One of the requirements of the AEO status is to verify the integrity of the information. In other words, contents of the packages and containers must be what is stated in packing lists and what is informed to the customs. Continuous violation of the AEO criteria can lead to removal of the AEO status. This justifies even more the importance of the accurate information.

An idea behind making and updating guidance revolves around lean fundamentals as described in chapter 4.2.4. One of the Valmet's principles, as well as the principles of Lean is continuous improvement. Maximum efficiency is gained by continuously improving procedures and instructions even though improvements are small as long as they occur in fixed intervals.

## 7.2 Make a list of the supplier's capabilities

During the interview, several interviewees stated that asking continuously same questions from suppliers is time consuming and waste of resources. Therefore, a simple spreadsheet file should be created where all the suppliers are listed. The list could be on cloud or in Notes database where all the employees can access it. In the list employees can find out that can the suppliers load containers and what are container types which can be loaded. In the same list, there should be notification if the supplier can do the export declaration. However, responsibility of the export declaration depends on incoterm and destination country. In spite of that, sometimes in situations when supplier should do the declaration, the work of doing it falls on the buying company. The list should also include a cell where experiences, problems and notifications can be written by the workers who work with that particular supplier. This assists to keep on track of the supplier's performance and if the same mistakes occur from time to time, functions can intervene on that matter. Suppliers key performance indicators does not provide a cause for the reduction of the indicator.

On the other hand, functions who are working with suppliers could be introduced to CoMPass. In the CoMPass, detailed information regarding the suppliers are listed including the contact persons, addresses and Valmet's workers who does work with the supplier. Aforementioned information regarding the capabilities of the supplier

could be listed also in the CoMPass where it is available for all the employees in Valmet.

This proposal follows Deming cycle as described in chapter 4.2.1 Firstly, the problem have to be addressed before the plan to get expected results can be established. Only after that, necessary arrangements can be made to identify the root cause and to thrive towards the goal where the problem is disappeared. However, cycle should be started over according the theory if the issue still exists. As total quality management philosophy states, it is more beneficial to things right on first time and every time than to occasionally review if something has gone wrong.

### 7.3 Improve the information flow

Major part of the issues can be traced back to the lack of information. Therefore, internal information flow in supply chain should be improved. Functions should follow principle of internal customer ship when every function provides necessary information to the next participant in the supply chain to maintain efficient processes. Different functions should have meetings where common practices are defined so that every function does know their responsibility. In addition, meetings between procurement, logistics and forwarding should be held before the projects. In the meetings, there should be conversations regarding what items are bought, where they are bought, when they are bought and where the items are delivered. In the agenda, there could also be topics such as “Are the delivery dates realistic?” and “Are there some other actions what should be considered before the shipments?”. Going through essential themes beforehand would decrease misunderstandings and shortage of information. To sum up, conversation between different functions should be amended.

Responsibility of reception is problematic, therefore the person who should do the reception has to be rethought with all the functions. While maintaining current practices, there should be transparency for procurement. Purchaser have to be kept in discussion in order to get the waybill, so reception of the goods is more feasible. On top of that, Valmet’s transportation gateway could have functionality that after the waybill is generated, the waybill could be sent directly to supply chain master. Supply

chain master is an application where purchasing documents, logistic data and data between subcontractors and Valmet's procurement is managed. This would increase accessibility and transparency for all functions.

However, some of the knowledge in functions is tacit while other is explicit. SECI-Model could be taken in use to improve transferring the knowledge within the organization. SECI-Model is a knowledge management tool which proposes four ways to transfer knowledge within the organization. The model is divided in four parts which can be seen in Figure 16. These parts are:

- Socialization: Knowledge is delivered through interaction between individuals. Passing the knowledge can occur also in the form of teaching or guidance.
- Externalization: Silence knowledge is transferred to explicit by documents or manuals which can easily be spread for all the individuals in the company.
- Combination: Documents or manuals are combined to create a larger entity.
- Internalization: Definite knowledge transform into individual's tacit knowledge (Frost 2012)

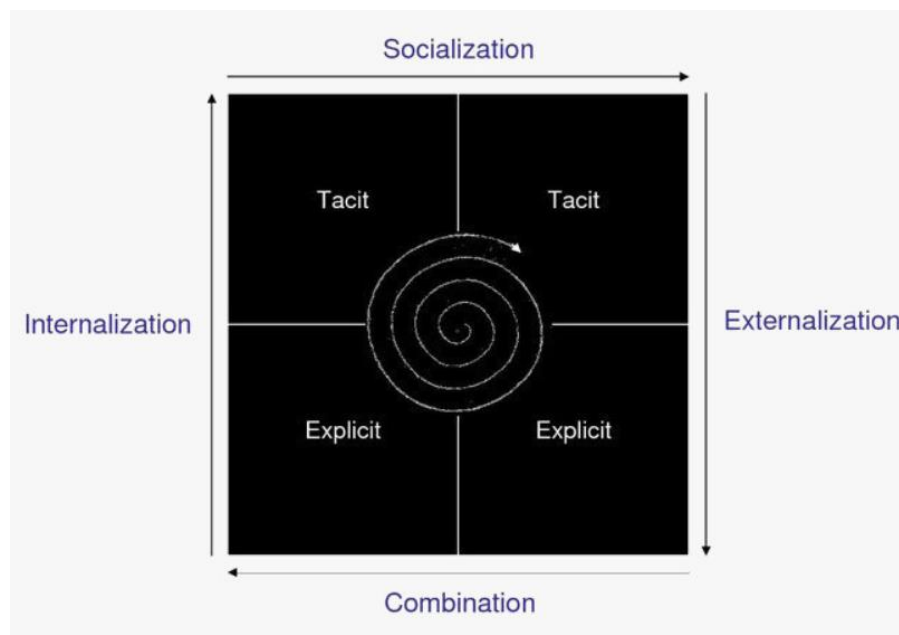


Figure 16 SECI-Model (Frost 2012)

SECI-Model is an efficient way to spread information in organization, since in the fourth step the cycle starts over when definite information is transferred into tacit knowledge. Implementation of this particular model is an efficient way to increase the flow of the information in the organization in all aspects.

This proposal follows fundamentals of Porter's chain as described in chapter 3.1.

Maximum value is created by thinking the whole supply chain as one entity and how get maximum value by not lowering the value of the other functions.

## 8 Discussion

The main objective of the thesis was to find out that what are the main issues in drop shipping and what needs to be done to improve order-delivery process. Additionally, purpose was to find out that what are the sections where these problems occur and what development proposals can be made from the outcome of the results.

There was not general knowledge regarding the research phenomenon. In most of the research materials, drop shipment were analyzed as a side note in the context of the main theme. There were only two theses directly related to the field of drop shipping in the Theseus database where publications and theses are published. However, while other thesis was from seller's point of view, the other were related to the spare parts business. Therefore, this research is not comparable with above-mentioned theses.

Research was conducted as an empirical case study using both qualitative and quantitative methods. Overall 14 persons were interviewed from logistics, procurement and forwarding to gather the data in order to answer to research questions. In addition, data from company's data base was examined and compared to the results of the interviews. Answers from the interviewees were analyzed by thematic analysis. As a result of the research, it was discovered that themes packaging and loading, dispatch, knowledge management and inaccurate information were the most significant problem points in the process. These aforementioned issues occurred in every section of the supply chain, but ocean freights from foreign suppliers were highlighted. Problems could be mitigated or erased by efficient sharing of the information, proper guidance and continuous improvement. In order to achieve efficiency during the process and erase all kind of waste, development proposals were suggested. Propositions followed lean fundamentals and implemented existing tools in the company. In conclusion, all research questions were answered.

Authenticity of the research was covered by using wide scale of references. References were compared with each other along with the material that was not used as a reference in order to prove the validity of the information. Suitable theories which are related to both the company and the research topic were chosen as a theoretical framework. Validity of the interviews were covered by structured interviews and

minimized interviewer bias. In addition, interviewees are all working with drop shipments. However, there can be a small margin of error in the results. Recent experiences or prejudices might have shaped the answers. Margin of error was tried to mitigate by having a large sample group compared to the people who work with drop shipments. However, quantitative data was only illustrative. The transportation data did take into account shipments which are booked in the system. Cities where the biggest factories of Valmet are located were left out from the data analysis in order to find the total amount of drop shipments. There might be suppliers or customers in the cities which were excluded leaving a small margin of error. The data did not count shipments which are booked by email or by face-to-face. However, the data comes from the only transportation booking system in case company, hence the data is comparable to real life. Therefore, transportation data gives proportions how the division of different alternatives would go if all the shipments would be taken into account.

Due to nature of project business line, repeating the research would produce slightly different answers. Projects are sensitive to changes and recent experiences of the interviewees might have an impact on answers which would produce different output. Nevertheless, the research questions would still be answered.

Research was done for paper business line's logistics unit in Finland and it is specified for Valmet's purposes according to tools and principles which are in use. Research and results are incomparable to other companies' due to Valmet's complicated supply chain and defined processes. However, results of the thesis can be used as an idea for other business lines in Valmet.

As further development suggestions, utilization and modification of the SCM should be considered. Packing documents, waybills and other logistics data could be stored with the purchase order data in the system. There the data would be available for all the functions; thus, transparency would be increased. Purchasers could find the information related to the packages and shipments, while logistics department could find foreknowledge of the future deliveries. Furthermore, modification of the supplier chain master could be considered. In the future suppliers could fill their package information directly to the system and logistics department could act as a buffer whose responsibility is to verify that the data is valid. However, aforementioned

modifications would require commitment of all functions and redefinition of processes.



## 9 References

- 5Xwhy. Internal network. Retrieved January 23, 2018, from <https://valmet.sharepoint.com/sites/flow/InfoCenter/quality/Lean/OnePagers/Pages/5-x-Why.aspx>
- Arto, K., Martinsuo, M., and Kujala, J. 2016. Projektiliiketoiminta. Retrieved December 1, 2017, from [http://pbgroup.aalto.fi/en/the\\_book\\_and\\_the\\_glossary/projektiliiketoiminta.pdf](http://pbgroup.aalto.fi/en/the_book_and_the_glossary/projektiliiketoiminta.pdf)
- Braun, V. and Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2). Retrieved February 2, 2018, from [http://eprints.uwe.ac.uk/11735/2/thematic\\_analysis\\_revised...](http://eprints.uwe.ac.uk/11735/2/thematic_analysis_revised...)
- Braun, V., and Clarke, V. 2013. *Successful Qualitative Research*. London: Sage Publications Ltd.
- Case study: Hidden Quality costs. 2017. Internal network. Retrieved December 2, 2017, from <https://valmet.sharepoint.com/sites/flow/newscenter/internal/Lists/Posts/Post.aspx?ID=639>
- Case-Tutkimus. Page on Virtuaali Ammattikorkeakoulu. Retrieved January 24, 2018, from <http://www2.amk.fi/digma.fi/www.amk.fi/opintojaksot/0709019/1193463890749/1193464144782/1194348546586/1194356433452.html>
- Chopra, S., and Meindl, P. 2007. *Supply chain management*. Third edition. New Jersey: Pearson
- Context Effect. Page on Oxford Reference. Retrieved January 31, 2018, from <http://www.oxfordreference.com/view/10.1093/oi/authority.20110803095634843>
- D'Alton, R. The importance of business Process Ownership. Retrieved December 3, 2017, from <http://www.modernanalyst.com/Resources/Articles/tabid/115/articleType/ArticleView/articleId/1779/The-Importance-of-Business-Process-Ownership.aspx>
- Fishbone. Internal network. Retrieved January 30, 2018, from <https://valmet.sharepoint.com/sites/flow/InfoCenter/quality/Lean/OnePagers/Pages/Fishbone.aspx>
- Frost, A. 2012. The SECI model and Knowledge Conversion. Retrieved February 12, 2018, from <http://www.knowledge-management-tools.net/knowledge-conversion.html>
- Girard, John P. and Girard, JoAnn L. 2015. *Defining knowledge management: Toward an applied compendium*. Retrieved February 6, 2018, from [http://www.iiakm.org/ojakm/articles/2015/volume3\\_1/OJAKM\\_Volume3\\_1pp1-20.pdf](http://www.iiakm.org/ojakm/articles/2015/volume3_1/OJAKM_Volume3_1pp1-20.pdf)
- Grant, D., Lambert, D., Stock, J., and Ellram, L. 2006. *Fundamentals of logistic management*. Berkshire: McGraw-Hill Education
- Harmon, P. 2017. Core versus support processes. Retrieved December 9, 2017, from <http://www.bptrends.com/publicationfiles/advisor20110614.pdf>

Hibben, K., Pennell B.E., & Scott, L. 2017. Minimizing Interviewer Effects: Innovations in Quality Assurance and Control in Multicultural, Multinational, and Multiregional Surveys. PowerPoint presentation. Retrieved January 28, 2018, from [https://www.oecd.org/skills/piaac/Minimizing%20Interviewer%20Effects\\_Beth-El-len%20Pennell%20and%20Kristen%20Cibelli%20Hibben.pdf](https://www.oecd.org/skills/piaac/Minimizing%20Interviewer%20Effects_Beth-El-len%20Pennell%20and%20Kristen%20Cibelli%20Hibben.pdf)

History 2017. Page on Valmet Corporation website. Retrieved November 4, 2017, from <http://www.valmet.com/about-us/valmet-in-brief/history/>

ISPM 15 STANDARD FOR WOODEN PACKAGING MATERIAL. Page on Evira's website. Retrieved February 9, 2018, from <https://www.evira.fi/en/plants/import-and-export/wooden-packaging-material/ispm-15-standard/>

Kerzner, H. 2013. Project Management: A Systems Approach to Planning, Scheduling, and Controlling. 11th ed. New Jersey: John Wiley & Sons

Laatu hyödyttää kaikkia. 2017. Internal network. Retrieved January 2, 2018, from <https://valmet.sharepoint.com/sites/flow/newscenter/inter-nal/Lists/Posts/Post.aspx?ID=592>

Lean 5S. Internal file. PowerPoint presentation. Retrieved January 20, 2018.

Lean lähetysuunnittelu esitehtävä. 2017. Internal file. PowerPoint presentation. Retrieved November 10, 2017.

Liker, J. and Morgan, J. 2006. The Toyota Way in Services: The Case of Lean Product Development. Retrieved January 17, 2018, from <https://pdfs.semanticscholar.org/9680/86e60966ce8e7b9b076209020c363b4f18f1.pdf>

Lindfors, K. 2012. Mistä tiedät onko prosessien kuvaamisesta hyötyä? Retrieved December 18, 2017, from <https://www.tivi.fi/Arkisto/2012-10-10/Mist%C3%A4-tied%C3%A4t-oliko-prosessien-kuvaamisesta-hy%C3%B6ty%C3%A4-3195336.html>

Longo, J. 2009. The benefits of key performance indicators to businesses. Retrieved December 22, 2017, from <http://www.dashboardinsight.com/articles/digital-dashboards/fundamentals/the-benefits-of-key-performance-indicators-to-businesses.aspx>

Lynch, S. 2015. What is a Metric (KPI)? Retrieved December 27, 2017, from <https://www.linkedin.com/pulse/what-kpi-its-probably-you-think-stephen-lynch>

Marion, G. 2017a. Supply Chain Management - How Do I Measure On-Time Delivery? Retrieved December 27, 2017, from <https://www.thebalance.com/how-do-i-measure-on-time-delivery-2221412>

Marion, G. 2017b. Back order versus backlog. Retrieved December 27, 2017, from <https://www.thebalance.com/back-order-versus-backlog-2221405>

Martínez-Lorente, A. and Martínez-Costa, M. ISO 9000 & TQM: SUBSTITUTES OR COMPLEMENTARIES? AN EMPIRICAL STUDY IN INDUSTRIAL COMPANIES. Retrieved January 16, 2018, from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.596.7749&rep=rep1&type=pdf>

Michael Porter's value chain analysis. 2012. Retrieved November 20, 2017, from [https://infocus.emc.com/william\\_schmarzo/big-data-mba-course-101a-unit-iii/](https://infocus.emc.com/william_schmarzo/big-data-mba-course-101a-unit-iii/)

Ministry of transport and communications. 2012. Logistic Report. Retrieved December 20, 2017, from <https://www.lvm.fi/documents/20181/812084/Julkaisu+11-2012/e222cafa-70ee-4035-83be-92e6765531f9?version=1.0>

Nightingale, D. 2015. Fundamentals of Lean. Retrieved January 16, 2018, from [https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-852j-integrating-the-lean-enterprise-fall-2005/lecture-notes/2\\_lean\\_fundament.pdf](https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-852j-integrating-the-lean-enterprise-fall-2005/lecture-notes/2_lean_fundament.pdf)

Our businesses. 2017. Page on Valmet Corporation website. Retrieved November 2, 2017, from <http://www.valmet.com/about-us/valmet-in-brief/our-businesses/>

Paper business line. 2017. Page on Valmet Corporation website. Retrieved November 4, 2017, from <http://www.valmet.com/investors/valmet-as-an-investment/business-lines/paper/>

Plan-Do-Check-Act Cycle (PDCA Cycle) Retrieved January 15, 2018, from <http://www.whatissixsigma.net/pdca-cycle>

PM delivery operations. 2017. Internal file. PowerPoint presentation. Retrieved November 4, 2017.

Project management process. Internal network. Retrieved December 5, 2017, from [https://valmet.sharepoint.com/sites/flow/InfoCenter/project\\_management](https://valmet.sharepoint.com/sites/flow/InfoCenter/project_management)

Project model. Internal network. Retrieved December 5, 2017, from <https://valmet.sharepoint.com/sites/flow/Businesses-and-Areas/PBL/PaperForward/Pages/Project-Model.aspx>

Rheude, J. 2016. Drop shipping fulfillment: Complete Guide. Retrieved December 26, 2017, from <https://redstagfulfillment.com/drop-shipping-fulfillment-complete-guide/>

Sakki, J. 2009. Tilaus-toimitusketjun hallinta. B2B-Vähemmällä Enemmän. Helsinki: Hakapaino Oy

Sakki, J. 2014. Tilaus-Toimitusketjun hallinta. Digitalisoitumisen haasteet. 8th edition. Vantaa: Print-Kirja

Sallis, E. 2002. Total quality management in education. London: Kogan Page Ltd

Sigma Performance Levels – One to Six Sigma. Retrieved January 15, 2018, from <https://www.isixsigma.com/new-to-six-sigma/sigma-level/sigma-performance-levels-one-six-sigma/>

Six Sigma vs. Total Quality Management. Retrieved January 15, 2018, from <https://www.sixsigmaonline.org/six-sigma-training-certification-information/six-sigma-vs-total-quality-management/>

Slack, N., Chambers, S., & Johnston, R. 2010. Operations Management. 6th ed. Essex: Pearson

Suomen Standardisoimisliitto SFS ry. 2016. Johdanto laadunhallinnan ISO 9000-standardeihin. PowerPoint presentation. Retrieved January 16, 2018, from [www.sfsedu.fi/files/126/ISO\\_9000\\_kalvosarja\\_oppilaitoksille\\_2016.ppt](http://www.sfsedu.fi/files/126/ISO_9000_kalvosarja_oppilaitoksille_2016.ppt)

Supplier relationship management driving competitive advantage. 2016. Internal network. Retrieved November 20, 2017, from <http://flow.valmet.com/news-center/Pages/Global/Supplier-Relationship-Management-driving-competitive-advantage.aspx>

Supply Chain Council. 2006. SCOR overview booklet 8.0. Retrieved November 25, 2017, from <http://people.ischool.berkeley.edu/~glushko/IS243Readings/SCORV8.pdf>

The history of the supply chain. 2017. Retrieved November 10, 2017, from <http://www.allpaq.com/2017/03/01/the-history-of-the-supply-chain/>

The Year of Quality. 2017. Internal network. Retrieved December 15, 2017, from <https://valmet.sharepoint.com/sites/flow/Businesses-and-Areas/PBL/the-year-of-quality>

TILAUKSESTA SUUNNITTELU (ETO). Page on Logistiikan Maailma. Retrieved December 27, 2017, from <http://www.logistiikanmaailma.fi/logistiikka/tuotanto/tilauksen-kohdennuspiste-opp/tilauksesta-suunnittelu-eto/>

Total Quality Management-TQM. Retrieved January 20, 2018, from <https://www.investopedia.com/terms/t/total-quality-management-tqm.asp>

U.S Department of Health & Human Services. Module 2: Research Design – Section 1 Discussion. Retrieved January 29, 2018, from <https://ori.hhs.gov/content/module-2-research-design-section-1-discussion>

Valmet CI Tool. Internal network. Retrieved January 27, 2018, from <https://valmet.sharepoint.com/sites/flow/InfoCenter/quality/CI%20Tool/Pages/Valmet%20CI%20Tool.aspx>

Valmet in brief.2017. Retrieved November 1, 2017, from <http://www.valmet.com/about-us/valmet-in-brief/>

Valmet pyrkii säästöihin laatukuurin avulla. 2015. Retrieved January 10, 2018, from <https://www.kauppalehti.fi/uutiset/valmet-pyrkii-saastoihin-laatukuurin-avulla/nhYDFr6d>

Valmet's Financial Statements Review 2017. Page on Valmet Corporation website. Retrieved February 14, 2018, from <http://www.valmet.com/globalassets/investors/reports--presentations/interim-reviews/2017/presentation-financial-statements-review-2017.pdf>

What is a process? 2016. Retrieved December 9, 2017, from [https://its.syr.edu/eps/services/process/what\\_is.html](https://its.syr.edu/eps/services/process/what_is.html)

What is SCOR model. Retrieved November 28, 2017, from <http://www.performedrivers.com.au/knowledge-centre/technical/what-is-scor-model.shtml>

Winder, R. and Judd, D. 1996. ORGANIZATIONAL ORIENTEERING: Linking Deming, Covey, and Senge in an Integrated Five Dimension Quality Model. Retrieved December 9, 2017, from <http://www.ldri.com/articles/96orgorient.html>

VSM – Value Stream mapping. Internal network. Retrieved January 23, 2018, from <https://valmet.sharepoint.com/sites/flow/InfoCenter/quality/Lean/OnePages/Pages/VSM.aspx>

Zhang, W. 2009. Six Sigma: A Retrospective and Prospective Study. POMS 20th Annual Conference Orlando, Florida U.S.A. Retrieved January 25, 2018, from <https://www.pomsmeetings.org/confpapers/011/011-0254.pdf>