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Procurement of spare parts from low-cost countries

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Toni Liimatainen

Abstract

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Stora Enos Oyj

Abstract

The aim of the research was to find out for the client company how much cost savings is possible to get in spare parts manufactured in a workshop by bidding for spare parts from Estonia which one is a low-cost country. The research also aimed to examine whether the current procurement organization has the resources and skills to procure from low-cost countries.

Quantitative research was used as the research method. ABC- and spend analysis as well as swot analysis were used in the research. The methods were able to classify the spare parts with the greatest potential for savings and to determine the annual savings.

As a result of the research, the savings potentials of classified spare parts were presented, as well as a suggestion on how the purchasing organization should be organized to make the purchase of spare parts from low-cost countries.

Keywords

Low-cost country, global sourcing, spare parts

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1 Introduction

The topic of this research has come from the great interest in the potential savings of spare parts manufactured in a workshop, by sourcing spare parts from low-cost countries.

Often, the procurement organization of large companies is too small and inexperienced to initiate supplier sourcing from low-cost countries. It is easy to use the local suppliers that have been always bought from.

Global sourcing has become more common and cost savings are often sought through this. The most savings potentials can be found in low-cost countries. Low-cost countries are competitive because the labor costs are lower than in high developed countries. However, sourcing from low-cost countries is not that simple as it involves several risks and requires a lot of resources from the procurement organization.

In this research, I used ABC analysis to classify spare parts that have a large volume and could have the greatest possible cost savings. After the classification, I tendered spare parts with current Finnish suppliers as well as low-cost country suppliers. After receiving the quotations, I used spend analysis to determine the potential savings for spare parts.

1.1 Research methods

Research methods are quantitative and qualitative research methods that can be used to collect data. Only another research method can be chosen, but it is also possible to combine them as they can complement each other. (Vilpas, P. 2013.)

Quantitative research seeks answers to the questions “how big” or “how many”. In quantitative research, research data are extensive and based on numbers. Quantitative research describes and interprets phenomena using measurement methods that collect numerical research data. When the observational data containing numerical values is completed, it is analysed by statistical analysis methods. (RajaTon. 2015; Vilpas, P. 2013.)

When an object cannot be measured, it is advisable to use a qualitative research method. Qualitative research seeks answers to the questions “why” and “how”. In qualitative research, the collected data are smaller, such as interviews as a good example. When conducting a qualitative interview, the respondent is not given answer options, but the respondents tell the answer voluntarily. The researcher makes a unified explanation of the data obtained in the interview. (RajaTon. 2015; Vilpas, P. 2013.)

In this research I used quantitative research method because quantitative research describes and interprets phenomena using measurement methods that collect numerical research data. When the observational data containing numerical values is completed, it is analysed by statistical analysis methods. (Vilpas, P. 2013.)

1.2 Research question and limitation of the study

This quantitative research work seeks answers to the main question: Is it profitable to start making machined spare parts purchases from low-cost countries. It is not that easy to start using low-cost countries because it needs a lot of resources from the company and there are also some risks. That is why, I also have a sub-question: how a procurement organization should be organized in order to start low-cost country sourcing.

The research is restricted to Stora Enso's Finnish purchasing organization and the purchase of spare parts for Stora Enso's mills in Finland. Request for quotations for spare parts were sent only to Finnish and Estonian suppliers, although the low-cost country area is much wider, including Asian and Eastern European countries. With the help of the chosen restriction, I was able to keep the number of spare parts quotation appropriate and the Estonian suppliers I used were reliable suppliers, as they are already familiar to me. With the help of these restrictions, I was able to keep the research in a suitable size.

2 Procurement

2.1 Procurement process

The target of the procurement process is to find the best possible supplier for the company to procure the equipment's, raw materials, components and services. The process consists of several different steps. Depending on the procurement situation, not all steps are used. Carefully executed procurement process may take up to several months. Figure 1 shows the Logistiikan maailma (2021) procurement process, where the triangle describes the number of suppliers during the process. At each stage of the process, suppliers are eliminated until the most suitable option is finally found. (Logistiikanmaailma 2021.)

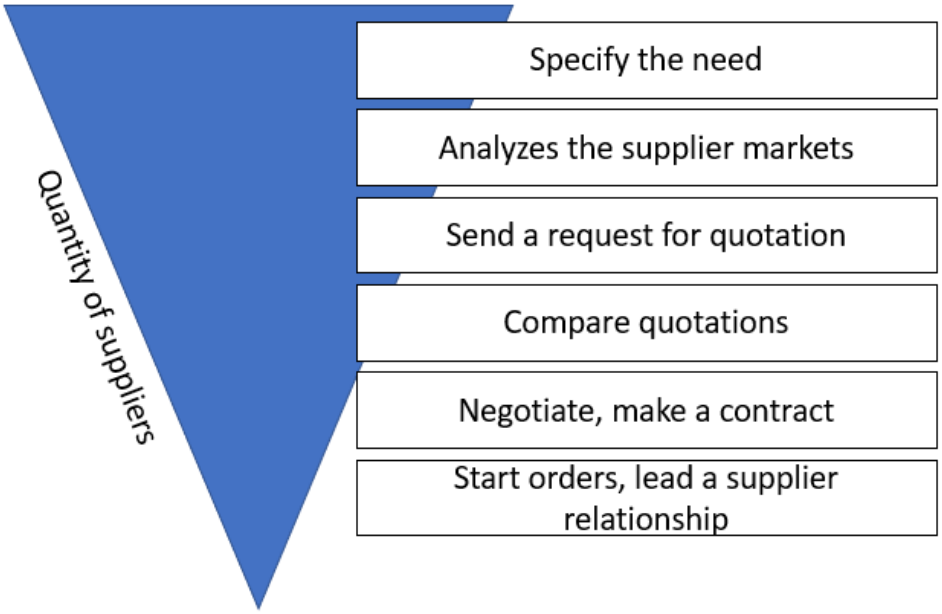


Figure 1. Procurement process (Logistiikanmaailma 2021)

There are several factors that affect to procurement process flow and its success. It is not on single person's or department's hands. The needs and requirements of the business set their own preconditions for the process, and each individual step has an impact on the following steps. It is therefore important that each step of the procurement process is planned and implemented carefully. The responsibilities and tasks must also be clearly defined in order to the process to be implemented effectively. The success of the cooperation may be the deciding factor throughout the success of the procurement process. (Nieminen 2016, chapter 3.)

2.1.1 Needs assessment

In order to make a purchase, you must first know what is needed. There are many different ways to define a need, for example, on the basis of the goods, service or technical characteristics. The scope of the definition can also vary widely. In order to find the best possible solution, the definition should be appropriate, with only mandatory and significant requirements. Then the definition does not unnecessarily exclude potential alternatives, but still enables the right solution to be found. The requirements of the legislation must be taken into account in the definition but attributes such as responsibility, quality, logistics and the entire product life cycle are also important factors. (Nieminen 2016, chapter 3.1.)

In order to make the procurement process as successful as possible, it is a good idea to start the needs assessment as soon as possible. It gives time to find out the real needs of the end user and this helps to keep costs down. It is a good idea to involve suppliers right at the beginning of the procurement process. You can get the latest information on current technology and thereby find the best solution for your company. Close supplier cooperation is one of the characteristics of a successful company. By using cross-organizational know-how, more cost-effective solutions are achieved. (Nieminen 2016, chapter 3.1; Van Weele 2018, 18.)

It is important to utilize the cooperation between the company's departments both in the need's assessment and in the selection of suppliers. Taking into account the opinions of different departments, the essential factors for successful procurement can be highlighted. (Mena, et al. 2014, 66.)

2.1.2 Selection of suppliers

Before the final selection of supplier and the signing of the procurement contract, the most potential suppliers must be found. Request of quotation have to be issued, and comparison must be made. Purchasing organization must decide the procurement method and supplier criteria and negotiate with alternative suppliers. (Van Weele 2018, 38-39.)

Finding new alternative suppliers is really important and new suppliers can be found in many different ways. The situation can change quickly, and the buyer must be able to quickly find new suppliers and make decisions about them. (Iloranta & Pajunen-Muhonen 2012, 78-79.)

When looking for new potential suppliers, the internet is often the first and the most common tool for this. This often also requires other tools to support it, as the information is inaccurate, although a wide range of information from different industries is available locally as well as globally. When evaluating a new supplier candidate, it is good to use one's own networks

and the experiences of others about the potential supplier. The databases produced by banks on the supplier's risk-freeness are also reliable. (Iloranta & Pajunen-Muhonen 2012, 231-232.)

2.1.3 Request for quotations, offers, contracts, orders and delivery control

Once the possible suppliers have been selected, you can begin to send requests for quotations to suppliers. Making and comparing requests for quotations should be done as planned, as it takes a lot of time and thus increases costs. (Sakki 2014, 36.)

The request for quotation can be either strictly guided and limited, or open. The open request for quotation accepts different solutions and different levels of quotations from suppliers. Private and public requests for quotations vary. For example private requests are very freeform, while public request are strictly regulated. (Iloranta & Pajunen-Muhonen 2012, 254.)

Once the quotations arrive, a comparison of them begins. Quotations must be carefully examined to ensure that they comply with the requests for quotation and are comparable, as their content may differ. It is not enough to consider the total cost of the quotation alone. (Nieminen 2016, chapter 3.2.)

The next step in the procurement process is to draft the contract. The contract can be oral or written, but in the trade between organizations, a written contract must be made, as it is difficult to prove an oral agreement. Once the parties have signed the contract, the contract is binding. After that the parties are obliged to monitor compliance with the contract. (Nieminen 2016, chapter 3.3)

After writing the contract, an order can be sent to the selected supplier. The order contains information about what will be ordered and when it will be delivered. (Nieminen 2016, chapter 3.4)

Once the order is placed, it must be ensured that the supplier stays on the schedule. Delivery control ensures that the ordered products arrive as agreed. In addition, it is ensured that order confirmations and quality assurance reports are received from the supplier. Delivery control should not be performed manually but using electronic systems to make delivery the control cost-effective. There are some basics that should always be in order with delivery control. These are quality, price, quantity and delivery time. If these things are not in order, it is advisable to complain to the supplier. (Nieminen 2016, chapter 3.5)

2.2 Operational and strategic tasks

There are two types of procurement expertise that can also be divided into different procurement tasks. Operational procurement expertise that focuses on existing suppliers and strategic procurement expertise that focuses on new suppliers and operational development. (Iloranta & Pajunen-Muhonen 2012, 139–140.)

Strategic procurement focuses on the beginning of the procurement process, as strategic tasks include e.g. mapping of new suppliers, supplier evaluations and contracts. Operational procurement focuses on the end of the procurement process, and operational tasks include sending orders, making complaints and monitoring deliveries. (Van Weele 2018, 9.)

It has traditionally been thought that the procurement organization only maintains the company's operations, i.e. the procurement is then passive. Passive procurement does not seek development and passive procurement only requires operational capabilities. Strategic procurement is called active procurement, as active procurement seeks new development targets and solutions. Table 1 shows the characteristics of a passive and active procurement professional. (Iloranta & Pajunen-Muhonen 2012, 151.)

Passive sourcing professional	**Active sourcing professional**
Causes costs.	Looks for added value.
Aims to save costs.	Strives to develop the business.
Waits for contacts from suppliers.	Source for new suppliers.
Expects active suppliers to justify the superiority of their proposals.	Markets his business, ideas and needs to the suppliers he wants.
Trusts on the information provided by the supplier.	Visits the suppliers and evaluate their skills and resources.
Selects the object of procurement from the solution offered and developed by the supplier.	Actively describes the needs so that new solutions can be develop together with the supplier.
Approves or rejects supplier's suggestions.	Further develops suggestions received from supliers.

Table 1. The characteristics of a passive and active procurement professional (Iloranta & Pajunen-Muhonen 2012, 151)

In order to maintain the competitiveness of companies, new solutions need to be found and developed, and therefore companies have invested in strategic procurement expertise. Traditional operational procurement expertise and a focus on existing suppliers are no longer enough to maintain the market position. (Iloranta & Pajunen-Muhonen 2012, 70, 151.)

2.3 Procurement organization

Procurement can be organized centrally, decentral, or in a form of hybrid model combining the two. Rarely company's procurement is fully centralized or decentralized, but usually procurement is between centralized and decentralized. Finding and approving new suppliers may be centralized function and placing purchase orders for contract suppliers may again be decentralized to production units. (Nieminen 2016, chapter 2.3)

2.3.1 Advantages and challenges of centralized- and decentralized procurement

As the business strategy changes, it is typical that the organization of the procurement changes. A typical change is the shift from decentralized to more centralized procurement, which aims to improve cost efficiency. In centralized procurement, the aim is to achieve savings through volume. Centralized procurement also makes the procurement organization more efficient, as purchasing can be divided into categories and individuals can acquire specific expertise in a particular category. Centralized procurement is also easier to manage because it is more compact. (Nieminen 2016, chapter 2.3)

Centralized procurements are limiting decision making of production units. This can be seen, for example, in the fact that the centralized standardization of the products or services to be procured may go beyond the strategic needs of an individual production unit. The distance of procurement personnel to the end users of the products grows which makes the big picture difficult to understand. (Nieminen 2016, chapter 2.3)

The advantage of decentralized procurement is that the production unit can make its own procurement decisions in the best way from the perspective of its own business. When a production unit makes its own purchasing decisions, the process is more straightforward and financial reporting clearer. Another advantage is that the procurement is closer, both to the suppliers and end users, and it helps cooperation. (Nieminen 2016, chapter 2.3)

There are several challenges in decentralized procurement. The biggest challenge is losing purchasing volume. Without purchasing volume, it is also more difficult to take advantage of the global opportunities. Although the advantage is that the unit can make its own decisions, the benefits of harmonization are not achieved, as contracts, prices and conditions

are different in different units. In the decentralized model, the totality of procurement at the company-wide level is difficult to conceive and potential development targets are not utilized. Table 2 shows when centralized and decentralized procurement should be considered. (Nieminen 2016, chapter 2.3)

centralization of procurement should be considered if,	**decentralization of procurement should be considered if,**
The units have many common needs.	The customer has a major influence on the company's purchasing decisions.
The units are geographically close to each other and have good transport links between them.	The needs of the units are very different from each other.
Suppliers have a strong negotiating position.	The units are located on different continents.
Due to the production structure of the industry or for some other reason, volume and scale advantages are of great importance.	The units are relatively large and have bargaining power even separately. Procurement tasks are simple.
Procurement requires a lot of special skills, whose decentralization to several units causes unnecessary duplication.	The price and cost trends in the supplier market are relatively stable.
Price sensitivity and price variations are high and their management requires close market monitoring, which should not be spread over several units.	

Table 2. When centralized and decentralized procurement should be considered (Iloranta & Pajunen-Muhonen 2012, 320)

2.3.2 Organization of procurement by product group

The division of procurement by product group allows buyers to focus on a specific managed product group. There are many benefits if the buyer has a specific product group. He or she learns about technologies, cost structures int the industry, companies and the people who work in them, understands the success factors of a business and the logic of competition. When a buyer can focus on just one product group, he or she gets to know the suppliers in the industry and their technology. Knowing your suppliers will also help you to understand

which supplier will succeed in different situation. (Iloranta & Pajunen-Muhonen 2012, 322-323.)

The lead buyer concept is used for product-specific procurement. A separate team is set up for different product groups, which creates procurement strategies for its own product group, negotiates with suppliers, selects suppliers, writes contracts and monitors the performance of suppliers. The leader of this group will be the lead buyer, who will hopefully be able to build his or her own team. The team should be built from the same continent units, as the product range and competitive situation may vary between continents. The product group-specific team does not quickly improve competitiveness, but only a result of learning and determined development together over time. (Iloranta & Pajunen-Muhonen 2012, 323-324.) Figure 2 shows roles of local and lead buyers.

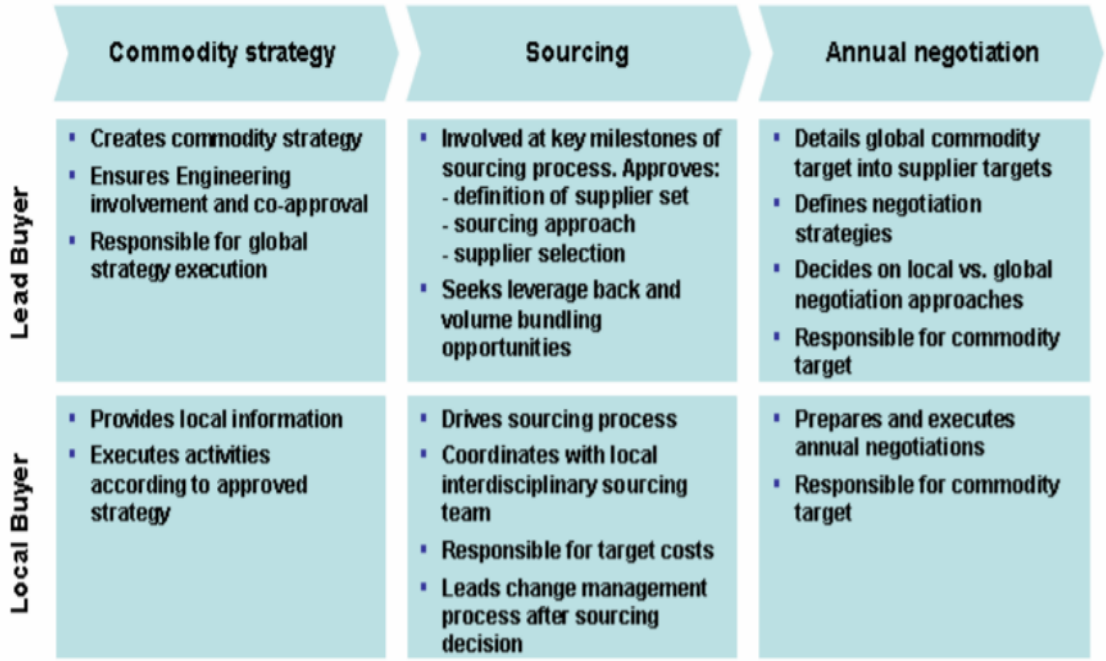


Figure 2. Roles of local and lead buyers (Güthenke & Möller 2021)

2.3.3 Distribution of procurement

Purchases can be divided into direct procurement and indirect procurement according to their intended use. Direct procurements are the purchases needed for the company's end product, such as raw materials, subcontracting, products, product development services

and components. Indirect procurements are purchases that are not related to the organization's end product or service. (Iloranta & Pajunen-Muhonen 2012, 67.)

Direct purchases are usually managed centrally and indirect purchases decentrally. Differences of direct procurement and indirect procurement are shown in figure 3. (Ross, 2020.)

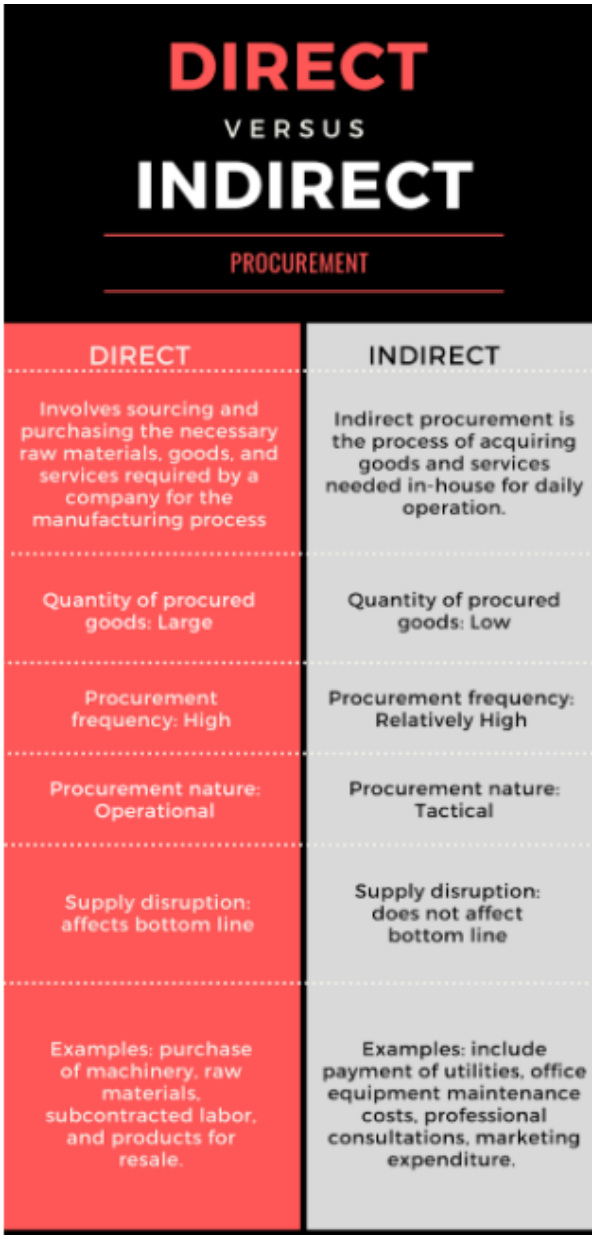


Figure 3. Differences of direct procurement and indirect procurement (Ross 2020)

Indirect procurement is a significant procurement entity, as it already accounts for more than half of the total value of companies procurement. Indirect procurement has a really

high potential for savings, as these procurements are typically handled decentrally in companies and organizations. (Iloranta & Pajunen-Muhonen 2012, 62-63.)

3 Supplier relationship management

There is not a perfect definition for a supplier relationship management (SRM). Supplier relationship management covers many different levels of functionality that are linked into one large entity. Supplier relationship management is e.g. performance measurement, supply chain management and the development of supplier co-operation. (O'Brien 2014, 1, 53.)

Sales revenues of the companies are used for different purchases, so supplier relationship management is really important for the company's result and a competitive position. If the supplier relationship is not managed and implemented as agreed, there is a risk that the work done for cost savings will be wasted. When the supplier relationship is handled properly, the buyer and the supplier can leverage each other's expertise and focus on development. (Van Weele 2018, 2; Mena, et al. 2014, 66.)

3.1 Risk management

Risk management prepares for risks related to the suppliers, and because of the risks, there are solutions that can be used to avoid the possible risks. The five largest risks are: risk of failure or delay, risk of loss of reputation, risks related to competitive advantage, price and cost risk and quality risk. It is advisable to do risk assessment in cooperation between different departments throughout the supplier relationship and for as many suppliers as possible at the same time. It is important to find and invest in the biggest risks and the most likely threats to your company, as not all risks can be avoided. (O'Brien 2014, 192-195).

It is not enough to only identify the risks, but also to prevent them, for example through contracts and audits. It is also good to be prepared for the risks, for instance to make a plan of changing the supplier. (O'Brien 2014, 195.)

Manufacturers have begun outsourcing their sales, so purchases directly from the manufacturer have decreased. The more middlemen there are, the bigger the risks and the importance of the risk management is emphasized. It is really important to understand the entire supply chain and its risks, as the risk management related to your own supplier alone is no longer enough. (Mena, et al. 2014, 134-139.)

3.2 Supplier evaluations

Supplier evaluations should be performed regularly and as planned at all stages of the procurement process and the purpose is to improve the overall picture of the supplier and its performance. Supplier evaluations should be performed for important suppliers on a regular basis and for other suppliers as needed. Every supplier is different, so each supplier should have their own kind of evaluation. (O'Brien 2014, 206; Iloranta & Pajunen-Muhonen 2018, 236.)

Supplier evaluations are inspections that gather information and facts and find out the current state of cooperation. Once the results have been obtained, it can be assessed whether the relationship with the supplier is worth continuing or not. The evaluation is not just a planned evaluation, but an evaluation is performed in every interaction with the supplier. (Iloranta & Pajunen-Muhonen 2012, 234).

3.3 Contract management

Contract management is important because contracts define everything that has been agreed and what follows if things agreed are not followed. With the contracts, companies minimize risks and possible misinterpretations. (Huuhka 2017, 139.)

The content of the contracts is case-specific and can vary a lot. Contracts may cover different products or services, deliveries or confidentiality. The scope of the contracts is also different. With the small companies with a low risk, it is not worthwhile to do such extensive contracts as with larger suppliers. (Huuhka 2017, 139.)

3.4 Supplier development

Supplier development aims to improve the supplier's competence, capability and performance, in which the purchasing organization plays a strong role. The goal of the purchasing organization is to achieve business benefits in both the short and long term. (Nieminen 2016, chapter 5.3.)

The development of suppliers takes place through a close co-operation, which is why the personnel of both organizations must be involved in the development, as this is a matter of joint effort. Feedback should be given regularly and immediately if necessary, as continuous guidance and support from the supplier will ensure that the things are moving forward. (Nieminen 2016, chapter 5.3.)

Supplier development is a long-term work for the purchasing organization, which requires a lot of resources. The purchasing organization should believe that investing in a specific supplier is worthwhile. (Nieminen 2016, chapter 5.3.)

4 Quality

Quality is a strategic competitive factor for companies and therefore it is worth using the resources well from the beginning. It is good to understand the quality of your organization, the supplier and also the requirements of the customer. (Logistiikanmaailma 2021.)

In the worst case, it is too late to invest in quality when quality problems are discovered. In companies the quality problems could be caused by faulty product, loss of reputation, too early or late delivery time and incomplete delivery. The quality of suppliers could be measured by the agreed delivery time of the ordered product, complaints and predictive accuracy. Customer surveys are a good way to measure a customer's opinion of the bquality, and if customer satisfaction is good, it affects the result and growth of your company's operations. (Logistiikanmaailma 2021.)

4.1 Quality management, quality leadership and quality management system

Quality management means maintaining and managing the quality of a manner, product or service. Companies that invest in quality management improve their efficiency, productivity, the quality of their products and services, and their level of customer service. There are several benefits to quality management such as employee and customers satisfaction, increased flexibility and reduction of mistakes and stocks. (Logistiikanmaailma 2021.)

Quality leadership is an operating model that attempts to get the entire organization to commit to a common quality goal. In quality leadership, the quality is built into operational processes and efforts are made to develop small and continuous improvements such as eliminating errors, wastage, inconveniences and short lead times. (Logistiikanmaailma 2021.)

It is a good for companies to have quality assurance to ensure that quality requirements are met. A quality management system, which is a leadership system, aims to ensure customer satisfaction, improve productivity, documentation, secure the quality of products, services, and processes, and develop new methods. Written instructions, quality files and a quality manual are part of the quality system. The best known quality management systems are ISO 9000 and EFQM (European Foundation for Quality Management). (Logistiikanmaailma 2021.)

4.2 Audit

The task of the audit is to verify the functionality, efficiency, weaknesses and strengths of the quality system of one’s own organization or the supplier. The audit can be performed by the company itself or by an external auditor due to its expertise. Companies audit new suppliers as well as the existing suppliers. New suppliers are audited to obtain information on the supplier's capacity, quality system and expertise. Before auditing a new supplier, the supplier is informed of the expectations and requirements of the purchasing company. Companies audit the existing suppliers regularly and the audit can help to reduce risks and to prevent quality problems. When planning a supplier audit, it is a good idea to form a team that includes professionally diverse individuals. (Logistiikanmaailma 2021.)

The audit involves interviewing staff, reviewing tools, methods and results and comparing quality documentation with the standard. The audit is followed by a report containing findings, strengths, weaknesses, recommendations and conclusions. The audit report is submitted to management, which is responsible for ensuring corrective action and monitoring. (Logistiikanmaailma 2021.)

5 Global sourcing

5.1 Developing a global strategy

As the costs of labor and capital equipment increase, companies are beginning to explore opportunities by sourcing from the low-cost countries. The low-cost countries not only provide cheap labor but their facilities are also more developed and productive compared to the developed countries. The rapid development of international trade has been promoted by e.g. communication tools, easily accessible transportation and labor prices along with a technically skilled and well-trained workforce. (Solish & Semanik 2011, 183.)

Global sourcing is a procurement strategy where companies try to find the most cost-efficient place globally for manufacturing goods. The goal of global sourcing is to lower production costs while maintaining the exact quality standards required for products and services. Companies should have suppliers from both inside and outside the country's borders in order to have the best possible competition. The main reasons why global sourcing is used are raw material costs as well labor costs which are lower abroad. (Solish & Semanik 2011, 183.)

As mentioned earlier, the main reason for sourcing from the low-cost countries is low labor costs and this also brings more options for sourcing. As the supply field grows with it the competition between suppliers increases leading to the lower costs. Expanding to the international markets does not necessarily mean increasing the number of suppliers, but it means a greater chance of finding better suppliers. (Solish & Semanik 2011, 183.)

When company decides to start procuring outside of its own borders, a procurement strategy must be created and incorporated into the existing strategy. The procurement strategy should include key elements such as contract information requirements and a plan for continuous performance measurement. There are also many challenges that need to be considered when making a global sourcing strategy such as cultural differences, risks and logistical requirements. (Solish & Semanik 2011, 184.)

It is not necessary to create your own strategy for sourcing from abroad but there are things to keep in mind, nonetheless. It needs to be checked whether the current goals are in line with foreign sourcing. Purchasing from abroad may also increase delivery time and create additional costs. (Solish & Semanik 2011, 184.)

Market analysis plays a major role in making a procurement strategy. There are several things that the analysis should include:

- Investigate the major international suppliers and their markets, as well as where their main customers are located.
- Find out if suppliers have the capacity and technology to deliver the right products for your business.
- Collect and analyze the supplier's financial position yourself or with the help of a third party.
- Find out if cost profiles offer the potential for savings.
- Are materials available locally?
- Can the transport be arranged in accordance with the requirements?
- Identify existing risks and how to manage them.

(Solish & Semanik 2011, 184-185.)

There are several requirements in addition to market analysis that should be considered when starting an international procurement:

- It is good to understand what skills and education the supplier's employees have and compare these to the current supplier.
- The turnover of key personnel and whether they are new to this industry.
- Cultural and language differences need to be understood by both the buyer and the supplier.
- Possible delivery terms and associated costs need to be checked.
- Purchasing must choose the best currency for pricing, If the supplier specifies a currency, he is released from currency risk.
- The payment term must be considered.
- In addition to communication and language barrier, time differences must be considered.
- You must be able to take the risks into account and also understand the potential environmental risks that exist when buying abroad. (Solish & Semanik 2011, 186-187.)

Incoterms 2020 is an internationally accepted term that defines the responsibilities of the buyer and seller in transportation and when the ownership of a product is transferred to the buyer. The most commonly used terms are presented in figure 4. (An Introduction to Incoterms 2020.)

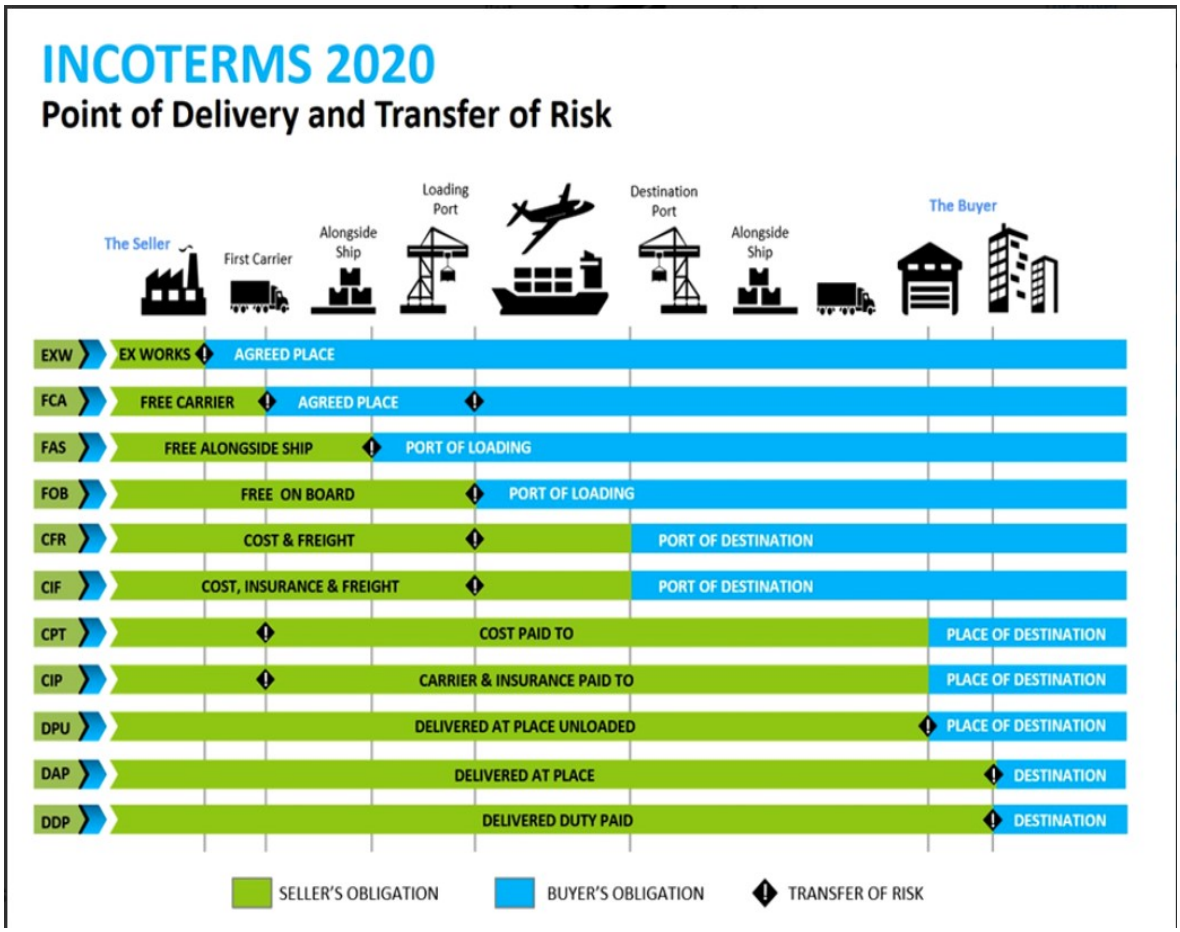


Figure 4. Incoterms 2020 (An Introduction to Incoterms 2020)

There are companies that provide professional sourcing services. Their mission is to make starting purchases globally easier for a developed country company. Companies may offer big savings but it is important to be careful that the extra costs stay under control. These companies manage quality, logistics, engineering and communication with the supplier. (Solish & Semanik 2011, 185-186.)

5.2 Low-cost country sourcing

As price competition intensifies, companies will have to pay special attention to their procurement. Purchasing division is becoming more strategic part of a company whereas it was before just an operational procurement department. As shown in figure 5 If procurement costs can be reduced by 1 %, The EBIT (earnings before interest and taxes) for example in engineering increases by 11 %. The global market provides the foundation for cost-effective products and here low-cost country sourcing plays a special role. The new global market also increases risks. Therefore, new suppliers need technical support, continuous process control, and audits at the supplier to ensure quality and security of supply. (Lanza et al. 2009.)

Figure 5. Increase in EBIT at a cost reduction of 1 % in purchase (Lanza et al. 2009)

Low-cost country sourcing is a procurement method aimed to procuring from countries where the cost of labor and resources are low. These countries are usually Asian and Eastern European countries. Low-cost country sourcing is used because of a cost-cutting strategy as well as to secure the availability. (Solish & Semanik 2011, 185.)

When thinking about low-cost country sourcing there are five general production factors and six other aspects that need to be considered. These nine factors will be considered individually below. (Lanza et al. 2009.)

Expenditure of labor

When labor costs are lower in the low-cost countries, the number of workers can be increased. Companies therefore do not have to procure new expensive automated equipment, which is why employees do not need that much training. (Lanza et al. 2009.)

Processing time

Because of cheaper labor costs and machine time in the low-cost countries, the processing time can be higher and it gives a possibility to use a cheaper material. The processing time and costs goes hand in hand. The higher the processing time, the higher the cost per unit. (Lanza et al. 2009.)

Materials used

Materials must be taken into account, as they represent a higher cost than labor and machine hours. The Materials should be sourced from a local supplier, as those delivered outside the borders increases costs. (Lanza et al. 2009.)

Requirements to the manufacturing equipment

It must be considered that the education and qualifications are much worse in low-cost countries than in high-income countries. Therefore qualified and trained employees are difficult to find and are really expensive. (Lanza et al. 2009.)

Different cultural and specialist background of suppliers

When a product is being tendered from abroad, it must be considered at the design stage that the supplier is able to understand the critical features and they are subject to the standard. Different cultural background can be a reason for a very serious misunderstanding. (Lanza et al. 2009.)

Long hauling distances

Due to long distances, it is not always possible to transport products by road. Other options are transportation by sea or air. Due to ship freight, the delivery time can be really long, and air freight again is really expensive. The price for ship cargo consists of quantity and the price of air cargo consists of weight. Eastern European countries do not have this problem because the time it takes to transport is relatively short and delivery costs are also lower. (Lanza et al. 2009.)

Tariffis and taxes

Tariffis and taxes must be kept in mind if ordering the product from outside the EU. Depending on the type of component, the tariff can vary considerably. (Lanza et al. 2009.)

Cost for coordination and support

Close cooperation with supplier can be challenging because the distances between a customer and supplier can be long. Low cost country supplier needs more support and it requires resources and more costs. The costs are also affected by how many different components there are and how many different actors have to be dealt with. (Lanza et al. 2009.)

6 Procurement classification and analysis tools

6.1 Classifications and analysis

It is a good idea to classify and analyze purchases, as the procurement consists of different products, raw materials and services. In addition to these, the economic significance of different procurements is different and various factors are emphasized in their management. Next, we will go through three different analysis tools that are good to use in procurement. (Huuhka 2017, 44.)

6.2 ABC-, spend- and swot analysis

ABC analysis is a method that allows company's purchases being categorized and prioritized according to the economic importance. The main purpose of the ABC analysis is at least getting the working capital and cost under control as well as to improve inventory rate. The ABC analysis is based on Pareto's 20/80 rule that 80 % of consequences are due to 20 % of causes. When applied to procurement, this could mean for example that 20 % of the items procured represent 80 % of the value of the procurement. (Huuhka 2017, 47.)

In the ABC analysis, the typical starting point is to divide products to three categories. So there are three categories A, B and C as shown in figure 6. Class A is the most important, as it accounts for the majority of procurement volume and is believed to have the most cost-saving potential. For B products, there are less sales or value – not that important than A products. C products are a class which has the lowest profit margin and less impact on the sales. Class C, on the other hand, may include products that may even be worth removing, but may also include products that are important, such as rarely needed but important spare parts. (Huuhka 2017, 48-50)

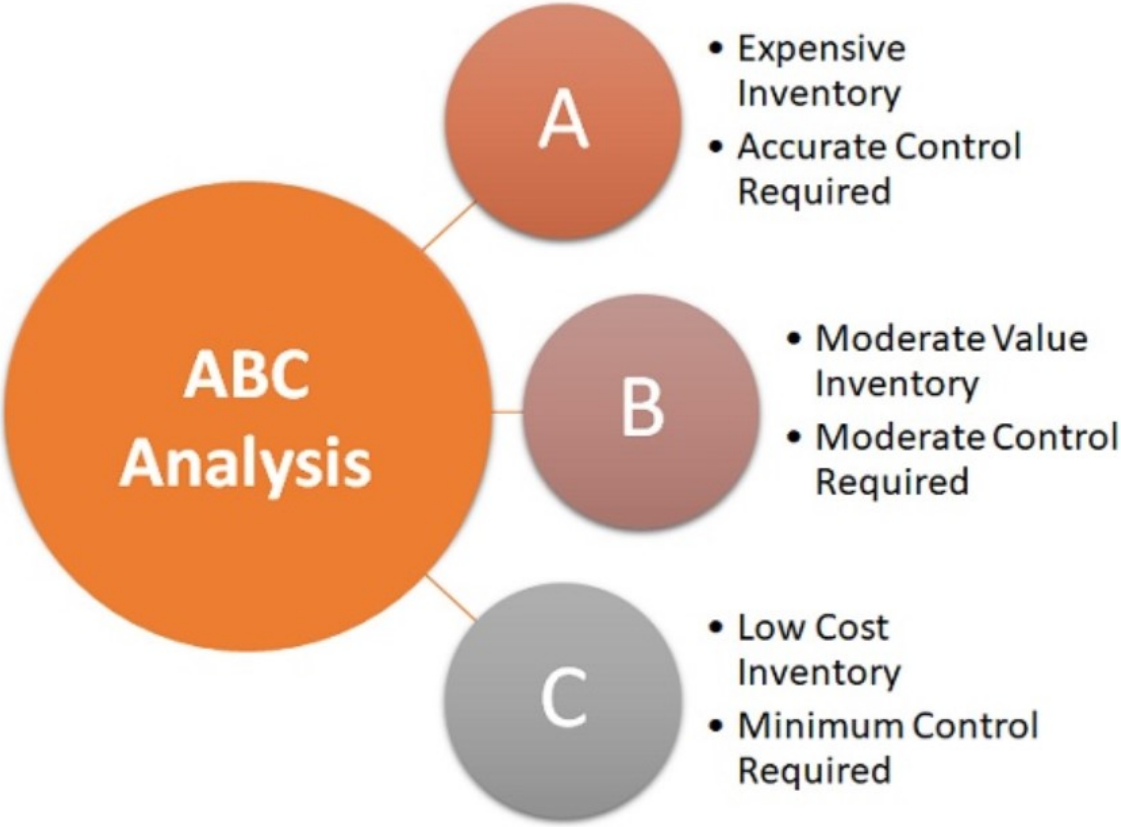


Figure 6. Three different categories (MBA Skool Team 2021)

A more in-depth spend analysis can also be used to categorize purchases using ABC analysis previously presented. The spend analysis is one of the most important tools used by purchasing organizations. In the spend analysis, the aim is to look at spend data and reduce costs, improve efficiency, and improve supplier relationships. The data from the spend analysis can improve visibility into corporate spend, as well as drive performance improvement, contract compliance, and the most importantly, cost savings. Figure 7 shows the benefits of spend analysis. (Sievo 2021.)

Figure 7. Benefits of spend analysis (Sievo 2021)

The process of the spend analysis involves pulling together purchase history data to answer and assess the who, what, when, where and how of an organization expenditure. To get the most out of the spend analysis, it should be an ongoing process, not just a one-time thing. (Sievo 2021.)

A SWOT analysis, also called a four-field-analysis, can be used to identify the strengths and weaknesses of a company or organization's current state and future threats and opportunities. The strengths can be exploited by companies or organizations and efforts are made to improve weaknesses so that the company or organization can operate effectively. Figure 8 shows an example of a swot analysis template. (Suomen riskienhallintayhdistys 2021.)

Figure 8. Swot analysis template (2021)

7 Case Stora Enso

7.1 Stora Enso

Stora Enso Is a leading provider of renewable solutions in packaging, biomaterials, wooden constructions and paper globally. As shown in figure 9, Stora Enso employs about 23000 people and have sales in more than 50 countries and their shares are listed on the Helsinki and Stockholm stock exchanges. Stora Enso headquarter is located in Helsinki, Finland. Stora Enso was formed in 1998 through the merger of the Finnish company Enso Oyj and the Swedish company Stora. (Stora Enso 2021a.)

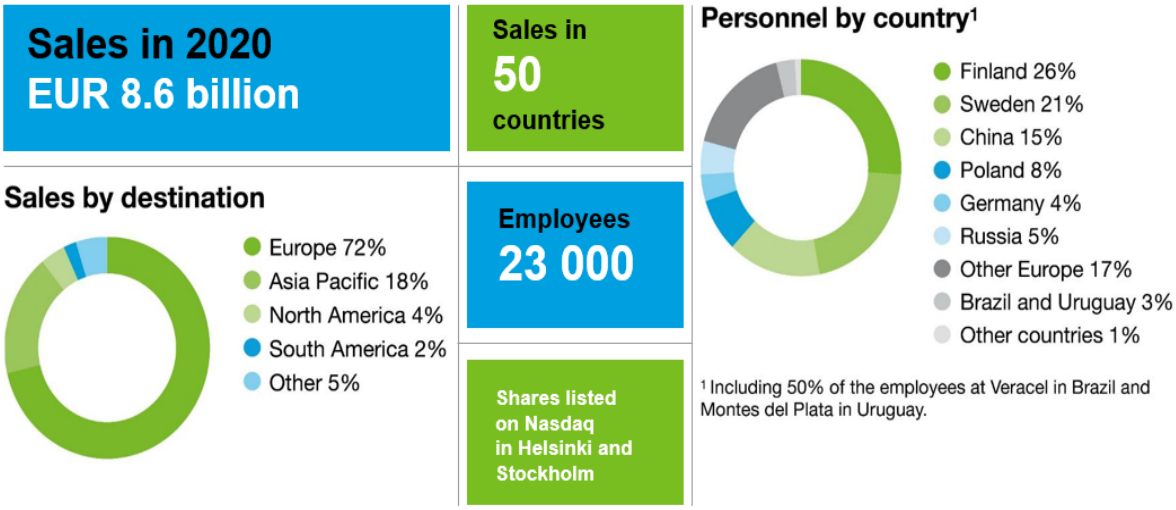


Figure 9. Stora Enso in brief (2021)

Stora Enso has divided their business in six different divisions as shown in figure 10. Divisions are packaging materials, packaging solutions, biomaterials, wood products, forest and paper. In 2020, the packaging materials had the biggest share of the group operational EBIT and it was 62 %. The paper division had the smallest share of the group operational EBIT and it was -6 %. (Stora Enso 2021a.)

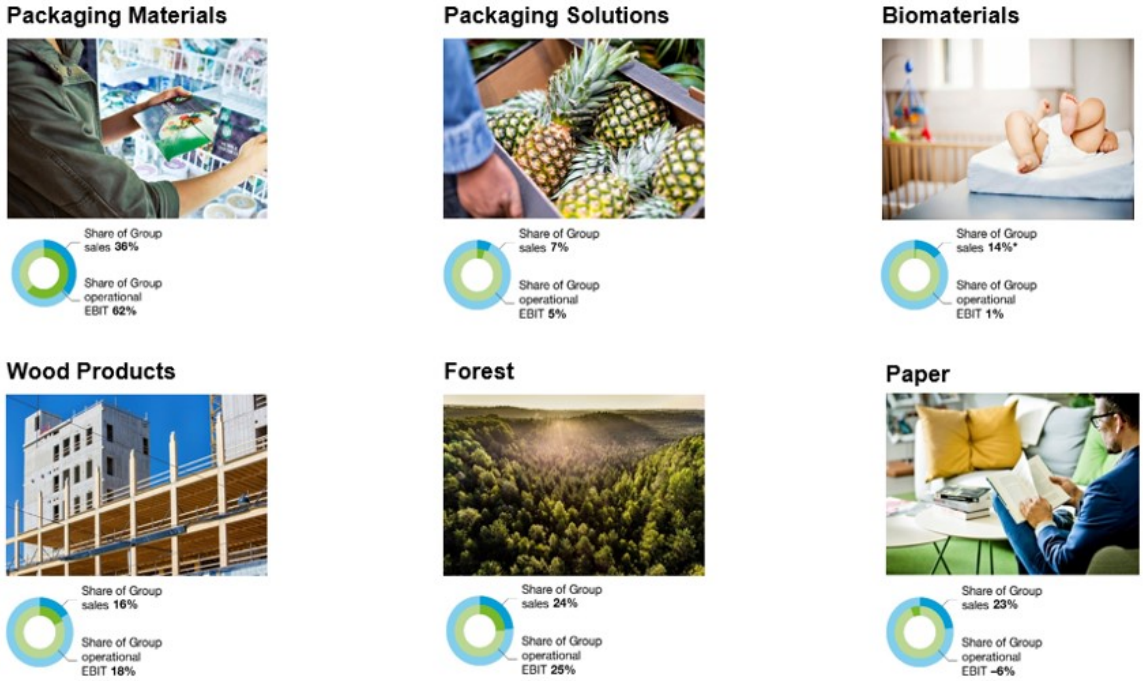


Figure 10. Stora Enso divisions (2021)

Stora Enso has ethical guidelines that do not operate based on unethical or illegal activities such as corruption. Stora Enso do not accept bribes. Stora Enso strives to ensure that the external partners understand and share a commitment to an ethical business. Stora Enso has also prepared guidelines for suppliers (supplier code of conduct). The supplier base is wide and global, so by setting requirements for suppliers, Stora Enso can drive change for the better. (Stora Enso 2021b.)

The company has five board mills, one paper mill, two packaging mills, two pulp mills and three sawmills in Finland. In recent years, Stora Enso has invested in the packaging- and board industry and shutting down and converting printing grade machines into board production.

7.2 Stora Enso Sourcing Finland

Stora Enso Sourcing Finland is an organization which is responsible for the procurement in Finland and provides procurement services for production and maintenance. The procurement is responsible for handling different contracts such as subcontracting, material, project and investments, utilizing procurement volumes across unit and mill boundaries. The procurement is based on Stora Enso group's procurement policy and guidelines. (Stora Enso 2021c.)

7.2.1 Stora Enso Finland sourcing process and organization

The procurement process is started either by the need of a local unit or by the procurement. The process by procurement when, for example, the current contract or price list expires and there is a need to renew it. In addition, if a new interesting opportunity opens up and the potential is identified, the procurement process can begin. There are five key steps and three points in the sourcing process as shown in figure 11. (Stora Enso 2021c.)

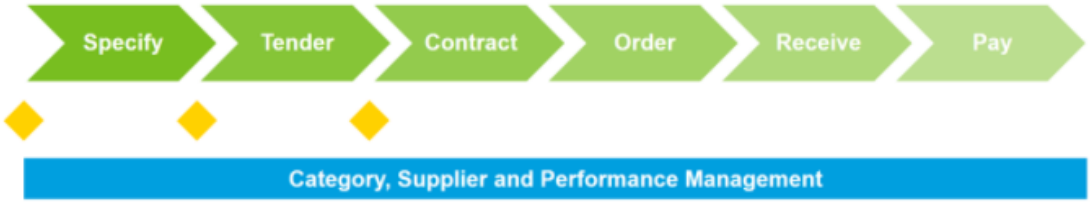


Figure 11. Procurement process diagram (2021)

If procurement exceed EUR 100 000 it needs deal with in a joint decision-making forum, the Sourcing Committee. The committee procedure is three-tiered. The steps are shown in the figure 13 procurement process diagram with yellow salmia. (Stora Enso 2021c.)

Sustainable considerations are inherent in all steps of the sourcing process – from pre-qualifying suppliers to assessing risk, monitoring performance and driving development. The sustainable sourcing process, which is shown in figure 12, requires certain steps to be taken by purchasers and suppliers in order to ensure sustainable performance throughout the supply chain. (Stora Enso 2021c.)

Figure 12. Sustainable sourcing process (2021)

Stora Enso Finland procurement organization is between centralized and decentralized procurement, so it is a hybrid model combining the two. There are some products that are centrally tendered by lead buyers, e.g., machine fabrics and chemicals, but each unit also has its own purchasing manager as well as a buyer who procures and negotiates on behalf of their own unit. Stora Enso group also has the best-cost country function for projects but it is quite new and still evolving. The current sourcing organization of Stora Enso Finland is shown in figure 13.

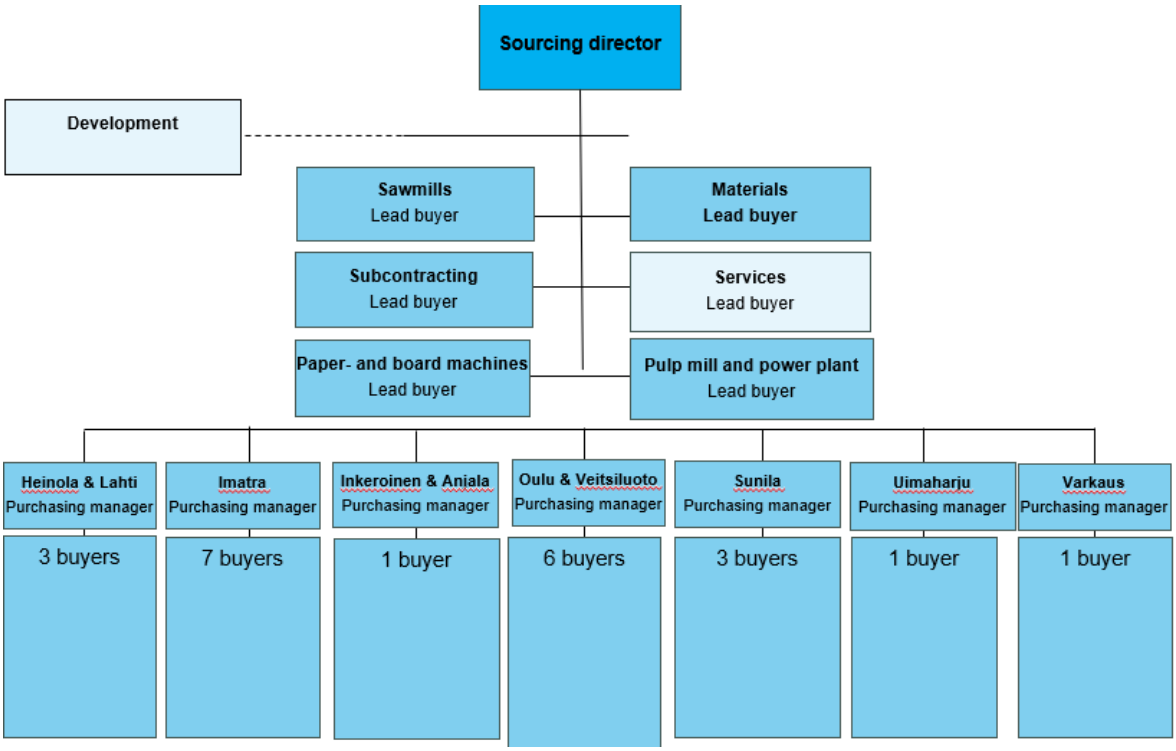


Figure 13. Sourcing organization (2021)

7.3 Problem space with spare part procurement in Stora Enso Finland

Equipment spare parts are a big cost for each Stora Enso mill. The global demand for board, pulp and sawn timber is growing all the time so the mills are running at full capacity. That is causing equipment to wear out more and spare parts to be needed.

The spare parts can be purchased from the equipment supplier, or from various machine workshops if the factories have drawings for the spare parts. There are no drawings of all spare parts, as equipment manufacturers try not to give them to customers. The spare parts

that the drawings can be found are either randomly obtained from the equipment manufacturers or designed and drawn by the factories themselves.

At the moment, the spare parts are procured decentrally at Stora Enso, i.e. each mill procures its own spare parts. Normally spare part sourcing process goes in Stora Enso Finland the following way: There is a maintenance engineer who knows the need of specific a spare part and has the best technical knowledge and knows a supplier that they have used for ages. Then there is a commercial buyer who buys the spare part from the manufacturer that the maintenance engineer suggests him to buy from. The difficulty in here is that the buyer does not have a technical background and knowledge where to find more cost effective and quality suppliers whereas the mechanical engineer does not have the knowledge how to source and find better suppliers.

Finding new suppliers in the low-cost countries is not possible with the current organization, as it takes time and requires a lot of resources. For the current organization, this would require a maintenance engineer with a technical know-how to leave with a buyer with a commercial background to visit new suppliers. A maintenance engineer is a foreman as well as a job planner in day-to-day work so he or she can not start to visit suppliers alongside the daily work. Buyers' working hours are also not enough for both the daily work and sourcing foreign suppliers. There are also concerns such as long delivery times as well as high freight costs even though the spare parts would be cheap.

7.4 Solutions for improving procurement of spare parts by using ABC-, spend- and swot analysis

Using the ABC analysis, I classified the selected spare parts into three different categories. After researching production control system (SAP) and based on my experience, I selected spare parts that wear a lot, are critical to mill operation and could have the potential for cost savings.

A-products (most possibilities for cost savings): Axle assemblies (including bearing housings, bearing). There are domestic suppliers and one Estonian supplier for product A. Example of an axle assembly is shown in figure 14.

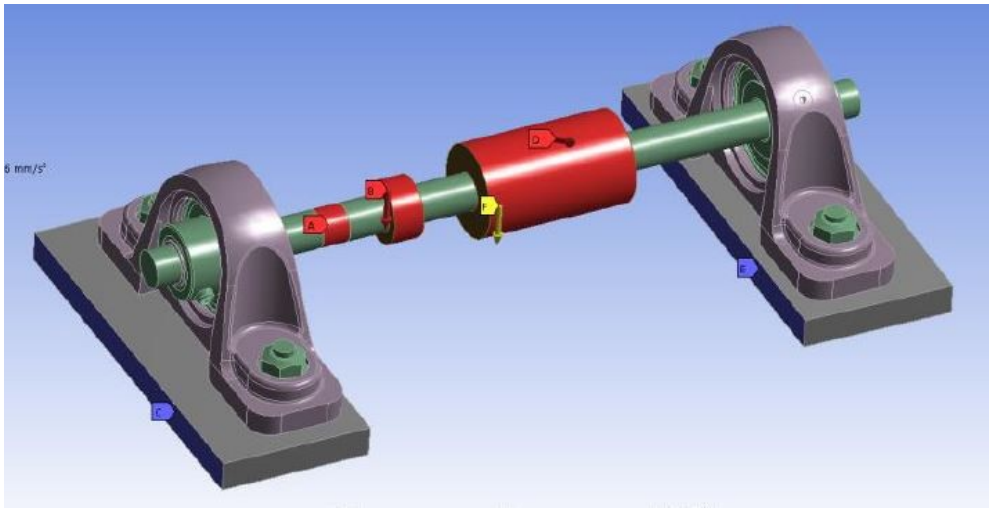


Figure 14. Example of an axle assembly (Chatakondu 2020)

B products: Conveyor screws (for transporting bark and wood chips) and **smaller machined parts** (these are for example chains sprockets, small rollers, shaft ends and bearing housings). There are domestic and one Estonian supplier for product B. An example of conveyor screw is shown in image 1, an example of chain sprocket is shown in image 2 and an example of small roller is shown in image 3.

Image 1. Conveyor screw (2019)

Image 2. Chain sprocket (2021)

Image 3. Small roller (2021)

C products consumables (challenges for obtaining cost savings): Bolts, nuts. For products in class C, there are only domestic suppliers.

After the ABC analysis, I contacted various Stora Enso units in Finland and asked if they now had a need for the previously mentioned A and B category products. The reception for my research was good at several mills, as almost each factory is interested in cost savings. There was one mill whose reception for spare parts purchase from low-cost countries was not so positive. A comment came from the mill that they have one machine workshop next to the mill and it is so easy to buy from there because it is so close and that's why they have no interest in buying elsewhere. The same mill also commented that if there is a need to complain, they don't want to go through a possible complaint with an Estonian supplier. This is probably due to the fact that there is no proficiency in English, and it is much easier to communicate with a Finnish supplier.

When I received inquiries from the factories, I tendered spare parts from the Finnish suppliers that had been used by the mills before, as well as from the Estonian suppliers who were already familiar to me. The reason why I chose these Estonian suppliers was that they are already used by big equipment manufacturers such as Valmet, Andritz and Raumaster. I used to work at Andritz which is why I am familiar with these suppliers and the cooperation and quality were at an excellent level.

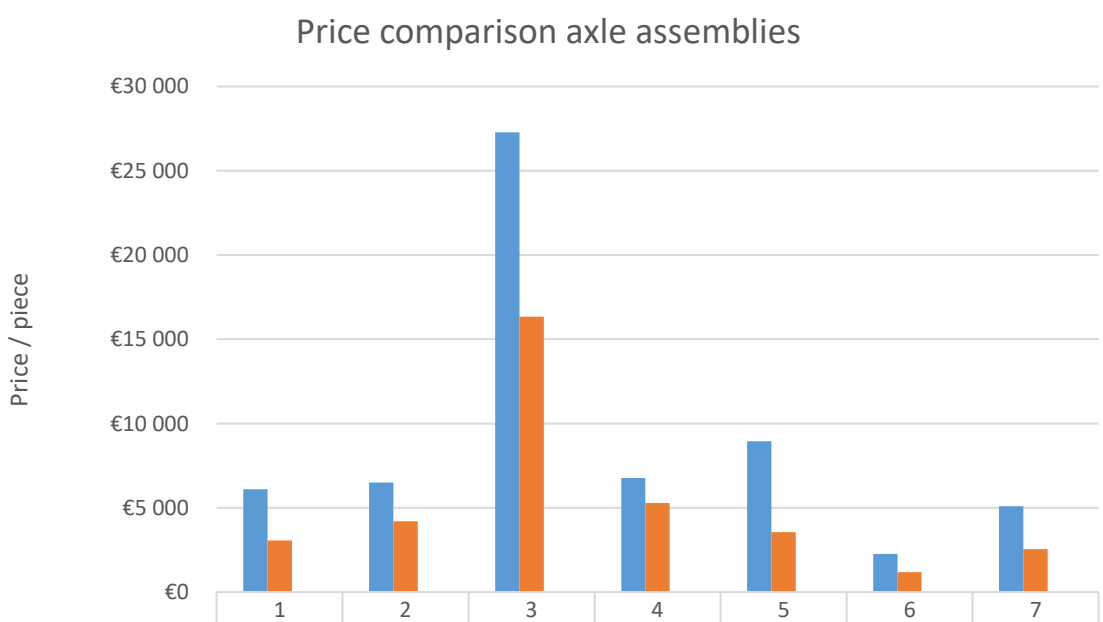
Some of the spare part drawings I received from the mills were good but there were drawings that didn't have enough information to offer or manufacture these. The Finnish suppliers still quoted, even though there were deficiencies in the drawings of the spare parts I had in my request for quotation. Estonian suppliers were really accurate and immediately asked if there were any deficiencies in the spare part drawings. In my opinion, this reflects the fact that the Estonian suppliers want to calculate the price really accurately already at the quoting stage, so that the quotation is as competitive as possible and if a possible order arrives, there will be no more changes. As a result, I had to be in contact with the mills several times in order to obtain similar quotations from the suppliers that they could be compared. This also raises a question of whether the maintenance engineers know what kind of drawings machine workshops need to be able to manufacture the part they need.

The increase in material prices also had a large impact at the quotation stage. Initially, my attention was to use the prices of the Finnish suppliers I received from the maintenance engineer or from production control system (SAP) if a spare part had been quoted or purchased during 2021. The large increase in the material prices during 2021 meant that I also had to ask the current price in order for the quotations between Estonian and Finnish sup-

pliers to be comparable. In addition to the price, the difference between Estonian and Finnish suppliers was also the validity period of the quotation. As a result of the continuous rise in material prices, the Estonian supplier's offer was only valid for one week, while the Finnish supplier's quotation was valid for one month.

When I received quotations from suppliers for A and B category products, I used the spend-analysis to determine the annual cost savings potential. In the spend analysis, the aim is to consider the spend data and reduce costs, improve efficiency and the supplier relationships. Here I consider at particularly those products that were identified in the ABC analysis.

In the ABC analysis, I identified axle assemblies as A products. I got seven different quotations for seven different type of axle assembly. Price comparison between Finnish and Estonian supplier is shown in figure 15. The Estonian supplier provides axle assemblies on average 43 percent cheaper than the domestic suppliers. About 1000 axle assemblies are procured for Stora Enso Finnish mills every year. The price range is large, between 2 000 – 30 000 euros and the average price is 8 992€. Axle assemblies are delivered with DAP terms. Roughly, the estimated potential cost saving is 4 million EUR as shown in table 3.



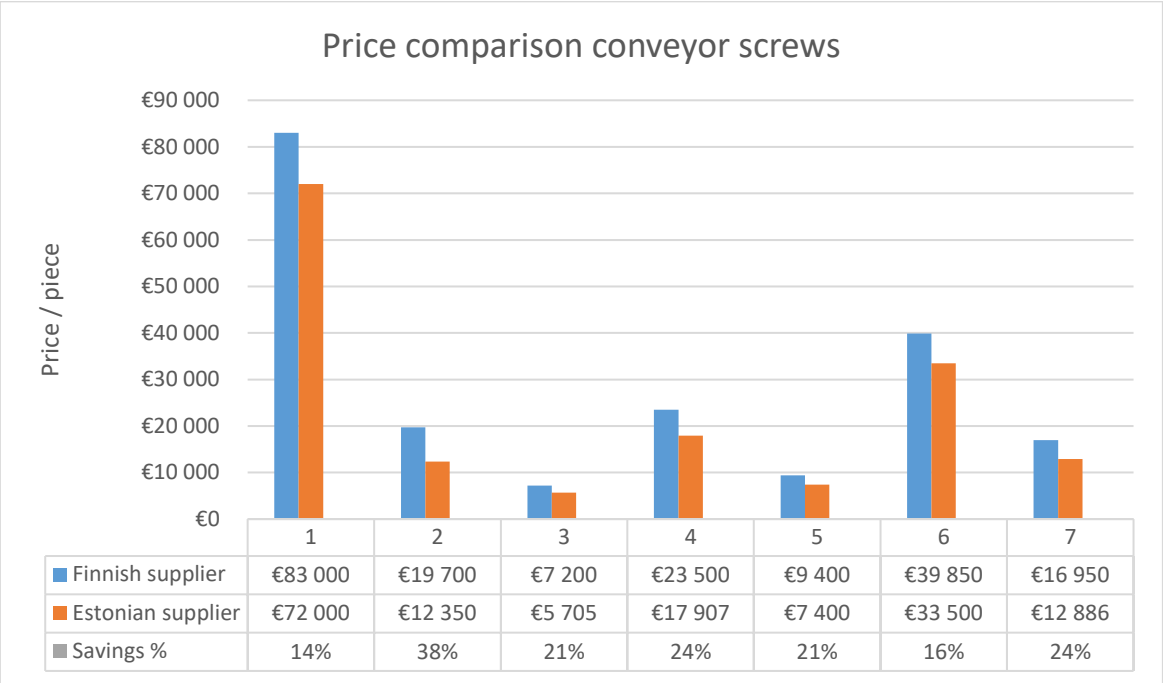
	1	2	3	4	5	6	7
Finnish supplier	€6 100	€6 490	€27 280	€6 772	€8 940	€2 264	€5 096
Estonian supplier	€3 058	€4 205	€16 336	€5 290	€3 550	€1 184	€2 550
Savings %	50%	35%	40%	22%	60%	48%	50%

Figure 15. Price comparison axle assemblies

Axel assemblies procured/ year	1000pcs
Average price / piece in Finland	8 992 €
Average savings % / piece	43,00 %
Total savings / year	3 866 560 €

Table 3. Axle assemblies total savings / year

In the previous section, I identified that the conveyor screws and smaller machined parts were the B products. I got seven different quotations for seven different type of conveyor screws and 14 quotations for 14 different type of smaller machined parts. Price comparison between Finnish and Estonian supplier for seven different type of conveyor screws is shown in figure 16 and for 14 different type of smaller machined parts is shown in figure 17. Conveyor screws are on average 22,5 % percent and smaller machined parts are about 50 % cheaper when ordered from the Estonian supplier. The estimated amount for the procurement of conveyor screws is 200 and for the small machined parts is 2000 pieces. Conveyor screws and smaller machined parts are procured with DAP terms. Delivery times are typically almost the same, around 5 to 12 weeks depending on a particular type of screw or machined part. The potential cost savings are around 1 to 1.5 million euros for conveyor screws as shown in table 4 and 800 000 euros for the smaller machined parts as shown in table 5.

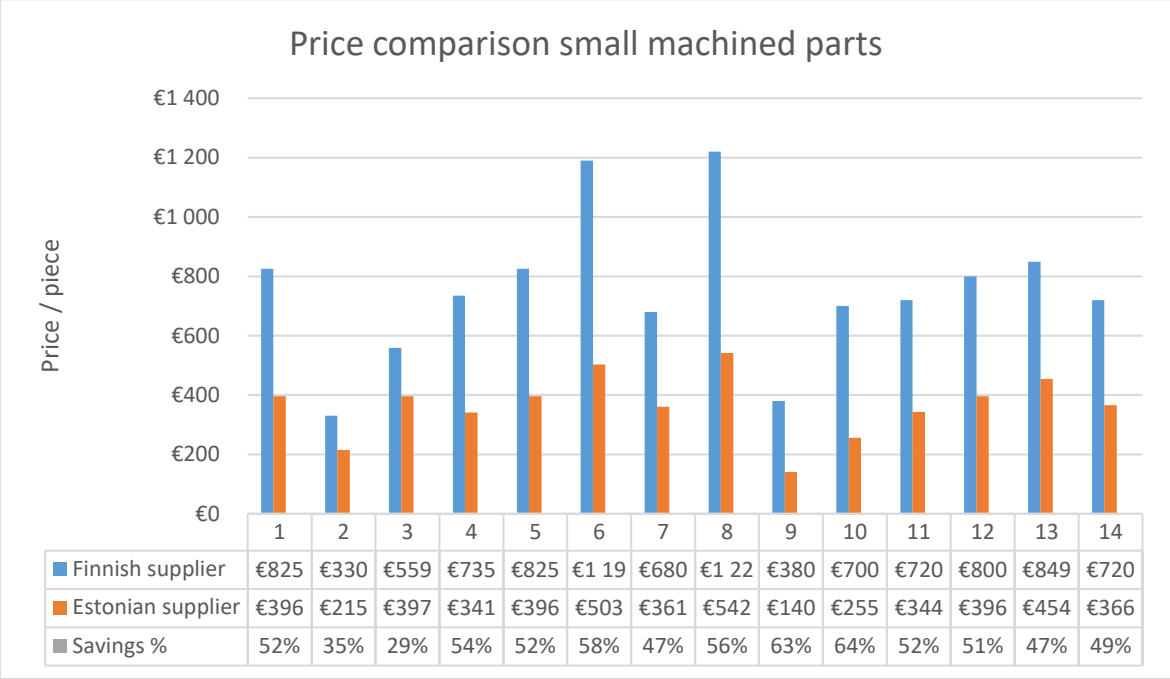


	1	2	3	4	5	6	7
Finnish supplier	€83 000	€19 700	€7 200	€23 500	€9 400	€39 850	€16 950
Estonian supplier	€72 000	€12 350	€5 705	€17 907	€7 400	€33 500	€12 886
Savings %	14%	38%	21%	24%	21%	16%	24%

Figure 16. Price comparison conveyor screws

Conveyor screws purchased / year	200 pcs
Average price / piece in Finland	28 514 €
Average savings % / piece	22,50 %
Total savings / year	1 283 130 €

Table 4. Conveyor screws total savings / year



	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Finnish supplier	€825	€330	€559	€735	€825	€1 19	€680	€1 22	€380	€700	€720	€800	€849	€720
Estonian supplier	€396	€215	€397	€341	€396	€503	€361	€542	€140	€255	€344	€396	€454	€366
Savings %	52%	35%	29%	54%	52%	58%	47%	56%	63%	64%	52%	51%	47%	49%

Figure 17. Price comparison small machined parts

Small machined parts / year	2000 pcs
Average price / piece in Finland	751 €
Average savings %	51,25 %
Total savings / year	769 775 €

Table 5. Small machined parts total savings / year

The bolts and nuts were categorized to the third product category C. They are procured for about 100 000 pieces, with a price 0,1 euros. In total, this means roughly a total price per year 10 000 euros, and not so much potential cost savings.

From the spend data, we can determine that the most significant potential cost savings relies in the A and B products. However, the C products have insignificant potential cost savings.

One mill ordered and already received three conveyor screws during my research and the comments were positive. Maintenance engineer of the mill told the quality was excellent and they have not received such a comprehensive quality documentation from anywhere

else. The quality documentation is a really important part of sourcing, as Stora Enso sourcing organization does not have its own quality controller to visit suppliers during spare part manufacturing. As I mentioned earlier, the Estonian suppliers I used in this research are used by large equipment manufacturers who have taught these suppliers to make comprehensive quality documentation.

The communication with the Estonian suppliers was easy. Two suppliers spoke an excellent English and two of the suppliers spoke Finnish. The Estonian suppliers also have a Finnish sales office which makes it easier for the mills to communicate with them, as it is not self-evident that the maintenance engineer of each mill would be able to communicate in English.

With the help of the SWOT analysis, figure 18, I did a current status-analysis of the procurement of the spare parts and outlined the strengths and weaknesses of the current state of the spare parts procurement, as well as future opportunities and threats.

Strengths

- Every mill can decide for themselves where to buy (decentralized procurement).
- Each mill has its own buyers, so communication is easier between maintenance and procurement.
- There are enough purchasing resources for basic purchases.

Weaknesses

- The procurement of spare parts is not global
- Every mill can decide for themselves where to buy (decentralized procurement).
- There is no dedicated lead buyer for spare parts to make centralized purchases.
- A Maintenance engineers who asks quotations does not have the time or skills to source new suppliers and the procurement does not have technical know-how or time to source new potential suppliers for spare parts.
- Purchase is passive and traditional.
- Development of spare parts' procurement.
- No quality control

Opportunities

- Procurement of spare parts from low-cost country
- Expand on supplier network
- Lead buyer for spare parts
- Centralized sourcing for spare parts
- Possibility to protect material availability between mills
- Better purchase terms
- Development on supplier relations
- Lead buyer would source workshop suppliers both in Finland and Baltics and make contracts with them. At the same time, the lead buyer should maintain good supplier relationships by visiting suppliers and performing quality inspections on spare parts which are in preparation.
- Lead buyer must be both technical and commercial.

Treaths

- Workshop capacity so there need to be more than one workshop in our list.
- The most cost-effective suppliers are small suppliers, and this requires time and resources.

Figure 18. Swot analysis

The fact that each factory can decide on the procurement of spare parts is both a strength and a weakness. As I mentioned in the theory section, when a unit makes its own purchasing decisions, the process is more straightforward and financial reporting clearer. Another strength is that the procurement is closer, both to suppliers and end users, and it helps cooperation. The biggest challenge is losing purchasing volume. Without purchasing volume, it is also more difficult to take advantage of global opportunities. Although the strength is that the unit can make its own decisions, the benefits of harmonization are not achieved, as contracts, prices and conditions are different in different units. This is a weakness when it comes to sourcing spare parts from abroad. The strength at the moment is that there are enough purchasing resources for the basic purchases.

Currently, there are several weaknesses in the organization regarding the purchasing of spare parts. Spare parts are currently only procured from Finnish suppliers if possible. There is no lead buyer who could centralize the procurement of spare parts. By centralizing the procurement of spare parts, it could be possible to get more cost savings. Purchasing is also passive and traditional, which means that the spare parts are often bought from where it is easy to buy and from suppliers that have always been used. As a result, spare part procurement is not currently being developed. There is currently no quality controller in the manufacture of spare parts. A maintenance engineers who ask quotations do not have the time or skills to source new suppliers and the procurement does not have technical know-how or time to source new potential suppliers for the spare parts.

The opportunity for the future is to purchase spare parts from the low-cost countries. In addition to savings, this provides an opportunity to grow the supplier network. An opportunity would be to hire a lead-buyer who could consider ways to centralize the spare parts procurement. Through the centralization of procurement, there would be a possibility to protect material availability between mills, chance to get better purchase terms and develop supplier relations. Lead buyer would source workshop suppliers from both in Finland and Baltics and make contracts with them. At the same time, the lead buyer should maintain good supplier relationships by visiting the suppliers and performing quality inspections on the spare parts which are in preparation.

The threat to the future, if procurement is centralized, is supplier workshop capacity so there needs to be more than one workshop in the list. The cheapest suppliers are generally small suppliers and this requires time and resources.

8 Results and conclusions

The savings from the spare parts for Stora Enso Finland can be several million euros per year. Therefore, the purchase of the spare parts outside Finland borders should be seriously considered. It is a good idea to categorize spare parts so that the resources are directed to the spare parts with the highest savings potential.

Stora Enso can now start to use these suppliers where I asked quotations. But if Stora Enso wants to take this further, they need to change their procurement organization. My suggestion is that Stora Enso procurement organization would hire a lead buyer who would be responsible for machined spare parts. He / she would have to have both technical and commercial background. The lead buyer visits workshop supplier both in Finland and in the low-cost countries and at the same time he / she performs quality control and maintains good supplier relations. Of course, because he or she is a lead buyer, he / she have to find out if there is a chance to centralize procurement of spare parts such as axle assemblies or conveyor screws. Figure 19 shows the new organization chart that includes a new position for the lead buyer who is responsible for the spare parts.

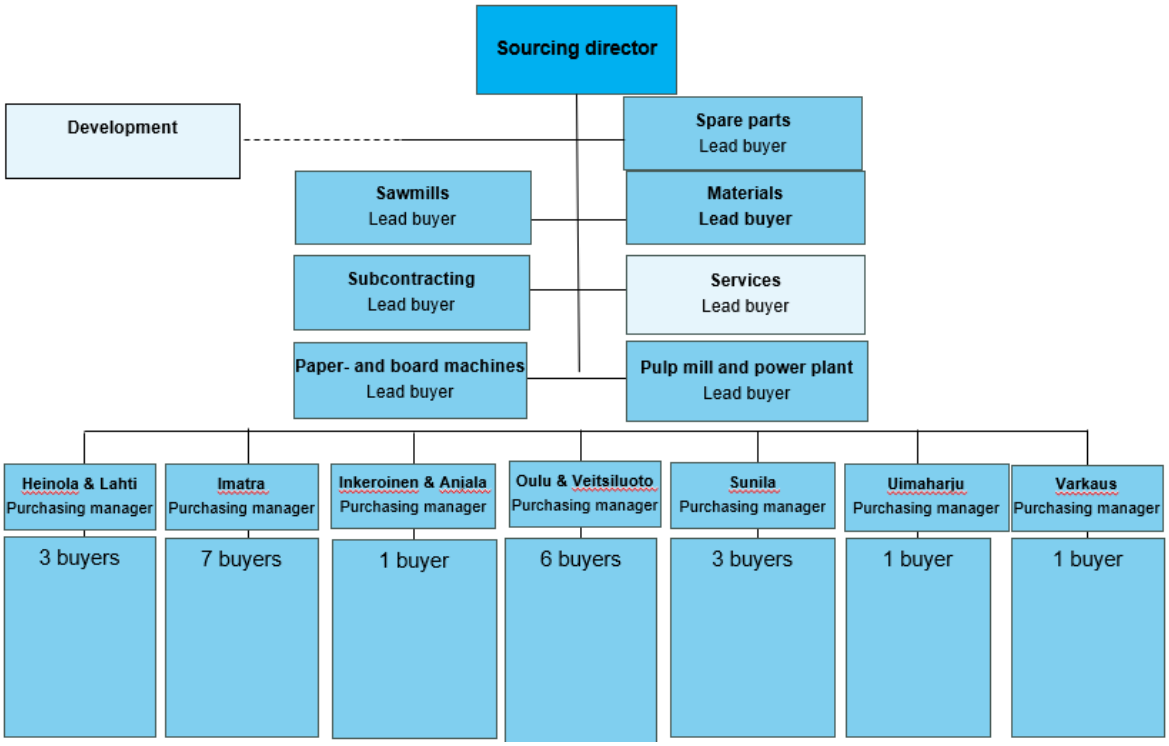


Figure 19. New organization chart.

The investigation revealed that the factories do not have technical drawings for every spare part. One development proposal for this could be the technical design and drawing of spare parts in Estonia, due to the low cost of labor in Estonia. Stora Enso's maintenance staff would take the necessary photographs and measurements, which could be sent to the Estonian designers and they would do the manufacturing drawings.

There are also other options to start sourcing from abroad. One, and probably the easiest option is that the company hires an external consultant to develop the company's own purchasing operations and purchasing organization. Another option is that the company would start to use international procurement services whose mission is to start making global purchases for a developed country company to start making global purchases.

In this research, the possible savings potential was measured and the research method was valid. The tenders received from suppliers indicate directly if it is profitable to make purchases outside of Finland. The research is also reliable because even if the measurement were repeated under the same conditions, the result would be the same.

9 Summary

The purpose of this research was to find out whether there is a potential for savings in machined spare parts if they were sourced from the low-cost countries and how the procurement organization would have to change in order to start utilizing this.

The research was performed using a quantitative research method. With the help of ABC analysis, spare parts were classified into A, B and C categories by studying the production control system as well as through my own experience. After the spare parts had been tendered to both Finnish and Estonian suppliers, I determined the annual cost savings potential using the spend analysis.

Based on the results of the analyses, it is definitely worth it to target the procurement of spare parts to the low-cost countries, as the potential for savings can be several million euros per year.

Moving the procurement to the low-cost countries requires resources that are not currently available in the procurement organization. This would require hiring at least one lead buyer who is both technically and commercially competent.

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