

UNIVERSITY OF VAASA
FACULTY OF TECHNOLOGY
INDUSTRIAL MANAGEMENT DEPARTMENT

Tuomo Ilonen
RECAPTURING VALUE THROUGH REVERSE LOGISTICS
Wärtsilä Ship Power - shopping list

Master's Thesis in
Industrial Management

Master of Economic Sciences

VAASA 2010

TABLE OF CONTENTS	2
ABSTRACT	4
TIIVISTELMÄ	5
1. INTRODUCTION	7
2. BUSINESS PROCESS	10
2.1. Characteristics of processes	10
2.2. Process thinking	12
3. BUSINESS PROCESS REDESIGN	14
3.1. Challenges in redesign	16
3.2. Leading a redesign team	17
3.3. Fighting resistance	19
3.4. Redesign process	20
3.5. Redesign solutions	21
3.6. Information technology	24
3.7. Organizational changes	26
4. REVERSE LOGISTICS	28
4.1. Green thinking	29
4.2. Benefits of reverse logistics	29
4.3. Attitudes towards reverse logistics	30
4.4. Reverse logistics strategy	33
4.5. Essentials of good reverse logistics	35
5. WAREHOUSE ACTIVITY	37
5.1. Obsolescence	38
6. ELIMINATION OF OBSOLETE MATERIAL	40
6.1. Reusing within a company	41
6.2. Return to supplier	42
6.3. Sell to secondary markets	43

6.4. Scrapping	44
6.5. Fixing the causes	44
7. WÄRTSILÄ OVERVIEW	46
7.1. Wärtsilä Ship Power overview	46
7.2. Sustainability in Wärtsilä	47
8. RESEARCH METHOD	48
8.1. Work experience	48
8.2. Interviews	49
8.3. Questionnaires	49
9. STEPS TOWARDS THE SOLUTION	51
9.1. Step one: Review of the current reverse logistic process	51
9.2. Step two: Framework for the new process	52
9.3. Step three: Making the shopping list	56
9.4. Step four: Planning the shopping list process	59
9.5. Step five: Planning the shopping list indicators	60
9.6. Step six: Storing the shopping list material	63
9.7. Step seven: Recapturing value	67
9.8. Step eight: Fixing the causes	75
10. CONCLUSIONS	77
10.1. Development ideas	79
10.2. Further study	81
11. REFERENCES	83
12. ATTACHMENTS	87
12.1. ATTACHMENT 1: Shopping list process	87
12.2. ATTACHMENT 2: Job description - shopping list responsible	92
12.3. ATTACHMENT 3: Reverse logistics questionnaire	94
12.4. ATTACHMENT 4: Supplier info	96

UNIVERSITY OF VAASA
Faculty of technology

Author:	Tuomo Ilonen	
Topic of the Master's Thesis:	Recapturing value through reverse logistics	
Instructor:	Petri Helo	
Degree:	Master of Science in Economics and Business Administration	
Laitos:	Department of Industrial Management	
Pääaine:	Industrial Management	
Opintojen aloitusvuosi:	2003	
Tutkielman valmistumisvuosi:	2010	Sivumäärä: 97

ABSTRACT:

Every now and then Wärtsilä Ship Power faces problems with project cancellations from customer side or incorrect purchase orders. Unless capable of canceling the orders from external suppliers in time, materials are taken to warehouse and to a *shopping list*. From this list they can be used to a different project. Unfortunately the current process is ineffective and does not bring the savings that it could. Project execution, operative purchasing and business control all have their responsibilities but no dedicated resources appointed. Processes of reselling material back to suppliers or scrapping them don't exist at all.

Shopping list process has defects in the process itself; responsibilities and information sharing is inadequate. Internal marketing of the list is missing. Reverse logistics process in business to business relationship is shortly studied area. I reviewed business process and business process redesigning as well as reverse logistics and relocation options from the literature to get an overview of all possible options to re-create smooth and effective shopping list process. Besides the literature review, I got valuable info from my own work experience inside the supply management department.

In my case, reverse logistics process was far from the core processes within Wärtsilä Ship Power. That is why I deemed it necessary to have only one person handling all operative work – the shopping list responsible. Other users of the list, both internal and external of the Ship Power department, need to be considered as customers, although they have some responsibilities in the process. Close cooperation between different functions is needed, especially with strategic purchasers who are in the best position to discuss about selling back the material to external suppliers. No process can work if it is not handled properly. Even a one person can be a good promoter.

KEYWORDS: Business process, Business process redesign, Reverse logistics, Obsolescence, Purchase

VAASAN YLIOPISTO**Teknillinen tiedekunta**

Tutkielman tekijä:	Tuomo Ilonen
Tutkielman nimi:	Recapturing value through reverse logistics
Ohjaajan nimi:	Petri Helo
Tutkinto:	Kauppätieteiden maisteri
Laitos:	Tuotannon laitos
Pääaine:	Tuotantotalous
Opintojen aloitusvuosi:	2003
Tutkielman valmistumisvuosi:	2010

Sivumäärä: 97

TIIVISTELMÄ:

Aina silloin tällöin Wärtsilä Ship Powerille aiheutuu ongelmia asiakkaan perumien projektien tai väärin hankintojen takia. Jos näihin liittyviä hankintoja toimittajilta ei pystytä ajoissa perumaan, tavarat otetaan varastoon ja siirretään *ostoslistalle* (shopping list). Tämän listan avulla ne pystytään käyttämään toisissa projekteissa. Valitettavasti nykyinen prosessi on tehoton, eikä tuo kustannussäästöjä, joihin sillä olisi mahdollisuus. Projektihallinnalla, operatiivisella ostolla ja bisneskontrollilla on prosessissa omat vastuut mutta kukaan ei ole yksin vastuussa. Toimittajille takaisin myymisen ja romuttamisen prosesseja ei ole olemassa ollenkaan.

Shopping list –prosessissa on itsessään puutteita; vastualueet ja tiedonjako on riittämätön. Listan sisäistä markkinointia ei ole. Kierrätyslogistiikan prosessi yritysten välisessä kaupankäynnissä on vähän tutkittu ala. Tarkastelin liiketoimintaprosessia ja liiketoimintaprosessin uudelleen suunnittelua kuin myös kierrätyslogistiikkaan kirjallisuudessa saadakseni yleiskuvan kaikista vaihtoehdoista luoda uusi sulavampi ja tehokkaampi shopping list –prosessi. Kirjallisuuskatsauksen lisäksi olen saanut arvokasta tietoa oman työkokemuksen myötä hankintaosastolla.

Minun tapauksessani, kierrätyslogistiikka on kaukana Wärtsilä Ship Powerin ydinprosesseista. Tästä syystä pidin välttämättömänä, että kaiken operatiivisen työn hoitaa yksi henkilö – shopping list vastaava. Listan muut käyttäjät, niin Ship Powerin sisäiset kuin ulkoisetkin, tulee kohdella asiakkaina, vaikka heillä jotain vastuita prosessissa onkin. Tiivis yhteistyö toimintojen välillä on tarpeellista, erityisesti strategisten ostajien kanssa, sillä he ovat parhaassa asemassa keskustella toimittajien kanssa takaisinostoista. Mikään prosessi ei toimi jos sitä ei hoida asianmukaisesti. Jo yksi henkilö voi olla hyvä edistäjä.

AVAINSANAT: Liiketoimintaprosessi, Liiketoimintaprosessin uudelleen suunnittelu, Kierrätyslogistiikka, Vanhentuneisuus, Ostaminen

1. INTRODUCTION

Shopping list is a term in Wärtsilä Ship Power which refers to redundant stock material that haven't been delivered to the customer they were originally ordered to. There are mainly three reasons: 1) project has been cancelled by the customer, 2) materials' technical specifications have been changed by the customer, and 3) Wärtsilä Ship Power has ordered material with wrong specifications.

When an order is for some reason cancelled, project management may try to find use for them from another project. If this option is not available, the project management is responsible for giving input to project purchaser to move the components to the shopping list. Project purchaser or strategic purchaser may also ask supplier whether components can be returned within reasonable costs.

At this point there is no effective way within Ship Power to handle this material that end up on the shopping list and physically to warehouses in Finland, Germany and sometimes Netherlands. In many components the warranty expires and technical specifications go out of date. Too often materials are stored only to be scrapped after several years of idleness. This causes storing, transport, and interest costs.

The Scope

This problem is not just within Wärtsilä Ship Power, since also Wärtsilä Power Plant has the same kind of list and probably the issue to deal with. Shopping lists covers only auxiliary equipments (e.g. generators, couplings, preheaters, coolers, flexible hoses etc.) which are delivered separately from the engines.

Engines themselves have similar type of list called WIP-list while Wärtsilä Propulsion doesn't have any kind of list at the moment.

This assignment will cover only Wärtsilä Ship Power auxiliary system components. Also the purpose is not to find out reasons why projects are being cancelled or order are changed by the customer or why components have been ordered with wrong specifications in the first place. Of course correcting these defects would eventually have the ultimate solution to make shopping list unnecessary.

The Objectives

The first objective is to study how Wärtsilä Ship Power can handle the list with minimum costs; how rapid the turnover should be among these items that they cover their own storing and transportation costs. This objective cost calculation, analyses of bookkeeping process, validation of warehousing process, and description of scrapping process.

The second objective is to find ways to enhance the process of reusing shopping list material. This includes process description for shopping list material, job description for person or persons handling the shopping list, and guidelines for project engineers and project purchasers to select material from shopping list to a new project.

The literature

I choose to review two different themes from literature: business process and reverse logistics. These two areas go smoothly hand-in-hand because, in many

companies, reverse logistics is the very area where business process concept is forgotten. Therefore I also study business process redesigning. It is clear that the current process with the shopping list doesn't save or bring money to Wärtsilä Ship Power as much as it could, if any. It is good to have a direction, a guideline or process description but if no one is really responsible, concerned or actually doing something with it the whole process is useless. I wanted to review business process and business process redesign from the literature to make sure things got done right and by right persons.

More specific subject for project at hand is reverse logistics. It is sure that when goods can't go forward they need to go at least somewhere because keeping them idle in storages doesn't benefit anyone but warehouse service provider. I wanted to review the literature to find solutions for functional reverse logistics process, warehousing activity and material relocation.

2. BUSINESS PROCESS

There is no one correct definition to business process but similarities throughout the literature are obvious. Based on interpretations of various writers (e.g. Davenport 1993) Tinnilä (1994: 5) has formed following definition of business process:

Business processes are logically related, structured and measured set of activities to produce a clearly defined output from an input to added value to customer.

Every company on earth consists of processes. Processes are what companies do. (Hammer & Champy 1993: 117.) Amount of processes is a bit more complicated issue and it depends on how you calculate them. The difficulty derives from the fact that processes are almost infinitely divisible; the activities involved in taking and fulfilling a customer order, for example, can be viewed as one process or hundreds (Tinnilä 1994: 13). According to Tinnilä (1994: 15), process boundaries are also difficult to determine because from customer point of view company can define only one process but internally company can have various processes. Together, the process and sub-process maps give a simple but effective picture of what [...] any company does (Hammer et al. 1993: 121).

2.1. Characteristics of processes

Foundation of process thinking is that business processes have input and outputs. Davenport & Short (1990) define that processes have customers and they cross organizational borders. Tinnilä (1994: 5) adds two more and considers the main characteristics of processes the following:

1. *They have customers*
2. *They cross organizational boundaries*
3. *Their efficiency should be assessed from customer viewpoint*
4. *They have owners*

Customers may be either internal or external of the firm. In contrast to functional definitions, the output is produced to meet customer demands rather than meeting internal targets. (Tinnilä 1994: 5.)

Companies have different types of business processes. Karrus (2005: 219) say that core business processes can be divided into two categories: ones that adds value to customer directly and ones that support those processes. Cypress (1994) sees things a bit differently and argues that there are only four fundamental processes: technical, innovation, enabling and social processes.

Morrow & Hazell (1992) argue that most business processes have never been designed, but they have evolved over time to meet expectations and fix problems. Processes are invisible and unnamed because people think about the individual departments, not about the process with which all of them are involved. Processes tend to be unmanaged that people are put in charge of the departments or work units, but no one is given the responsibility for getting the whole job -the process- done. (Hammer et al. 1993: 118.) Hammer et al. (1993: 28) even claim that, in most companies, hardly anyone is even aware of the processes.

2.2. Process thinking

Companies who wish to improve the quality of operations are urged to look at an entire process rather than particular task or business function (Davenport et al. 1990). According to Karrus (2005: 218) process thinking aims for better understanding of company's operative processes which are made up of structures and logistically related tasks.

The emphasis is on *how* work is done, rather than functional emphasis on *what* is done in an organizational unit (Davenport 1993). In process thinking, customer satisfaction concentrates on activities in customer interface and core processes behind them (Karrus 2005: 220).

Tinnilä (1994: 25) has pointed out that measuring processes is more like art than actual science, therefore efficiency or inefficiency is not always easy to demonstrate. Also measures given in literature appear to be of operational character, and therefore don't help in comparing different types of processes. Still, measurements are critical to process improvement:

If you cannot measure it, you cannot control it. If you cannot control it, you cannot manage it. If you cannot manage it, you cannot improve it. (Harrington 1991.)

Until there are systems that support entire processes, process performance information must continue to be generated manually, that is, by sampling, time reporting, walking a document through the process and so forth. Following measures are given in literature to evaluate general efficiency of the processes:

- *cost and cost reduction*
- *service and speed*

- *simplification, improvement in quality or flexibility*
- *cycle time*

Simchi-Levi D., Kaminsky & Simchi-Levi E. (2008: 408–409) introduce Supply-Chain Operations Reference (SCOR), the model developed by the Supply Chain Council, which measures overall level of maturity of the firm's business process. A good maturity level is reached when processes are internally integrated. That means integration of functional information, documentation of processes followed by the entire organization, and interdepartmentally used key measurements. Further level of maturity can be reached by external and multi-enterprise integration. That means collaboration with suppliers and customers.

As Willoch (1993) points out, one of the biggest problems in process measuring is departmentally organized functions, which naturally are concerned only about reaching their own targets. The value to customer is usually more difficult to measure than the internal efficiency (Tinnilä 1994: 26).

3. BUSINESS PROCESS REDESIGN

Business process redesign (BPR), also known as business process reengineering and rethinking, is a term from early 90's that rapidly gain success in companies. Hammer et al. (1993: 31) put it simply "starting over." It is not fixing things that are broken but replacing them with totally new process. Tinnilä (1994: 24) has summarized formal definition of business process redesign from various literature sources:

Business process redesign is the fundamental, one-time rethinking, innovation and radical redesign and analysis of critical, key business processes within and between organizations to achieve dramatic improvements in performance, measured by several measurements.

Tinnilä (1994: 221) divides development plans to two categories: one-time radical change or step-by-step continuous development, most often some sort of quality project. According to Boddy, Boonstra & Kennedy (2002: 124) starting from current situation may limit radical thinking which is essential in redesigning. Only process innovation (redesign) is intended to achieve radical business improvement. The focus in BRP should be more on fixing the process rather than daily problems (Tinnilä 1994: 22).

However, companies need to be careful of what they redesign. Hammer et al. (1993: 40, 222) remind that reengineering must focus on redesigning a fundamental business process, not on departments or other organizational units. Little processes are just as hard to redesign as big ones, because any reengineering program is going to cross organizational boundaries and functional lines and create unrest. Three key words describe BPR (Hammer et al. 1993: 32–33):

Fundamental: Businesspeople must ask the most basic questions about their companies and how they operate: Why do we do what we do? And why do we do it the way we do?

Radical: Radical redesign means getting to the root of things: not making superficial changes or fiddling with what is already in place, but throwing away the old

Dramatic: Reengineering isn't about making marginal or incremental improvements but about achieving quantum leaps in performance. Reengineering should be brought in only when a need exists for heavy blasting.

Why to redesign? Redesigning is about organizing work today, given the demands of today's markets and the power of today's technologies. How people and companies did things yesterday doesn't matter to business redesign. Too often simple process is spread across functional work units and task related to it are simply done to meet internal demands and have nothing to do with meeting customer needs – that is, creating a product high in quality, supplying that product at a fair price, and providing excellent service. Business process redesign isn't about saving money, it's about making it. (Hammer et al. 1993.)

Quality has barely a role in BPR. It is important but only after redesign process have been completed. It has many times been recognized that [e.g.] the Total Quality Management is improving what you have – an incremental improvement – BRP aims for something more (Tinnilä 1994: 21). Even with perfect quality, the process itself can be slow and error prone. Tinkering with the individual process pieces is the best way to guarantee continued bad business performance. (Hammer et al. 1993: 27.)

3.1. Challenges in redesign

Processes in a company correspond to natural business activities, but they are often fragmented and obscured by the organizational structures. Most companies lack process owners, because in traditional organizations people do not tend to think in process terms. People involved never complete a job; they just perform piecemeal tasks and make sure their departmental goals are reached. Classical business structure also stifles innovation and creativity in an organization because every new idea has to go up the corporate hierarchy. (Hammer et al. 1993: 12, 28, 108, 118.)

Day-to-day pressure and the force of habit mean that the established way of doing things becomes the only way. It is hard to think about them with an open mind. People in an established department [...] see themselves as specialised, experienced and knowledgeable. This illustrates a central part of the challenge of rethinking and innovating business processes. It needs an open mind, a certain level of independence and a critical attitude to things which people take for granted. (Boddy et al. 2002: 122.)

Most of the methods of BPR are borrowed from information technology and industrial engineering disciplines (Knorr 1991). Actually although some of the methods and tools used in reengineering are more novel than others, none of them are real innovations, least of all radical innovations (Grint 1993). Hammer et al. (1993: 146) present three different techniques that reengineering teams can use to help them get the ideas flowing:

- 1) Boldly apply one or more principles of reengineering
- 2) Search and destroy assumptions
- 3) Go looking for opportunities for the creative application of technology

Reengineering principles and technologies will be introduced in later chapters. The fewer and broader the processes the greater the possibility of innovation through process integration, and the greater the problems of understanding, measures, and changing the process (Tinnilä 1994: 14).

Simchi-Levi et al. (2008: 410) explains how their research reveals that companies with mature business processes and best-in-class information systems have 75 percent higher profitability than average companies. While numerous rivalling definitions and terms for business processes and business process redesign have been proposed, the essence of definitions is the same: Radical rethinking of core processes to achieve dramatic improvements in measurable procedures (Tinnilä 1994: 27).

3.2. Leading a redesign team

Companies don't reengineer processes; people do. How companies select and organize the people who actually do the reengineering is the key to the success of endeavour. It is important not just to get senior management's concurrence, but to get them to commit themselves and their best people to the effort. If companies don't put reengineering at the top of their agenda, they should leave it off entirely. (Hammer et al. 1993: 102, 170, 209.)

Most reengineering failures stem from breakdowns in leadership. It is axiomatic that reengineering never happens from the bottom up. There are two reasons why frontline employees and middle managers are unable to initiate and implement a successful reengineering effort. The first reason [...] is that people near the front lines lack the broad perspective that reengineering demands. Second, any business process inevitably crosses organizational boundaries, so

no mid-level manager will have sufficient authority to insist that such a process be transformed. Its scope will inevitably transcend his or her domain of responsibility. (Hammer et al. 1993: 107, 207-208.)

According to Hammer et al. (1993: 102) there are three different roles directly involved in redesigning of the new process: leader, process owner and reengineering team. The reengineering leader makes reengineering happen. He or she is a senior executive with enough clout to cause an organization to turn itself inside out and upside down and to persuade people to accept the radical disruptions that reengineering brings. Without a leader, an organization can do some "paper studies," can even come up with new process design concepts, but absent a leader, no reengineering will happen. Regis Filtz from Bell Atlantic state that good leader is respected by her peer group, good communicator, teacher, role model and can inspire others. (Hammer et al. 1993: 103, 195.)

Process owner, who is responsible for reengineering a specific process, should be senior-level manager, usually with line responsibility. Process owner's job is to make it happen in the small, at the individual process level. Process owners take the heat so that their teams can concentrate on making reengineering happen. (Hammer et al. 1993: 108–109.)

Hammer et al. (1993) says that redesign is best done in teams, which consist of insiders and outsiders. Insiders bring knowledge of the company and the needed process and outsiders bring disruptive power and viewpoint that hasn't grown numb to the old process. Companies also have to make sure that people in redesign team are "comfortable with change, tolerant of ambiguity and serene in adversity." Team members must also share the objective; there is no room for private agendas.

3.3. Fighting resistance

Hammer et al. (1993) demands that redesign teams must be largely self-directed. The process owner has to be considered as a client, not boss. Having great ideas is not difficult but team must have power to execute them. They can discard all functional and departmental measurement and objectives. Redesigning is going to be disruptive and create unrest within the company. Leader and process owner have to accept major changes. Sometimes ideas aren't that good but punishing the innovator when innovation fails is the best way to ensure that no one ever tries to be innovative again.

Implementation of the ideas is much more difficult and this is the area where winners and losers are separated. Members of the redesign team should be involved also in the implementation part for the sake of continuity, at least in the beginning. (Hammer et al. 1993: 113, 211.)

That people resist change, shouldn't surprise anyone, especially not those in charge of a company's reengineering effort. Resistance is an inevitable reaction to major change. Expect resistance and be prepared to deal with it (Hammer et al. 1993: 181, 212). The complexity of such change is that organizational issues and human issues [...] are all playing an important role (Boddy et al. 2002: 137). Only strong leadership from above will induce these people to accept the transformation that reengineering brings. To get people to move from where they are to where they are supposed to be requires two actions. First, they have to get unstuck from where they are. The tool that unstuck people is a wedge – the case for action. Next, the unstuck people have to be attracted to another point of view. The second is the job of a magnet – the vision. (Hammer et al. 1993: 155, 208.)

Senior managers too often overlook [...] the cardinal and continuing need to communicate, communicate, communicate so that everyone in the organization understands the method and goals of the reengineering effort. Successful reengineering leaders have learned that they always underestimate how much communicating they must do. Radical change [...] is an educational and communicating campaign that runs from reengineering's start to finish. The companies that have the most success in selling change to their employees are those that have developed the clearest message about the need for reengineering. A powerful vision contains three elements that a product of a walk in the woods usually lacks. First, it focuses on operations; second, it includes measurable objectives and metrics; and third, if it is really powerful, it changes the basis for competition in the industry. (Hammer et al. 1993: 105, 148, 156, 170.)

3.4. Redesign process

Kim (1995) has developed an approach which models a process and then uses this model to analyse the process. This model distinguishes three constructs:

- 1) Event: perceived change of status at one point in time which is of interest to the organization.
- 2) Process: activity or series of activities performed by customer or between customer and organization over time, often a response to the triggering events.
- 3) Wait: a significant average delay before start of an event or a process due to a queue or other unfavourable conditions of the organization. Most of the time in a process is taken up waiting for the next process to start.

According to Kim, redesigning should be started with the most critical process.

Before reengineering team can proceed to redesign, it needs to know some things about the existing process: what it does, how well (or poorly) it performs, and the critical issues that govern its performance. Since the team's goal is not to improve the existing process, it does not need to analyze and document it to expose all of its details. Traditional process analysis takes the process inputs and outputs as a given and looks purely inside the process to measure and examine what goes on. A reengineering team attempting to understand a process does not accept the existing output as a given. (Hammer et al. 1993: 129–130.)

The best place for the reengineering team to begin to understand a process is on the customer end. What are customers' real requirements? What problems do they have? Since the eventual goal of redesigning a process is to create one that better meets customer needs, it is critical that team truly understand these needs. What people do and what they say they do are almost never the same. A better way to acquire information about what customers do is to watch them do it. (Hammer et al. 1993: 130–131) Hammer et al. (1993: 125) say that value of the single step in process can be judged by simple question: "Does customer care?" If answer is no, then individual step is useless. Most of internal control, audits, management and reporting steps fall into that category.

3.5. Redesign solutions

Although redesign process can trigger novel innovations, some recurring solutions can be found. According to Boddy et al. (2002: 125) four simple questions can get you started:

- 1) Is it possible to eliminate process steps? Many processes contain unnecessary steps and consequently unnecessary waiting times.
- 2) Is it possible to simplify process steps? Often unnecessary forms and too many procedures are used.
- 3) Is it possible to integrate process steps? Some tasks which are separated and executed by different people or different departments can easily be done by one.
- 4) Is it possible to automate process steps? For example, can dangerous or boring work be eliminated, and is there scope for eliminating duplication in capturing and transferring data.

Basically all of these questions lead to two fundamental principles of redesign Hammer et al. (1993: 144): A) As few people as possible should be involved in the performance of a process and B) processes must be kept simple.

Hammer et al. (1993) have listed some common themes for redesigned process. First is that several jobs are combined into one. When the old process is more carefully examined, there usually lie very straightforward tasks one after the other. One people, a generalist, can handle them with little training instead of dozen other people and different departments. This leads to less waiting time, fewer errors and misunderstandings and lower process administration overhead costs.

Growing responsibility need automatically to be accompanied by the power to make decision. Vertical compression means that at the points in a process where workers used to have to go up the managerial hierarchy for an answer, they now make their own decisions. The benefits of this compression are basically the same as above – fewer delays, lower overhead costs, and better customer response. (Hammer et al. 1993: 53.)

Empowerment of the workers lead to reduced number of checks and controls which are another kind of non-value adding work that gets minimized in reengineered processes. Controls and checks are usually only internal precautions and in most cases they are merely relics from the past. (Hammer et al. 1993: 58.)

Redesigning usually helps to reorganize steps in the process into more natural order. In reengineered processes, work is sequenced in terms of what needs to follow what. "Delinearizing" processes speeds them up in two ways. First, many jobs get done simultaneously. Second, reducing the amount of time that elapses between the early and late steps of a process narrows the window for major change that might make the earlier work obsolete. Organizations therefore encounter less rework. (Hammer et al. 1993: 53–54.)

Redesigning process usually means it getting multiple versions for simple cases and for more complex cases. Traditional processes were intended to provide mass production for a mass market. All inputs were handled identically, so companies could produce uniform and consistent outputs. To meet the demands of today's environment, we need multiple versions of the same process. The decision point between processes is better to install up front. Multiple version solution should remove special cases and exceptions from the process in later stages. (Hammer et al. 1993: 55, 126.)

Finally, since the customer is the most important thing to a firm, one common redesign theme is especially made for this: A case manager, that provides a single point of contact. Acting as a buffer between the still complex process and the customer, the case manager behaves with customer as if he or she were responsible for performing the entire process. Case manager needs access to all the information systems that people actually performing the process use and

the ability to contact those people with questions and requests for further assistance when necessary. (Hammer et al. 1993: 62–63.)

3.6. Information technology

The agent that enabled [...] companies to break their old rules and create new process models was modern information technology (IT). IT acts as an enabler that allows organizations to do work in radically different ways. Its disruptive power and ability to break the rules, that limit how we conduct our work that makes it critical to companies looking for competitive advantage. (Hammer et al. 1993: 47, 91.)

Although IT has undisputed powers, concentrating too much on information systems on the expense of efficient process can be dangerous. Based on the research with SCOR model, Simchi-Levi et al. (2008: 410) found out that investing only in IT infrastructure (and not in business processes) leads to significant inefficiencies. According to Boddy et al. (2002: 134) many managers say that they have to adapt their business to the ERP (enterprise resource planning) system rather than vice versa to make the system work. The system forces the company to organize its processes in a certain prescribed way – which may lose a distinct advantage. Managers should change their structures and businesses first. When that is done they should implement the most appropriate information system to support them.

Before introducing some disruptive power of IT, we should first understand what data and information – especially good information is. Data can be text, numbers, audio, video, images, or any combination of these. Data must be processed to become information. When we process data and convert it into a

form that is useful and meaningful to decision maker, it becomes information. Human beings apply facts, principles, knowledge, experience, and intuition to convert data into information. (Gupta 1996: 12.)

Converting data into information includes several steps. First is to collect data. Next, data is classified and sorted to arrange it in a meaningful form. When processed data becomes information, it can be considered and summarized to make it more useful to the decision maker. The information is then stored carefully for future use. Finally information must be disseminated or distributed in the right format, at the right time, to the right place, and to the right people if it is to be useful. (Gupta 1996: 14.)

Boddy et al. (2002: 130–131) says that IT can help business processes in many different ways. It reduces the number of steps, departments and people involved. It also supports individuals by helping them to access data and make well-informed decisions quickly. Companies can exploit following features of information systems: integration of tasks, long distance information transfer, automation, better analysis of information with decision-making tools, filtering of information, and enhanced monitoring.

Hammer et al. (1993) introduces couple of disruptive technologies common in process redesign. First is shared databases which allow people from everywhere within the company to use information simultaneously. Today, advanced telecommunications network and handy portable computers (laptops), allow company personnel access those databases everywhere they travel. Besides better and faster access to system and crucial information, it also gives workers tools to make right decisions faster. These are called expert systems or decision support tool.

Through careful consideration and limitation of user rights, most advanced companies allow its suppliers or customers to access company's database in order to further make interactions more fluent. Inter-organizational systems are one of the latest innovations in IT today and in order to reach good level in business process and information systems, this branch need to be examined. (e.g. Hammer et al. 1993.)

3.7. Organizational changes

When a process is reengineered, jobs evolve from narrow and task-oriented to multidimensional. People who once did as they were instructed now make choices and decisions on their own instead. Assembly-line work disappears. Functional departments lose their reason for being. Managers stop acting like supervisors and behave more like coaches. Workers focus more on the customers' needs and less on their bosses'. Attitude and values change in response to new incentives. Practically every aspect of the organization is transformed, often beyond recognition. (Hammer et al. 1993: 65.)

Willcocks & Smith (1995) say also that innovation projects usually have wide consequences. They have mentioned a few most important. First is changing of the work units. Since processes break old departmental boundaries, it is very common that in a new organization there exists process team and not functional teams. Hammer et al. (1993: 66, 68–69) reminds that process team can only contain one person, a generalist, who has knowledge, power and tools to complete whole process. This leads automatically to more multi-dimensional work. As work become more multi-dimensional, it also becomes more substantive. Reengineering eliminates not just waste but non-value-adding work as well. People will spend more time doing real work.

Second consequence is that people's roles change. As we have discussed in earlier chapter, workers after redesign process have more power to make decisions. Days when people lived under natural fear of their supervisors are long gone. More power usually means more interesting job description, and therefore, better employee satisfaction. Also values and goals of the company can be brought closer to each and every worker; focus of performance shifts from activity to results and values change from protective to productive. (Willcocks et al. 1995.)

Hammer et al. (1993: 81, 205) demands senior managers to show continuous commitment during the reengineering process and after it. They must give speeches about new rules, as well as demonstrate their commitment by their personal behaviour. Workers have to be made aware of the goals and understand them. For example, an order fulfilment process that is designed to operate quickly and accurately will not do so unless the people performing it believe speed and accuracy are important.

4. REVERSE LOGISTICS

Rogers & Tibben-Lembke (1999: 2) have defined reverse logistics as:

The process of planning, implementing and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing or creating value or for proper disposal.

In the current research, the “recapturing or creating value” component of the reverse logistics process is of particular interest (Rogers et al. 1999). Reverse logistics includes asset recovery (returns, recalls, seasonal inventory, salvage, restock, obsolescent etc.), service logistics (reuse, repair, refurbishment, warranty management, reselling etc), recycling and environmental management (disposal of goods, waste and hazardous waste), and end-of-life manufacturing (e.g. source reduction, materials substitution). (Martinez 2008, Richey, Genchev & Daugherty. 2005.)

Term *reverse logistics* comes from United States. Apparently it was originally used as some sort of cover name for situations where car industry had to call back sold vehicles to factory for repair (so-called *product recall*). Nowadays it has been established to describe process in which used, damaged, or obsolete products and packing are collected back from end customer. Goal of the reverse logistics is reduction of environmental burden. At the same time it aims for cost efficiency through raw-material and energy conserving. (Karrus 2005: 278.)

Recycling can be divided into primary and secondary recycling. Primary recycling means “eternal” recycle of the raw-material without value reduction (for example noble metals like gold). In secondary recycling, value of the component and material reduces each time it is recycled. Obsolete and used component can be sold as such to secondary markets. (Karrus 2005: 284, 285.)

4.1. Green thinking

Very often new business activity, new function, or new production definition is influenced by corporate sustainability or so-called green thinking. Good examples of totally new business models are for example companies specialized in recycling of raw-material. (Karrus 2005: 278.) An overall corporate sustainability program includes people, planet and profits (Doughton 2008).

The most far-reaching approach is the value-seeking, in that companies integrate environmental activities into a business strategy and operate the firm to reduce its impact on the environment as a strategic initiative (van Hoek 1999). According to Kopicki, Berg, Legg, Dasappa & Maggioni (1993) and Walton, Handfield & Melnyk (1998) companies will only reach the final phase of environmental management when they include whole supply chain to the system. This means close relationship and integrated product design, evaluation and inbound logistics processes with suppliers, customer, and other players.

4.2. Benefits of reverse logistics

Manufacturers and their distributors must cope with an increased flow of returned products from their customers. Although the reverse supply chain of returned products represents a sizeable flow of potentially recoverable assets, only a small fraction is currently extracted by manufacturers. A large proportion of the product value erodes away in return process. Elevating the returns process to a new marketing opportunity builds a loyal customer base

and also attracts new ones (Stock, Speh & Shear 2002, Guide Jr., Souza, van Wassenhove & Blackburn 2006, Jayaraman & Luo 2007.)

Surplus is seldom considered an enchanting activity, and it rarely receives the management attention it deserves. Regardless of the lack of glamour associated with surplus materials, effective disposal of surplus produces a very handsome payoff (Lee & Dobler 1977: 363). Green logistics should be viewed as means to save costs, influence customers' buying decisions or as an independent business activity (Karrus 2005: 283). Richey et al. (2005) quotes CEO of USF Processors, Denis Reilly "a well developed and well-executed returns process is one of the few areas left for companies and managers to improve efficiencies and drop money to the bottom line."

Van Hoek (1999) explains that value-seeking approach is potential source of competitiveness and may bring company a marketing edge with environmentally conscious customers and leveraging innovation. [Companies] can eliminate unnecessary purchases of additional fixtures, avoid damage to property, lengthen the life span of fixtures and free space in back rooms (Chain Store Age 2002).

4.3. Attitudes towards reverse logistics

In many companies reverse logistics is viewed as a nuisance and felt like a headache. Competition is high and getting products out of the door in the first place is difficult enough. What happens in case of returns is barely an afterthought. Managers struggle to design, plan, and control their reverse supply chains the process returned products from customer, recover their value, and use or sell them again. Reverse logistics is too often too little problem

and returns flow completely below top management's radar. (Blackburn, Guide Jr., Souza & van Wassenhove 2004, Martinez 2008.)

But why most companies lack decent reverse logistics process? Lambert & Stock (1993) compares reverse logistics to a one-way street which you drive to opposite direction. Most of the goods go to "right" direction and systems and supporting functions as well as way-of-working is built on that foundation. Lambert et al. (1993) believe that handling product return causes nine times more costs than handling same product in forward supply chain. These costs are caused by more difficult warehousing, handling and transporting. Norek (2003) says that reverse logistics process usually requires "a series of intricate multilayered steps" which range from returns authorization to arranging transportation.

Martinez (2008) has compiled following comparison between forward and reverse logistics (see table 1).

AREA	FORWARD LOGISTICS	REVERSE LOGISTICS
Forecasting	Relatively straightforward	More difficult
Distribution	One to many	Many to one
Product quality	Uniform	Not uniform
Destination routing	Clear	Not clear
Pricing	Relatively uniform	Dependent on many factors
Disposition options	Clear	Not clear
Importance of speed	Recognized	Often not priority
Distribution costs	Visible	Less visible
Inventory management	Consistent	Not consistent

Product lifecycle	Manageable	More complex
Negotiation between parties	Straightforward	Complicated
Marketing methods	Well known	Complicated
Visibility of process	More transparent	Less transparent

Table 1: Comparison between forward and reverse logistics

Although reverse logistics is challenging process, as seen above, the problem usually lies in indifference towards very principles of business process: Lack of process owner. "There is no single person who's responsible for the overall unsaleables initiative within organizations," says Don Rombach from Genco Supply Chain Solutions. "Unsaleables cuts across the many different functional areas within a company. People change positions and people change companies. When that happens, you tend to lose some of the momentum that a company has developed in unsaleables initiatives." (Karolefski 2007.)

For any large or small supplier [...] it is crucial that returns are handled effectively. Failure to do so can affect a business' competitive edge, and subsequently its financial performance. A poor reverse logistics system can have a devastating impact on how customer views brand, and will influence how he or she interacts with it in the future. (Precision Marketing 2006.)

Richey et al. (2005) studied the role of resource commitment and innovation in reverse logistics performance. The study reveals the importance of personnel resources towards reverse logistics, especially managerial. These additional resources are needed because of the unique and special nature of reverse logistics activities. Blackburn et al. (2004) say that managers should give reverse supply chain as much attention as forward supply chain. Too much value lies in reverse supply chain to let it just go waste.

Commitment or resources has little impact on a firm's reverse logistics program performance if that commitment does not create some type of innovation. Resources must be allocated in such manner as to yield a new, innovative approach. Studies show that with larger firms, resource commitment significantly influenced innovation and, further, innovation was positively related to strategic performance and to operational service quality. With respect to reverse logistics, innovative approaches can be developed to bypass standard distribution formats used for original outbound shipments and apply special decision rules/policies for returns. (Richey et al. 2005.)

4.4. Reverse logistics strategy

Unlike forward supply chains, design strategy for reverse supply chains are relatively unexplored and underdeveloped (Blackburn et al. 2004). Many authors considers reverse logistics channel as a trade-off between efficient and responsive designs. Before choosing their course, company must know the time value of their goods and also volume of returns. Predicting the return flow characteristics is important for decisions at all levels, for example, for network design at the strategic level; for procurement decisions, capacity planning, collecting policy and disposal management at the tactical level; and for production planning and inventory control at the operational level (Toktay, van der Laan & de Brito 2003).

Toktay et al. (2003) thinks that knowing certain drivers in your company would enable better decision for reverse supply chain. These drivers are product category, life-cycle length, market value of used product, customer segment, ease of return, rebate policy, etc. In determining return policies, the first step

should be to evaluate the cost of alternative return policies. To this end, a model of how return rates will be impacted by the return policy needs to be developed.

Blackburn et al. (2004) name marginal value of time (MVT) to be the most influential product characteristic for supply chain design. MVT can be viewed as a measure of clock speed. If component is innovative in nature and have high marginal value of time, in other words – its value lowers fast, best design is *responsive* reverse supply chain. For reverse supply chain design to be responsive, decisions need to be made fast, usually already in the field before returned product comes back to factory. Blackburn et al. (2004) sees two big advantages in this *decentralized* process

- 1) It reduces the time delays for disposition of new and scrap products; new, unused products tend to have the highest marginal time value and the most to lose from delays in processing.
- 2) It speeds up the processing of the remaining products – the units that need further testing and repair. By diverting the extremes of product condition (new and scrap) from the main returns flow, the flow of product requiring further evaluation, perhaps by remanufacturing specialists, is reduced.

By being able to achieve responsive reverse supply chain design, company must address two significant issues. First is the question of technical feasibility – that is, being able to determine the condition of the product return in the field quickly and inexpensively. Second is the question of how to induce the reseller to do these activities at the point of return. (Blackburn et al. 2004.)

Efficient reverse supply chains are appropriate for products with low MVT. This design is more popular simply because product return process is easier and requires less attention and innovation. Even when the situation calls for

responsive actions, many companies have efficient process design in place. This centralized, efficient supply chain embodies a fundamental design principle of forward supply chain: postponement. Postponement – or delayed product differentiation – has been used as an effective strategy for dealing with the cost of variety in forward supply chains. In this respect, efficient reverse supply chain design should be used with functional components such as tools which don't lose their value fast. (Blackburn et al. 2004.)

4.5. Essentials of good reverse logistics

Developing a good reverse supply chain requires same elements than business process redesign. Both call for best human resources, innovation and openness of information. First of all, the awareness of the importance of reverse logistics must be raised to a high level in the organization. Only way to do this let process be championed by senior management and supported by cross-functional teams. The most important part of reverse logistics is to try everything to make the whole reverse logistics process useless by eliminating the causes of returns. (Business Wire 2008.)

Reverse logistics should also go hand-in-hand with company's strategy. The process itself needs to have an owner – that someone, who has the ultimate accountability for returns and returns policy. As we learned before, good maturity level of process and information systems mean superior performance. This calls for visibility and knowledge inside the company as well as education and collaborative practices between supply chain partners work. In the best case scenario that means integrated reverse logistics system and processes with supply chain partners to support collaborative returns management initiatives. (Business Wire 2008, Simchi-Levi et al. 2008.)

Vice President of strategic initiatives for Genco, Pete Rector says that “ten years ago, a lot of merchandise was going into some of America’s finest landfills, because the return process was so complex it was easier to throw away returns and accept the loss as a cost of doing business (Chain Store Age 2002).” Martinez (2008) stress two important points of reverse logistics process: instructions have to be clear and returns have to be monitored closely. It is also important to notice that more than 75% of all returned product are not defective; they maybe just results of misleading marketing or careless purchasing. (Karolefski 2007.)

Not all reverse supply chains are identical, nor should they be. However, most return supply chains are organized to carry out five key processes (Blackburn et al. 2004):

- *Product acquisition: obtaining the used product from the user*
- *Reverse logistics: transporting the products to a facility for inspecting, sorting, and disposition*
- *Inspecting and disposition: assessing the condition of the return and making the most profitable decision for reuse*
- *Remanufacturing (also called refurbishing): returning the product to original specifications*
- *Marketing: creating secondary markets for the recovered products*

5. WAREHOUSE ACTIVITY

Warehousing and distribution centre costs include three main components (Simchi-Levi et al. 2008: 88):

- 1) Handling costs: include labour and utility costs that are proportional to annual flow through the warehouse
- 2) Fixed costs: capture all cost components that are not proportional to the amount of material that flows through the warehouse. The fixed cost is typically proportional to warehouse size (capacity) but in a nonlinear way. Cost is fixed in a certain ranges of the warehouse size.
- 3) Storage costs. These represent inventory holding costs, which are proportional to average positive inventory levels.

Inventory holding costs include, not only state taxes, property taxes, insurance on inventories, and maintenance costs, but also couple of cost area that can be eliminated or at least reduced by efficient reverse logistics. First is obsolescence cost, which derives from the risk that an item will lose some of its value because of changes in the market. Second is opportunity cost, which represent the return on investment that one would receive had money been invested in something else (e.g. the stock market) instead of inventory. (Simchi-Levi et al. 2008: 32.)

One of the most widely recognized concepts of inventory management is referred to as ABC inventory control. The objective of ABC control is to vary the expense associated with maintaining appropriate control according to the potential savings associated with a proper level of such control. In this strategy, items are classified into three categories, Class A items include all high-revenue products, which typically account for about 80-percent of annual sales and represent 20 percent of inventory SKUs (stock-keeping unit). Class B items

include products that account for about 15 percent of annual sales, while Class C products represent low-revenue items, products whose value is no more than 5 percent of sales. Because Class A items account for the major part of the business, a high-frequency periodic review policy (e.g. a weekly review) is appropriate in this case. (Hoffman & Gunders 1970: 65, Simchi-Levi et al. 2008: 56.)

5.1. Obsolescence

“Industrial surpluses” are defined as those materials which are in excess of a firm’s operational requirements. Surpluses originate from three primary sources: (1) scrap and waste; (2) surplus, obsolete, or damaged stocks; and (3) surplus, obsolete, or damaged equipment. Surpluses from production processing are inevitable but they also result from the inefficient use of production machinery, carelessness, and poor purchasing. (Lee et al. 1977: 365.)

In this study, we are interested in obsolescence. Baily (1979: 160) define *obsolete* and *obsolescent* as follows:

Obsolete items are not required because requirements have changed; obsolescent items are in process of becoming obsolete, demand is declining and probably excessive stocks are held in relation to expected demand.

No component is purchased to be obsolete, they end up being obsolete. Value of the obsolete component is partly or totally lost. (Hakonen, Pöhö & Summa 1992: 10.)

According to Hakonen et al. (1992:10-11) there are two types of obsolescence: physical and technical. Physical obsolescence means that component go below

company's quality standards. Usually value of these components is totally lost but it is still possible that component can be repaired and value recovered fully. Physical obsolescence is usually easily forecasted. Technical obsolescence means that component's value decline because of general technical development or introduction of new model that replace the old one. Technical obsolescence can be planned or unplanned; value might be recovered totally or partly but sometimes only choice is to scrap component.

Obsolete stock ties up capital, clog and occupy valuable warehouse space, complicates handling, clutter records and distort accounting ratios. Many authors advise companies to clear obsolete items out and use storage areas for live stocks. Periodic inventory review policy makes it possible to identify slow-moving and obsolete products and allows management to continuously reduce inventory levels. If companies have further use for obsolete material and need to store it temporarily, they should keep them segregated. (Baily 1979: 58, Hakonen et al. 1992: 15, Simchi-Levi et al. 2008: 55, Ammer 1980: 420.)

6. ELIMINATION OF OBSOLETE MATERIAL

The buying process does not necessarily end when satisfactory material is received on schedule. The buyer also must sell surplus and scrap materials that are inevitable generated when material is used or becomes obsolete. Many authors claim that disposal and selling of obsolete material is a task for either salvage and reclamation (S&R) department or purchasing department. The basic charge management gives to its S&R department is to ensure that surpluses are disposed of with optimum profitability. To accomplish this, all of a firm's surplus materials should be handled by its S&R department. (Ammer 1980: 420, Lee et al. 1977: 368.)

Lee et al. (1977: 369) put the responsibility of reselling to purchasing department because they are best informed about materials markets, current economic market conditions, and the players in the markets such as customers, second-hand dealers and suppliers. The firm's sales department focuses its energies on selling the firm's end products in the markets for these products. It is not normally familiar with or interested in surplus markets.

First step in the process of eliminating obsolete materials is to stop ordering similar material. Also existing orders should be cancelled even if there is cancellation costs expected. Second phase is trying to use up the obsolete materials. In big company, there are many departments who may have solution, at least part of it. We already mentioned salvage and reclamation and purchasing department but also design department, or even other divisions' in the company. The most important thing is not to hang on the obsolete item without a good hint that it can be of use in the future. (Baily 1979: 58, Hakonen et al. 1992: 17.)

Throughout the literature (e.g Hakonen et al. 1992, Lee et al. 1977) there are many options given to relocate obsolete material. Despite many different terms, these options can be narrowed down to four big categories in order of recovered value:

- 1) Reusing within a company: selling as they are or refurbish
- 2) Return to supplier
- 3) Sell to secondary markets or to a private person
- 4) Donate or scrap

Each of these categories and tactics within them are discussed in the following chapters.

6.1. Reusing within a company

If possible, best option financially and sustainably is to reuse obsolete material within a company. That could mean selling it as it is, refurbishing, or returning back to production as separate components. For example some old components can be valuable to service department due to long service contracts with the customer. The firms that are pleased [with their reverse logistics process] tend to have a dedicated division handling returns, exchanges and repairs, which means they do not need to draw resources from the supply chain. (Hakonen et al. 1992: 30, Precision Marketing 2006.)

Reusing within a company calls for cross-functional process, willing cooperation and complete visibility. Reusability of the components and spare parts depends on the product design and that's why also design department and purchasing department need to be addressed with reverse logistics issues.

Sometimes immediate availability can be much more valuable than actual value of the material. This is where reverse logistics process plays important role.

6.2. Return to supplier

Simchi-Levi et al. (2008: 317) suggest that companies invest in redundancy in order to “manage the Unknown-Unknown.” Redundancy is a key challenge in risk management to design the supply chain so that it can effectively respond to unforeseen events, the unknown-unknown, without significantly increasing costs. This can be done through careful analysis of supply chain cost trade-offs so that the appropriate level of redundancy is built into supply chain. Reverse logistics sometimes fall into this category. Although product returns can sometimes be forecasted, there is always danger for larger volume of them.

Simchi-Levi et al. (2008) mention, that product return policy of strategic components' suppliers, should already be agreed in supply contract. He introduces four strategies for solving product return process: *buy-back contract*, *revenue-sharing contract*, *quantity-flexible contract* and *global optimization*. In theory, global optimization gains biggest profit for the whole supply, but similar to all strategies is risk sharing with the supplier. This type of supply contracts are rarely applied in real business life. Why? The answer has to do with various implementation drawbacks. For example, buy-back contracts require the supplier to have an effective reverse logistics system and, indeed, may increase its logistics cost. In addition, when retailers sell competing products, some under buy-back contract while others are not, they (buyers) have an incentive to push the products not under the buy-back contract. Also, most companies don't like outside parties to have such a visibility in their process and figures that these strategies would require. (Simchi-Levi et al. 2008.)

Suppliers typically allow the return of both new and used surpluses as a courtesy to good accounts. Saleable materials returned from inventory are traditionally accepted at original cost, less a nominal restocking charge. (Lee et al. 1977.)

6.3. Sell to secondary markets

In many branch, there are dealers and brokers who might be interested in buying obsolete items and then selling them forward to secondary markets. Companies can also do this by themselves if they have a good contact or a decent customer forthcoming. Simchi-Levi et al. (2008) name this operation *markdown*, or *sale* which companies can employ to get rid of the excess inventory. The concept, of markdowns is to sell the product to customers whose reservation prices were below the original price, but above the sale price. Traditionally, retailers tried to avoid markdowns because they are the evidence of mistakes in purchasing, pricing, or marketing. The low price customers are seen as less desirable or profitable, but useful to get rid of obsolete material. (Simchi-Levi et al. 2008: 390–391.)

Companies soon realize that reverse logistics management process is rarely as simple as sending a replacement or refund. It can often involve processing some items back into stock, storing damaged goods before they go back to supplier, or even disposing of hazardous waste. If companies lack skills, interest, or resources to handle the process themselves, they can outsource it. In United States there are companies which are specialized in reverse logistics management. They are called *fulfilment* houses. They can find secondary retailers, wholesalers, brokers, exporters, and on-line auctions to sell materials

forward. Outsourcing doesn't pay off that well but at least processing and warehousing costs are reduced. (Precision Marketing 2006, Anonymous 2002, The Returns Company 2008.)

6.4. Scrapping

Unless obsolete material has forthcoming demand, it doesn't have alternative costs of warehousing and should therefore be erased immediately. If there are no use for it within the company and it can't be sold to secondary markets either, it has to be scrapped. (Hakonen et al. 1992: 20.)

Scrap metals depending on existing economic conditions, are best disposed of by either a short- or long-term contract made with a local scrap dealer. The dealer getting contract should be selected from an investigation of at least three dealers. The highly competitive nature of the scrap business usually keeps the variation in bid prices within a narrow range. Local dealers have an operating and transportation advantage over more distant competitors; also, they can provide more frequent pickups and more personalized contract service. (Lee et al. 1977: 373.)

6.5. Fixing the causes

Best way to deal with reverse logistics is to eliminate reasons that cause returns in the first place. First, companies need to understand why products are returned. Was the marketing misleading? Was the material defective? Where there miscommunication during transport? Or maybe the customer didn't have

money to the product they have ordered? Although it has been stated that some returns are inevitable, there still are solutions that can reduce the number of returns to minimum. Misleading marketing can be fixed with better market communication. Defective material can be fixed with better quality control. Defective deliveries can be fixed with more careful transportation process and financial situation of the customer can be checked beforehand by pre-payment and order confirmed with written contract.

Moving one step closer toward the components themselves, product design plays a huge role in reverse logistics success. Standardisation of the product, standardisation of its sub-components and standardisation of tools and machines that built the product goes a mile when a company design its reverse logistics process and worry about the costs of product returns. When bigger parts can be used in another products and when the smaller parts can be returned to shelf the design and purchasing department have done its job remarkable. Not only the company save money in materials but it can also offer better compensation to customer if product return happens if free return time has expired. This leads of course to better customer satisfaction. (Baily 1979, van Hoek 1999.)

7. WÄRTSILÄ OVERVIEW

Wärtsilä is a global leader in complete lifecycle power solutions for marine and energy markets. By emphasising technological innovation and total efficiency, Wärtsilä maximises the environment and economic performance of the vessels and power plants of its customer. In 2008, Wärtsilä's net sales totalled EUR 4.6 billion with 19,000 employees. The company has operations in 160 locations in 70 countries around the world. (www.wartsila.com)

7.1. Wärtsilä Ship Power overview

Wärtsilä is the leading provider of ship power solutions including engines, generating sets, reduction gears, propulsion equipment, automation and power distribution systems as well as sealing solutions for the marine industry. Customer are the global or local leading companies within merchant, offshore, cruise and ferry, navy and special vessel segments. Wärtsilä command a strong position in all main marine segments as a supplier of highly rated ship machinery and systems. (www.wartsila.com)

Ship Power's vision is to be a trusted partner of shipyards and ship-owners and operators of all types of marine and offshore vessels through their life cycle, from design to services. With the broadest product and service portfolio in the industry, the ability to combine equipment and services into larger systems and solutions, and truly global sales and service network, Wärtsilä is in a unique competitive position. (www.wartsila.com)

7.2. Sustainability in Wärtsilä

Wärtsilä's mission, vision and strategy, along with its sustainable development objectives, create framework for developing the company's activities and products. They are supplemented by Wärtsilä's management system, a tool for continuous improvement, quality and occupational health and safety policy and the company's operating principles. Wärtsilä's sustainable development is based on three closely interrelated pillars: economic, environmental and social performance. Wärtsilä has endeavoured to integrate responsible conduct into its business processes. (www.wartsila.com)

8. RESEARCH METHOD

My objective is to create new and better shopping list process to recapture as much value as possible from the shopping list material. In addition to process flow chart, I will also sort our responsibilities regarding the shopping list (including job description for shopping list responsible) and make warehouse cost calculations and create initial measures to follow process performance.

Research is based on my own work experience, interviews, questionnaires, and known facts within and outside Wärtsilä Ship Power. Since the ultimate goal is to recover as much value as possible from redundant material, leaves it very wide area to work with the best solution. To add even more challenge, there is no *one* best solution. Some solution might work with the tiniest components but surely larger and more complex components calls for totally different solution.

8.1. Work experience

Best thing to learn things is to do it yourself. I first started as a delivery coordinator and then moved to operative purchasing. As an operative purchaser I have been given privilege to see reverse logistics problems of my organization from the front row. I'm daily in contact with project management, strategic purchaser, and external suppliers and it has given me lot of insight knowledge about possible solutions with reverse logistic process inside Wärtsilä. Simultaneously when working with this research I have also been operatively responsible for running the process along the way. This has also been a very unique opportunity to see the process, although preliminary, in

place. There are things that are almost impossible to detect when working with the process only on paper.

8.2. Interviews

Very early on I understood that my department need help from other departments if we are to be efficient. I interviewed my colleagues from supply management, sales department, project management, business control, project documentation etc. I went to get answers but most of the time I left with more open questions; few had any answers, least of all, solutions. Not because they didn't want to give them or don't know their work; reverse logistics issues were simply an area left untouched until now. These interviews helped me to see challenge and value of coming research.

8.3. Questionnaires

I made two questionnaires for my research. First, that studied basic info about our biggest suppliers, was aimed at strategic purchasers in my department because they have better knowledge and understanding of the suppliers. Some of these questions were answered by looking at facts from our information systems, for example order frequency, average order value and item variation. Purpose of this questionnaire was to determine which component could be easy to reuse within Wärtsilä. (See attachment 4.)

Second questionnaire was aimed directly at those same suppliers. It studied the level of their current product return process and future plans. Purpose of this

questionnaire was to determine which component might be possible to sell back to suppliers. Results of both questionnaires will be analysed in next chapter. (See attachment 3.)

9. STEPS TOWARDS THE SOLUTION

Empirical part of my research plays big role in final proposals due to the fact that little study overall on reverse logistics concentrate on business to business reverse logistics. Besides that, environment of my research is very unique. Wärtsilä Ship Power itself doesn't have any blue collar workers on its payroll. The warehouses and people working there are either outsourced or bought internally from Wärtsilä Industrial Operations. Also returning product that has been designed for one specific purpose in specific project creates huge problems and diminishes suppliers' willingness to buy it back. All of these more or less big problems in an environment that has been designed solely for forward chain activity.

9.1. Step one: Review of the current reverse logistic process

Current process, called "the shopping list" was barely functional at all. No one was really responsible for it and no one was updating it. Process also suffered from implementation of new ERP system. Process description for reusing redundant material looked fine and had been made thoroughly although it lead to a strange situation for business control department to answer questions a list about materials they didn't had good knowledge. Problem was insufficient info about the materials which was merely a result caused by almost total indifference towards the whole process. Reason for this lack of interest is easy to understand: booming business. First reverse logistics lesson learned: be proactive and design the process before it is too late.

The shopping list itself is an excel sheet (Microsoft office tool) that has general info of the material that, for some reason, are left unused in their primary project. They might belong to cancelled project, ordered with wrong specification or returns from the customer. The info on the list was too general. The main thing people need, the type name and the supplier of the product was usually missing. That made it very difficult to use for both project engineers and operative purchasers. Also some of the oldest components had purchase order numbers from old ERP system. Basically this lack of information and poor layout made it repulsive for people to use. Another big problem with the shopping list was the lack of specific rules for adding goods to shopping list. Lack of responsible people lead to situation where people considered shopping list as a dumpster, where one can simply put all kind of old material. Eventually those materials ended up being there for many years because they weren't listed and no specific info was given.

9.2. Step two: Framework for the new process

Goals

From the start I saw the potential in current reverse logistics process and I wanted to keep that name *shopping list* although it had somewhat bad reputation. First I needed to understand people who will be involved in the process and who will use the process. The internal users have to be seen as customers and treated accordingly. Reverse logistics process is naturally, and hopefully, for the company's sake, much smaller process than forward logistics process. That is why forward logistics process is familiar and convenient to use. Marketing a process that is unfamiliar and inconvenient to use is a dead end. I

wanted the process that is informative enough to be interested, simply enough to be useful and efficient enough to save money.

Perhaps the most important business process principle loses its focus in reverse logistics process: the customer. Forward supply chain always have customer that companies need to keep in mind. Then customer says that they don't need what they have ordered. What happens when you take that obvious customer out of the picture? Companies are back in small scale marketing process; suddenly finding a new customer becomes number one target. Whoever is that new customer - internal or external – it needs same special attention as the original customer. Company is still selling something; any lack of interest towards the process or the customer mean losing the deal and the money.

Ship Power is not the only division in Wärtsilä; there are also Power Plant, Services and Industrial Operations. Overlooking their ability to help is simply foolish. My biggest concern was the lack of power to utilize the help of Wärtsilä Services. Big company means irreplaceable resources but sometimes it brings too much bureaucracy for its own good. Making a process cross-functional is a walk in the park compared to making it cross-divisional. But, when redesigning the process, it is critical to make some noise, create unrest and destroy assumptions. I wanted to make sure every option within the company is investigated.

Information systems will play a big role. I wanted to make IT support the process, not shackle. In my case, reverse logistic was not built in to the system. Rather everything was against it. Basic procedures like purchasing were optimized for smooth forward logistics and using them to serve in reverse

logistics was simply impossible. Another reason to support my idea to make my own shopping list using Microsoft office tool Excel was the critical need for information quality. I wanted to sell good-looking and informative list. Making an excel-list was not originally my idea; current process also used the same program. I simply made sure that all necessary info is put into the list and fixed the layout.

Handling shopping list process in ERP-system (SAP) proved to be impossible due to couple of reasons. First of all, Wärtsilä Ship Power currently can't have anything in stock. This is due to bookkeeping reasons. To work in SAP, shopping list process needs the possibility to use stock function. Business control can run a report by network number (which is changed to each shopping list item to move the costs out of the project) by this info is nowhere near as detail as required. Also reporting a recovered value is difficult through systems. This is because savings are achieved in different ways: sometimes by cancelling existing order, sometimes by not ordering at all or simply by selling shopping list items internally or back to customer.

Responsibilities

Processes should have as few people involved as possible. In this case, when reverse logistic process is nowhere near the scale of forward logistics process, it is possible to couple of persons to be responsible for operative work. Rather than speaking about people involved in the process, it is more close to truth to be talking about people *around* the process. On the other side are people maintaining the process and on the other side are people using the process. Since I wanted to treat people using the process as customers, the idea is of course to have many of them.

Two useful tips of process redesign were utilized more than others in my research. Both relates to fact that less people maintaining the process makes more people using it happy. I wanted to use one person from Supply Management department, *shopping list responsible*, as a single contact point to anyone using the process and asking questions about it. One people from Business control department and one from documentation department will help maintaining the process but don't actively participate. They will handle the work on their side on request of the shopping list responsible, mainly update information systems accordingly. Current process needed work from project management side that actually harmed the process performance. All necessary things can be done in Supply Management department, so best leave operative work there. Thus we come to second tip: combine jobs.

Business process is not all about operative work. Reverse logistics needs also strategy and I wanted to cover that dimension. Natural selection would be strategic purchasing together with supply management director. It is important to make sure that whoever is responsible for the reverse logistics process, has the power and knowledge to negotiate and execute all possible solutions for reusing the materials. Strategic purchasers are more often in contact with the suppliers in strategic questions and can negotiate sell-back prices with them.

Some minor strategic decision might be best to leave to shopping list responsible in order to avoid pointless checks and controls with strategic purchasing. At least, when dealing with less valuable material, strategic purchasers can authorize shopping list responsible to handle communication with the supplier. I would also like to see shopping list responsible in charge of further developing current way of working and investigating new possibilities

to reuse difficult shopping list materials. That means constantly looking for internal buyers and second hand dealers.

Although I want to treat users of the process as customers, some of them would also have responsibility to play their role. That means operative purchasers, project engineers and sales support engineers. They are in the first position to reuse materials when they know the demand. The whole process has been developed for their convenient use; only thing required then is them to actually use it.

9.3. Step three: Making the shopping list

As I stated before, current shopping list was almost unusable due to insufficient info. I wanted to make sure whatever material we put on the list has all-inclusive info. Due to interviews and my own work experience the following info needed to be given (see also pictures 1 and 2):

Material type and specification details

Many columns in new shopping list cover this area. SAP order number is probably the most important. Although checking it up from the information systems is rather easy and unambiguous, it isn't visual at all in the shopping list. That is why much more guidance is needed to make the list convenient to use. I completed material info with type name, supplier name, component name, and system name (to which it belongs in the whole installation). Behind the type name I added hyperlink that directs the user to even more specific info

about the product. That means either to IDM (Internal data management), TERPS (Total Engine Room Package for auxiliary Systems), or to packing list. Complete knowledge of the component is crucial to all users. Furthermore, name of the project manager and strategic purchaser is added. They can be contacted in the most difficult or unclear situations.

Tracking details

This category is also covered with many columns, basically with info about the material that will be added to the system after purchasing it; project number and name as well as case number, measures, weight and location. This category basically helps shopping list responsible in his or her operative work with the list.

Value details

Each and every material on the list shall be given value at the time of purchasing and the current book value (-20% per year). Therefore two dates shall be written down: '*moved to shopping list*' and '*goods receipt*'. Goods receipt tells the actual date when the material has been received. The date when material is moved to shopping list helps measuring the shopping list performance. This category is mainly for strategic purchasers and supply management director to follow the value of the list and make any strategic decision needed.

SP shopping list							
Project number	Case no	project name	Project Manager	p/o no.	System	Component	Brand/Supplier
M/02894.M21	301	Volgograd 354	Atte Filppa	4500613486	Comb. air & exh. gas	Exhaust gas bellows	KE-Burgmann Bredan /
M/02894.M21	301	Volgograd 354	Atte Filppa	4500613486	Comb. air & exh. gas	Exhaust gas bellows	KE-Burgmann Bredan /
M/02894.M11	302	Volgograd 353	Atte Filppa	4500598679	Comb. air & exh. gas	Exhaust gas bellows	KE-Burgmann Bredan /
M/02894.M11	302	Volgograd 353	Atte Filppa	4500598679	Comb. air & exh. gas	Exhaust gas bellows	KE-Burgmann Bredan /
M/02967.M11	309	Qnezhsky 203	Atte Filppa	4500887566	Comb. air & exh. gas	Exhaust gas bellows	KE-Burgmann Bredan /
M/02121.M11	308	QSA 1010	Eric Quek	4500055333	Comb. air & exh. gas	Exhaust gas silencer w/ spark arrestor	JTK Power Oy
M/02121.M11	309	QSA 1010	Eric Quek	4500055333	Comb. air & exh. gas	Exhaust gas silencer w/ spark arrestor	JTK Power Oy
M/02687.M11	841	M/V Sei Whale	Atte Filppa	4500417398	Comb. air & exh. gas	Exhaust gas silencer w/ spark arrestor	JTK Power Oy
M/02894.M21	841	Volgograd 354	Atte Filppa	4500615992	Comb. air & exh. gas	Exhaust gas silencer w/ spark arrestor	JTK Power Oy
M/02894.M11	841	Volgograd 353	Atte Filppa	4500598240	Comb. air & exh. gas	Exhaust gas silencer w/ spark arrestor	JTK Power Oy
M/02417.M31	841	Hindustan 11138	Leif Rönn	4500449960	Comb. air & exh. gas	Exhaust gas silencer w/ spark arrestor	JTK Power Oy
M/02417.M41	841	Hindustan 11139	Leif Rönn	4500450451	Comb. air & exh. gas	Exhaust gas silencer w/ spark arrestor	JTK Power Oy

Type/description	Material number	Class. cert.	L	W	H	Vol	weight	Switched to shopping list	Stock	Goods receipt
US1F 0350 1 xxx		GL						29.01.2009	ABB/FF Vaasa	10.01.2008
US1F 100.245/F DN100		GL	80	60	55	0.264	56	29.01.2009	ABB/FF Vaasa	10.01.2008
US1F 0350 1 xxx		GL						29.01.2009	ABB/FF Vaasa	06.02.2008
US1F 100.245/F DN100		GL	60	80	54	0.259	59	29.01.2009	ABB/FF Vaasa	06.02.2008
UT1FE-0300.1.039 (6121ZT128)		GL	60	80	74	0.355	65	09.04.2009	ABB/FF Vaasa	19.12.2008
MS-PAEXG-WSA NS 500 / 25 DB(A)		ABS	370	145	150	8.048	1050	04.02.2009	Supplier Vöyri	30.12.2004
MS-PAEXG-WSA NS 500 / 25 DB(A)		ABS	370	145	150	8.048	1050	04.02.2009	Supplier Vöyri	30.12.2004
MS-PAEXG-WSA NS 400 / 25 DB(A)	PAAE084415	RMRS	355	130	135	6.23	950	26.06.2008	ABB/FF Vaasa	13.08.2007
MS-PAEXG-WSA NS 600 / 25 DB(A)			435	195	170	14.42	1500	04.02.2009	Supplier Vöyri	15.01.2008
MS-PAEXG-WSA NS 600 / 25 DB(A)			435	195	170	14.42	1500	04.02.2009	Supplier Vöyri	22.02.2008
MS-PAEXG-WSA NS300 35dB(A)	PAAE065179		380	110	120	5.016	750	16.4.2009	Supplier Vöyri	13.03.2008

Picture 1 and 2: The shopping list in Microsoft excel format. Hyperlinks are underlined. Value also exists but is not visible here. Yellow lines mean multiple items in one case. Automatic filters in each column make searching easier.

Avoiding information overload

Since modern world is full of information and everyone has a lot of work to do, I wanted the list to be clear and easy to use. Good visual layout and 'less is more' attitude gets best attention. Best idea is to customize the layout and material detail level by the user. For example project engineers and strategic purchasers don't need the tracking info that shopping list responsible need. Before opening the actual list, the user could choose his or her own department which gives the view and info their department usually needs. This feature is not included in my proposal yet. So far only sales department is given modified list which contains the most valuable materials.

Another way to handle list layout in excel format is using multiple sheets for different stages of the circle. Besides the actual shopping list, I have also

included *on process*, *reused*, and *resold* sheets. On process helps shopping list responsible to follow materials that are on their way to another project. It also keeps actual shopping list fresh. Two latter sheets will be discussed in later chapters.

9.4. Step four: Planning the shopping list process

Making the shopping list is totally pointless unless it has decent process to help people circulate the materials away from it. First of all, operative work needs to be controlled by one person, shopping list responsible (see attachment 2). There are two reasons: 1) decentralized responsibility leads to mess in updates on the shopping list and 2) my idea in the first place is internal customer service. In my case, reverse logistic concept is too far away from core business processes that it should be included in everyone's job description and special skills.

The list itself should be available to everyone within the company that might have a use for such materials. No limitations here; each and every door must be kept open within the company. Also an intense internal promoting of shopping list on the high level within Wärtsilä Ship Power supply management, project execution, and sales is mandatory. Shopping list itself can be stored in IDM and link to all possible users should be send regularly for example once a month (at least in times when there is much value in the list). All regular users should be given advice to add this link to their *desktop* or *favourite* folder in their browser.

Shopping list process covers phase of putting materials into the shopping list, phase of reusing them and phase of scrapping them. Time is not essential, so

best relocation option can and should be assessed carefully. Critical is that such decision is made. Process description should describe both events and responsibilities. See attachment 1 for shopping list directive and process flow.

9.5. Step five: Planning the shopping list indicators

Business processes should always be measurable. Managers need that both concrete numbers and the trend. Especially all alarming info has to be captured. In reverse logistics, that info can be slow turn over and rising warehousing costs. First I wanted to measure the overall and book value of the shopping list. That is rather easy. 20 per cent per year reduction in book value had been agreed with business control. All I need to do is to mark the price on the component on one column and the book value on the other. Then every 3 months I will reduce the book value by 5 per cent.

The first indicator (see table 2) then shows the overall value of the shopping list, book value and ratio of these two. Ratio reveals the average age of the shopping list material. Two very alarming issues can be detected at an early stage: 1) Positive trend of overall value of the shopping list, which is course negative when looked from company's point of view, and 2) Negative trend in *book value* and *value* ratio, which reveals that materials are getting older. This *turnover ratio* should be set in a level that correspond to possible storage time of the component due to technical obsolescent and physical obsolescence. In my case, two to three years (60-40%) is probably the last time to act until it is too late.

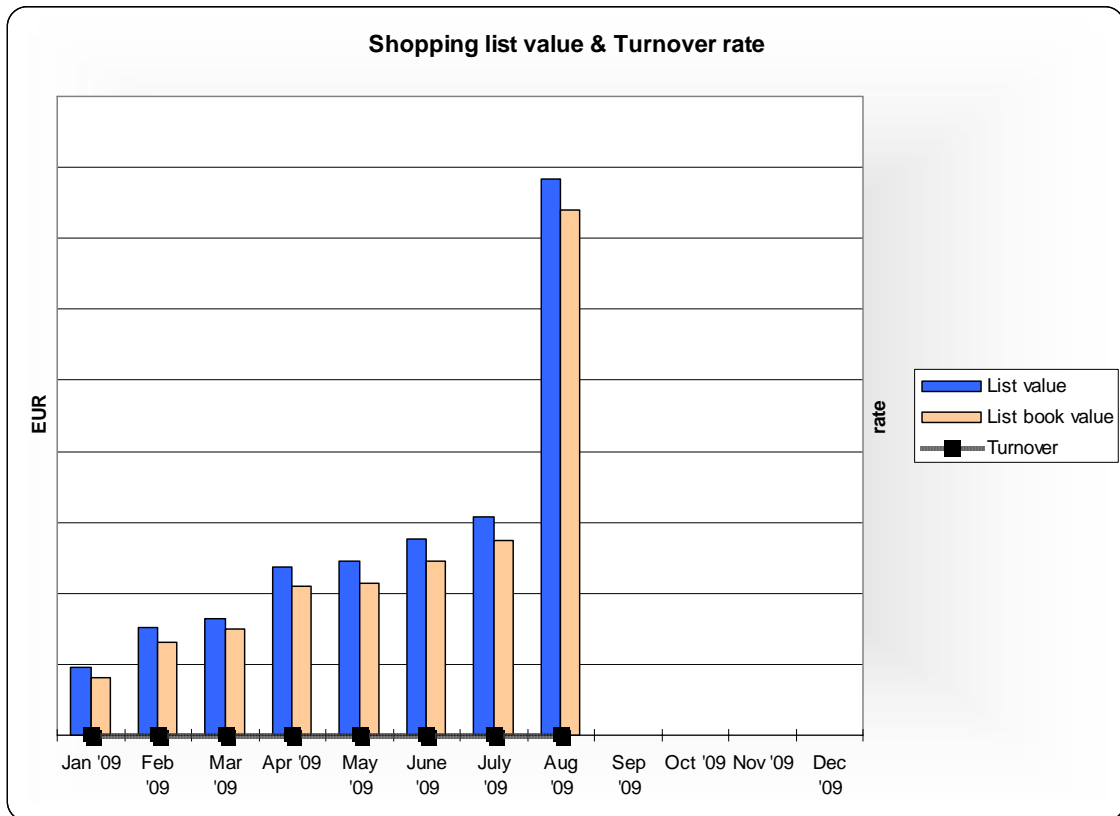


Table 2: Shopping list value and turnover rate from January to April 2009

The second indicator I wanted to measure shopping list performance but couple of traps needed to be avoided which made the indicator difficult to establish. First of all, I can't simple measure the amount of money recovered because that is highly dependable on how much the overall is shopping list value. That is why some sort of ratio is needed which gives an idea how effective is the process, the decisions made, and deals agreed with the suppliers. Both amount of the reused material and the ratio of recovered value and overall value of the reused material need to be combined. I planned to follow and reveal these indicators monthly. This makes the performance indicator automatically restless (see table 3). Mainly because some great deals would eventually make some of the months look fine although otherwise performance and interest towards the list would have been low. But anymore than one month, at least, in

difficult times is too long period that people might simply forget its necessity. Reverse logistics is constantly in danger to lose its charm.

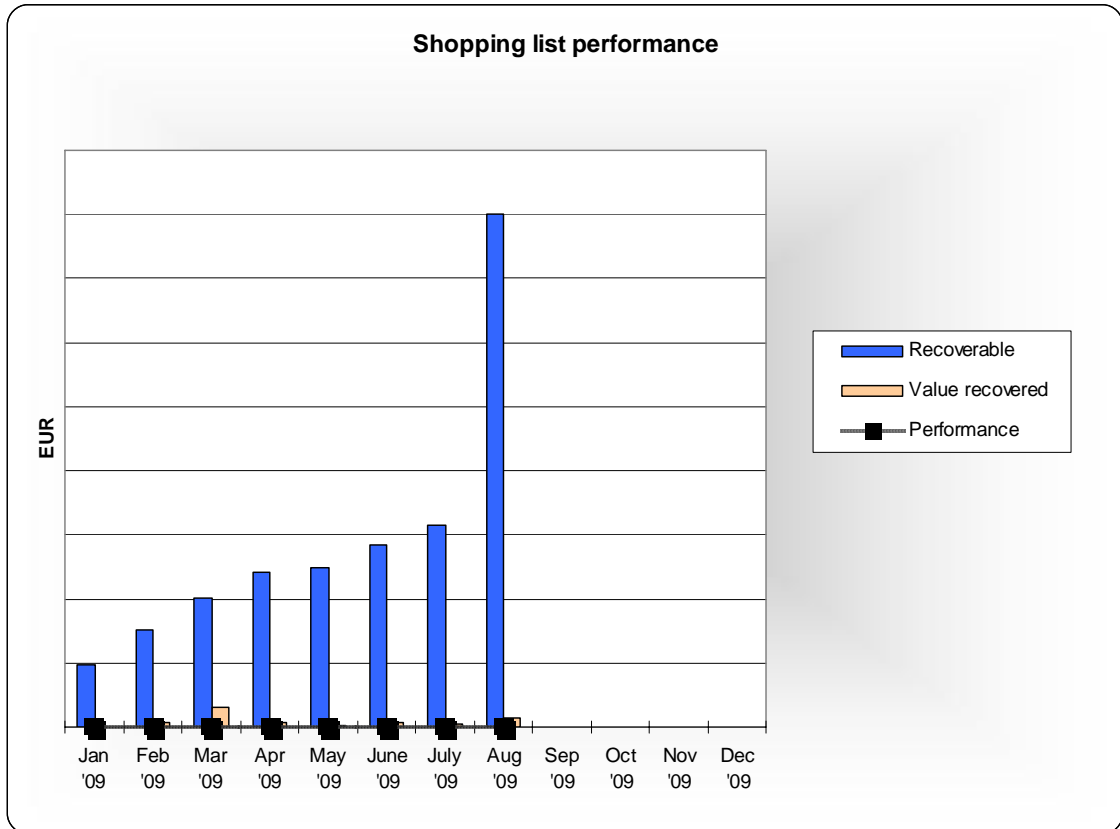


Table 3: Shopping list performance from January to April 2009

Performance is important to measure; it brings necessary goals to everyday work. But in this case, I suggest that managers and strategic purchasers keep their eyes on the first indicator and do not rest until the overall value of the list have taken slight sharp turn down and turnover ratio is solid above 90 per cent.

Supply management do not see components but external suppliers. That is why I also wanted to make more detailed indicators for strategic purchasers and show the value of the list by different suppliers. This way strategic purchaser can prioritize their actions when dealing with shopping list problems.

9.6. Step six: Storing the shopping list material

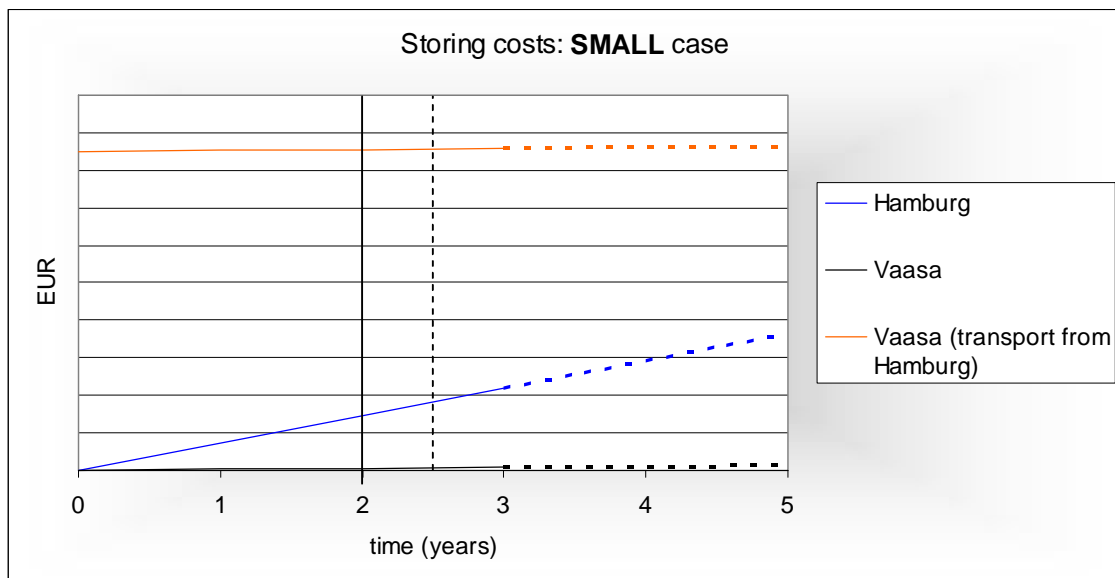
Shopping list materials don't suffer from fast value reduction. Most of the goods stay technically and physically up-to-date for couple of years. It is best to have shopping list material stored separately from other goods because they may require further handling, for example inspections and repacking. Another reason for separate storing is visual reminder about the goods.

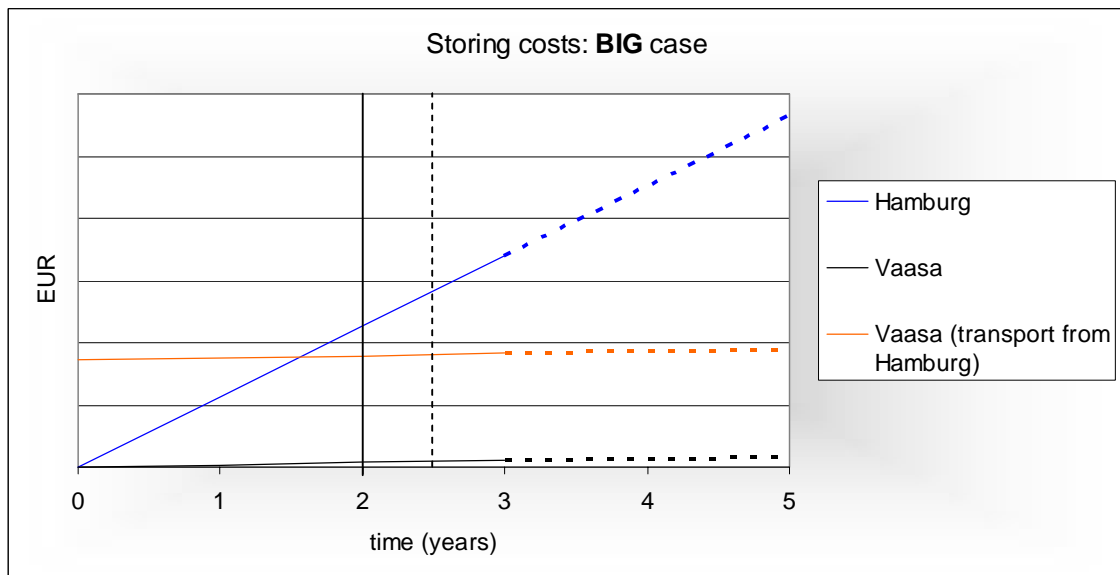
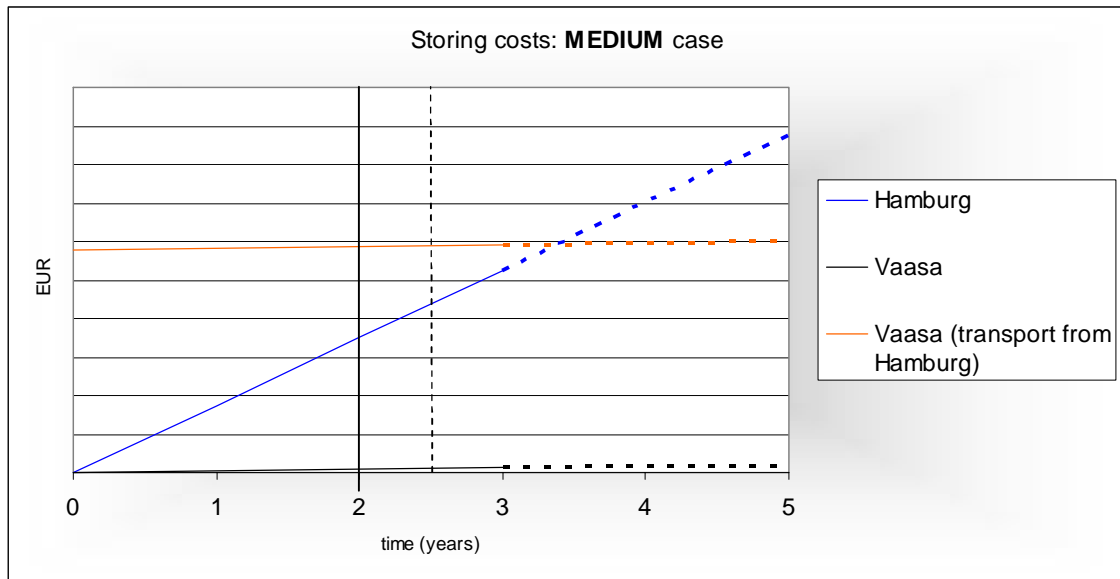
Storage space is the biggest cost of all, especially if it requires renting more space. Few companies have dedicated space for materials coming from reverse logistics channel. Wärtsilä Ship Power is supposed to have dedicated space in near future. One problem is somewhat decentralized warehousing. Two of the warehouses are in Vaasa, one in Pori, and one in Hamburg. Also some supplier store goods in their premises.

Two of these warehouses are respectable candidates for storing shopping list material: Wärtsilä's own warehouse in Vaasa and outsourced warehouse in Hamburg. Smaller warehouse in Vaasa is outsourced and Pori creates problem with handling. By far the most economical option is Wärtsilä's own warehouse in Vaasa. There are both advantages and disadvantages in collecting shopping list material to Vaasa. Big advantage is substantially cheaper price (see tables xx), better control and possibility to personally check the condition. Also repacking, which reusing of the materials may need, is more common activity in Vaasa than in Hamburg. One more problem is caused by the fact that

Hamburg warehouse activity is outsourced and every extra handling costs extra money.

On the other hand, European suppliers deliver their goods to Hamburg (as a default option) due to proximity reasons. This also means that shopping list material is more cost and time-effective to send materials back to supplier from Hamburg than from Vaasa. For example modification, reclassification or plain sell back requires that action.





Tables 4, 5 and 6: Storing cost comparison in three example cases: small ($0,22\text{m}^3$), medium ($0,95\text{m}^3$) and big ($6,03\text{m}^3$).

I have gathered storing cost comparison for three example cases: small case (volume: $0,22\text{m}^3$), medium case ($0,95\text{m}^3$) and big case ($6,03\text{m}^3$). In each case I compare storing costs in 1) Hamburg, 2) Vaasa and in 3) Vaasa after the case has been transported there from Hamburg. As the graphic shows, usually there is no point collecting materials only to Vaasa, if shopping list process works

well and average turnover stays above two years. So materials should stay where they are stored at the moment they are moved to shopping list with following exceptions:

a) Rather invaluable material from Finnish suppliers that is stored at Hamburg and almost impossible to reuse as they are due to their packing manner. For example quantity of flexible hoses varies from order to order but they are always packed in one case. These cases should either be taken back to Finland, sell back to supplier or scrap immediately. Cost calculation in those cases is irrelevant.

b) Highly valuable and complex material that is difficult to reuse in short time (within one year) should be collected to Vaasa or at least sold immediately back to supplier or second hand dealer.

Shopping list responsible shall be contact person to warehouse operatives. To make things happen smoother in the future, it is good to visit warehouses and meet the people from time to time. Each warehouse should have also one person handling all shopping list issues and requests.

One crucial thing to avoid is using shopping list as a dumping ground for all old material. Shopping list should only have material that is either unused or otherwise in perfect condition. Everything has to be sell-able at least after little inspection or refurbishing. This is also why one shopping list responsible makes better sense than collective maintenance; he or she can immediately deny all attempts to use the list as a way for people to wash their hands from loose spare parts and old rusted and damaged material. Useless material should not

be added to shopping list because no one can ever use it again. Handling this kind of waste should not be part of shopping list process. These materials have to be scrapped immediately.

9.7. Step seven: Recapturing value

Gathering idle materials lying in the warehouse and putting them in the form of an excel list is only one part of the shopping list process. Real savings comes from value that can be recaptured through reusing and reselling of the shopping list material. Single goal is to capture as much money as possible. Basically nothing else matters anymore. Shopping list should be distributed to wide group of people within Wärtsilä Ship Power and interested parties in other divisions. In order to get an overview of the materials and suppliers, I went through Wärtsilä Ship Power purchase order database and interviewed strategic purchasers to fill in the supplier info questionnaire (see attachment 4). This info acts as a starting point for deciding correct strategy for shopping list material by 30 biggest suppliers. Chapters below are in hierarchical order to capture as much value as possible.

Internal use

The first line of internal customers are operative purchasers whose job to make sure that no new component is bought if similar can be found from the shopping list. In difficult situation, purchaser can consult project engineer. Slight difference in component specifications should be checked with project

engineer also. Strategic purchasers can find use for the most valuable components, for example generators.

Waiting for new orders that can be fulfilled alternatively by shopping list material is not enough. Current order book has to be checked also. This can be done by shopping list responsible, strategic purchasers or operative purchasers. Whoever has the responsibility, should be allowed to have enough time to go through either their suppliers (strategic purchasers) or their orders (operative purchaser). My answer is shopping list responsible, just to make sure job gets done and more people can focus on their normal daily work. And also, shopping list responsible can collectively discuss with strategic purchasers.

The second line of internal users are project management people, mainly project engineers who make the purchase order requisition. They shall be responsible for checking the shopping list for similar material. The third line of internal users are sales support engineers, mainly then can spot the most valuable item in very early stages of the project. They can reserve the material for specific time period and wait customer's reaction to sales offer. The last line of internal users are other divisions. First thing is to find right persons in right positions. I have contacted for example Wärtsilä Service people, Wärtsilä laboratories, and Wärtsilä training centres. It is not wise to forget unofficial channel; many people in Ship Power know colleagues from other divisions. Encouraging in this activity is part of the big marketing campaign that the shopping list needs.

Difficulties in reuse process can easily lead to lowered interest towards the shopping list. That is why it is best to have only one person responsible for handling operative issues during the shopping list process. Things need to happen fast and preferably without mistakes. Decentralized responsibility can

result in mistakes and eventually in chaos, because system-wise, the shopping list is can be difficult to handle. I like to use the term customer. Like I said before, if the shopping list responsible thinks that internal users of the list are his or her customers, everything works better and people dare to use the list. Transporting, repacking, reclassifying, and reporting the reused material shall all belong to shopping list responsible. The responsibility ends when material is ready to be used in different project, then operative purchaser shall take over.

Return to supplier

Selling shopping list material back to suppliers may even be better solution than using them within the company. In normal situations, this should not be too much of a problem. Main problem in Wärtsilä Ship Power is uniqueness of the components and systems - engines, propulsion systems, gearboxes, generators and couplings. All represent more or less project specific products. Suppliers of gearboxes, generators, couplings and many other smaller auxiliary system components are naturally reluctant to buy their products back due to this uniqueness.

Before simply asking each and every supplier their buy back price, I did a research that measures Wärtsilä Ship Power's suppliers' reverse logistics capability and willingness. I sent questionnaire to 31 biggest external supplier of Wärtsilä Ship Power (calculated by the amount of purchase orders). The questionnaire (see attachment 3) itself consists of short introduction page and second page with the six following questions:

1. Reverse logistics and product return process in your company today

2. In our company, we have recognized following common benefits of a good reverse logistics channel
3. Our dedicated resources to reverse logistics today
4. Our dedicated resources to reverse logistics in the future
5. Our contact person for future discussions in this matter
6. Other comments or questions about product return process

First four questions include alternatives and two last questions are open. The first question is the most important. I wanted to know whether supplier has full product return process, case-by-case product return process or no process at all. Most suppliers, 48%, have only case-by-case product return process (see table 4). Only 14% of the suppliers have full product return process. This single question reveals the necessity of the shopping list and shopping list process. Wärtsilä cannot simple return goods to suppliers with a good price. In most case the company is on its own.

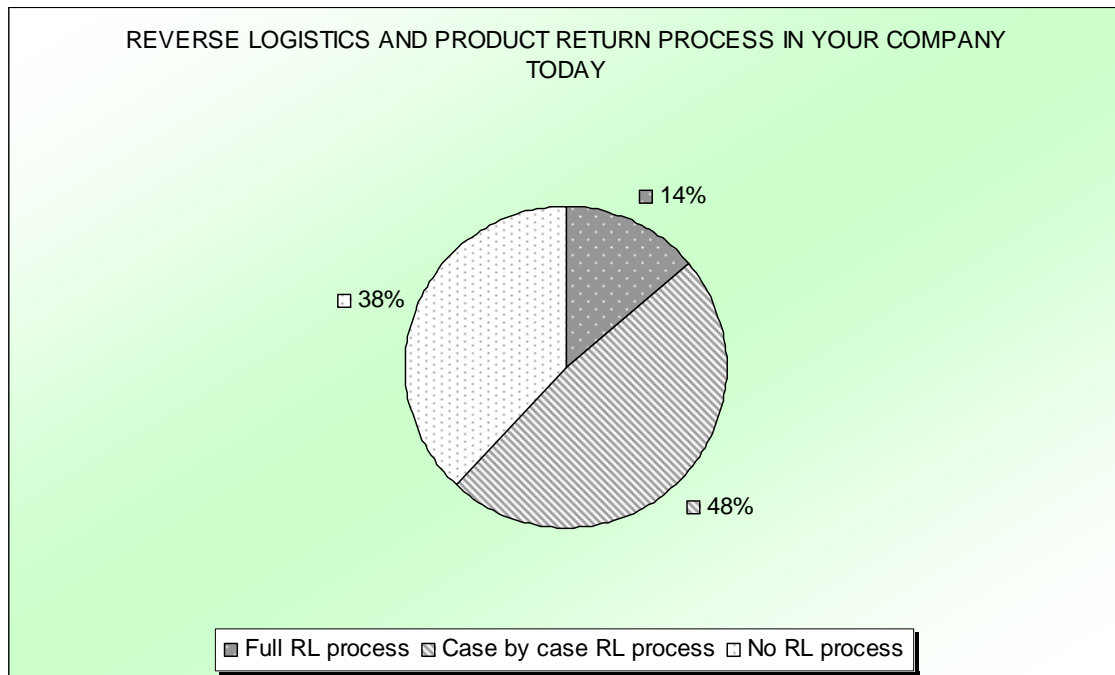


Table 7: Suppliers' product return process.

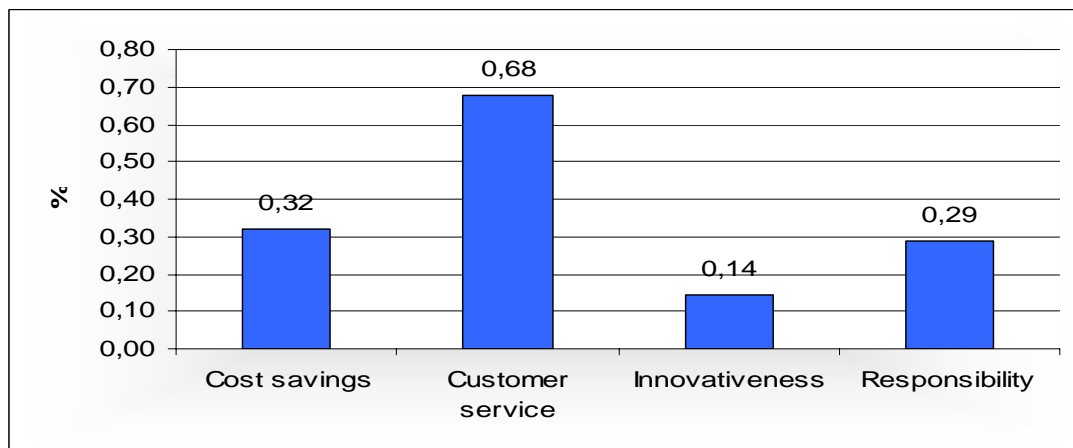
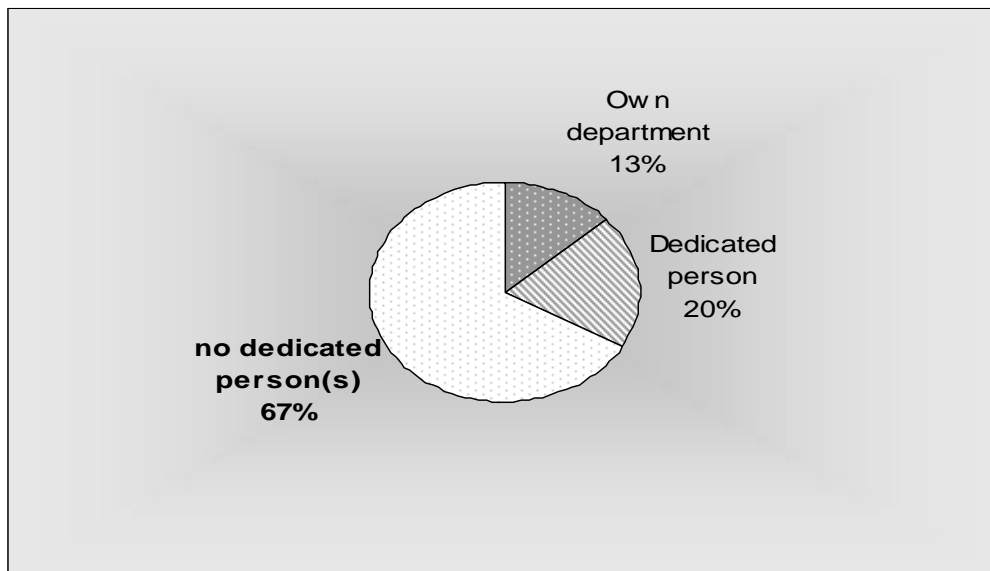


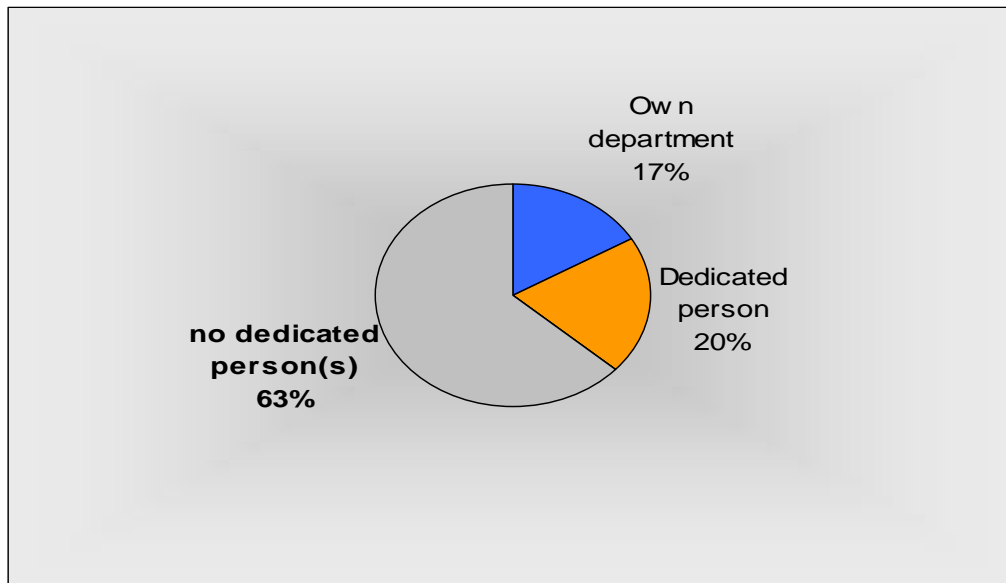
Table 8: Benefits of reverse logistics process recognized by suppliers.

68% of the suppliers have seen better customer service as a benefit of reverse logistics process; 32% of the suppliers have saved money due to it (see table 5). This indicates that companies know the benefits that product return option brings but are afraid to promise full product return option to Wärtsilä Ship

Power. It is also important in this point remember the market situation at the time I made the study. By the end of 2008, the world economy had faced its biggest crisis since the oil crisis in the 1980's. Ship industry was hit hard and many end customers had to either postpone or cancel their engine orders from Wärtsilä. Suppliers also knew the problem. They realized that taking their products back from cancelled project is probably the best idea at this point. They might end up standing idle by in their own warehouses due to lack of demand. Many suppliers also indicated that their warehouses are already full.

Although these warning signs in the business were all around, suppliers don't have plans to add more personnel resources to their reverse logistics process. This can be concluded from the questions 3 and 4 (see tables 6 and 7). 67% of the companies have no dedicated personnel to handle reverse logistics. Situation was not about to change radically in the future (question 4): 63%. 17 % of the supplier will have own department for reverse logistics in the future.





Tables 9 and 10: Suppliers' Dedicated resources to reverse logistics; today (above) and in the future (below).

Regardless of the questionnaire answers, suppliers' willingness to buy back the shopping list material should always be asked - especially, if there is a change to ask for a package deal for multiple components. Not only closing this one deal, it paves the way for coming interaction in similar matter. The shopping list material which is difficult to reuse due to the packing procedure (multiple components in same seaworthy packing) should be sold back to supplier because handling them internally without warehouse activity in information systems is very difficult and time consuming. Due to this overall complexity (uniqueness of the components and reclassification needs) of reusing the components, there surely will be situations when supplier's offer for buy back is unflattering but simply necessary to accept. Best option is to include buy-back option in supply agreement which can be fulfilled on Wärtsilä's request.

One option has proved to be more fertile with many suppliers: re-modification. If supplier is reluctant to buy back their components or their offer is not good, it

might be better idea to check their price for re-modification of the shopping list component to match the new or existing order. Suppliers feel much more comfortable if they can be sure that the shopping list materials don't end up lying in their own warehouse for years to come. In order to avoid future problems and make shopping list process smoother in this step, it is best to negotiate buy back option already in supply contract.

Sell to secondary markets or scrap

Selling shopping list material to secondary markets or scrapping it should be the final desperate choice. Finding good dealer or broker specialized in used components is better option than scrapping. Although getting rid of valuable material is painful, it is far better than storing same material in company's warehouse for five more years. The money is basically nothing but more valuable is the storage space that can now be used for live stock.

Getting rid of the goods that Wärtsilä Ship Power (or other divisions) can't use itself should be organized every six months. Strategic purchasers and supply management director should go through the list of all shopping list material more than two years old and inform the shopping list responsible which material should still be kept in shopping list. For every saved component, there has to be very convincing explanation. All other material should be moved to "to be scrapped" list and stay there for other 6 months. Material is now available for everyone with substantial discount (for example -75% to -90%). All remaining items in "to be scrapped" list should then be sold to secondary

markets or scrap after six month period. This two and a half year should be enough time to find every material a new home if there is meant to be one.

Another thing is loose spare parts, open boxes without proper identification numbers and returns from customer. As I said before shopping list responsible shall only accept recognisable material (complete info available) to shopping list. Find person responsible or get rid of any old unrecognisable material as fast as possible, unless it looks very valuable, say, generator or coupling. It is not uncommon that some other division has found a way to infiltrate goods into your warehouse. Wärtsilä Ship Power auxiliary system consist of components from external suppliers, all damaged material should be send to these suppliers.

9.8. Step eight: Fixing the causes

Frankly speaking, this step eight is probably the most important step. Basically all previous seven steps can be made pointless if Wärtsilä Ship Power can identify and eliminate the reasons why materials end up in the shopping list in the first place. It is important to admit that each and every shopping list material is more or less a mistake and for every mistake there are preventive actions. Human errors occur from time to time but mistakes caused by existing processes should be analysed carefully. For example handling of project cancellation and postponements and related information flow to purchasing department has to be fast and accurate. Otherwise goods end up in the shopping list when the order could have been cancelled instead.

There are also possibilities to make the shopping list process easier by standardizing the components. Material numbers also help the shopping list responsible to relocate shopping list material to another project. Reclassification creates one big problem when reusing components internally. Whenever possible, the suppliers should provide strategic purchasers with type approvals, at least for all major classification societies. Type approvals speeds up the reclassification process and ease the workload of the shopping list responsible.

10.CONCLUSIONS

I am very pleased with my study overall. Being really in the centre of the problems and seeing those problems disappear is a sure sign of job well done. It is also easy to admit that own work experience as an operative purchaser was by far the most fruitful source of knowledge and ideas.

I was first introduced to the whole shopping list idea in March 2008. Back then it didn't seem like an important issue. It felt more like doing an inventory of old rusty components that almost everyone has forgotten and putting that inventory list online for all to see if they have time or interest - usually neither. But when world economy finally collapsed, it hit hard shipping industry and suddenly ship owners and shipyards didn't have money to buy for what they had ordered. Deals were cancelled and materials were stuck in the warehouses. Suddenly WIP (work in process; although engines were not actually in the middle of production line but shiny and ready for delivery) list of engines and shopping list of auxiliary system were on everyone's lips. To take on that huge challenge from my side in November 2008 really made me try my best. It was no old rusty material anymore; it was brand new equipment.

Luckily for me, I knew from the start that hard work would do the trick, no rocket science needed. I studied the suppliers, sent them questionnaire and riffled through our purchasing orders to get some idea of what we order and how much; which items are unique and which are standard. I talked with my supervisors, strategic purchasers, technical specialist, sales people, business control project engineers, document coordinators and VAT expert. I wanted to hear their side of the story and absorb their ideas, should they have any.

Literature had help only on higher level. Finally I chose to look into business processes and reverse logistics. I decided to apply business process redesign principles because certainly a huge improvement was needed, even though shopping list process is far from core processes within Wärtsilä Ship Power. Reverse logistics has been very common field for latest studies in logistics. The difficulties raise from the fact that mainly this literature focus on *business to customer* (so called B2C) product returns. Business to business (B2B) reverse logistics is far more uncommon. Especially when speaking about totally unused material. Why would company buy something brand new just to return in after a while – totally unused? Literature didn't really have answer for that. So I absorbed those ideas that I could and adapted them to my special situation whenever possible.

In the end it was nice to see how I and my colleagues managed to market the shopping list within Ship Power. Now I get mails regarding the shopping list daily and material is constantly moving to another project. It is rather sad to face the fact that shopping list process in this magnitude will probably never come again. The whole point in shopping list process is to keep the actual shopping list (the list of materials) at a minimum. The work is done when the list is empty.

Economical impact of the shopping list process is minimal it is compared to total revenue in Wärtsilä. But when one goes to departmental level, in this case Wärtsilä Ship Power supply management, it really starts to stand out. Sometimes long and piercing negotiations with a supplier can drop the price 10 % but reusing something that company already owns means 100% savings. Even more in practice since inbound transport costs are zero.

As mentioned before, savings in reverse logistics impacts directly the bottom line in profit and loss statement. However, that is not all the benefit the company gets. There are many indirect profits masked in such words as supplier relationship and organizational flexibility. From reverse logistics point of view it is also possible to review your forward logistics; think about product standardization for example, or packing material recycling...

10.1. Development ideas

The shopping list process is not difficult to handle if it is given proper resources. Value can be recovered through rather simple actions. I have gathered the following guidelines to conclude my study. The main problem was the lack of resources towards reverse logistics and the cure is easy to guess: reverse logistics accepted as a part of supply chain activities.

Dedicate resources

One shopping list responsible to make sure everything runs smoothly. All other users of the list have to be considered as customers although they have responsibilities in the process. Besides having someone doing the operative work, the process also needs strategic thinking and decision making. Strategic purchasers shall work closely with the shopping list responsible, especially in times when overall value of the list is increasing or material is becoming obsolete. Reporting is also required.

Make the list popular

It doesn't hurt to ensure that everyone within Wärtsilä Ship Power is aware of the shopping list. Periodical reminder of the list with link to IDM is in order. This guideline works in both ends. First, all potential shopping list material (material in good condition without destination) has to be added to the list; otherwise no one knows they even exist. Second, the users, operative purchasers, project engineers and project managers have to check shopping list first before they order anything new. Therefore shopping list link is to be made visible in TERPS also. Shopping list can also act as a last resort when customer needs something very fast.

Recapture as much value as possible

Shopping list responsible shall always go through the existing orders when new material is added the list. This is the most profitable way to recapture value. All main suppliers' buy back offers should be evaluated in case there is possibility to return multiple components at the same time or reusing is difficult due to uniqueness of the product. Furthermore, buy-back option and credit percentage of the original purchasing price should be included in supply agreement. This enables faster decision making and faster turnover. If supplier's offer is not good, next step is to ask for modification and then challenge the supplier to take further steps in their product return process.

Get rid of excess material

Materials that don't have a real change to be reused or sold back to supplier should not be kept in the warehouse just because they are too valuable to throw away. Of course every option should be examined thoroughly but if no solution is found, selling the material the dealer or scrapping it is the right choice.

Material that is over two years old should be moved to scrapping list unless it still has 100% chance it can be reused in the future.

Ensure proactive work

Shopping list process is all about handling unexpected events and the consequences of human or process errors. The best thing the company can do with its reverse logistics is to eliminate the reasons for product returns. This should be done in high level co-operation with sales department, project management and supply management and Wärtsilä Service.

10.2. Further study

Further study is needed in order to find more option for reusing or selling the shopping list material. I was in contact with Wärtsilä Service things didn't get rolling. Higher level discussions have to take place. Aim should be overall benefit for whole Wärtsilä. Another option that I left out from my study was dealers and second hand markets. Eventually it turned out to be more fruitful way to discuss the sellbacks with suppliers. However this option should be analyzed carefully because it might enable getting rid of the most difficult material. Good way to start study is through Machine Tools (www.machinetools.com) which has collected used material dealers around the world.

More attention should also be paid to materials. At least the most common products that Wärtsilä Ship Power buys from external suppliers should be analyzed together with supply management, project management and technical specialists from Wärtsilä and supplier side. It is then possible to determinate

exactly how easy it is to reuse certain material based on their order quantity, product variation, product changeability, classification needs, and packing procedure. Then it is easy to decide maximum shopping list time for slightly complex products and the most complex products can then be scrapped immediately without separate handling every time.

Further study should also be pointed towards reclassification process. I was in contact with classification societies and suppliers but the overall picture, rather than separate cases, should be understood. Wärtsilä Ship Power is still missing their classification responsible. This person is needed badly not with reclassification issues only.

Study Generalization

Generalization on detailed level is difficult because companies are never the same. However, people tend to be the same, or at least tend to think alike. That is why higher reverse logistics concepts should be given thought in every company. Reverse logistics is usually forgotten because all focus is on forward logistics and developing its process. Really remarked things can be learned from reverse logistics too: savings and profit, just to mention two of them. What can be learned from this study is that even a little resource and attention given to reverse logistics result in savings that overrun the costs multiple times. Companies should also keep in mind that reverse logistics and its costs can (and usually) exist in every company; even if you don't know about it.

11. REFERENCES

- Ammer, Dean S. (1980). *Materials management and purchasing*. Homewood, Ill.: R. D. Irwin.
- Baily, Peter (1979). *Successful stock control by manual systems*. London: Gower Press.
- Blackburn, Joseph D.; V. Daniel R. Guide Jr.; Gilvan C. Souza & Luk N. van Wassenhove (2004). *Reverse Supply Chains for Commercial Returns*. California Management Review, Winter, Vol. 46, No. 2.
- Boddy, David; Albert Boonstra & Graham Kennedy (2002). *Managing information systems: an organisational perspective*. Harlow: Prentice Hall.
- Bookseller, Sep2008 Supply Chain Portfolio (2008). *The Returns Company*. Business Source Premier (EBSCO), p. 19.
- Business Wire, anonymous (2008). *Reverse Logistics: Backward Practices That Matter*. New York: Jul 24.
- Chain Store Age, anonymous (2002). *Returning value to returned merchandise*. New York: February 2002, Vol. 78, No. 2, p. 4B-6B.
- Cypress, H.L. (1994). *Re-engineering*. OR/MS Today, February.
- Davenport, T. H. & J. E. Short (1990). *The new industrial engineering: information technology and Business Process Redesign*. Sloan Management Review: Summer.
- Davenport, Thomas H. (1993). *Process Innovation: Renegineering Work Through Information technology*. Boston: Harvard Business School Press.
- Doughton, Mark (2008). *Incorporate Reverse Logistics Into Your Sustainability Goals*. New York: Food logistics, June No. 105, p.20.
- Grint, Keith (1993). *Reengineering history: an analysis of Business Process Reengineering*. Management Research Papers 93/20. Templeton college, Oxford.
- Guide Jr., V. Daniel R.; Gilvan C. Souza; Luk N. van Wassenhove & Joseph D. Blackburn (2006). *Time Value of Commercial Product Returns*. Abi/Inform Global. Management Science Vol. 52, No. 8, August, p. 1200-1214.

- Gupta, Uma G. (1996). *Management information systems: a managerial perspective*. Minneapolis/St Paul: West.
- Hakonen, Tommi; Juhani Pöhö & Timo Summa (1992). *Vaihto-omaisuuden epäkuranttiuden hallinta*. Lappeenranta: Lappeenrannan teknillinen korkeakoulu.
- Hammer, Michael & James Champy (1993). *Reengineering the corporation: a manifesto for business revolution*. London: Brealey.
- Hoek, Remko I. van (1999). *From reversed logistics to green supply chains*. MCB University Press. *Supply Chain Management* Vol.4 No.3 p. 129-134.
- Hoffman, Raymond & Henry Gunders (1970). *Inventories: control, costing, and effect upon income and taxes*. 2nd ed. New York: Ronald Pr.
- Jayaraman, Vaidyanathan & Yadong Luo (2007). *Creating Competitive Advantages Through New Value Creation: A Reverse Logistics Perspective*. Briarcliff Manor: *The Academy of Management perspectives*, May, Vol. 21, No. 2, p. 56-73
- Karolefski, John (2007). *Cracking Down On Unsaleables*. *Food Logistics*. New York: Jan/Feb, No. 92, p. 22, 24-26.
- Karrus, Kaij E. (2005). *Logistiikka*. 3.-5. ed. Helsinki: Werner Söderström Osakeyhtiö.
- Kim, Y.G. (1995). *Process modeling for BPR: event process chain approach*. *Proceedings of the 16th International Conference on Information Systems*, North-Holland, Amsterdam.
- Kopicki, R.; M.J. Berg; L. Legg; V. Dasappa & C. Maggioni (1993). *Reuse and Recycling – Reverse Logistics Opportunities*. Oak Brook, IL.: Council of Logistics Management.
- Knorr, Robert E. (1991). *Business Process Redesign: Key to Competitiveness*. *The Journal of Business Strategy*, November-December.
- Lambert, D. & J. Stock (1993). *Strategic Logistics Management*, Illinois: Irwin.
- Lee Jr., Lamar & Donald W. Dobler (1977). *Purchasing and Materials Management: Text and Cases*. 3rd Ed. United States of America: McGraw-Hill, Inc.

- MachineTools. Machine Tools website:
<http://www.machinetools.com/MT/resources/search/index.tmpl?what=machinedealer> (visited 26.8.2009) 1999-2009 MACHINEWEB
- Martinez, Rob (2008). *Returns to Sender*. Multichannel Merchant. Stamford: June Vol. 25, No. 6, p. 52
- Morrow, M & M. Hazell (1992). *Activity Mapping for Business Process Redesign*. Management Accounting, February.
- Norek, C. D. (2003). *Throwing it into reverse*. DC Velocity, Vol. 1, No. 1, p. 54-8
- Precision Marketing, anonymous (2006). *Fulfilment: Return to the fold*. London: Dec 15, p. 27-28.
- Richey, R. Glenn; Stefan. E. Genchev & Patricia J. Daugherty (2005). *The role of resource commitment and innovation in reverse logistics performance*. Emerald Group Publishing Ltd: International Journal of Physical Distribution & Logistics Management. Vol. 35 No. 4. p. 233-257.
- Rogers, D.S. & R. Tibben-Lembke (1999). *Going Backwards: Reverse logistics Trends and Practices*. Pittsburgh, PA.: RLEC Press
- Simchi-Levi, David; Philip Kaminsky & Edith Simchi-Levi (2008). *Designing and managing the supply chain: concepts, strategies, and case studies*. 3rd ed. Boston (Mass.): McGraw.Hill/Irwin
- Stock, J.; T. Speh & H. Shear (2002). *Many happy (product) returns*. Harvard Business School. Rev 80(7) 16-17.
- Tinnilä, Markku (1994). *Business process redesign concepts and perspectives*. Helsinki: Helsingin Kauppakorkeakoulu.
- Toktay, Beril; Erwin a. van der Laan & Marisa P. De Brito (2003). *Managing Product Returns: The Role of Forecasting*. ERIM Report Series Research in Management, ERS-2003-023-LIS.
- Walton, S.V.; R.B. Handfield & S.A. Melnyk (1998). *The green supply chain: integrating suppliers into environmental management processes*. International Journal of Purchasing & Materials Management, Vol. 34 No. 2, Spring, p. 2-11.

Wärtsilä – group structure (online).

<http://www.wartsila.com/en/aboutus,0,generalcontent,57FDA3AE-A342-4D95-A732-D4C4D9B1A320,92D82833-AB87-4136-8EEB-57206C6F0DCF,,7000.htm>. Accessed 21.05.2009

Wärtsilä – Mission, vision and strategy (online).

<http://www.wartsila.com/en/sustainability,0,generalcontent,ED982224-E153-4A50-AC04-1043BD75143B,2203CB43-BFA2-4064-8A9E-AF93E933EED4,,6900.htm>. Accessed 21.05.2009

Wärtsilä – Sustainability (online).


<http://www.wartsila.com/en/sustainability,0,generalcontent,61D16DFC-3025-4A64-8E77-F16F5390D6EB,98A55016-B5B8-48FB-881D-B08C4534B46A,,7300.htm>. Accessed 21.05.2009

Willcocks, L & G. Smith (1995). *IT enabled business process reengineering: organizational and human resource dimension*. Strategic Information Systems, 4(3).

Willoch, K. (1993). *Business Process Reengineering- Radical Change for a Dramatic Decade*. Presentation by Willoch Management consultants.

12. ATTACHMENTS

12.1. ATTACHMENT 1: Shopping list process

	Instruction			
	Title:	Shopping List Instruction	DocID:	-
	Author:	Tuomo Ilonen / Jussi Mäkiranta	Revision:	1
	Date:	24.5.2009	Status:	Draft
	Approved:	-	Pages:	1 (3)

Owner of the process: Ship Power Technology Supply Management, Shopping list responsible.

Purpose: The goal and purpose of this instruction is to move redundant equipment to Shopping List and from the Shopping list to other projects. Third part specifies scrapping process for obsolete shopping list material.

Abbreviations:
 SLR = shopping list responsible
 PEXE = project execution (project manager and project engineer)

ADD EQUIPMENT TO SHOPPING LIST

The process starts when some equipment has become redundant for a certain project or the scope of supply changes.

1. The responsible PEXE has to immediately inform SP Technology Supply Management (SLR and project purchaser) of changes concerning equipment in the project.
2. The PEXE is responsible for ensuring that all purchasing is stopped for the equipment concerned in the project and that all ordered equipment is analysed as follows:
 - Manufacturing not started: cancel order / purchase order requisitions / service notifications
 - The equipment is ready: see section 6
 - Manufacturing started:
 - a) Wärtsilä standard equipment: the PM is to decide if the manufacturing continues, is temporarily stopped or shall be cancelled.
 - b) Wärtsilä non standard equipment: cancel order
 - c) Auxiliary equipment: In case of high cancellation costs, strategic purchaser, SLR and PEXE shall be consulted.
3. The PEXE shall always check if redundant equipment can be moved directly to another project without shopping list process. However this shall not take longer than one day. If another project is available, SLR shall be informed and asked to fill in **Transfer Sheet**.
4. The PEXE is responsible for the equipment until input about redundant material is send to SLR and project purchaser. SLR shall then take over the process: check immediately existing orders and unreleased purchase order requisitions for similar equipment (see section 7).
5. The purchaser helps the PEXE to make necessary changes to the purchase orders. Orders, which are not delivered nor invoiced, can be transferred as such to another project. Those orders only need to be revised. All other orders (which are delivered and/or invoiced) are to be transferred to the shopping list or directly to the new project.

6. Changing and cancelling cost will remain on the original project.
7. SLR shall execute sell-back option if agreed with supplier separately or in the contract. Also SLR shall execute sell-forward option if agreed with other Wärtsilä divisions.
8. If no other option, SLR adds the redundant equipment to the shopping list and co-ordinate it to the right warehouse (if necessary). SLR will fill in the applicable information on the **Transfer Sheet** and forwards it to Assistant Controller. NOTE: damaged or unidentified equipment shall not be moved to shopping list.
9. Assistant Controller transfers the costs from the old project to the Shopping list project or to new project. SLR updates book keeping value to the Shopping List. When equipment is booked to the shopping list the value is written down by 5 % each quarter. No cost transfer actions will be performed without **Transfer Sheet**. Incomplete **Transfer Sheet** will be returned.

USE EQUIPMENT FROM SHOPPING LIST

1. The process starts already in sales department (by sales support engineer or after the Kick-off-meeting for a new project, when the responsible PEXE for that specific project, prior to any orders placed to suppliers, shall check, if there are suitable equipment on the shopping list.
2. The value of the equipment taken from the shopping list will be based on the original purchase price (including packing, manuals and classification) deducted by 5 % each quarter.
3. If suitable equipment is found from the Shopping list by the responsible sales support engineer, PEXE or Purchaser, SLR shall be contacted. SLR will prepare equipment to new project by arranging new certificate and repacking (if needed) and updating shopping list. SLR shall then fill in Transfer Sheet and send it with instructions to:
 - Assistant Controller
 - Project Purchaser
 - PEXE of the new project
 - PEXE of the old project (only if required)
 - Document coordinator


Responsibility of the equipment now transfers to new PEXE:

The PEXE is responsible for:

- distributing the information to Purchaser in order to coordinate the equipment to the right destination
- Making the material reservation with purchasing group SLI and add text "taken from the shopping list" to free text field. **POR shall not be released.**

The project purchaser is responsible for:

- coordination of the equipment with warehouse (new markings and packing list etc.)

	Instruction			
	Title:	Shopping List Instruction	DocID:	-
	Author:	Tuomo Ilonen / Jussi Mäkiranta	Revision:	1
	Date:	24.5.2009	Status:	Draft
	Approved:	-	Pages:	3 (3)

Assistant Controller shall update the accounting system. No cost transfer actions will be performed without **Transfer Sheet**. Incomplete **Transfer Sheet** will be returned.

SCRAP THE SHOPPING LIST MATERIAL

1. The process is repeated twice a year: The second of April and the first of September. SLR shall arrange a list of material older than two years (calculated from good receipt) to strategic purchasers. Strategic purchasers shall then mark equipment that need to remain in the shopping list.
2. Unmarked material will be moved to scrapping list ("to be scrapped") together with the equipment that has been mark to be scrapped the time it entered the shopping list. Material value on the scrapping list shall be reduced to 0-25% of the purchase value (this value has no effect on book value which remains -20% per year)
3. In the next six months period, items on the scrapping list are available to anyone interested, even to individual parties. Selling of equipment with very high value shall be confirmed with strategic purchaser.
4. After being in the scrapping list for six months, material will be scrapped or sold to highest bidder (dealers, brokers or education institutions etc.). SLR shall handle scrapping or selling after being confirmed by strategic purchasers and supply management director.

NOTE:

It's important that Project manager communicates with Project Engineer when equipment with significant value becomes redundant in projects. SLR shall actively find new project for shopping list material by going through existing orders. Read also *job description for Shopping list responsible*.

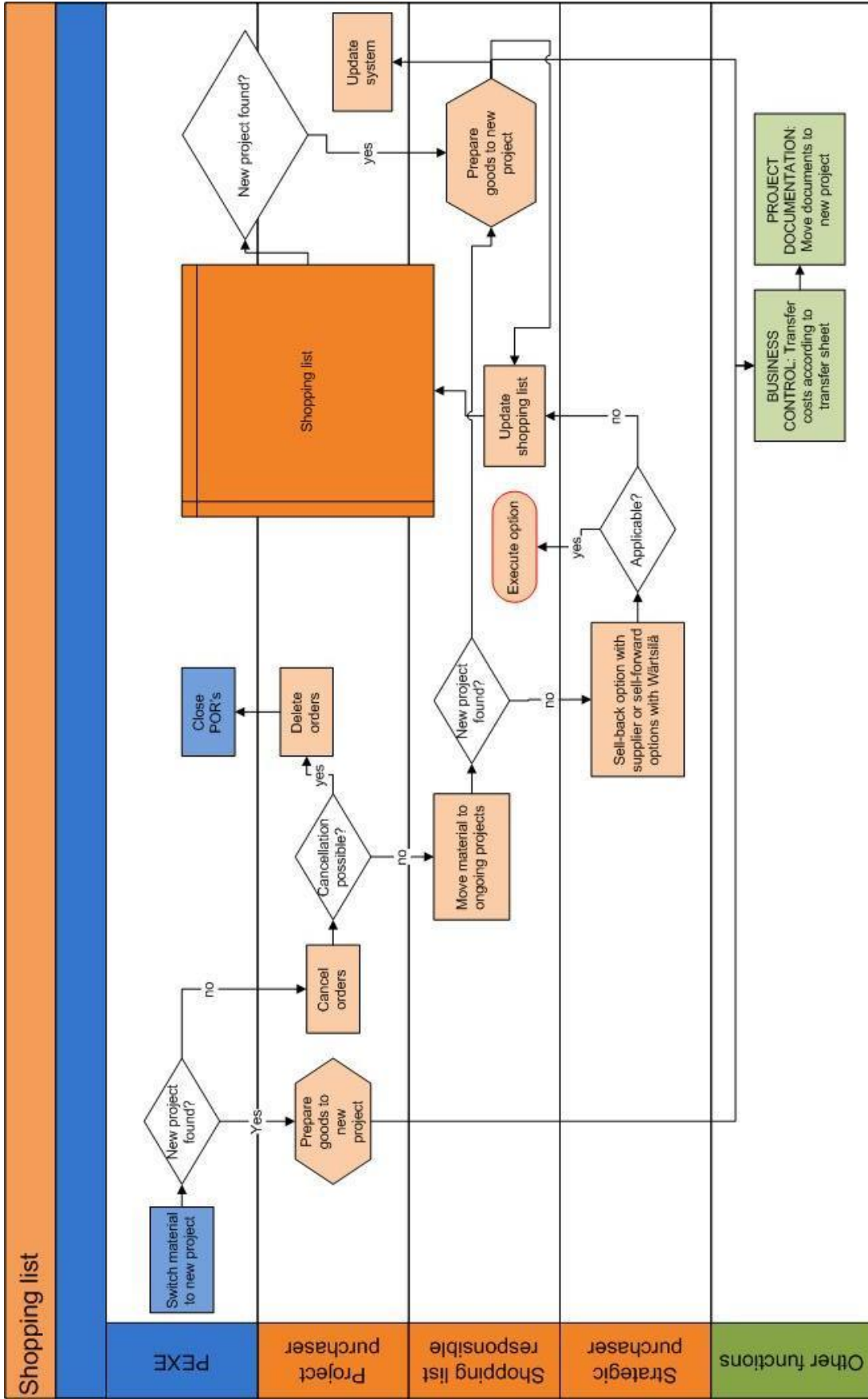
LINKS:

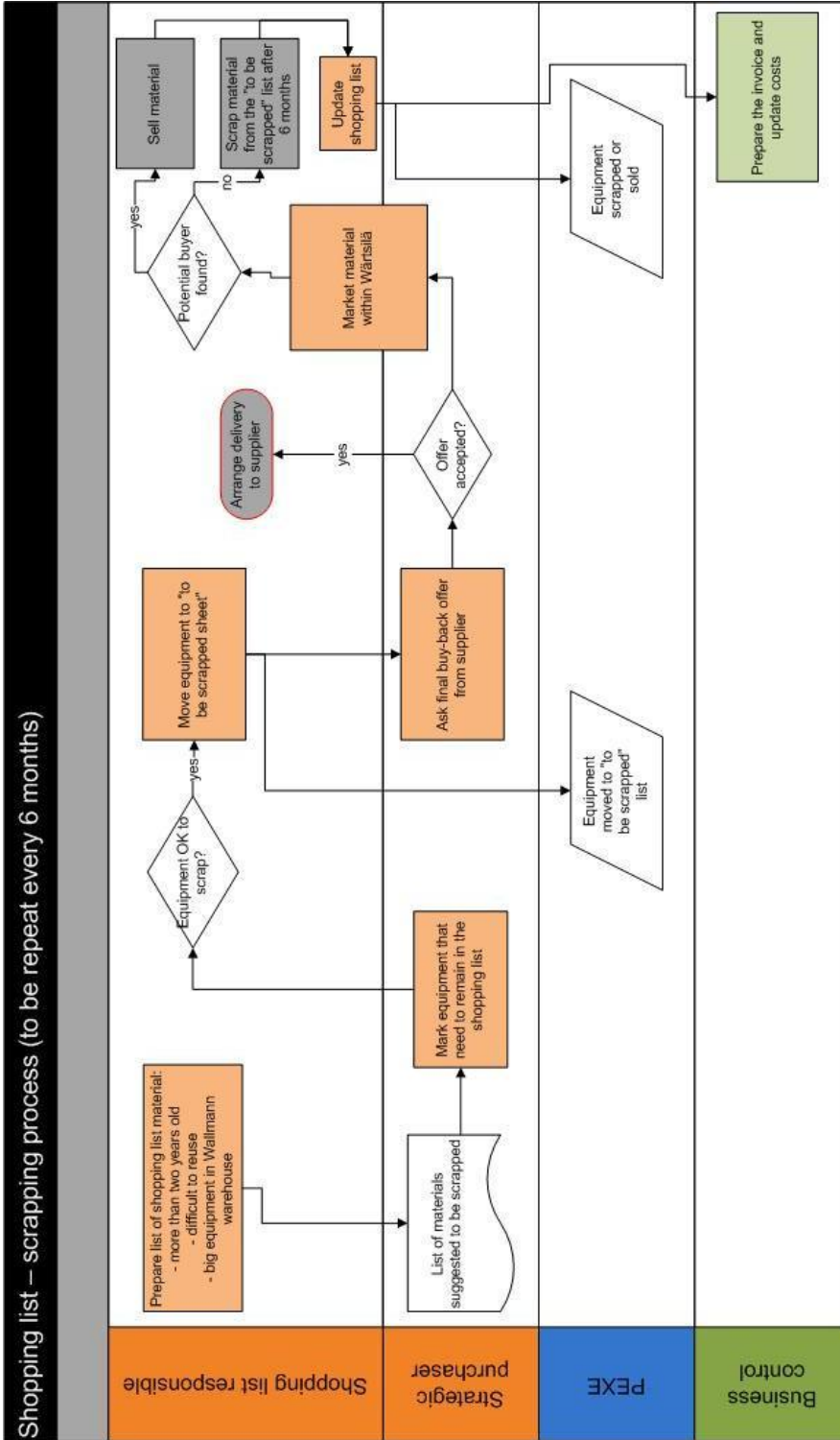
Shopping list in IDM:

https://iidm01.wnsd.com/kronodoc/2122/GetLatest/3624337/Ship_power_shopping_list.xls


Transfer Sheet in IDM:

<https://iidm01.wnsd.com/kronodoc/2122/GetLatest/3624337/Transfer%20sheet.xls>





12.2. ATTACHMENT 2: Job description - shopping list responsible

	Instruction			
	Title:	Shopping list responsible	DocID:	-
	Author:	Tuomo Ilonen	Revision:	1
	Date:	27.5.2009	Status:	Draft
	Approved:	-	Pages:	1 (2)

Purpose: The goal and purpose of this job description is to define responsibilities and tasks of shopping list responsible

Abbreviations: SLR = shopping list responsible
PEXE = project execution (project manager and project engineer)

RESPONSIBILITIES IN SHORT

1. SLR is responsible for all operative work concerning the shopping list. This includes moving material to shopping list and to another project upon requests from PEXE and Supply Management.

MAINTAINING AND REPORTING THE SHOPPING LIST

1. When equipment becomes redundant, operative purchaser or PEXE is required to notify SLR. SLR moves material to shopping list by filling new line to shopping list and sending transfer sheet to Assistant Controller. All columns in the line have to be filled in. Operative purchaser has to update systems if some info is not available.
2. SLR keeps also the list of all old material (more than two years) lying in the warehouses that are not given permission to move to shopping list. This list shall be sent every three months to concerned project managers and project engineers.
3. Whenever material is moving to another process or has been temporarily offered to customer, it shall be moved to "on process" sheet in shopping list. Whenever material is moved to another project, it shall be moved to "re-used" sheet and whenever material is sold outside Ship Power, it shall be moved to "sold outside Ship Power" sheet. All columns in the line have to be filled in. When moved to another project or sold, SLR shall fill transfer sheet and send it to Assistant Controller.
4. SLR shall send reminder to PEXE, strategic purchasers and operative purchasers once a month about the shopping list (with link to latest shopping list and updates on the process). List of receivers can also be longer; basically every interested party can be added.
5. SLR shall send detailed performance report with conclusions and proposals (if needed) once a month to strategic purchasers and purchase manager. Performance progress shall be uploaded to IDM also.

MOVING MATERIAL TO NEW PROJECT

1. SLR is responsible for preparing shopping list material to new project upon a request. This includes also repacking and reclassification if needed. Material shall be moved to "on process" sheet until it is completely prepared for new project.
2. When material is ready, SLR sends info to PEXE and operative purchaser of new project, assistant business controller and document coordinator with further instructions about system update and remarking of the case(s). If requested, this info goes also to PEXE of the old project.
3. SLR updates shopping list and moves material to "re-used" section and fill in all required info.

PROACTIVE WORK III GENERAL

1. SLR shall constantly seek new ways to recapture value of the shopping list. This means checking existing orders and replacing them with shopping list material if possible. SLR shall also look for options related to reselling or modifying the material. This includes working closely with other divisions within Wärtsilä

NOTE:

Reclassification instructions shall be presented in different directive.

LINKS:**Shopping list in IDM:**

https://fidm01.wnsd.com/kronodoc/2122/GetLatest/3624337/Ship_power_shipping_list.xls

Transfer Sheet in IDM:

<https://fidm01.wnsd.com/kronodoc/2122/GetLatest/3624337/Transfer%20sheet.xls>

12.3. ATTACHMENT 3: Reverse logistics questionnaire

Dear Madam or Sir,

My name is Tuomo Ilonen and I work as a purchaser trainee in Wärtsilä Ship Power Technology. I'm currently doing my final thesis to University of Vaasa about "value recovery through reverse logistics process" here in Wärtsilä Ship Power.

Your company is one of the most valuable suppliers to Wärtsilä Ship Power and therefore we would like you to fill the following short questionnaire about reverse logistics process and product return policy in your company. When filling the questionnaire, please take into consideration your division or segment that manufacture products that Wärtsilä Ship Power purchases.

By product return we mean returning products in the same conditions as they have left your company in the first place. Most of the returned products would come back unopened in the same seaworthy or crate packing that you originally dispatched them. We hope that this questionnaire can be used as a starting point to future discussion in this matter between your company and Wärtsilä Ship Power.

If you have any questions about this questionnaire, please contact me (tuomo.ilonen@wartsila.com). If you like to discuss about strategic decisions and future plans, please contact our strategic purchaser Ms. Firstname Lastname (Firstname.lastname@wartsila.com).

1. REVERSE LOGISTICS AND PRODUCT RETURN PROCESS IN YOUR COMPANY TODAY

- A) We have reverse logistic channel in place and resources dedicated to handle product returns effectively with minimal processing costs.
 - We are interested in implementing our existing process with Wärtsilä Ship Power.

- B) We have only a case-by-case based product return process in place.
 - We are interested in implementing our case-by-case based product return process with Wärtsilä Ship Power.

- C) We have no reverse logistics process in place today
 - Process is planned to be in place in ___ quarter of 200 ___
 - Schedule still open
 - No plans at this point

2. IN OUR COMPANY, WE HAVE RECOGNIZED FOLLOWING COMMON BENEFITS OF A GOOD REVERSE LOGISTICS CHANNEL

- Cost savings
- Enhanced customer service
- Increased innovativeness
- More responsive organization
- Other, _____

3. OUR DEDICATED RESOURCES TO REVERSE LOGISTICS TODAY

- Own department
- Dedicated person
- Outsourced
- No dedicated resources (product returns handled along with other tasks)

4. OUR DEDICATED RESOURCES TO REVERSE LOGISTICS IN THE FUTURE

- Own department
- Dedicated person
- Outsourced
- No dedicated resources (product returns handled along with other tasks)

5. OUR CONTACT PERSON FOR FUTURE DISCUSSIONS IN THIS MATTER

6. OTHER COMMENTS OR QUESTIONS ABOUT PRODUCT RETURN PROCESS

12.4. ATTACHMENT 4: Supplier info

SUPPLIER: _____

Supplier location

- Near Vaasa
 Near Hamburg
 Finland
 EU, _____
 non-EU, _____

Ship Power Strategic purchaser

Current: _____
 New: _____
 (from __, __, 2009)

Do other divisions* use same supplier:

- Same items, which: _____

 Same supplier: _____

* Power Plant, WTO, Bio

Supplier dedicated strategic purchasers

_____/_____
 _____/_____
 _____/_____
 _____/_____
 _____/_____

Supplier dedicated operative purchasers

_____/_____
 _____/_____
 _____/_____
 _____/_____
 _____/_____

Supplier contact person(s) in product returns (name/email)

Preferred supplier

- Preferred
 Neutral
 Not preferred

Order frequency

- very high (standard component)
 high
 average
 low
 very low (special case)

Comment: _____

Order frequency in future*

- much higher
 little higher
 same
 little lower

- much lower
 difficult to tell

Comment: _____

* compared to other suppliers

Average order value

- very high (more than 50 000 EUR)
 high
 average
 low
 very low (less than 500 EUR)

Average item value

- very high (more than 20 000 EUR)
 high
 average
 low
 very low (less than 100 EUR)

Item variation between orders

- Usually unique orders
 Variable
 Standard
 Same one to three items

Delivery time

- Long (over 3 months)
 Standard (2 weeks to 3 months)
 Short/Shelf item (less than 2 weeks)

Markings on the component

- usually
 stamped
 ear-marked
 seldom
 stamped
 ear-marked
 never

Wärtsilä Painting

- Usually/Always
 Seldom
 Never

Classification

- Usually/Always (avg validity: ___ years)
 Seldom (avg validity: ___ years)
 Never

Classification process

- Complex (performance test)
 Oversight

Packing

- one item / case
 two to three items / case
 more than three items / case
 supplier doesn't pack

Packing list marking

- detailed
 type, item class and main quantity
 only code and item class
 only item class

Valuable raw material(s)

- usually, what: _____
 sometimes, what: _____
 never

Item technology level*

- High
 Average
 Low

**Added value of design*

Main quantities

Component type: _____
 1. _____
 2. _____

Component type: _____
 1. _____
 2. _____

Specification strictness*

- Very strict
 Possible
 Flexible

**How easy to fit to another project.*

Wärtsilä design protection

- yes (supplier can't resell to other companies)
 no

Supplier willingness to buy back

- with almost full compensation
 cautious compensation
 salvage compensation
 not at all

Does Service use same supplier?

- Yes, they usually buy these items to us
 Yes, but different items
 No

Is item scheduled to be replaced by Service?

- Yes, very often
 Yes, seldom
 Never

How often item face unscheduled replacing by Service?

- Often
 Sometimes
 Never

Other notes/comments:
