

TUTKIMUSRAPORTTI - RESEARCH REPORT 137

Pasi Kivinen – Anita Lukka

VALUE ADDED LOGISTICAL SUPPORT SERVICE

Part 1

TRENDS AND NEW CONCEPT MODEL

**Tuotantotalouden osasto
Department of Industrial Engineering and Management**

**Lappeenrannan teknillinen korkeakoulu
Lappeenranta University of Technology**

FIN-53851 Lappeenranta, Box 20, Finland

**ISBN 951-764-694-1
ISSN 0784-7688**

Lappeenranta 2002

VALUE ADDED LOGISTICAL SUPPORT SERVICE (VALSSI):

TRENDS AND NEW CONCEPT MODEL

PASI KIVINEN – ANITA LUKKA

Lappeenranta University of Technology

ABSTRACT

The aim of ‘Valssi’ study was to find out the service requirements in ‘business-to-business’ (B2B) markets and to present a new logistics service concept, where the traditional logistics service is expanded with significant manufacturing and value added facilities. The traditional third-party logistics service providers are not necessarily able to offer services, which cover widely the needs of potential customers. The study has been outlined to spare part markets in metal industry. In the second phase of the Valssi-project the aim is to examine the economical conditions and potentiality of the new logistics business concept.

This research report (Part 1) concentrates on examining current trends in global and domestic logistics markets. Based on detailed survey among the participating companies, the study presents basis for a new logistics business concept model. The developed concept consists of 12 different service modules, which are split into deeper details of processes.

The integration of worldwide supplier and service provider network together with customer companies systems is a challenge. The report focuses on evaluating the requirements for the new business concept from the customer-companies point of view. The study paints an overall picture of distribution and service provider network including an abstract about the software and system integration possibilities.

As a result of the survey, it can be concluded that there is need for the new business concept among the participating companies, and a modular service concept meets the requirements of them, because the new sophisticated concept considers the specialities involved in spare part logistics in metal industry.

Key words: logistics, integrator, manufacturing, outsourcing, spare parts, modular concept

PREFACE

Outsourcing logistics activities is a strategic choice made by more and more companies nowadays. The requirements of customer companies are increasing constantly, which seems to lead to a fact that the logistics service providers must concentrate on their competencies in only selected business sectors. The spare part logistics in metal industry has its own specialties and requirements.

The 'Valssi'-research report is divided into three parts: Part 1, 2 and 3. Part 1 deals with logistics trends and development of new concept model for spare part logistics. Part 2 is named as 'Outsourcing Process of Spare Part Logistics in Metal Industry'. It includes guidelines for purchase of logistical services and views about the process of externalization. Part 3 deals with economical conditions and cost-benefit analysis of the new business concept.

I wish to thank Tekes, the National Technology Agency for participating in funding this project, and KONE for giving me a possibility to participate in this research project. I also want to thank the following Valssi-steering group members and their organizations for fruitful collaboration and support during the project: Heidi Lindroth (Tekes), Anita Lukka (LUT), Aarto Kivimäki (Kalmar Industries), Tapio Jämsä (KONE), Mikko Ilola (Metso Paper), Kari Suninen (Larox), Kenneth Palmgren (TNT Finland) and Kyösti Enqvist (ValLog).

I express special thanks to Anita Lukka and Aarto Kivimäki for their important overall role in realization of Valssi-project.

Lappeenranta 26th of September, 2002

Pasi Kivinen

TERMS AND ABBREVIATIONS

3G	Third-Generation
1PL	One Party Logistics
2PL	Two Party Logistics
3PL	3 rd Party Logistics
4PL	4 th Party Logistics™
ADSL	Asymmetric Digital Subscriber Line
ANI	Advanced Networking in Industry
ASL	After Sales and Logistics
ASP	Application Service Provider
B2B	Business-to-Business
BBP	Best-Business-Practice
EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
EU	European Union
FIM	Finnish Mark
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communication
IDC	International Data Corporation
ISDN	Integrated Services Digital Network
IP	Internet Protocol
IT	Information Technology
ITT	Invitation To Tender
KM	Knowledge Management
KPI	Key Performance Indicator
LAN	Local Area Network
LMS	Logistics Management System
MBO	Management-Buy-Out
MD	Managing Director
MET	Federation of Finnish Metal Industry
MLSC	Modular Logistics Service Concept
PC	Personal Computer
PDM	Product Data Management
PM	Product Management
POD	Proof of Delivery
RTSC	Real Time Supply Chain
SCM	Supply Chain Management
SME	Small and Medium Sized Enterprise
US	United States
WLAN	Wireless Local Area Network
XML	Extensible Markup Language

CONTENTS

ABSTRACT

PREFACE

TERMS AND ABBREVIATIONS

1	INTRODUCTION	7
1.1	Background	7
1.2	Aim and Method of Study	8
1.3	Outlines	8
1.4	Project Integrity and Steering Group	8
2	INTRODUCTION OF COMPANIES	9
2.1	Representatives of Customer-Companies	9
2.1.1	Kone Group	10
2.1.2	Larox Group	11
2.1.3	Metso Group	12
2.2	Representatives of Service Providers	14
2.2.1	TNT Group	14
2.2.2	ValLog Corporation	16
2.3	Research Institutions	17
2.3.1	Tekes	17
2.3.2	Lappeenranta University of Technology	19
3	LOGISTICS TRENDS	20
3.1	Global Logistics Trends	20
3.1.1	Third Party Logistics	22
3.1.2	Fourth Party Logistics	23
3.1.3	Logistics Networking	26
3.2	Logistics Trends in Finland	31
3.2.1	Networking	33
3.2.2	Electronic Business	34

3.3 Outsourcing	36
3.3.1 Advantages of Outsourcing	36
3.3.2 Disadvantages of Outsourcing	38
3.4 Process of Externalization	40
3.5 Purchase of Logistical Services	41
4 MODEL OF NEW BUSINESS CONCEPT	42
4.1 Mapping the Requirements of Research Parties	43
4.2 Synergy Benefit Survey	44
4.2.1 Warehouse Location	45
4.2.2 Warehousing Services	45
4.2.3 Transportation Services	46
4.2.4 Value Added Services	47
4.2.5 4PL Services	51
4.2.6 Ordering and Delivery Process	52
4.3 Options for New Business Concept Model	54
4.3.1 Scope of Services	55
4.3.2 Distribution	57
4.3.3 Service Provider Network	59
4.3.4 Software and System Integration	60
4.3.5 Market Environment	65
5 CONCLUSION	67
REFERENCES	71
APPENDIX 1 Rating of Services	74

1 INTRODUCTION

1.1 Background

Nowadays companies have a trend to concentrate their resources on core activities, customer relation management and development, and additionally non-core activities are outsourced or subcontracted from external parties. With aid of information systems companies are trying to improve customer service, speed-up supply chain and reduce the stocks and avoid capital investments on non-core functions. Logistics is clear competition factor in present markets, where delivery performance, speed, quality, service and cost-effectiveness play an essential role.

On the other hand customers are asking more and more services from service providers and subcontractors in order to satisfy the end-customer requirements and economical targets. The purchased logistics services are diversified and increasingly they include customer-specific features. Also the service providers require from customers substantial readiness and quality in information flows, product identification & tracability and ready-made product labels attached to delivery lots. However it is obvious that only the customers having extensive volumes and high-value products are able to provide these attributes. So in practice service providers are often in favor of high-volume customers.

Especially logistics service providers operating in global markets have high expectations for their customers concerning product identification & packaging and delivery information flows. These features are in many cases thought as self-evident, which is not the situation in practice, especially in service part operations in metal industry. For instance consumer goods business do have sophisticated logistics centers and production units, which are able to provide these features.

Due to increasing environmental concern the reverse and recycling logistic is becoming more and more as a topic in metal industry, and they are already implemented in some extent. The problem is that in many cases the service providers for the reverse and recycling logistics are different customers which do not have anything to do with for instance with the warehouse service providers. It forces the companies to put a lot of resources, time and investments on managing these different subcontractors and service providers. The problem becomes more extensive when it comes to the material suppliers. In service part operations the volumes are typically low and the supplier base is wide. The management of supplier base is very difficult and time consuming. Again the product identification, packaging and delivery information becomes a big issue. An outsourced warehouse operation is almost impossible to be managed in accordance with high quality expectations if the suppliers do not deliver goods to logistics centers in needed format. Often the suppliers are not able to supply the goods in adequate format cost-effectively.

Only in exceptional cases the warehouse service providers have readiness to support customers in technical questions. In case a customer has outsourced the logistics and manufacturing functions, the service providers lack of know-how in manufacturing or technical issues prevents to perform the day-to-day business in adequate quality level.

Due to the fact that the third-party service providers are not necessarily able to offer services needed in the logistics markets or they are they do not satisfy the current needs of potential customers, there seems to be a need for new business concept and mode of services.

This research is a natural continuation project for the EAKR-funded Tekes-project called 'After Sales and Logistics - ASL'. The ideas and basis for this research project were developed during the ASL-project in the LUT. The ASL-project includes benchmarking analysis and highlights of the findings in Best-Business-Practices (BBP) of after sales logistics to support after sales service in manufacturing industry.

1.2 Aim and Method of Study

The aim of 'Valssi' study was to find out the service requirements in 'business-to-business' (B2B) markets and to present a new logistics service concept, where the traditional logistics service is expanded with significant manufacturing and value added facilities. The traditional third-party logistics service providers are not necessarily able to offer all the services, which cover widely the needs of potential customers. The study has been outlined to spare part activities in metal industry. In the second phase of the Valssi-project the aim is to examine the economical conditions and potentiality of the new logistics business concept.

The method of study consists of three inputs that include questionnaires, interviews and site visits among participating companies. The sources, for determining what kind of logistics services there are available in markets, are international and domestic logistics magazines, publications, newspapers, Internet pages and company presentations of logistics service providers. The report includes also references to literature material.

1.3 Outlines

Every industrial business area has different features in their logistics activities even within the company (e.g. new products vs. after sales logistics). Therefore the participating companies decided to define the project outlines, which take into account specialities in their own operations.

This study was outlined to spare parts and B2B markets in metal industry by the project steering group due to the fact that the participating customer companies operate in metal industry and they have operations globally.

1.4 Project Integrity and Steering Group

This study was realized as a part of Tekes funded project "Value Added Logistics Service Support – Valssi" in Lappeenranta University of Technology.

The 'Valssi'-research report is divided into three parts: Part 1, 2 and 3. Part 1 deals with logistics trends and development of new concept model for spare part logistics.

Part 2 is named as ‘Outsourcing Process of Spare Part Logistics in Metal Industry’. It includes guidelines for purchase of logistical services and views about the process of externalization. Part 3 deals with economical conditions and cost-benefit analysis of the new business concept.

This project has a close connection to the Tekes technology program called ‘ELO’ (Elektronisen liiketoiminnan logistiikka). The purpose of ‘ELO’ (2002-2005) is to clarify for instance:

- What kind of services and service models are needed in the future
- What kind of steering-, planning- and control tools are needed for managing the logistic operations
- How the electronic business produces new requirements to logistics and what kind of new possibilities it gives for realizing and controlling the physical material flow.

The Valssi project was steered by the project steering group. The steering group had meetings quarterly. The members of steering group are presented in preface section.

The following parties participated in funding the project:

- Tekes
- KONE Group
- Metso Group
- Larox Group
- TNT Group and
- ValLog Corp.

2 INTRODUCTION OF COMPANIES

This section introduces the companies involved in Valssi project. The participating parties are divided into three categories: Customer companies, service providers, and research institutions.

2.1 Representatives of Customer-Companies

The customer companies are defined as enterprises, which purchase physical materials and logistics services from external parties (service providers). These companies have outsourced their logistics activities to third-party vendors partly or entirely or they are considering to do it in the future.

2.1.1 Kone Group

The KONE Group is a multinational company, which operates in some 50 countries. The Group consists of the parent company, KONE Corporation, and its over 150 subsidiaries.

KONE develops, manufactures, installs, modernizes and services elevators, escalators and autowalks.

The KONE Group has four different businesses: New Elevator Business (NEB), Service Elevator Business (SEB) and Escalator Business and Automatic Building Door Business.

KONE's net sales in 2000 totaled 2 602 MEUR and net income was 105,6 MEUR. Service business accounts for 58% of turnover; new elevator and escalator sales for 42%. Service business includes maintenance services, modernisation planning and technical consultation. KONE is the world's leading escalator supplier and the fourth largest elevator company operating globally. KONE services nearly 500 000 elevators and escalators and 120 000 automatic building doors under maintenance contract. KONE designs, manufactures and installs over 20 000 new elevators and escalators annually. The number of employees worldwide was 22 978 at the end of 2000 (KONE 2000).

The net sales by market areas is presented in the Figure 1.

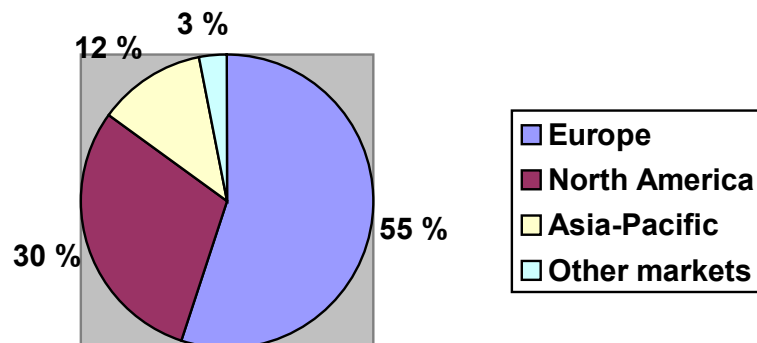


Figure 1. Net sales by market areas in KONE. (KONE 2000).

KONE acquired Partek Group in 2002, which is a specialist in container- and load-handling, forest machines and tractors, recorded sales of EUR 2.7 billion in 2001 (nearly equal to KONE's EUR 2.8 billion). Partek's number of employees at the end of the year totaled 12,447 or only slightly more than half of KONE's 22,949.

Partek is the world's number one supplier of container-handling equipment and services to ports and terminals, a global market leader in load-handling solutions for vehicles, the world's number two supplier of cut-to-length forest machines and mechanized timber harvesters, and the market-leading supplier of tractors in the Nordic countries and number two in Latin America.

After the acquisition of Partek, KONE is the biggest service and machine shop company in Scandinavia. KONE's and Partek's turnover totals 5600 MEUR (2001), and the number of employees is over 35 000.

More information about the KONE Corporation can be found in their home pages <http://www.kone.com>.

2.1.2 Larox Group

Larox is a leader in solid/liquid separation, liquid polishing filtration and valve solutions. The company is dedicated to serving the world's process industries by developing high-performance automatic pressure filters, polishing filters and pinch valve products. Larox solutions expand production capacities, simplify processes, reduce energy consumption and improve end-product quality.

Larox Group comprises seven subsidiaries and five sales offices in addition to the parent company, which is headquartered in Lappeenranta, Finland.

Since 1997, Larox Service has built a comprehensive customer support organization covering twelve countries on six continents. Larox Service's target is to have a strategically located global service network providing around-the-clock after sales service, quick response time and a highly competitive service level. Larox Service is the Larox customer's first line of contact after a start-up.

The current Larox Service product portfolio includes expertise, spare parts and modernizations. In practice this involves technical consultation and customer support, spare parts and filter cloth service, installation and start-ups, training, documentation and continuous product improvements.

Larox's net sales totalled 55,372 MEUR and operating profit was 5,555 MEUR in 2000. The group employs 256 personnel. The corporation had 50% of the total personnel in Finland and 8 % in other Nordic countries (Larox 2000).

Larox concentrates on solid/liquid separation. Mining, metallurgy and chemical processing are the biggest in need of pressure and polishing filters. In recent years the after sales business has grown quickly.

The majority of Larox's clients are either domestic or international leaders in their field of business. Larox is present with its own subsidiaries&sales offices or through its representatives in Europe (including CIS-countries), North America, South America, Africa and Asia.

More information about the Larox Corporation can be found in their home pages <http://www.larox.com>.

2.1.3 Metso Group

The aim of Metso Corporation is to be a leading knowledge-based technology company supplying innovative solutions to customers in selected areas of the process industry. Metso Corporation has four business areas.

Metso Paper develops, designs and manufactures

- Machinery and equipment for the pulp and paper industry
- Complete production lines for pulping and papermaking
- Machinery and equipment for the panelboard industry
- Machinery and equipment for the packaging and converting industries.

Metso Paper's largest business units are located in Finland, Sweden, Germany, the USA, Canada, the UK, Italy, France, Switzerland, China and Thailand.

Metso Minerals develops, designs and supplies:

- Equipment and total solutions for the crushing, grinding, screening and transportation of rock and other minerals
- Equipment and systems for the mining industry processes
- Compaction and asphalt paving equipment
- Wear protection and conveying equipment.

The main customer segments are quarries, mines and civil engineering contractors.

Metso Minerals' largest business units are located in Finland, Sweden, France, the UK, the USA, Brazil, South Africa, Canada, Germany, Australia and China.

Metso Automation develops, designs and supplies:

- Process industry automation and information management application networks and systems
- Field control solutions.

Metso Automation's main customers are the pulp and paper industry, power generation and distribution, and other process industry. The largest business units are located in Finland, the USA, Canada, Mexico, Austria, the UK, France and Germany.

Metso Ventures contains the synergetic businesses of Metso's core business areas, as well as new businesses and those, which are under strategic development. The business area comprises Metso Engineering and Valmet Automotive.

Metso Engineering develops, manufactures and supplies:

- Wind turbine gears
- Paper machine drives,
- Other industrial gears
- Hydraulic motors
- Related maintenance services
- Production and know-how services in machine building.

Metso Engineering's largest business units are located in Finland, Sweden, Germany, the USA and Canada.

Valmet Automotive is an independent contract manufacturer of specialty cars, which offers its expertise to other car manufacturers.

It has focused on the production and product development of demanding specialty cars. The automotive plant is located in Uusikaupunki, Finland.

In this project it is concentrated on Metso Paper's Service operations in Nordic countries. The units in the Nordic Countries are located in

- Metso Chemical Pulping Oy Pori Service Technology Center, Finland
- Metso Paper, Inc., Jyväskylä Service Technology Center, Finland
- Metso Paper, Inc., Järvenpää Service Technology Center, Finland
- Metso Paper, Inc., Hollola Service Point, Finland
- Valmet Mechanical Pulping Oy, Fiber Applications Service Technology Center, Valkeakoski, Finland
- Metso Paper Karlstad AB, Karlstad Service Technology Center, Sweden
- Metso Paper Sundsvall AB, Sundsvall Service Technology Center, Sweden.

Metso's net sales totalled 3 891 MEUR and net income was 389 MEUR in 2000. Metso Paper's net sales totalled 2 286 MEUR and operating result was 106,4 MEUR in 2000. On December 31, 2000, Metso Corporation employed 22 024 persons. The corporation had 50% of the total personnel in Finland and 8 % in other Nordic countries (Metso 2000).

The net sales by market areas is presented in Figure 2.

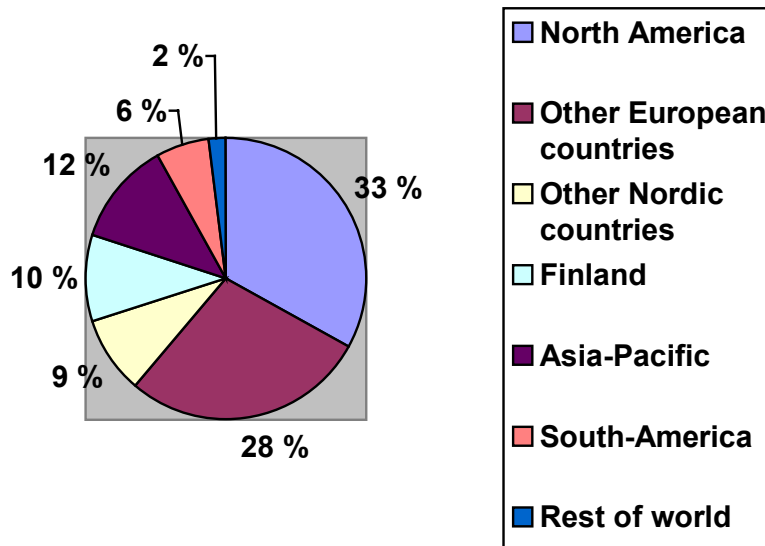


Figure 2. Net sales by market areas in Metso. (Metso 2000).

More information about the Metso Corporation can be found in their home pages <http://www.metso.com>.

2.2 Service Providers

The service providers are defined as companies, which offer physical materials or logistic services to any customer companies.

2.2.1 TNT Group

TPG (TNT Post Group) is the holding company of Royal PTT Post and TNT. They offer logistics solutions in Mail, Express and Logistics functions.

TPG is a global player, with 135,000 employees in 58 countries. TPG provides services in over 200 countries worldwide. TPG's mission is to achieve a recognised world leadership position through excellent service to customers in three divisions - Mail, Express and Logistics - based on a strong market position in Europe.

TPG's net sales totalled 9 936 MEUR and net income was 526 MEUR in 2000.

The revenues / divisions are:

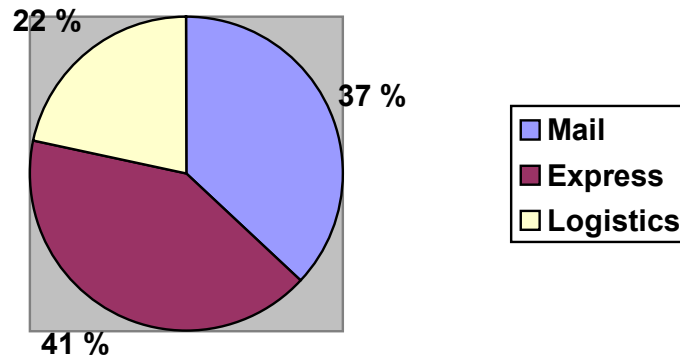


Figure 3. TPG's net sales by market areas end of 2000. (TPG 2000).

TNT Logistics designs, implements and manages complex, value-adding logistics solutions for its customers. The fundamental issue is to deliver the right product, at the right time, in the right condition at the right price. Services offered range from warehousing, transportation and distribution to total supply chain solutions.

TNT Express is one of the world's top four providers of global express distribution services. TNT provides on-demand, time-definite and day-certain delivery of documents, parcels and freight.

The core of TNT's Express strategy is:

- Maintaining a strong customer focus by creating tailored express solutions for large and mid-size customers and offering excellent customer service by applying state of the art information technology.
- Expanding capacity, coverage and technology capabilities through the addition of road and air fleet, hubs, depots and other infrastructure, and through the development of technology.
- Reducing costs and improving services by integrating its international and domestic distribution networks and offering seamless services through its air and road networks for line-haul and delivery operations.

TNT also takes care of specific industry requirements. For example TNT provides packaging and distribution solutions for businesses with biomedical and pharmaceutical samples that need to be delivered fast and with their temperature controlled.

Below some basic facts about the TNT Express (Table 1).

Table 1. TNT Express Facts. (TPG 2000).

TNT Express facts	Year 2000
Consignments carried	192 937 000
Total tonnes carried	3 204 757
Depots, jet stations and hubs	840
Number of vehicles	19 126
Company owned aircraft	61
Staff	40 000

TNT International Mail has over 80 strategically located mailing centres, serving virtually every country in the world and is supported by a globally integrated express distribution network.

TNT has close working relationships with postal authorities all over the world, providing customers with a wide choice of distribution methods and routing options (TPG 2000).

In this project the unit involved from TNT is TNT Finland. More information about the TPG Group can be found in their home pages <http://www.tntpost-group.com>.

2.2.2 ValLog Corporation

Vallog is a privately owned company founded in Hyvinkää in 2001. ValLog's history roots are in the KONE Group. ValLog used to be a KONE unit called Spares Manufacturing Center including a small logistics unit for warehousing a limited number of elevator spare parts. KONE decided to outsource this operation in spring 2001, and it was sold out on MBO (Management Buy Out) basis. Therefore a new company was established, named ValLog (ValLog 2002).

Vallog consists of two business lines: Manufacturing and Logistics. Manufacturing unit offers for instance following services:

- Turning
- Facing
- Boring
- Broaching drilling
- Welding
- Component reconditioning and repairing
- Installation and repairing activities in customers facility.

Logistics unit offers following services:

- Warehousing
- Picking
- Packing
- Packaging (individual packaging)
- Labelling

- Shipping
- Consolidation
- Export declarations
- Office rental.

ValLog is also strongly involved in developing value added services as its own operations or through its partner network. ValLog offers for instance following services:

- Procurement services (e.g. material call-offs)
- Reverse logistics
- Recycling logistics
- Packaging services
- Transportation services
- Disposal activities
- Component restoring (factory restored)
- Photographing (e.g. for spare part catalogues)
- Electronic part catalogues
- Cable cutting
- Subcontracting services for manufacturing components.

Turnover of Vallog is circa 2,5 MEUR p.a. and it employed 23 persons at the end of 2001. ValLog's service is based on modular service concept in logistics and manufacturing business.

More information about the ValLog Corporation can be found in their home pages <http://www.vallog.fi>.

2.3 Research Institutions

This section presents the research institutions and their area of expertise. The involvement of different research institutions in industrial research and development projects has become an important and significant trend in Finland, which started in 1990's.

2.3.1 Tekes

Tekes, the National Technology Agency is the main financing organization for applied and industrial research and development (R&D) in Finland. The funds for financing are awarded from state budget via the Ministry of Trade and Industry.

Tekes offers excellent channels for co-operation with Finnish companies, universities and research institutes.

Tekes' technology programmes offer excellent channels for cooperation with Finnish companies, universities and research institutes. Also foreign research institutes and enterprises are involved in Tekes technology programs.

Tekes coordinates and offers financial support for participation in international technology initiatives, including EU research programmes, EUREKA, research activities of OECD's energy organization IEA (International Energy Agency), European Cooperation in Scientific and Technical research (COST), European Space Agency (ESA) and Nordic cooperation (NI).

Tekes also offers a network of Technology Counsellors whose aim is to increase technological cooperation between their base countries and Finland.

Finland has a world-class technology in:

- Electronics and telecommunication
- Forest industries
- Production and process machinery
- Process industries
- Off-shore industries

The results of Tekes' operations are visible in the internationally competitive products, production methods and services developed by its customers and in the increase in expertise.

The Figure 4 presents R&D input in some OECD countries.

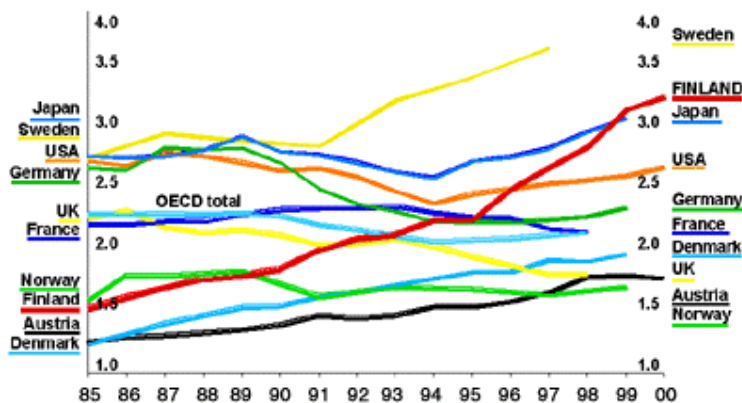


Figure 4. R&D input in some OECD countries. (Source: OECD, Main Science and Technology Indicators Database).

Technology programmes are an essential part of the Finnish innovation chain. The technology programmes aim at gaining new technology expertise and product development options in the important business areas of the future (Tekes 2001).

More information about the Tekes can be found in their home pages <http://www.tekes.fi>.

2.3.2 Lappeenranta University of Technology

Lappeenranta University of Technology (LUT) combines expertise in technology and economics. The act of the foundation of LUT was passed in 1966 and the University was opened in 1969.

Total expenditure of LUT in 1999 was FIM 200 million and external financing was about 37% - FIM 80 million (LUT, 2001).

LUT educates students in following departments for Master of Science degrees:

- Energy Technology
- Electrical Engineering
- Business Administration
- Chemical Technology
- Mechanical Engineering
- Information Technology
- Industrial Engineering and Management
- Entrepreneur training programme

and for

- Post graduate degrees
- Doctor of Technology and of Economic Sciences
- Doctor of Philosophy

LUT is involved in 10 different graduate schools. Two of these programmes are coordinated by LUT.

LUT has several operational strengths in the areas of research added with international co-operation with foreign universities. Main research areas are:

- High technology metal structures
- Learning and intelligent systems
- Data communication programs
- Separation techniques
- Technology management
- Logistics
- Energy and environmental technology
- Electric power technology
- Safety of nuclear power stations
- East-west economical relations

The department of Industrial Engineering and Management is divided in four field of study:

- Logistics
- Engineering and Technology Management
- International Operations and Information Management

- Industrial Knowledge

Professor Anita Lukka from the department of Industrial Engineering and Management is the head of the Valssi Research project.

More information about the Lappeenranta University of Technology can be found in their home pages <http://www.lut.fi>.

3 LOGISTICS TRENDS

3.1 Global Logistics Trends

The logistics costs vary extensively between the countries within Europe. According to Liikanen (2001, p. 5) the Europeans are in a weaker and challenging position because they have pay in average 16 % more compared to the companies in the United States of America and even 21 % more than the Japanese companies as far as the transportation costs are concerned. The variations in warehousing and transportation costs, property prices and interest rates are different from country to country in European markets. The influence of the European Union (EU) will harmonize these differences of course in the long run.

A remarkable area in politics in the EU is the harmonizing of pricing in transportation area. This means that there should be a system where the social cost are taken into account in transportation in the settlements and taxes. Korpela (2001, p.7) claims that the aim is not to have a centralized pricing system. The idea is to have a frame system and the member countries within the EU may decide freely about the pricing.

The global megatrends are according to Larsson (2000, p.15-18) as listed below:

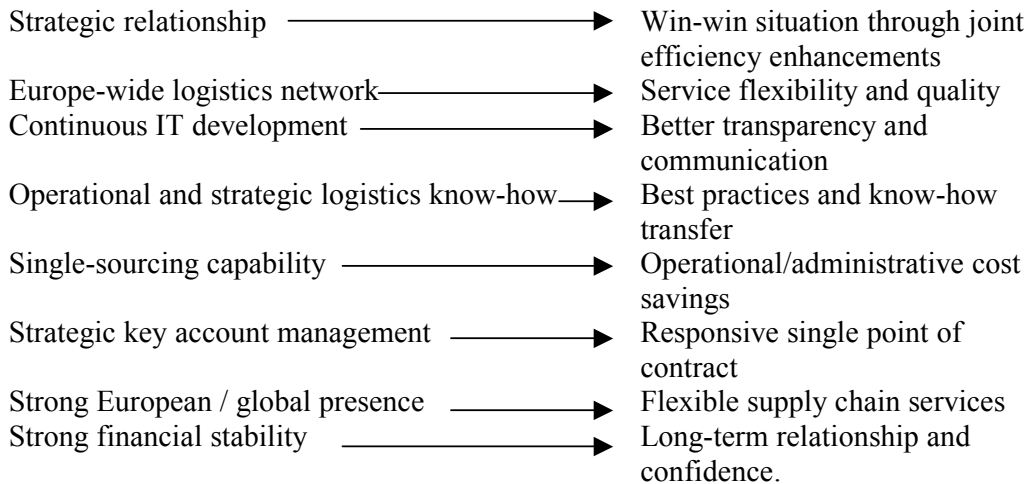
- Deregulation in all sectors in Europe, industrial concentration, globalisation
- Increasing competition
- Focus on quality, service, flexibility, low cost and efficiency
- Logistics as a strategic issue and a success factor
- Increasing outsourcing of logistics functions
- Increasing impact from e-commerce and Internet applications
- Increasing environment concerns.

The service providers must react to these trends due the fact that also the customer demands are changing. Larsson lists the customer demands in a nutshell in the following way:

- One-stop shopping approach / one face to the customer
- Global coverage
- Complete range of products / logistics services
- Supply chain solutions / collaborations
- Management / execution of customer processes

- Quality and cost focus
- Overall competence within logistics / IT and Web-systems.

Demands put on the logistics industry are increasing every day. Larsson says that competence within logistics further measures investments into supply chain management systems and competence. System, people, competence and capital are needed to satisfy increasing demands from the market. But as a result of this it is needed to build new, exclusive and long-term relationships. These relationships can be strengthened with following concentrating and improving following factors (Larsson, 2000):



Järvinen (2001, p.30) claims that also the competition factors are changing as presented in the Table 2. Especially in the area of communication it is crucial to have good and open discussions with customers what are the strategic visions of customers, how they see the ways to achieve their objectives and what can the service provider do for helping in achieving these goals. Branding is also becoming more and more important in the future. The customers are not interested in logistics processes itself but they count on brand, and if the customers do not get their goods in right quantity and timing the brand will loose its bright.

Table 2. Change of competition factors. (Järvinen, 2001).

<i>Factors before</i>	<i>Factors now</i>
Capital	Time
Location	Know-How
Largeness	Differentiation
Quality	Communication
Hard work	Personnel
	Brand

3.1.1 Third Party Logistics

The outsourcing of logistics has proceeded during last few decades step by step and the third party logistics is the main stage currently in the outsourcing process of logistics services. This process is presented in the Figure 5.

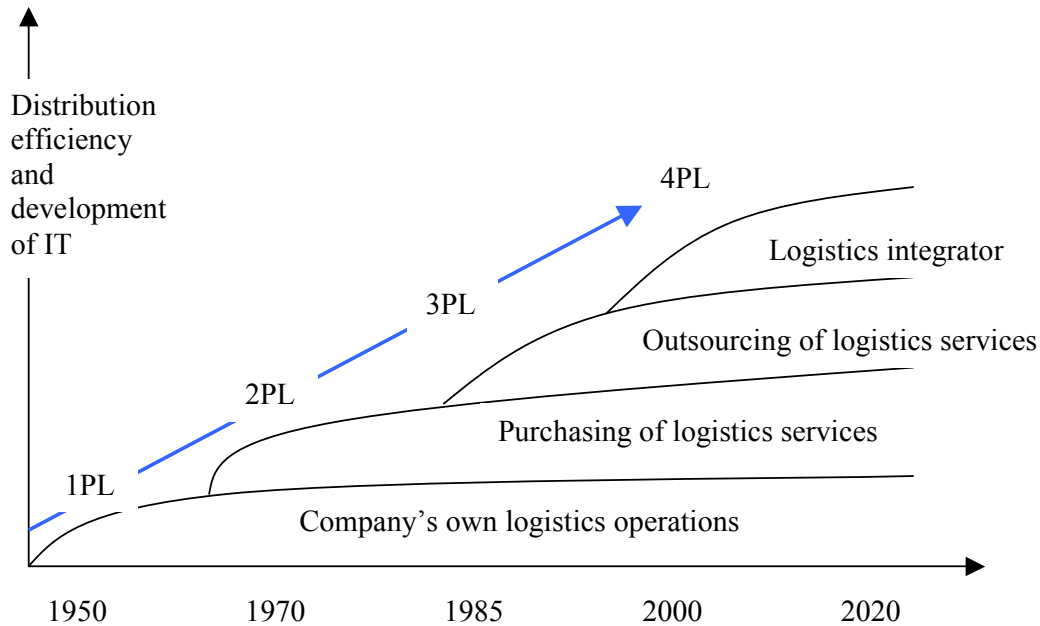


Figure 5. Outsourcing development of logistics services and networks.

(Source: Haapanen & Vepsäläinen 1999).

The first stage was one party logistics (1PL) where the company did the logistics operation itself. In two party logistics (2PL) the company purchases certain logistics services from external markets. In the 2PL concept the company buying the logistics services is a user and the company participating in the logistics processes is a service provider. In the third party (3PL) logistics the companies who need logistics services centralize the services to a third party service provider. Next step in the outsourcing development of logistics services is fourth party logistics (4PL[®]). A 4PL provider is a supply chain integrator that assembles and manages resources, capabilities, and technology of its own organization with those of complementary service providers to deliver a comprehensive supply chain solution. The 4PL concept is discussed more in details in chapter 3.1.2.

The power of outsourcing is based on material flow combination and specialization and these factors bring with it superiority in managing logistics. In the third party logistics both the user of logistics services and service provider need to go deep in details in the supply chain processes in order to get full benefit from outsourcing. The responsibility questions and operational rules must be mutually agreed for avoiding misunderstandings.

In the 3PL concept the outsourcing relationship should be developed towards wide and open consultancy partnership. A third party vendor should share his experience in logistics with his customers. A service provider should also have strategic business process understanding, which helps in comprehensive logistics development.

A successful partnership fulfills the following features (Storbacka 2000, p.9):

- Confidence
- Sincerity
- Common manuscript
- Profitable co-operation for both parties
- Communication and interaction capabilities.

There have been major improvements in the nature of the third-party logistical services on offer. Standards have undoubtedly risen and operations become more complex. On the other hand also the customer expectations have towards world-class services. There are also logistics consultants on the market, which give professional advices and help along the tendering and decision making process.

New types of services have been developed which are more closely tailored to clients' requirements. Logistical services are being much more skillfully and aggressively marketed than in the past.

Many transport and warehousing firms have evolved into broadly based logistics service providers. By trading up into integrated distribution, the larger carriers have been able to add value to their services, create niche markets with much higher entry costs and secure longer-term contracts with clients. This has enabled them to improve both their profitability and growth prospects. The logistics companies are becoming increasingly involved in the customization of products, changing the physical character of the goods they handle and thus blurring the traditional distinction between distribution and manufacturing.

It seems that the 3PL industry has settled in to an annual growth factor of 20-30% despite some growing pains related to customer service and performance management.

It's estimated that less than 5% of logistics expenditures worldwide are outsourced, leaving a huge market opportunity for suppliers who can fulfill the outsourcing of logistics management functions (Enslow 2001).

3.1.2 Fourth Party Logistics

The next significant evolution in supply chain management is the 4PL concept. Fourth Party Logistics is the evolution of supply chain outsourcing. The convergence of technology and the rapid acceleration of e-capabilities have heightened the need for an over-arching integrator for supply chain-spanning activities. Fourth Party Logistics is the shared sourcing of supply chain spanning activity with a client and select teaming partner, under the direction of a 4PL integrator.

Bauknight and Miller (1999) state that central to the 4PLs' success is the "best of breed" approach to providing services to a client. The development of 4PL solutions leverages the capabilities of 3PLs, technology service providers, and business process managers to provide the client organization with greater cross-functional integration and broader operational autonomy.

Two key distinctions make the concept of 4PL unique and set it apart from other supply chain outsourcing options available to the market today: (1) a 4PL delivers a comprehensive supply chain solution; and, (2) a 4PL delivers value through the ability to have an impact on the entire supply chain.

A 4PL supply chain solution should be considered in the broader context of improvements across the entire supply chain. Bauknight and Miller have identified three phases of work: *Reinvention*, *Transformation*, and *Execution*.

At the highest level of the 4PL solution is *Reinvention*. The most likely source of enhancements is through synchronization of supply chain planning and execution activities across all supply chain participants. Reinvention leverages traditional supply chain management consulting skills, aligning business strategy with supply chain strategy, to creatively redesign and integrate the supply chains of the participants.

Reinvention, however, requires *Transformation*. Transformation efforts focus on specific supply chain functions, including sales and operations planning, distribution management, procurement strategy, customer support, and supply chain technology. Transformation leverages strategic thought, deep analysis, process redesign, organizational change management, and technology to integrate the client's supply chain activities and processes.

At the tactical level is *Execution*. A 4PL provider takes on operational responsibility for multiple supply chain functions and processes. The scope goes well beyond traditional transportation management and warehouse operations logistics outsourcing. An organization can outsource the entire range of its supply chain activities to a 4PL provider; however, a 4PL solution can be a subset of supply chain functions or processes drawn from the full "menu" of execution offerings.

To be successful, a 4PL leverages a full range of service providers (3PLs, IT providers, contract logistics providers, call centers, etc.) along with the capabilities of the client and its supply chain partners. The 4PL acts as a single point of interface with the client organization and provides the management of multiple service providers through a teaming partnership or an alliance.

The 4PL approaches the concept of supply chain integration through four key drivers of shareholder value: increased revenue, operating cost reduction, working capital reduction, and fixed capital reduction. Traditional approaches have tended to focus only on operating cost reduction and asset transfer.

Revenue growth is driven by enhanced product quality, product availability and improved customer service. Experience has shown that customer service measures, such as stock outs and ship complete, can be improved in excess of 100%. With the 4PL focusing on the entire supply chain – not just the efficiency associated with

warehousing or lowest-cost transportation – dramatic customer service improvements can be attained.

Operating-cost reductions of up to 15% are driven through operational efficiencies, process enhancements and procurement savings. Savings are achieved through the complete outsourcing of the supply chain function – not just components – and economies of scale. Synchronization of supply chain activities by supply chain participants leads to operating-cost reductions and a lower cost of goods sold, due to integration of processes, and improved planning and execution of supply chain activities.

Working-capital reductions of up to 30% can be realized through inventory reductions and reduced "order to cash" cycle times. The proactive use of technology to manage order and SKU movement throughout the pipeline minimizes the amount of inventory required, and increases item availability to reduce cycle times.

Fixed-capital reductions result from capital asset transfer and enhanced asset utilization. The 4PL's logistics service providers can take ownership of physical assets, thus freeing up assets. This allows the client organization to invest in its core competencies (i.e., research and design, product development, sales and marketing), rather than in bricks and mortar.

The 4PL provider needs to possess a comprehensive set of skills to effectively deliver a 4PL solution. This depth of skills and knowledge is critical to the success of the arrangement. Bauknight and Miller have identified the following criteria to evaluate a 4PL provider:

- Availability of a large body of trained supply chain professionals
- If applicable, global capabilities, reach and resources
- Ability to manage multiple service providers
- Ability to transition clients' employees and other assets smoothly to the new 4PL organization
- Strong relationship and teaming skills
- Delivery of world-class supply chain strategy formulation and business process redesign
- Strength in integrating supply chain technologies and outsourcing capabilities
- Understanding of organizational change issues.

Management consultants have traditionally focused on the strategic end of supply chain solutions - reinvention and transformation. These supply chain solutions have leveraged technology to support the strategic imperatives. Third party logistics providers have focused on operational issues, implementation and execution.

The Figure 6 presents the different approaches of Management Consultants and 3PL service providers.

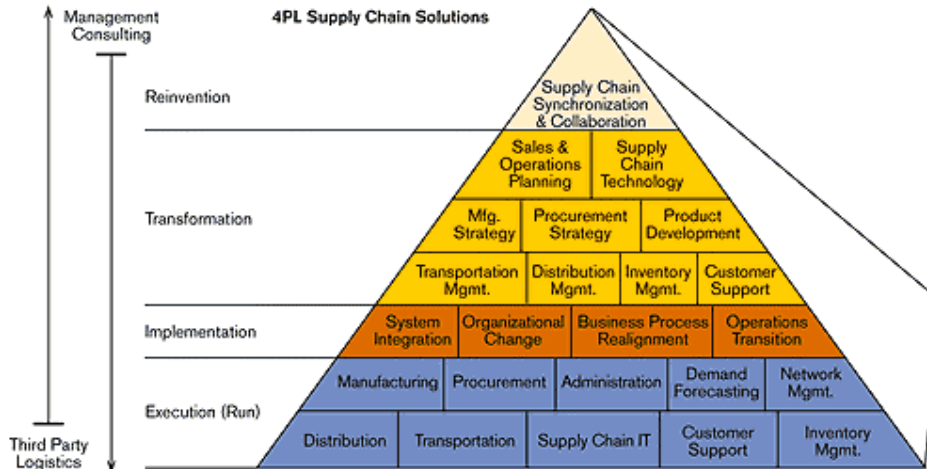


Figure 6. 4PL Supply Chain Solutions (Deogade and Ramani 2001).

3.1.3 Logistics Networking

Networking has become a clear trend in industrial activities.

The Internet and the World Wide Web (Web) have dramatically changed the Supply-Chain landscape. New opportunities are now emerging in the Supply Chain under the umbrella of E-business.

According to Deogade and Ramani (2001) early networking within the corporation consisted of mainframe-connected terminals. Users were limited to viewing and entering data, and had to manually pore over printouts and reports to analyze their data. The advent of the PC and applications like the spreadsheet enabled users to use their data, bringing reporting, analysis and presentation onto the desktop, thereby increasing users' ability to act on decisions quickly, and heightening the company's business agility.

Internet computing is following a similar path. With browsers and the World Wide Web, the Internet today is largely for viewing and entering data. The pivotal change that's underway is moving the industry to a more interactive Internet that enables applications to not only view, but also make active use of data. As this transition occurs, the Real Time Supply Chains evolve from Supplier-Centric to Customer-Centric.

Today's World Wide Web allows suppliers to create a web presence (Figure 7) for providing product and service information directly to their customers. This phenomenon, known as disintermediation, adds value by enabling businesses to communicate directly with customers, in addition to established channels of communication, such as sales and marketing or customer service.

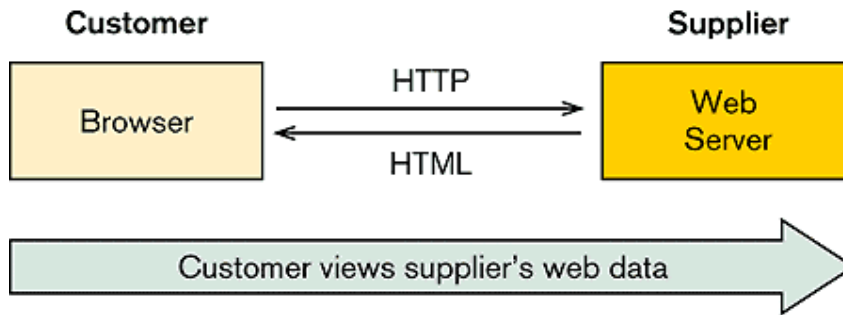


Figure 7. Web presence (Deogade and Ramani, 2001).

In more advanced concept the process integration between the decision-making systems of businesses, their suppliers, and their customers becomes bi-directional and tightly integrated. Suppliers can interact dynamically and can initiate business processes within each other's information systems by pre-defining business rules that trigger events across systems. That means that the RTSCs (Real Time Supply Chain) can be fully automated.

When an order comes to a supplier, orders to the supplier's suppliers to replace committed stock are automatically generated and a ripple effect through the supply chain ensues. Less human intervention is required at each step, as inter-business processes become more automated and rules-based.

Customers' and suppliers' business systems are able to make more intelligent business decisions. For example, if one supplier's price drops below that of other suppliers, the customer's application might automatically move that supplier up in the vendor of choice list on the business rules engine. The customer consulting the vendor of choice list before ordering would see the supplier at the top of the list and place an order with that supplier rather than the others.

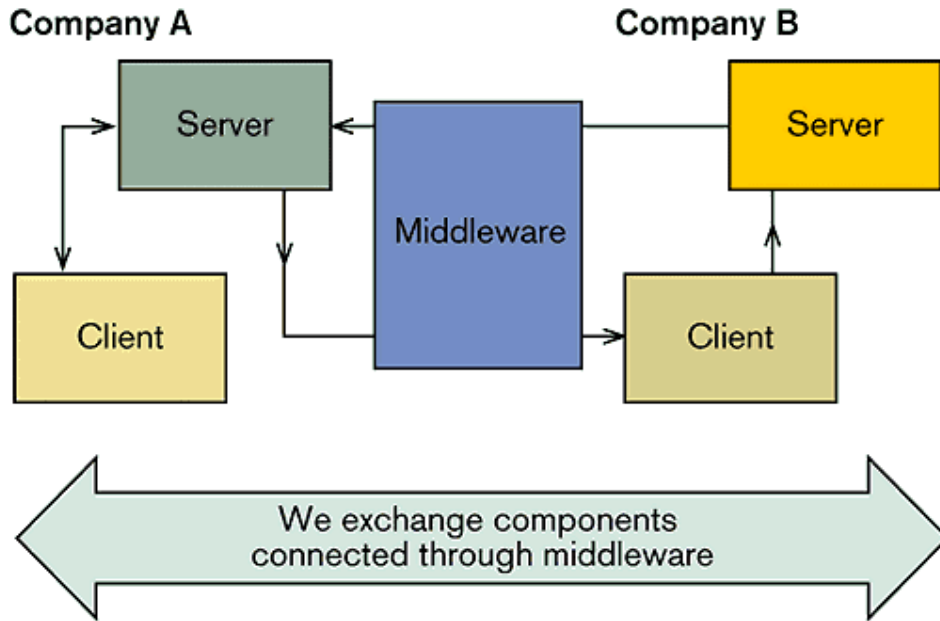


Figure 8. Automated Inter-business processes (Deogade and Ramani, 2001).

The purchasing and logistics functions in companies use nowadays more and more Internet's basic services. Internet includes wide searching engines, which help in finding certain products, services and e-marketplaces. Sakki (2002, pp. 225-231) has handled and gathered information about different types of e-marketplaces, which are partly adapted in following lists (searching engines).

Google	www.google.com
Altavista	www.altavista.com
Yahoo	www.yahoo.com
Vivisimo	www.vivisimo.com

Also general portals like SoneraPlaza (<http://fi.soneraplaza.net/>) can act like a link between purchasers and for instance service providers.

In communication portals it is possible to search information not only about suppliers and service providers but also about exhibitions, news, methods etc. Some samples about communication portals:

- www.advisor.com
- www.purchasing.com
- www.wlwonline.de

The E-market places cover normally several business lines and they operate globally. The service is aimed mainly for research and development persons and purchasers. Some samples about the E-Market places:

- www.globalsourcing.com
- www.metalsite.net

- www.worldparts.net

There are also auctions available in the Internet and they normally operate in a certain limited geographical area.

- www.huuto.net
- www.bidder-network.com
- www.freemarkets.com

It is not very easy to compare the prices of different products and services because the purchasing prices are based on the agreement between the purchaser and service provider. Some general price information is available for instance in:

- www.globalsources.com
- www.metalprices.com

In company's internal Intranet it is possible to save documents concerning for instance

- Purchasing policy
- Benchmarking data
- Tender documents
- Price information
- Quality standards, procedures and evaluations
- Reports etc.

The access to this information can be restricted on individual user level. The Intranet helps in team communication and unifies operations.

Most of the logistics companies have nowadays sophisticated Internet pages for giving basic information about the company, services, basic prices, and tracking and tracing of consignments. In the Internet it is also possible to sell available transportation capacity on auction basis (e.g. www.cargox.net).

The Internet provides excellent possibilities to companies to join in different integrated networks. One example of integrated networks is the endorsia.com, which supports the buying and selling requirements of manufacturers, distributors and end users. It makes it possible to connect with all the preferred suppliers and customers by a single interface and that creates an ideal platform for doing business.

Endorsia.com International AB owns the marketplace. The technology, infrastructure and operations are provided by mro.com, a leading supplier of e-business solutions.

With the buyer's browser access, the buyer is able to review detailed product information and alternative part numbers on line. The buyer can also place orders and has access to customer-specific information, such as pricing, local product availability, shipping and order history.

The browser based user interface provides a common interface to supplier catalogue content and purchase order transaction management (mroBuyer). With mro Buyer option it is possible to:

- Search for and select part from online catalogues
- Create purchase orders on line
- Electronically transfer purchase orders to selected suppliers
- Create requisitions from desktop
- View real-time inventory availability and contract pricing
- Access order status information online
- Access invoice and shipping history.

The catalogue contains product information such as manufacturer's part number, supplier's part number and description. Attributes such as width, height, inner diameter etc. are used in creating specification templates in the catalogue.

Distribution information such as pack code and pricing are also stored in the catalogue. The user searches the catalogue using key words, such as part numbers, or performs parametric searches using attributes.

To support supplier's trading activities, endorsia.com has two key areas of functionality – the catalogue and transaction server, which provides connectivity. Transactions are in real time, providing the buyer with up-to-date information, or in batch form. The transaction server makes it possible for suppliers to receive orders and queries from their Internet Service Provider or directly when connected with endorsia.com.

SKF claims that for both buyers and sellers, electronic order handling reduces administration costs by up to 90 percent compared with handling orders manually. And, if required, endorsia.com can be completely integrated with front and back office applications systems (endorsia.com 2001).

A recent trend has also been that companies are looking for business and network partners in order to establish an e-commerce marketplace in the Internet. In this way the companies can combine their purchasing volumes, and this gives them possibility to get price reductions in product prices. Typical products for this type business are Information Technology (IT) and office equipment, commercial items, such as bearings, contactors and tools etc.

There are also some risks in the e-commerce business, which should be taken into account before implementing any e-procurement transactions. The risks are for instance that:

- Buyer wants normally to buy with its own terms – usually the e-seller sells with his terms
- In global markets, which country's law and regulations are followed (due to this, it is not possible get rid off the purchasing contracts anyway)
- General norms in e-business are not clear (e.g. procedures)
- Electronic signing is not approved yet

- How the disagreements will be solved and communicated
- What are the procedures in case of errors in delivery (in quantities, quality, defects)
- General problem in the Internet is that the adversary is anonym
- In e-procurement the disbursement may have been done several weeks before the goods are actually delivered, so the seller does not have anymore an interest to follow the delivery process
- Product liability conditions may be unclear
- Data privacy is not always controllable, because every visit in the Internet pages is documented and the service provider knows more than expected about the "visitor".

3.2 Logistics Trends in Finland

During the recession and booming time in the 1990's it was invested remarkably much capital and efforts on improving the logistics in Finland. The change is visible in ten essential development trends. These trends are according to the Logistics study (1996-1997) carried out by Ministry of Transport and Communications in Finland:

- Customer-centric focus
- Increasing importance of procurement
- Integration of companies borderlines
- Trend towards process logistics
- Quality improvement development continues
- Significance of logistics information systems
- Slow development in logistics planning and measuring
- Environmental impact concern in logistics development
- Outsourcing of services is increasing
- Logistics costs are decreasing.

According to the Finnish Association of Logistics (2001) the capital investments and development work during last few years the logistics costs have decreased on annual basis about 2,500 MEUR. Despite of this the logistics costs are bigger in Finland compared to Sweden and middle Europe. This proves that the importance of logistics for Finnish companies' competitiveness is significant. On the other hand the cost difference is mainly due to Finnish production structure, small volume of material flows, distance from main markets, and scattered settlement.

According to the Confederation of Finnish Industry and Employers (2000) the logistics cost is the second biggest cost allocation in export business sector after personnel costs. The Figure 9 presents a comparison about the logistics cost comparison in some EU-countries in 1995 (logistics cost relation / turnover, %).

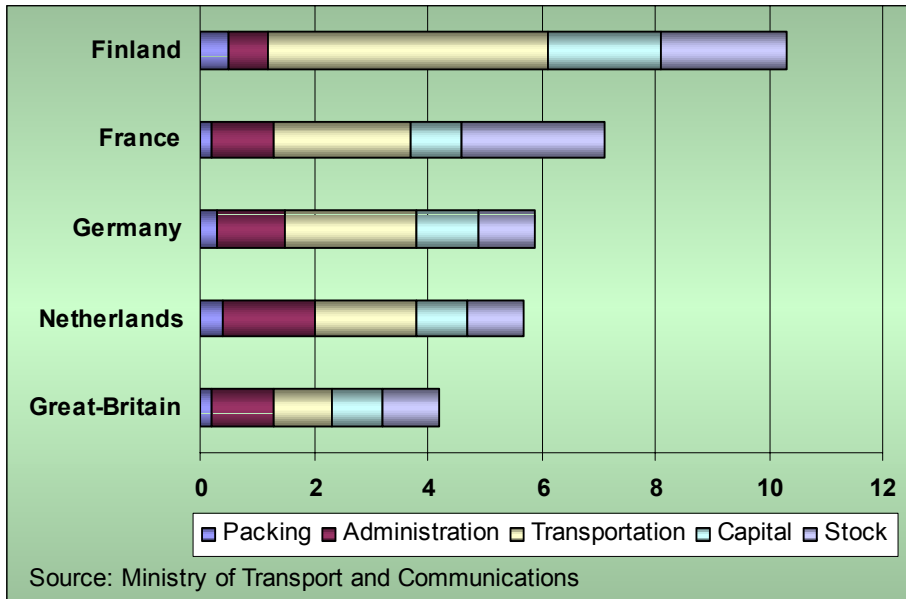


Figure 9. Logistics cost in some EU-countries in 1995.
 (Source: Ministry of Transport and Communications 1997, pp. 32-34).

The Figure 10 shows the development of logistics costs in Finland in 1990-1999 (Billion FIM).

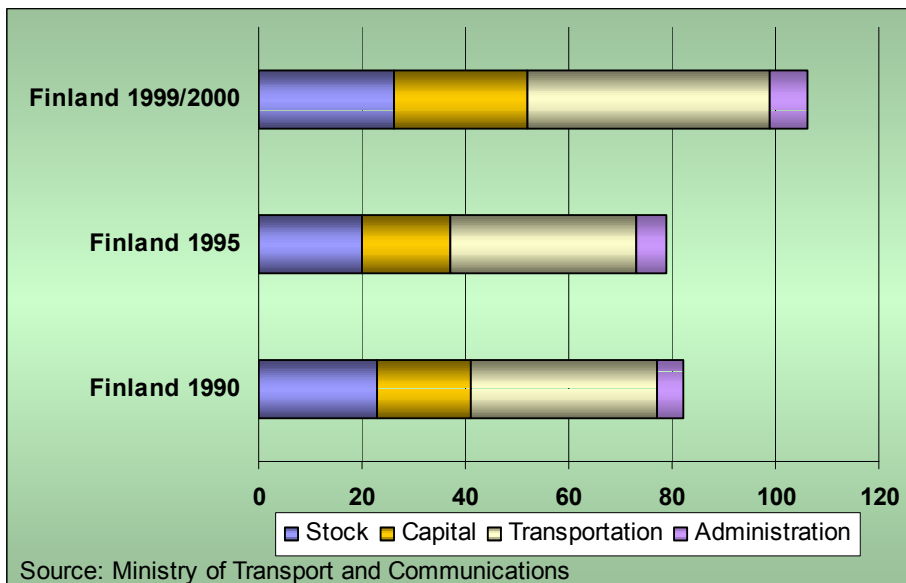


Figure 10. Development logistics costs in Finland (Billion FIM).
 (Source: Ministry of Transport and Communications 2001, pp. 47-52).

The Figure 10 shows that the logistics costs in Finland have increased during 1990-1999. It is estimated that the increase has happened due to the volume increase and the industrial changes in 1990's. The possible cost increases have happened due to increasing efforts put on customer satisfaction like, improving service level, decreasing lot sizes, shortening the delivery times and making customer specific services.

The Logistics study (2001) shows that the Finnish companies' logistics costs are in average 10,2% compared to the turnover (1995; 10,3% and 1990; 11,0%).

3.2.1 Networking

Networking has become a clear trend in Finnish industry. According to a survey carried out in 2000 by the Confederation of Finnish Industry and Employers two thirds of companies are involved in networking co-operation (Nissinen et al, p.18) However, the extent of co-operation varies from one company to another. 60 % of companies who employ less than 50 persons, and about 75 % of companies who employ more than 50 persons, are involved in network co-operations.

The survey states that the risks and problems involved in networking are not considered clearly enough. There are still problems in networks internal relations and in relations to surrounding.

According to the survey the general overview about the functioning of networks during boom period is positive. The costs are decreasing, and companies can concentrate on their core activities. Problems occur in losing special know-how, communication and deviations in delivery times and quality.

The subcontractors may face for instance following problems in networks:

- Excessive competition
- Difficult and excessive terms of agreements
- Capacity variation due to changes in volumes.

The positive things in networks according to the survey are:

- Improvement of know-how
- New inventions
- Quality improvements of products.

During the recession time there may occur problems if the main suppliers and big companies utilize the network and they let the subcontractors to carry the investing, sales and production risks on their behalf. Despite the problems the networking is expected to become more common.

The networking is the most generally in use in metal and electronics business, and the companies involved in networks grow faster compared to the companies outside the networks. The influence on profitability does not seem to be different whether a company is involved in networking or not.

According to a survey carried out by the Federation of Finnish Metal Industry, Engineering and Electrotechnical Industries (MET) the outsourcing presents more than 40 % of the turnover of main suppliers, and this trend is increasing (Suolonen 2001, p. 14-15). Martti Mäenpää, from the MET, says that the networking with a global company requires also from subcontractors development of its operations towards world-class. This opens a natural way to subcontractors to international business.

One of the current trends is the establishment of regional logistics centers. The intention is to establish a network oriented logistics center where the public authority works as a co-operation catalyst and public relation leader. The actual business is based on company driven activity. In a networking logistics center the companies create a limited company or equivalent, and they are corresponded in great deal about the business activity and financing.

There are plans to establish a regional logistics center for instance in Oulu and Turku. The starting phase is financed in these two cases mainly by public funds. The first practical action has been the establishment of a virtual logistics center, which is involved in marketing actions, but it does not take part in actual logistics operations.

Both of these projects follow basically same procedure in starting phase.

1. Creation of a common Internet service portal for commercial carriers and logistics companies. It forms a network of companies that provide logistics solutions.
2. Deepening of marketing strategies and expansion of data bank and creating new services.
3. Expansion of services for network companies, including Information Technology and Systems. Starting of global marketing and communication.

Both logistics centers have their Web-page in the Internet; Turku at <http://www.turku.chamber.fi> and Oulu at <http://www.pohjois-pohjanmaa.fi>).

3.2.2 Electronic Business

According to the survey 'Electronic Business in Finnish Industry' carried out by the Confederation of Finnish Industry and Employers (2000) about 95 % of industry in Finland uses some form of electronic business. In small and medium-sized companies electronic business is less usual, but nevertheless four out of five small companies claim to use at least some form of it. Several forms of electronic business are forecasted to become widespread within the next three years.

The volume of electronic business is still quite small but is forecasted to grow rapid in the near future. On the basis of the survey, it can be estimated that electronic business is presently increasing industrial productivity by at least 1 % and racing capacity utilization and profitability by at least 0.2 – 0.3 percentage units compared to a situation in which this kind of business would not be practiced. Industrial production can be estimated as being 0.6 – 0.8 % higher thanks to electronic business. On the other hand there are enormous variations between different companies.

Electronic business can be divided into several different segments. One way is to divide them into nine groups:

- Sales of own products
- Ordering products
- Transfer of information to partners
- Acquisition of new customers
- Acquisition of new partners
- Searching of new markets
- Monitoring production
- Monitoring transportation
- Monitoring inventories.

According to the survey the most widely used new technology is the transfer of information to business partners and ordering goods for one's own company. Electronic business was somewhat less common in monitoring production, transport and inventories as well as in various segments of marketing. The survey concludes that there was clearly less use of the new technologies by small and medium-sized (SME) companies than by large companies.

In 2000, industry invested about FIM 1,5 billion in the development of electronic business, which represent about 3 % of all industrial investments. Investments in electronic business are expected to at least double from 1999 to 2001, and there are now great differences between SMEs and the whole of industry.

The majority of companies recognized that they had benefited from electronic business. The most usual benefit was customer satisfaction, in which more than 80 % of industry as a whole had experienced a positive effect. There are quite large variations between companies concerning the magnitude of the benefits brought by electronic business, with about 15 % of companies gaining much greater benefits than the average.

Somewhat fewer SMEs than industry on average stated that they had benefited from electronic business, but the overall picture clearly splits in two. The lower benefits to SMEs may be due not only to a less diverse application of electronic business and its later introduction, but also, for example, to the benefits piling up at the end of the production chain.

The companies that had invested most in electronic business had also generally gained the greatest benefits. Electronic business has improved the quality of production processes and products, and increased profitability, productivity, and capacity utilization. The survey shows also that electronic business has significant effects on the national economy.

The most important obstacles were lack of know-how, and various issues relating to technical solutions, which were seen as problems by more than 80 % of industry. The security of electronic business was also a major obstacle. The survey concludes that there were quite few differences in the obstacles encountered by companies of

different size, but SMEs emphasized the high price of technical solutions and limited financial resources.

3.3 Outsourcing

Outsourcing has been one of the dominant business trends of the 1990's and this trend is still increasing. Companies have been concentrating their resources on core activities. Outsourcing is a strategic decision, which should promote corporate's long-term targets. The agreements are concluded for long-term, at least for three years but it is not exceptional that there are agreements for 5 or even 10 years. The contract should include aims for contract period, service level agreement, and business targets. The service provider must be responsible for operational functionality. The company should not outsource problems or an activity or any kind of activity, which is unclear, if the company's aim is to solve only short-term targets.

According to a survey made by International Data Corporation (IDC), the outsourcing is expected to grow by 40 % annually in coming few years (Sorkamo 2001). The Great Britain is superiorly the biggest outsourcer. France, Germany and Italy are outsourcing also quite much.

When selecting a service partner one should consider the supplier's capability to commit himself for short and long term. The practice has proven that the service provider should also be interested in customers business and processes. A world-class service provider is able to give tips for improving the partnership and processes. Communication becomes an important factor especially in global partnership relation.

Sorkamo (2001) states that, when 55 Finnish companies were asked to list few arguments, what are the most important issues, what they value, when selecting a service partner. Below the list of the most important factors:

- Know-How in outsourced process
- Business line know-how
- Readiness for ongoing improvement
- Experience in previous co-operation
- Capability to understand customers business.

According to Sorkamo, the companies have received through outsourcing in average 20 % cost saving. The biggest savings have been reached in real partnership co-operation between the supplier and customer.

3.3.1 Advantages of Outsourcing

Outsourcing logistics activities is a strategic choice made by more and more companies nowadays. This means that the customer no longer has to deal with complex logistics processes, and that it can focus totally on its core business. Besides the "back to core business" philosophy and the advantages for the customer there are numerous other significant benefits, namely (McKinnon, 1999):

- Fixed costs become variable, creating new core business investment opportunities
- No investments (money, manpower and know-how) in other than core activities
- Flexible and effective logistics concepts form an additional marketing tools that will ensure the fulfillment of rapidly changing customer requirements
- To maintain a drive for improvement of the logistics processes, performance targets are being set and agreed upon by both partners periodically. In doing so a continuous improvement is guaranteed
- Major cost reductions can be obtained by considering integrated logistic processes
- To utilize accumulated expert's rich expertise and know-how, which is the best way to ensure a smooth running goods flow. This may be translated in a short and reliable delivery lead-time, "zero-defects" delivery and also high level of customer service.

One important factor in successful outsourcing process is the co-operation with an experienced third party.

There is also an important international dimension to the externalization of logistical services. Manufacturers tend to rely heavily on contractors both for international transport and for the distribution of their products within foreign markets. McKinnon (1999) says that roughly two-thirds of the European distribution centers, used by American, Japanese, Korean and Taiwanese manufacturers, are managed by third-party logistics companies (Holland International Distribution Council, 1996). The steep upward trend in global sourcing and distribution is therefore inflating the demand for contract services at both the international and national levels (McKinnon, 1999).

According to the Logistics Study (2001) the most important reasons for the increasing usage of external logistics services in Finnish companies (industry, commerce and constructing) are presented in the Figure 11.

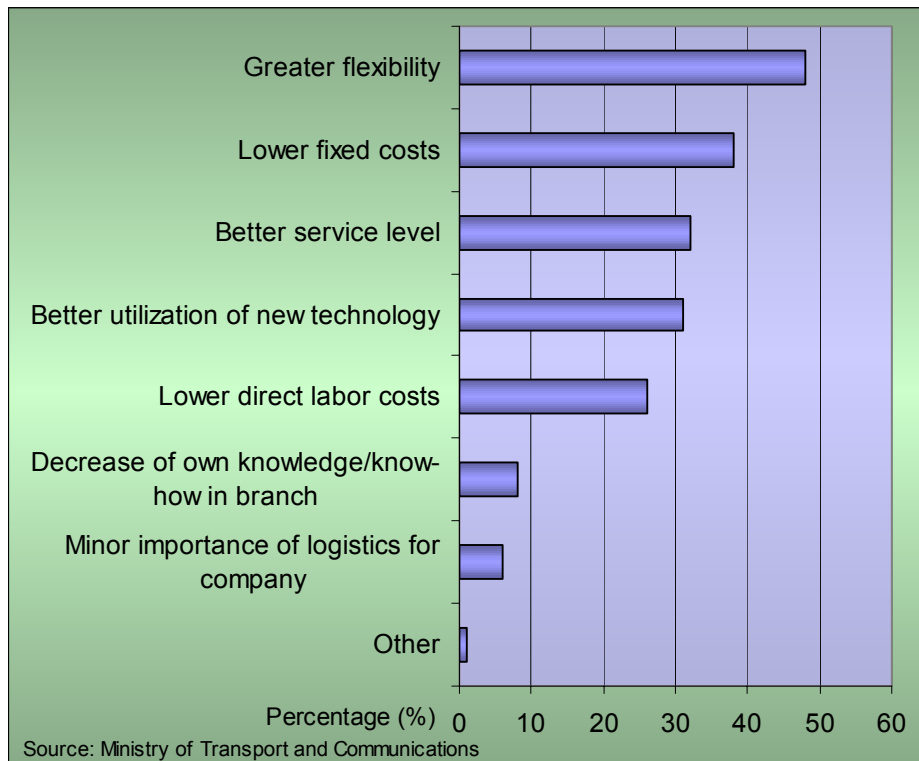


Figure 11. The most important reasons for the increasing usage of external logistics services in Finnish companies (Source: Ministry of Transport and Communications 2001, pp. 112-113).

3.3.2 Disadvantages of Outsourcing

To some extent the disadvantages of outsourcing are the inverse of the benefits discussed above. Malz (1994) has listed a few arguments about the some disadvantages of outsourcing:

- May lose the control of important capabilities. For example, dimensions such as quality conformance, delivery speed and delivery reliability are now, in part, within the processes and systems of suppliers. Managing the whole supply chain becomes an increasingly important priority.
- New management skills – managing a supply chain requires different, and often more demanding, skills than those to handle in-house logistics. Integrating the essential links within a supply network requires high resource and management talent to secure the essential contribution to meeting the needs of clients needs.
- Difficulty to manage the outsourced activity in accordance with the corporate strategy targets in ongoing market change.
- Restrictions in legislation locally and globally, which may prevent the outsourcing already in the first place (e.g. negotiations with unions).

In general review of the literature on the outsourcing of services, Maltz (1994) observes that general management papers tend to emphasize the potential cost

savings, whereas those written by purchasing and marketing specialists attach equal importance to cost and service benefits. Much of specialist logistics research has identified the demand for higher standards as the main motive for outsourcing. This, for example, is the conclusion reached by La Londe and Malz (1992) in a study of the outsourcing of warehousing in the US. More recent surveys, however, suggest that similar importance is attached to cost savings, service improvement and flexibility in the decision to outsource logistics (PE Consulting, 1996). According to the survey made by PE Consulting (refers also to Peters et al, 1998) the most frequently quoted reasons for outsourcing logistics are as presented in the Table 3.

Table 3: The most frequently quoted reasons for outsourcing logistics. (Source: PE Consulting, 1996).

PE Consulting	% of firms	Peters, Lieb and Randall	% of firms
Improve service	87	Lower cost	56
Reduce cost	85	Greater flexibility	55
Increase flexibility	79	Improved operational efficiency	53
Avoid investment	61	Ability to focus on core business	51
Non-core activity	59	Improved customer service	49
Obtain specialist management	50	Improved expertise/market knowledge and access to data	29
Improve control	50	Other	8

According to the Logistics Study (2001) the most important reasons for not increasing the usage of external logistics services in Finnish companies (industry and commerce) are presented in the Figure 12.

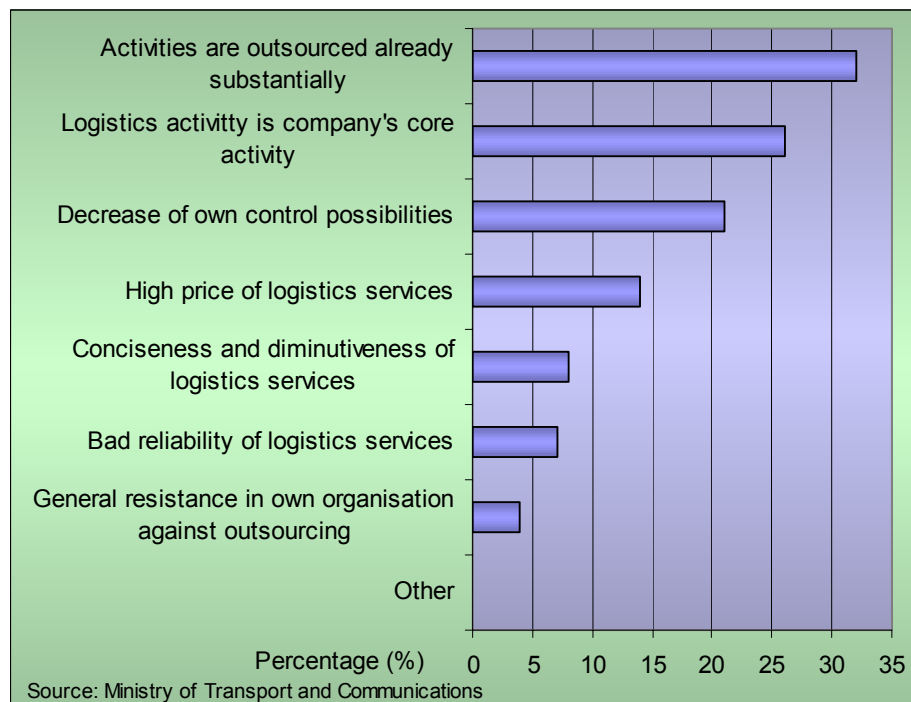


Figure 12. The most important reasons for not increasing the usage of external logistics services in Finnish companies. (Source: Ministry of Transport and Communications 2001, pp. 113-115).

3.4 Process of Externalisation

According to McKinnon (1999) firms can outsource their logistics in various ways. The most dramatic form of outsourcing involves closure of the in-house system and transfer of all responsibility for logistics to an outside contractor. This may be too radical for many own-account operators, which are unwilling to dispose of existing logistical assets, shed staff and risk disruption of their operations during the transitional period. Some prefer to adopt a more gradual process of outsourcing, phasing the transfer of responsibility geographical, by business sector or product group. It is also possible for firms to ease the transition in other ways:

1. **System takeover:** There have been numerous examples of large logistics service providers buying out in-house systems, assuming ownership of vehicles, depots and equipment and taking on much of the previous workforce. Following a takeover of this type, the system may continue to be operated on an exclusive basis for the 'divesting' firm or the contractor may share the use of the acquired facilities with other clients, thereby improving utilization and spreading overhead costs. Within the EU, until 1993, it was possible for the acquiring firm to alter the terms and conditions of employees absorbed from the own-account operation. A legal judgment in that year relating to the EU on the Transfer of Undertakings and Protection of Employment (TUPE) tightly limited the scope for modifying earlier contracts.
2. **Joint Ventures:** Some clients prefer to retain part-ownership of distribution facilities and maintain closer involvement in the logistical operation. For them, joint ventures with contractors offer a more attractive means of injecting outside capital and expertise.
3. **System 'spin off':** Tucker and Zivan (1987) advocate the 'spinning-off of firms' in-house logistical systems as separate subsidiaries. There have been several examples of own-account operators initially making their distribution department a separate profit center, allowing it to tender for third-party business and ultimately selling it off, typically as a management buy-out.
4. **Management-only contract:** Firms wishing to retain ownership of logistical assets can still contract-out their management. Many companies see contracting out more as a way of upgrading the management of their distribution operation than of releasing capital for other uses. As this form of outsourcing is not asset-based it gives the client greater flexibility to renegotiate and, if necessary, terminate contracts.

The latest feature in the process of externalization is the 4PL concept. This issue is discussed more in details in chapter 3.1.2.

The Valssi-project has also published a manual named as 'Outsourcing Process of Spare Part Logistics in Metal Industry' (Kivinen 2002), which includes guidelines for purchase of logistical services and views about the process of externalization. The manual considers the specialties involved in spare part logistics in participating companies and metal industry generally.

3.5 Purchase of Logistical Services

Below a list of some recent trends in purchasing logistical services according to McKinnon (1999).

- Increase in the proportion of logistical services bought on a contractual basis
- Reduction in the number of contractors used
- Closer involvement of contractors in the design of distribution systems
- Greater emphasis on the development of longer term partnerships
- Adaptation of the Just-in-time principle
- Development of Electronic Data Interchange (EDI)
- Increasing specialization of logistical equipment
- Change in the degree of interdependence towards closer co-operative relationships
- Evolving relationship between providers and users of logistical services
- More precise contract specification
- Improved contractor-client communication at all levels
- Joint initiatives (innovativeness and proactiveness)
- Refinement of appraisal schemes
- Adoption of open-book accounting.

One way to purchase logistical services is to ask an external party (e.g. consultant etc.) to take care of the practical tendering process and even the implementation of new services including legal services for finalizing the contract. The advantages of using external party in tender process are the savings in time and resources. The outsourcing party will only make the decisions in each step during the outsourcing/tendering process.

The consultant can be responsible for instance on following issues during the project:

- Takes care of all communication and meetings with potential partners
- Selection of potential service partners
- Sending an invitation to tender (ITT) to potential service partners
- Gathering the data into comparable format
- Comparison of offers (independently)
- Recommendation list of best service partners (e.g. 5 potential partners)
- Organizes site visits
- Arranges final offers
- Is involved in contract negotiations (prepares the agreement)
- Is project leader during implementation phase (together with implementation team)
- Finalizes the implementation phase and hands over the responsibility to operations team.

For instance, when purchasing warehouse services, the project should start by agreeing objectives and key data on which the invitation to tender is based upon. The ITT should include at least a general overview about the task, dates, offer requirements and contact information for tender process. The ITT should also include a specification for tender, which gives information for potential service providers about indicators/volumes, storage requirements, process description, quality and

service requirements, Information technology and system requirements. It will ease a lot in analyzing phase if the ITT is in standard form, and the service partners have to fill in a standard template where all the financial figures are gathered. In many cases the companies, who are outsourcing logistics services, want to have a signed confidentiality agreement before proceeding in tendering process.

There can be different factors for criteria to find a warehouse service provider. Below an example about the criteria's:

- Locations and connectivity to road and air hubs
- Storage and process
- Capacities (especially in volume in case of variations)
- Experience in similar projects
- Quality
- Reputation / references
- Cost

There are several ways to charge the costs of operations in warehousing. Below some samples about the charging methods:

- Line fee (inbound and outbound lines)
- Cost + margin fee
- Hour rate
- Square meters used
- Fee per pallet etc.

Normally a contract includes penalties if the agreed quality level falls down. From the service provider point of view, it is motivating, that in case the agreed quality level exceeds a certain point, to have a bonus.

It would be beneficial especially for small customers to take a full benefit from the buying power in transportation by networking with other partners or 4PL integrator. A world-class service provider or integrator can offer competitive rates in transportation (or in any other services), which a small customer company would never get on its own.

4 MODEL OF NEW BUSINESS CONCEPT

During the first project steering group meeting it was discussed and outlined in rough level, how the new business concept could look like. The concept was restricted to focusing on Business-to-Business (B2B) markets, and product range was limited to spare part deliveries. An outlined notion about the concept was designed as presented in the Figure 13.

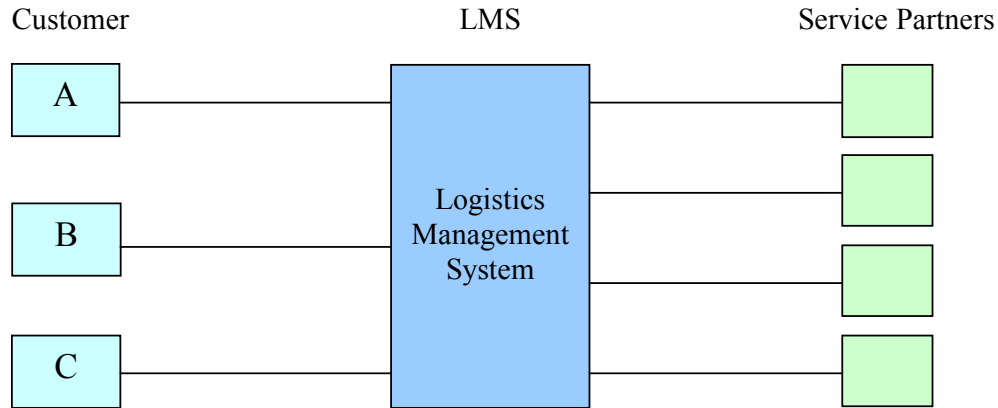


Figure 13. Outlined concept model.

Customer is considered to be in this survey the logistics department of customer-company, who has outsourced logistics functions to several service partners. In further stage the customer could be also the end customer. Customer is expected to define tasks to be performed, and it supplies master and order data to Logistics Management Systems (LMS company). Customer also suggests the performance indicators.

LMS-company leads and controls entire data exchange, and manages the interfaces to all service providers. LMS should also take responsibility about the operational issues and strives for continuous quality improvement.

A service partner can be any supplier that is involved in any stage of the logistics process. A partner can supply either services or products. Typically a service partner is a third party vendor. Vendors receive orders or service requests for his individual range of services from LMS, and they report on order completion and check points for order processing. Quality indicators are reported to the LMS or alternatively LMS-company compiles the reports with aid of its own system.

4.1 Mapping the Requirements of Research Parties

The actual survey was started by searching as many logistics services as possible, which could be typically used by the customer companies and especially in the their area of business. The sources for finding logistics services were international and domestic logistics magazines, publications, newspapers, Internet pages and company presentations of logistics service providers. As a result of searching process, a "menu of services" was prepared. The list includes five basic categories of services (see Appendix 1):

- Warehouse (actual site and location)
- Warehouse services (basic activities in warehouse)
- Transportation services
- Value added services and

- 4PL services

There was also one service named as "dedicated services", where the companies had a possibility to add any missing services on the list, that they felt worth of studying but none of the companies named any.

The "menu of services" list was distributed both to the customer companies and service providers. The list was gone through by the representatives of the companies and researcher. The rates were given during the meeting and any special comments were recorded into a comment column. The rates were given from 1 to 3.

The rates for the customer companies were:

- 1 = service not needed for time being
- 2 = future potential
- 3 = service needed (high priority)

In this survey the customer companies were Kone Service Business Unit, Larox Service and Metso Paper Service. Due to confidentiality reasons, the customer companies have been named as A, B, and C.

The rates for the service providers were:

- 1 = service not available for time being
- 2 = service available as special service (not standard)
- 3 = service available as standard

In this survey the service providers were TNT and ValLog.

The customer companies were also asked to list the three most important services and any value added services, which they think is needed with high priority for helping in focusing the survey resources into right allocation.

The summary of survey results is presented in Appendix 1. The rates are shown as averages of both groups of companies: Customer companies and service providers.

4.2 Synergy Benefit Survey

The survey showed clearly that the customer companies are in different position in the warehouse outsourcing process. The companies A and B have not outsourced their spare part warehousing to external service providers. Company C has outsourced the warehousing activities except one continental stock, but plans have been made to outsource that activity too. The synergy benefit survey is divided into five different categories:

- Warehouse location
- Warehousing services
- Transportation services
- Value added services (in wide extent)

- 4PL services.

The results of service providers have only informative value in this survey due to the fact that they offer products and/or services, which are typical for 3PL companies. In general it can be concluded that these companies' standard service range corresponds in average well the expectations of customers. But either of the service providers does not supply 4PL services at the time survey was made. Generally these companies strength would be networking because their scope of services completes each other.

4.2.1 Warehouse Location

Because the customer companies are operating globally, the requirements for warehouse locations are therefore global. According to the survey there are three types of warehouses, which are needed; continental distribution centers, local part centers and consolidation points (virtual warehouse).

The LMS should offer continental distribution centers, which are located in the following areas:

- Finland
- Central Europe (in the European Union)
- Asia Pacific
- Northern America.

There is also a need to have Local Part Centers (Strategic Part Center). These Centers are needed because the end customers have requested that the goods must be delivered on same day as they were ordered. In these cases a continental distribution center cannot deliver the goods in such a short notice due to long distances and customs formalities. The Strategic Part Centers item range is significantly smaller compared to Continental Distribution Centers. In most of the cases the customer company owns the stocked items, but in some cases the end customer owns the stock, but the actual warehousing service is outsourced (consignment stock). The Strategic Part Center concept should be available in all continents.

Due to the fact, that the companies are trying to reduce operational costs by optimizing transport, process and material costs, the consolidation of goods nearby the end-user is becoming very important issue. The consolidation is time-critical activity, and it requires advanced features from information systems. The communication flow is the biggest challenge in managing consolidation.

4.2.2 Warehousing Services

Two of the customer-companies preferred to have a multi-user warehouse and one was looking for a dedicated warehouse. A multi-user warehouse is a good option if the warehousing processes are standard from material and information flow point of view. Below the list of services which are needed from the LMS as standard services:

- Unloading

- Receiving
- Storing
- Picking
- Packing
- Loading
- Inventory counting
- Equipment (packing equipment, fork lifts etc.)
- Returns administration
- Key Performance Indicators (KPI) in warehousing

The security of warehouse was also seen as an important issue, but there were not any special requirements that for instance the warehouse should be divided from other customers by fences or otherwise locked area. Basic requirement is that only authorized persons are allowed to enter the warehouse, and the warehouse is controlled for avoiding stealing.

4.2.3 Transportation Services

Transportation service needs vary from one customer-company to another. The LMS should offer transport management in international air, truck and sea freight services. Because the customer companies are supplying spare parts, the liability and risk management services are not needed in high priority, but there is future potential in this area. Sometimes there is a need to collect the freight payment on behalf of customer by LMS (or service provider). Therefore the freight payment service is needed (concerns both inbound and outbound deliveries). The LMS-company should offer transportation and claims administration services, which means in practice, that LMS should take the operational responsibility about the transport management including quality issues.

Measuring of the supply chain performance in general is becoming more and more important in the future. Therefore many of the transportation companies supply proof of delivery (POD) information in their Internet pages. These pages include information about the package moves in transportation checkpoints, when the package was supplied (date & time), who received the package (signature). Also in case of troubles in transportation, it is very important that the package can be tracked and traced in short notice. The POD information should be imported to customer companies ERP-systems (Enterprise Resource Management). It can be utilized in measuring the performance of total supply chain by extracting the file from the ERP-system.

Carriage load design and route scheduling was ranked only by one customer company high priority task. This company wants to optimize these tasks especially in new equipment deliveries.

Pick-up and drop-off locations are considered as high priority by one customer-company. The overnight delivery concept is needed by two of the companies. The overnight delivery concept is based on deliveries before 9AM on next day from shipping, and the goods can be delivered to unmanned location like to a locker point, garage or service car.

All the three customer companies requested that the LMS-company should deliver KPI's (Key Performance Indicator) concerning transportation.

4.2.4 Value Added Services

Consolidation and break&bulk services are high priority to one of the companies. This option is not needed frequently in spare part deliveries but more in case delivering modernization products. The company C has 15-20 suppliers in 5-7 countries in Europe for modernization products. These shipments coming from several suppliers should be consolidated as one delivery (may include several collies). The goods have several weeks delivery time from the suppliers, and in ideal situation the goods are delivered on exactly same day with other goods at the site (by end user). This operation requires advantaged controlling from the Information Systems point of view. Break & bulk service is needed in company C, but it is not in use at the moment. Break & bulk option could mean in practice that for instance the continental distribution center would send all orders going to one destination country in a big container by air freight, and when the goods arrive in the country the orders in the container should be sorted out. After sorting the orders the goods can be delivered to end destination for instance by using local transportation modes within the country.

The customer C needs virtual warehousing service, and it is linked to consolidation process. This option can be used especially in modernization product deliveries but it can be expanded to spare part deliveries too. The idea of virtual warehousing is to reduce the stocking costs, which reduces the capital costs. Information systems play an important role in managing this type of supply chain solution. The company B named the consolidation and break&bulk services as future potential.

Packaging & identification of individual items were seen very important issue for all three customer-companies. On the other hands the environmental regulations must be taken into account too. In practice the packaging materials should be environmental friendly and recycled. All three companies want to increase the product identification and tracability by individual labeling of products. The bar coding system could be also implemented. Co-packing is needed because there is frequently a need to change the brand of original suppliers products to customer-companies brand. Packaging service should include at least following activities:

- Packaging
- Repacking
- Co-packing
- Labeling of individual items.

The company A does not need the *manufacturing* as high priority task. The LMS could be a supplier for some metal products for company A. The company B indicated that they might need in the future some manufacturing services for metal products from the LMS. The company C is looking for a service provider who could give services in kitting, product configurations, metal, electronics and plastic products manufacturing.

Companies B and C need repair and installation services. In principal there could be a group of fitters/service engineers who could make small repairs and installations for new equipment and especially disassemble old equipment. Because the both of these companies operate globally the service could be started in Finland, and then expanded to other areas step by step. Training is an important issue in outsourcing repair and installation services.

Removal and relocation services are not needed by any of the three customer companies for time being.

Product life cycle management is seen as more an internal issue within the organization than an outsourced activity. Nevertheless there may be future potential also in managing the product life cycle.

Due to increasing awareness and pressure in environmental regulations the *reverse logistics* is becoming an important area of business. Recycling, disposal activities and surplus material return process is seen as a high priority task in companies B and C. Company A considers the reverse logistics as potential for the future.

Customer B for emergency cases needs customer service activity. The service should be available 24 hours a day and 7 days a week. The call center should have some basic technical information about the customer-companies products. Call center should also contact in real emergency cases the service engineers and give them short description of problem. Call center should also be able organize the emergency spare part deliveries if needed. Company C needs the call center especially for delivering urgent orders during out of office hours.

Financial services were not seen as a high priority task by any of the customer-companies. On the other hand these services may become valid in the future.

Procurement services can be divided into three groups:

- Purchasing contract service, where the supplier is responsible for ordering and delivering the agreed products and services on behalf of customer. The LMS-company should produce these products and services by itself or it can use its own network of sourcing. The LMS is responsible for all contract negotiations, ordering, delivering and quality procedures. The added value for customer companies by making a purchasing contract with LMS would be the economics of scale (volume benefit) and fixed cost could be moved to variable cost because the resources are not tight in making annual contracts and purchasing negotiations.
- Call-off service, where the customer company maintains the procurement responsibility and the annual contracts by itself. The LMS would only make practical material-calls from suppliers, and it controls the operative material flow and reporting. By using call-off service a customer-company changes the fixed costs to variable cost because the need of purchasing resources decreases.
- Project procurement creates flexibility especially in case of temporary need of purchasing resources. In practice this service is mainly renting of resources from an external party.

Material call-off service is rated as future potential for one company and for two customer-companies it is a high priority project. Project procurement is needed by two of the companies. Only one company is considering outsourcing more purchasing activities to LMS (procurement service). The procurement services in general become an important issue when the companies are trying to reduce the number of suppliers. Especially the purchasing of slow moving items could be worthwhile of sourcing from one single supplier even if the material's purchasing price is a little bit more expensive compared to a situation when it is purchased by own purchasing department.

Customer A needs customs brokerage services in the future, and by B and C as high priority. Company B named following countries, which have special needs for this customs brokerage services: China, Brazil, India, Russia, Kazakstan and CIS countries. Company C needs these services especially in the Asian Pacific area.

Inventory management services are considered to be future potentials. One of the companies is thinking of outsourcing also the inventory management. So the conclusion is that at first phase the customer-companies want to control the stock levels and optimize it by themselves at least in first phase.

Company A has, in one of its spare part stocks, outsourced the actual warehouse handling (picking & packing process) to external personnel. Company B has thought as option for the future to use *in-house outsourcing* for warehousing activities.

Fiscal representation services could be needed by companies A and C. Company B needs the services as high priority. Practical sample about the shipping certificates is the EUR1-certificate, which is needed in some countries for customs purposes. Another sample is the Intrastat-reporting, which is also needed for customs. The Intrastat report must be compiled regularly if a company makes import/export business over a certain monetary value.

All three companies considered that KPI's are needed across the entire supply chain, and quality inspections are needed especially during inbound process in warehouse. *Quality control services* can be expanded into other areas too, and it can be divided basically in two main groups; The *KPI analysis* could be made on consulting basis and *quality inspection* is concrete work on shop floor.

Wireless, mobile, Internet, and e-commerce solutions are considered important issues among the companies, but the practical applications are not very clear yet. As a conclusion the LMS should have good knowledge and partner network *in information systems and technology*. This know-how should be in-house or it can be also outsourced from external parties.

Logistics technology solutions may be applied in the future but there is no special requirement to apply them to LMS in the first phase.

In general, if a company has outsourced any part of its logistics activities to external parties, the processes and service providers should be benchmarked on regularly basis. One value added task, what the LMS could offer, is a data bank, which could be used by the customer companies. LMS should update and develop the data bank

regularly and develop it constantly. *Consultancy services* should include benchmarking at least in following areas:

- Warehouse locations
- Warehouse service providers
- Transportation service providers.

The need for customer specific value added service will definitely increase in the future, and LMS should have good networks with companies working in different business areas, which could offer value added services to LMS. E-procurement is also an area, which will become even a competitive edge of companies in the future. The whole LMS concept is based on outsourcing of non-core activities to external service provider(s). The successful implementation of any outsourcing project is critical both from outsourcer and service provider point of view. Therefore consultancy services should include basic guidelines for outsourcing of logistics activities to an external party.

Office hotel services are not needed for time being by the customer-companies.

Company B is considering implementing the *human resource rental services* of LMS. The office employees could be used in call center activities and in purchasing. Company B has also considered the rental of fitters and service engineers in their global operations at the end-customers facilities for making maintenance and small repairs work.

There is no specific need in *property maintenance and controlling services* within the companies.

The customer companies were also asked to list the three most important services and any value added services, which they think is needed by high priority. The Table 4 presents a summary list of these *dedicated services*, which are in practice customer specific. There doesn't seem to be much synergy benefits that could be achieved by implementing the dedicated services.

Table 4. Summary of dedicated services.

	Company A	Company B	Company C
Dedicated services	<ol style="list-style-type: none"> 1. Recycling of align tray including material reusage and grinding 2. Packaging standardisation and product identification and traceability 3. Special inbound checking process for machined products 	<ol style="list-style-type: none"> 1. Guidelines for outsourcing process 2. Ordering process in Intranet / Extranet 3. Logistics management in CIS countries 	<ol style="list-style-type: none"> 1. Rope and cable cutting 2. Packaging standardisation and product identification and traceability 3. Consolidation of modernization packages (virtual warehousing)

4.2.5 4PL Services

In general all the three customer companies are willing to give more responsibility to a single service provider, in this case to LMS, in managing their logistics network concerning spare part business.

Warehousing management module's operations is required to be global. The basic requirement is that this module should include normal inbound/outbound operations, and goods return process. All the equipment needed in warehouse operations should be invested or leased by the service provider. KPI reporting is essential for all the customer-companies, and there are no special specifications that should be observed concerning reporting methods.

One of the customer companies wants to negotiate the transportation prices by itself. Two other companies are willing to use price lists negotiated by the LMS. *Transportation management* module should include normal administration operations, like arranging the connections to different transportation service providers, tracking and tracing services, claims administration and performance & cost controlling.

The customer companies have different needs for *value added service* module. The differences can be explained by the facts that the companies are in different industrial area, and additionally they are in different phase concerning outsourcing process. Nevertheless value added module is needed and customer specific dedicated services must also be taken care of.

Supplier management module is needed especially for monitoring the vendor quality like controlling the delivery times, documentation and packing quality. The vendor

quality monitoring is needed necessarily for securing the smooth operational work in warehouse processes. Supplier management requires good and sophisticated communication tools and procedures.

There could be two ways of arranging the *logistics controlling* module services. Because basically all the modules include process, which should be measured, the monitoring and reporting could be one part of an every individual module. Probably more effective way of organizing the controlling activities is to centralize all the monitoring and reporting tasks into one module. With aid of this procedure the following benefits can be gained:

- Due to centralized operation the operative work is not disturbed because of complex reporting methods
- Guaranteeing the development work of controlling methods and tools
- Convergent and updated tools and methods
- Clear responsibility partition
- Specialized resources in their area of business
- System integration in centralized area of responsibility
- Convergent distribution of reports secures that the reports are send in time to customers
- Centralized analysis and reporting methods for management
- SLA (service level agreement) target figures are measured against actual figures.

Interface management includes integration of human, physical and IT interfaces. This module should define and give clear guidelines that who are the contact persons in managerial, commercial, technical and operational issues for customers, suppliers and service providers. It also includes IT interfaces to customers, suppliers and service providers. Training of persons involved in operations and change management could also be part of the interface management services.

4.2.6 Ordering and Delivery Process

Basically all the three customer-companies have same kind of ordering and delivery process. There are minor differences due to the facts, that proportion of stock and order bounded vary. Two of the units are dealing directly with external customers and one is dealing with internal sales units globally, and the products' value and need for engineering varies between the companies. The Figure 14 presents a simplified process description of quotation process.

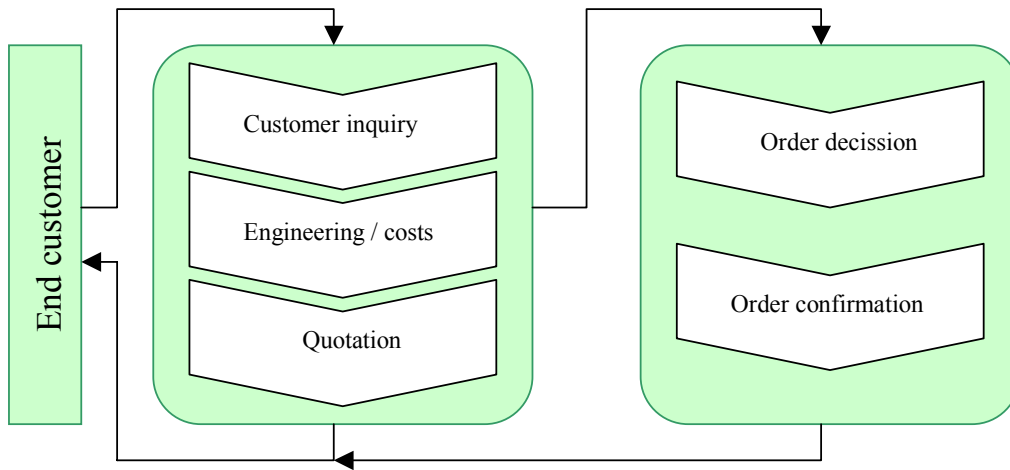


Figure 14. Quotation process.

The Figure 15 presents a simplified process description of ordering and delivery process.

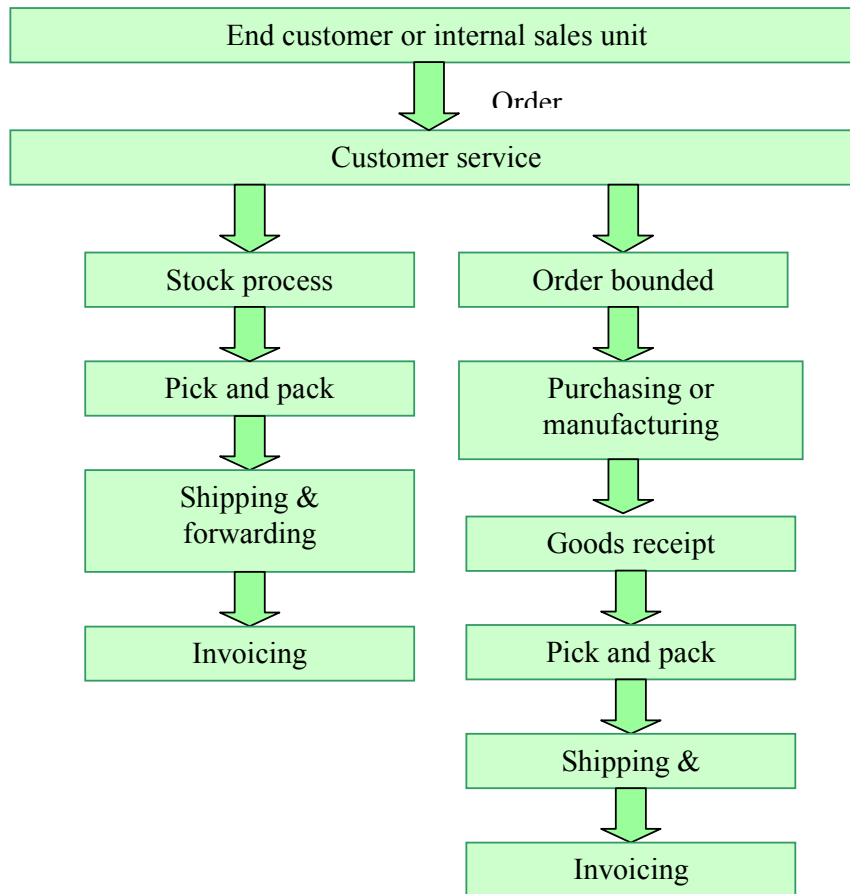


Figure 15. Ordering and delivery process.

Stock process means in practice that the items are in stock, and they can be shipped on same day from stock as they were ordered. The order-bounded items are not stocked, and they need in most of the cases engineering work before shipping. Delivery time can be from one day to several weeks. In some cases the order-bounded items can be shipped directly from a supplier to the end destination. In most of the cases the supplier sends the items to warehouse, where the quality is checked and occasionally they are consolidated with other materials belonging to the order. When all the goods are ready to be shipped, the consolidated shipment is send to the end destination.

4.3 Options for New Business Concept Model

During the discussions in service survey phase different views about the LMS were observed. These observations can be split to three ideas, how the LMS-company could be organized as presented in the Figure 16:

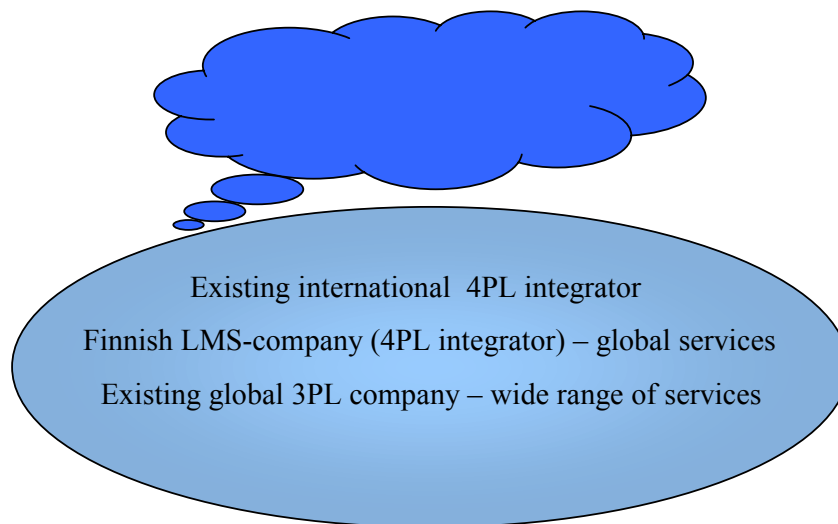


Figure 16. The LMS views after survey phase.

It was decided in one of the project steering group meetings that the survey should not go into too deep details in suggesting and analyzing the LMS-company itself, but the survey should concentrate especially on the requirements that the customer-companies have to the LMS-concept.

In general it can be concluded that the requirements for logistics service provider from outsourcing companies point of view depend on following issues:

- State of logistics outsourcing process
- Size of company

- Development stage of ERP system
- Stability of business
- Process requirements
- Geographical factors of outsourced activities
- Product type
- Products expected lifetime
- Cultural factors.

4.3.1 Scope of Services

After analyzing the synergy benefit survey and reviewing the rates given in the questionnaires, the new business model started to get its shapes. A modular service concept seemed to be an optimal and natural solution for presenting and organizing the services requested from the LMS-company. The selection criteria, in regard to choosing the modular concept, is presented on following list:

- Clear presentation style
- Gathers in natural way the diversity of services in understandable format
- Gives customer freedom to choice any services needed
- Process-oriented approach
- Makes easier to implement the Activity Based Management both in service provider's and customer's organization
- A clear base for pricing the services.

The basic target in the modular service concept is the value increase for managing the customer companies' supply chain and at the same time to work in closer relationship with them. In practice the modular service concept requires excellent knowledge in customers' processes and business. Special attention must be paid to understand the change of proportion in the lifetime of products and services. Often, in after sales business, the products maturity requires high service completion not only from end customer point of view but also from service provider point of view.

The services required from LMS are listed in the Figure 17 and they are based on the requirements identified in survey phase discussed more in details in the chapter 4.2. A basic selection criterion, for choosing an individual service, has been that the sum of rates has to at least 6 points before a service was selected (in customer companies' questionnaire). The only exception was made in selecting the dedicated warehouse service due to the fact that in metal industry in general this option may have more demand than among the participating companies in this research project. Many companies may be ready to outsource the logistics activities step by step, and they want a service provider to use the customer-company's own IT-system in the first stage.

The services, listed in the Figure 17 are typical for companies operating in metal industry, thus they can be applied to any organization in that business area. Value added services vary, and they are either customer specific or services, which can be applied basically to any customer.

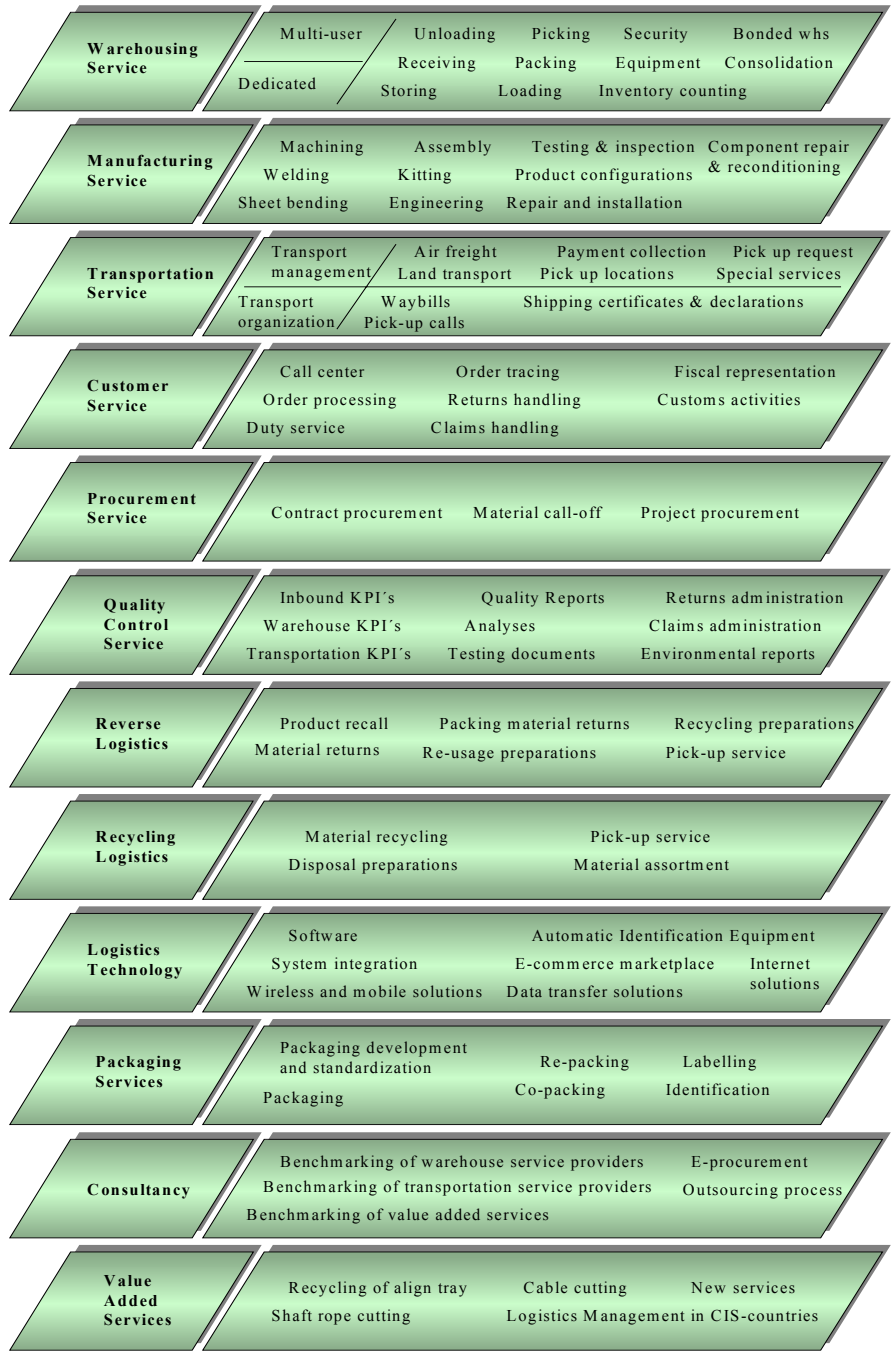


Figure 17. Modular service concept.

An interesting detail concerns the logistics consultancy service. The 4PL concept makes possible the implementation of delivering the benchmarking studies. Traditionally a 3PL service provider is disqualified for delivering information from other service providers, and on the other hand they are not willing to do share that information. Because a 4PL company does not carry out physically for instance the warehouse operations, but they are purchased from an external party, it makes them

possible to collect and deliver independent benchmarking information about the service providers. Traditionally this information is asked from special consultant companies.

During the discussions with customer-companies a few common comments were raised up as basic requirements and expectations for the LMS-company. The human communication flows (managerial and operational) are expected to be open and two-ways. The LMS should be able to integrate the information systems to any system used by the customer-companies or other service providers. Flexible processes were also seen as important factors. But the two most important factors were the high service level and general qualitative expectation.

4.3.2 Distribution

The distribution concept of LMS is challenging due to the global operation requirements from the customer companies. Below listed a few issues which can be seen as positive arguments in favor of LMS:

- Information flows in digital format decrease manual work
- Resources can be moved from manual work to more value added producing work
- Facilitates communication and information distribution more effectively (information analyzing and distribution)
- New business practices will be developed in macro and micro scale
- Benefits coming through the economics of scale both to customer and LMS
- Forces towards re-evaluation of current processes
- Manages 3PL service providers and develops them
- Compares the functionality of logistics in global level.

There are also challenges, which must be taken into account in planning phase of developing the LMS concept. These challenges are listed below:

- International communication
- Market fragmentation
- Increasing complexity of co-coordinating supply chain networks
- Service level requirements
- Logistics costs are increasing due to additional 4PL player in logistics network
- Information overload and knowledge obsolescence in internet applications
- Human resistance to change
- Need for managing knowledge, documents and product data (KM, PM, PDM) will increase in the future
- Linking of different databases and softwares
- Finding the balance between flexibility with customer requirements and aiming towards standard processes
- Cost efficiency
- Product and market differentiation needs
- Inventiveness

The Figure 18 presents the proposed delivery concept of LMS in general level.

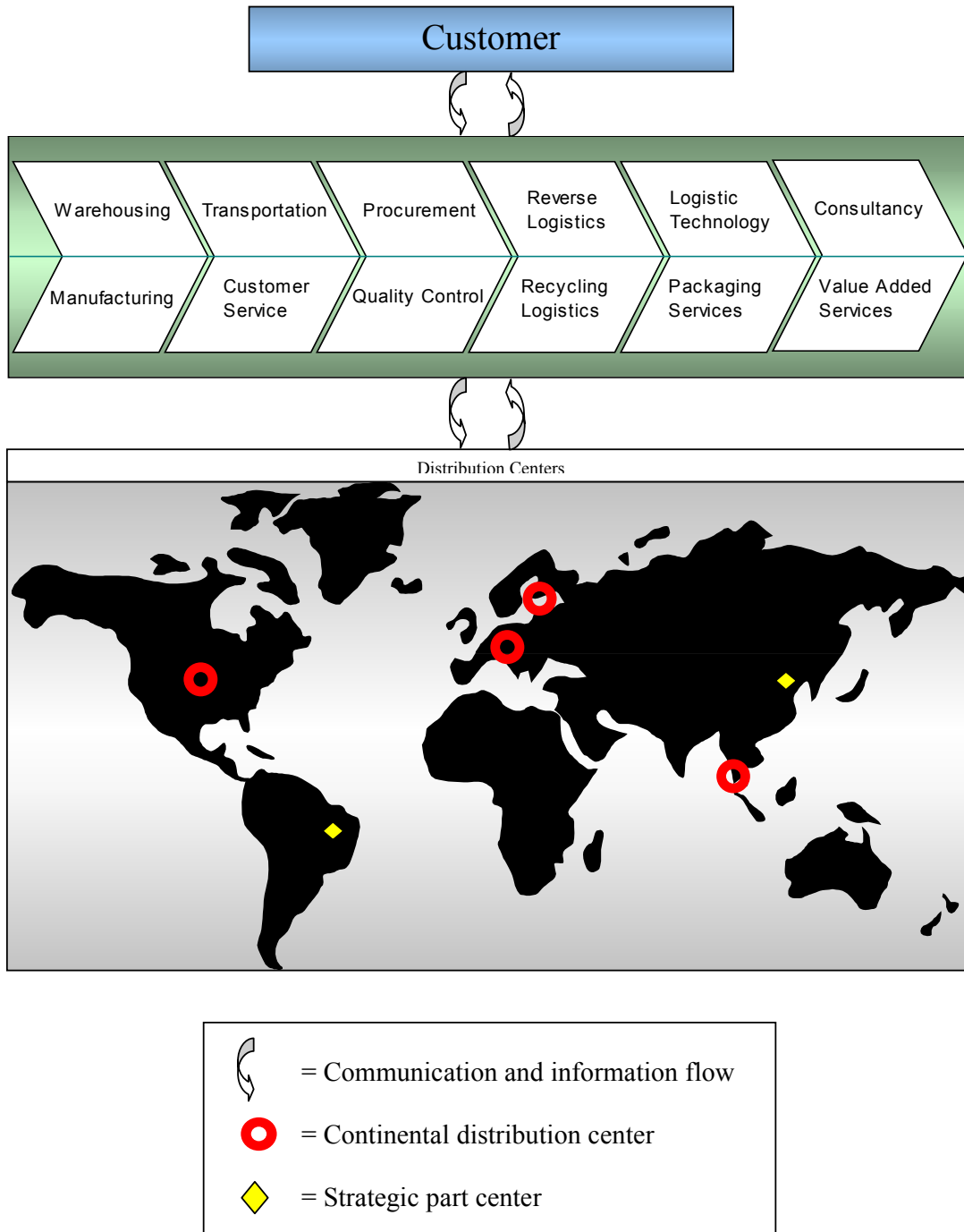


Figure 18. Proposed LMS delivery concept.

The definition of Continental distribution center and Strategic part center is discussed more in details in the chapter 4.2.1. The geographical locations of centers are drawn into the map in rough level, and they are presented only of principle.

4.3.3 Service Provider Network and Other Interest Groups

A 4PL company must understand the consequences of the make or buy decision. The products or services that are made in-house must be core competence of the integrator. It is also possible that in first phase the integrator must make a service by itself, because there are not any service providers in the market from where the service could be purchased. In the second phase service can be sold or the service can be developed with another supply chain company, who is willing to invest on performing the needed activities. This situation may be valid especially in procuring value added services, which are mostly customer specific. If a product or service is not a core competence of the integrator, they can be bought from supply chain professionals. These professionals should be in many cases globally present in the markets.

The purchasing of products (and services) would face a lot of cost pressure from the customer-companies side. It is clear that they are not willing to pay higher prices only because there is one player more in the supply chain. So undoubtedly the LMS-company has to be able to produce added value for making the operations sensible and cost-efficient. The added value and benefit consist of a value added operation during the process, process saving (improved efficiencies) or increased scale of combined purchasing.

There are many ways to start the planning and engineering phase of network model. One planning method of network concept is the concept defined in the "PKT-laatuverkko" project. The Partner quality network (PKT Laatuverkko – PKT Säätö, 2001) is a process for different types of networking operations. The target of this concept is to create a network, which corresponds the customer requirements in terms of coherent business practices and achieving business targets. The concept is based on three components: Creation of network, function of network and clearing of network. More detailed information about the concept can be found in PKT Associations Web-pages (<http://www.pkt.fi/laatuverkko>).

The LMS-company has a lot of interest groups that should be professionals in their area of business and on the other hand LMS should have resources and knowledge to manage the communication interactions with them. The interest groups involved in the LMS operations could be in principal following:

- Customers (and/or their customers)
- Personnel
- Suppliers
- Subcontractors
- Competitors
- Warehouse service providers
- Transportation companies
- IT technology companies
- Engineering companies
- Legal agencies
- Environmental authorities
- Customs authorities

- Insurance companies
- Banks and financial institutions
- Research and education institutions
- Consultants.

4.3.4 Software and System Integration

Nowadays the ERP (Enterprise Resource Planning) systems are very sophisticated and integrated including full coverage of functionalities.

Cap Gemini (1999) has made a market survey about the ERP systems in Europe and the United States. According to survey two leading companies dominate the ERP markets in Europe. They have a share of 45% of the ERP markets. The six biggest ERP companies cover 60 % of the market.

The five biggest ERP suppliers are:

- SAP 29%
- Oracle 15%
- Peoplesoft 7%
- JD Edwards 6%
- Baan 3 %.

The survey shows that companies are looking for cheaper ERP implementation projects. Mainframe is the most common technology in ERPs in Europe and the United States. One third is based on client server architecture.

The implementation time of ERP system varies depending on the size of a company. In Europe the ERP projects are finished within two years. It is estimated that the companies will increasingly use external consultants in implementation projects.

The ERP system products include normally the following features:

- Accounting
- Warehouse management
- Materials management
- Production planning and management
- Human resource management
- Sales and distribution.

It is possible to add other functionality components into ERPs. Many companies are developing their organization towards process controlling. For this purpose it is possible to add the SCM (Supply Chain Management) and CSM (Customer Relationship Management) functionalities, which serve one single process but distribute process knowledge to other processes too (Knowledge Management).

The aim of LMS concept is to establish an electronic interaction between customers ERP systems, service providers systems and LMS systems.

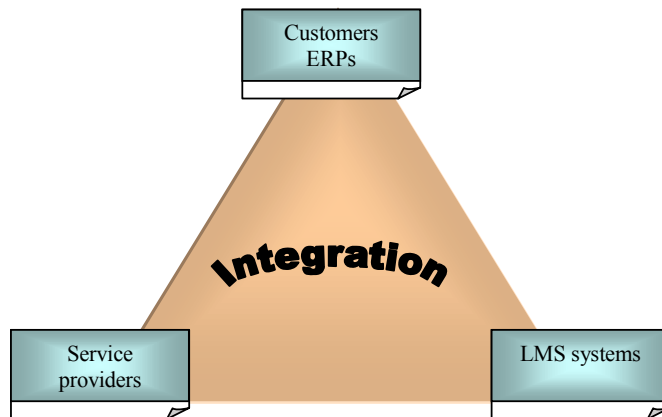


Figure 19. LMS system integration.

There are risks in this comprehensive integration. Below listed some risks and constrains:

- The quality of interface data transfer is incomplete
- Customer confidence in security of electronic payment
- Different ERP systems may not always support interfacing
- Need for interface transaction control will increase
- Scattered geographical network in different economical areas
- The complexity of managing interfaces.

There are plans and programs in development of e-business solutions in the EU-level. The networking linkage of the SME companies is also politically an important target (Metallitekniikka 2002, pp.32-33). One sophisticated linking operator is the Anilinker Oy (Advanced Networking in Industry-Ani). Anilinker Oy is an inter-company service house and operator for international electronic commerce (especially for metal industry). Anilinker provides electronic services for order, supply, and invoicing routines, product data sharing and company's internal network management (Anilinker Oy, 2002).

According to MD Antti Kari (Metallitekniikka 2002, pp.32-33) it is possible to link even hundred service providers with aid of Anilinker within a few months. Kari claims that the Anilinker's concept differs from traditional datatransfer operators in taking the full responsibility for network operations, not only about one link. Anilinker Oy invoices about the services from users based on usage (bits) as other operators do also. The Ani-model is open for datatransfer standards. In another words, the companies can join the network with any technology they prefer (e.g. Edifact, XML).

The Figure 20 presents the basic function of Ani-concept.

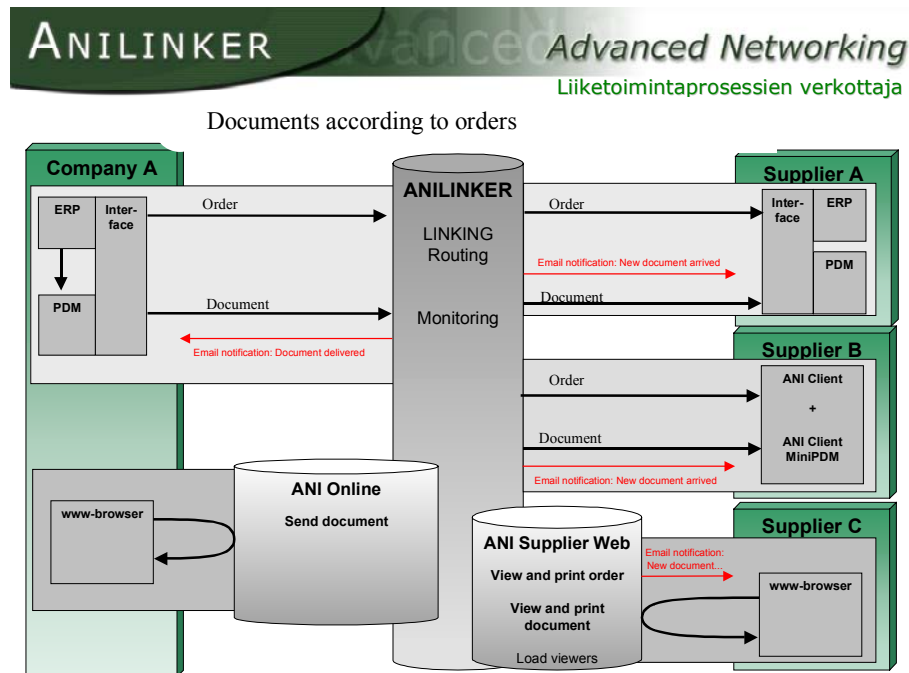


Figure 20. Ani-concept (Source: Anilinker Oy, 2002).

In general level it can be concluded that the Ani-concept is a potential way to link the customers and service providers into LMS-concept.

The exchange connection to data networks can be realized in several ways. From the LMS point of view there is not big importance how the connections are realized technically. The most important issue for LMS is that the chosen infrastructure can offer optimal solution from the cost and quality point of view in the most efficient way.

The microprocessors, data transfer connections and transfer speeds are developing constantly. Also the safety of the transfer quality is improving.

The Table 5 presents a short description about the wireless data transfers development (Luomala et al., 2001, pp. 23-25). According to Luomala et al the immobile network seems to maintain its superior speed, and the wireless solutions are not expected to replace it for a long time. The mobile technologies will be used for time being only in the business areas where they can produce real added value. This is in accordance with the results founded in this survey.

Table 5. Development of wireless data transfer.

Connection solution	Development stage	Transfer speed	Availability	Price
Phone net	Mature technology	56-128 kbit/s	Very extensively	Decent
xDSL	Strongly developing	256 kbit/s – even 6 Mbit/s	Restricted areas	Decreasing
Optic fibre	Mature technology, excellent operation safety	Hundreds of Mbit/s	Restricted areas	Quite expensive
Cable TV	Strongly developing	Several Mbit/s, but divided between several users when import data 0,5-1 Mbit/s and export data 0,1-0,2Mbit/s	Restricted areas	Decent
Electricity network	Development ongoing, expanding insecure	About 1 Mbit/s in new, protected cables in urban locality, short distances	In theory extensively	Open
Broadcast	Sending data possible, receiving must be handled in different way	Open. Incoming data even tens of Mbit/s	Extensively	Open
Wireless solutions	Based on WLAN or microwawe links	About 1 Mbit/s	Restricted areas	Decent
Mobile solutions	GSM data, GPRS, 3G solutions offer mobility	GSM data 9,6 kBit/s, GPRS 20-50 kbit/s, 3G 100-500 kbit/s	GSM data used extensively, GPRS coming extensively, 3G coming to restricted areas	In extensive use expensive
Satellite	Long transfer decay time	0,4mbit/s	In principal worldwide	Expensive

The most common data transfer standards are EDIFACT and XML. EDIFACT is a computerized system that allows linked computers to conduct business transactions, such as invoicing and ordering, over a telecommunications network. XML is a markup language for documents containing structured information. XML structured documents could be used over the Internet (web). The implementation of Edifact is laborious and may require big investments. XML solution is in technique wise easier to implement and cheaper. XML technique seems to displace the Edifact gradually as the most common data transfer method.

There are available in marketplace companies who can consult in defining and implementing the data network. A consultant company can also help in exchanging internationally agreed and recommended trade procedures in electronic business in general.

The development of Internet together with Application Service Provisioning (ASP) model will facilitate the utilization of information systems in SMEs. According to International Data Corporation (IDC) also the ASP service providers are trying to enlarge their markets to big companies.

ASPs offer to their customers software on leasing basis over the Internet. The price of leasing can be based for instance on usage time and/or handled data quantity or monthly fee. The service contract can include added to software equipment, training and support functions. The softwares are used typically with browser. The softwares and databases may locate at customers facility.

According to IDC, an application service provider has five defining characters. They include:

1. Operating an application center. The core value of an ASP is hosting and managing a commercially available application
2. Managing data at a site other than the customer's
3. Offering a one-to-many solution. ASPs have standard offerings with little customization
4. Owning the application license or having an agreement to use the application
5. Having total responsibility for delivering on all elements of the contract.

According to Luomala (et al, 2001) the ASP model is expected to be the most common way of purchasing softwares at the end of this decade.

The benefits coming from implementation of ASP are for instance common infrastructure (best business practices), globally easy to implement, releases resources to core activities and integrability to information systems in general. The development decelerates due to the fact the ASP service providers are aiming to use only standard services and they do not customized services. ASP service level agreements play a key role in successful partnership.

4.3.5 Market Environment

This chapter handles shortly the market environment in conjunction to this survey. The market analysis is based on quick survey in the Internet.

Despite the fact, that the 4PL concept is rather new business idea, logistics companies are adding a 4PL element to their supply chain solutions. On the other hand new companies are entering into the logistics markets, and they aim to be flexible, innovative, and make use of newer, more efficient technology compared to traditional 3PL's. The companies selling the 4PL approach may have considerably different services between each other in their service scope.

A new group entering into the logistics service providers markets are the units which used to belong to customer-company, but which are sold-out due to focusing only in company's core-business. It is quite common nowadays that a metal industry company sells its spare part manufacturing and/or logistics unit to external party (organisation's re-structuring).

One of the aims of this study was to present a new logistics service concept, where the traditional logistics service (3PL) is expanded with significant manufacturing and value added facilities, and the study was outlined to spare part logistics in metal industry. For making a market survey it should be considered the different types of approach alternatives that there are for analyzing the logistics markets. From this research project's point of view the market survey could be split into three different categories:

1. Pure 4PL companies
2. 3PL companies that have features from 4PL and
3. 3PL/4PL companies selling also manufacturing services.

If all these categories include only logistics service providers, whose core business is in spare part warehousing and distribution (especially for metal industry), the survey would correspond the interest of this research project. In practice it is quite difficult to really know if a logistics service provider is able to provide world-class spare part distribution service for customers operating in metal industry. Another problem is that even the 'big players' in global logistics market may be able to offer 4PL services only in certain countries but not company-widely.

Typical companies in the category 1 are for instance TX-Logistics, e-Chain Logistics and FreeLog. The category 2 includes logistics companies that are operating both in 3PL and 4PL business. Companies operating in this group are such as DHL, Fedex, TNT, UPS, Deutsche Post, Schenker, D.Logistics, Ryder, and Menlo.

It is a little bit more difficult to name any companies into category 3. Inbound Logistics magazine has published in their Internet pages the top 100 3PL service providers (<http://www.inboundlogistics.com/3pl>, referred on the 22.10.2002). With aid of these pages it is also possible to check which 3PL characteristics match for individual needs. A short look in the Internet (top 100 PL's) addressed, that there are logistics companies, who market, that they have manufacturing services in their service scope. A deeper analysis in the world-class logistics service providers

Internet-pages showed that in practice most of these companies do not perform actual manufacturing but they are deeply involved in their customers supply chain. The logistics companies participate for instance in delivering parts to production lines (for instance by JIT-principle) and make some value-added work and distribute finished products. This is very common procedure for instance in automotive industry and high-value products in electronics business. Especially the Northern American logistics companies seem to be actively involved along the supply chain of their customers.

In Finland for instance the Libri-Logistiikka markets also integrator logistics services, but their expertise in the 4PL business is mainly related to the graphical and media products. Finland Post Corporation is also able to provide 4PL services for spare part business, but as discussed earlier they do not have clear manufacturing services in their service scope (only value-added services). Logistiikkatalo Group markets in their Internet pages that they select collaboration partners, which are suitable for the case under investigation. They also offer comprehensive logistics solutions for their customers.

There are also in Finland machine shops that manufacture products/equipment for new and after sales business. They are able to perform some parts of other logistical services like for instance warehousing in small-scale, procurement service, assembly, kitting and individual packaging. But in large-extent they are not able to perform advanced logistical solutions (not their core-business).

There are also a lot of companies that are specialized in the e-commerce business, and they can offer supply chain solutions to B2B-markets. But their supply concept is not actually planned to satisfy the high reliability, punctuality and speed expectations of spare part business.

One interesting case is the Cat Logistics. They started their operations as a spare part logistics service provider operating in global markets for Caterpillar. Due to the company's historical background Cat Logistics is able to offer in some-extent manufacturing services through its own production and supply chain network. Cat Logistics has globally launched just recently the 6 Sigma-methodology at all company business units for improving quality and reliability and to achieve cost reductions. For instance many Swedish companies have established a central warehouse for Europe, like Hiab (articulated cranes), Assa Abloy (locks and security equipment) and Electrolux (lawn and garden equipment), and are using Cat Logistics as their logistics service provider. Cat Logistics seems to market in their Web-pages information technology, inventory management, warehouse/operations management and transportation management.

Another notable case is the ValLog Corp. in Finland. They have quite similar historical background as Cat Logistics. ValLog started their operations as an internal elevator spare part manufacturer and logistics unit for KONE Corporation. Nowadays, as an independent company, their operation is based on modular service concept, which was developed as a part of the Valssi-project. Peltonen (2002) has made a diploma thesis about the development of logistics service concept for. ValLog operates in Finnish markets but makes export business through their customers supply chain. As a general observation it can be concluded that after a short exploration in the

Internet in the logistics companies Web-pages, it seems that there is not a company whose logistics market offering would fall into the following profile:

- Global supply chain solution
- Core-business: Spare Part logistics service provider of machine-shops (high-tech market)
- Service based purely on the 4PL concept
- Wide range of **standard** logistics services (eg. Warehousing, inventory mgmt, procurement service, customer service, reverse logistics, transportation mgmt, recycling logistics, logistics consulting, quality control services, dedicated and packaging services)
- Manufacturing services (mechanical).

It seems to be quite common that the logistics service providers do categorize the spare part logistics of metal industry customers under the Hi-Tech division.

Benchmarking is a practical tool for improving performance by learning from best practices and the processes by which they have achieved. Concerning the interest area of LMS-concept the following issues would be at least worth of studying in more details in terms of benchmarking the Best-Business-Practices (BBP) and market research in global spare part distribution:

- Consolidation of industry
- Market structure
- Demand for logistics service providers
- Key companies (customers/service providers)
- Strategy
- Business concept
- Management
- Organization
- Location
- Processes
- Pricing
- Efficiency and performance
- Partnerships and alliances
- Information systems in use
- References.

5 CONCLUSION

The interviews among the participating customer-companies indicated that there are logistical needs that the traditional third-party logistics service providers are not likely able to offer that would cover widely the needs of potential customers. The customers value the single-source approach. Due to the fact that requirements of customers are increasing constantly the third-party logistics service providers have almost an

infeasible task in trying to satisfy the customer expectations. The special business features of metal industry companies (machine-shops) operating in global markets forces them to find constantly logistical solutions that are not standard services of service providers. On the other hand also the end-customers require reliable services and products, faster delivery times and competitive prices.

It seems that the networking becomes a potential way to solve the complex requirements of customers. The suitability of pure 4PL concept for the metal industry depends remarkably on the logistics life span and culture of company. Also company's level of know-how and experience in logistical solutions has an impact on decision-making process. Basically the 4PL concept is quite similar to the LMS concept. Establishing an integrator, based on the LMS-approach, has few possibilities. As such LMS-company does not need to own the means of individual services and equipment but has to manage exclusive agreements with service providers.

The global operational environment requires also a strong financial stability, which is in favor of the fact that an existing world-class 3PL/4PL operator manages the supply chain network. In fact this is what the global integrators already in some extent do, but at least from participating customer-companies point of view the results in practice seem not to be very attractive so far. The trend in general is that alliances and acquisitions keep on growing, which means that the world-class integrators become even bigger.

Important success factor of LMS-concept is the ability to solve customer's problems. Networks and alliances can do this. Forming joint ventures and alliances between different suppliers and customers in that way letting other companies to join could be one way to work and realize the LMS-based concept. In fact, a recent trend seems to be that the networks are becoming dynamic, and they can be set up and discontinued in short notice. The networks will be build-up on ad hoc basis. LUT has started a research project called "Valosade", which handles the function of these networks more in details.

If all companies joining in the joint venture fit well for the LMS-concept, it can be coordinated to the advantage of all the customers. In another words there seems to be market potential for a logistics service provider who is specialized in spare part (after sales) logistics for metal industry. It could be for instance Finland-based logistician who could expand its operation gradually towards global markets.

It is questionable whether it will be possible to implement the 4PL approach in its pure form. The modular business concept however allows also a 'new-comer' to establish a business based on LMS-concept. The operation and services could be started in the order of importance. In practice a new logistics company has to start the operations only in national level, which is a disadvantage. Due to the fact that logistics processes become more complicated, a small logistician has the possibility to be more flexible. Second step in globalizing the operation could be for instance to expand the markets into the Nordic countries.

Another interesting aspect is that how the regional logistics centers could utilize the LMS-based approach. The examples of these regional centers were discussed shortly in the Chapter 3.2.1. It is extremely difficult to ensure quality of services in global

level, especially if the services include customer specific operations and to implement a perfectly coordinated interface management. By utilizing the globally operating companies in the region and their network, the logistics services could be expanded accordingly.

Anyway the management of LMS-approach is in practice a combination of internal professional know-how and versatile contact network. Basic aim should be that the services offered must be standard services and not designed on ad hoc basis. In the LMS-concept also the question of neutrality becomes an important issue. Based on the survey a consulting approach is a key element in the LMS-concept. The LMS-company should measure and benchmark continuously the supplier network and the results are a particular interest of customers’.

There are also risks involved in the LMS-concept. The challenges concern for instance the complexity of processes, integratability of systems, business processes’ dependence on the LMS, company-cultural fitness and qualitative readiness of supplier network of customer-company. Cost efficiency requirements force the LMS-company to use systems as much as possible for managing information, make innovative solutions and manage supplier and distribution network effectively. The total costs may increase and a question mark is that are the end-customers willing to pay for the services and products delivered.

In the Chapter 4 it was outlined a draft about the LMS concept. As a conclusion of the survey the concept can be completed as presented in the Figure 21.

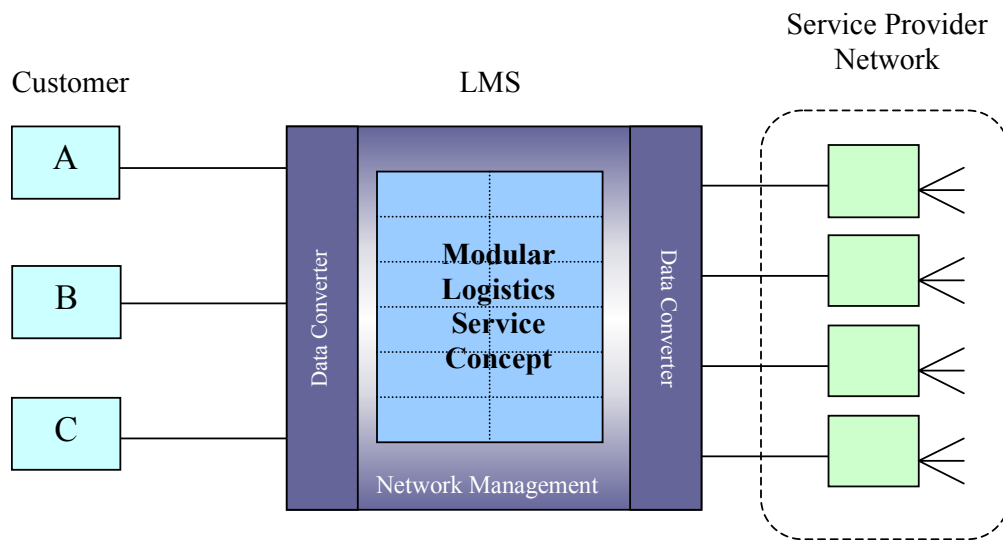


Figure 21. Modular logistics service concept.

In the Modular Logistics Service Concept (MLSC) the ERP-system of LMS-company plays an important role. Another important factor is the integratability of different ERP-systems. Probably it would be wise to select one of the biggest ERP-suppliers for

managing the concept. This is the case especially when the LMS operates in global level. But in practice, if a typical Finnish SME machine shop is examined, their capability and readiness to integrate with an LMS-system varies a lot. Especially the small-sized companies most probably would like to send the orders, at least in the beginning of the partnership, in traditional way for instance manually by fax or e-mail. Another possibility is that the customer provides its own ERP-system for managing the logistics chain. In that case the LMS may lose some important features of its service concept and competitive edge, but again this may be only a temporary situation. When both of the parties are ready for integrating the ERP-systems, the implementation process may be also easier to realize because both parties know the process requirements and operational environment better.

The suppliers' system integration feasibility depends much on delivery volumes and lot-sizes. Economies of scale must be achieved before the integration of ERP-systems is worth of implementing. Also in case of low-volume suppliers and service providers a manual information transfer may be the easiest and the most cost-effective solution. On the other hand the supplier and service provider network should be as small as possible for keeping the management of them controllable. Dedicated solutions in general should be avoided for not losing the flexibility.

Starting up an LMS-based operation has a wide range of strategies. In practice the demands of potential customers lead which way to go. A start up with global strategy may be too optimistic but alternatively for instance a country-based, Scandinavian or European level operation could be more attractive and realistic approach. The network of customers, suppliers and service providers influence also from their part on the choice of strategy.

REFERENCES

Anilinker Oy, 2002. Company and ANI-Community.presentation. WWW-document [ref. 9.9.2002].

<http://www.anilinker.com>

Bauknight Dow N. and Miller John R. 1999. CALM Supply Chain & Logistics Journal, Summer 1999. WWW-document [ref. 18.10.2001].

<http://www.infochain.org/quarterly/Smr99/Fourth.html>

Cap Gemini Ernst & Young Finland, 1999. Cap Gemini tutki Euroopan ja USA:n ERP-markkinat. WWW-document [ref. 4.12.2001].

<http://www.fi.cgey.com/uutiset/99/231199>

Confederation of Finnish Industry and Employers, 2000. Logistiikka ja väylät – talouskasvun heikko lenkki ? WWW-document [ref. 26.11.2001]. 8 pages.

<http://www.tt.fi/arkisto/original.pdf>

Confederation of Finnish Industry and Employers, 2000. Electronic Business in Finnish Industry. September 2000. 15 pages.

Deogade, Chaitanya and Ramani, Mahendra, 2001. Real time Supply Chain Management. Future Trends. WWW-document [ref. 25.9.2001].

<http://www.isr.umd.edu/cdeogade/future.html>

Endorsia.com 2001. Electronic marketplace. WWW-document [ref. 23.10.2001].

<http://www.endorsia.com>

Enslow, Beth, 2001. Ascet Volume 3. The virtual logistics department: Next Generation Logistics Exchanges. Descartes System Group. WWW-document [ref. 15.10.2001].

<http://www.ascet.com>.

Finnish Association of Logistics, 2001. Logistiikan 90-luvun kehitys. WWW-document [ref. 29.11.2001].

<http://www.logy.fi/90.shtml>

Haapanen, Mikko – Vepsäläinen, Ari , 1999. Jakelu 2020. Asiakkaan läpimurto. Espoo. ELC-Finland. 279 pages.

International Data Corporation - IDC, 2001. What Does an ASP Do? Let Me Count The Ways. Jessica Goepfert. January 2001. WWW-document [ref. 18.10.2001].

<http://www.asp-outsourcing-journal.com/issues/jan2001/analyst-1.html>

Kivinen, Pasi 2002. Outsourcing Process of Spare Part Logistics in Metal Industry. Lappeenranta University of Technology. Department of Industrial Engineering and Management. Lappeenranta. ISBN 951-764-695-X. 63pages.

Järvinen, Petteri 2001. Logistiikkaseminaari Finlandia-talo 8.2.01. Luentoreferaatit 117 pages.

KONE Corporation Annual Report, 2000. WWW-document [ref. 17.9.2001].
<http://www.kone.com>.

Korpela, Juhani 2001. Logistiikkaseminaari Finlandia-talo 8.2.01. Liikenne- ja viestintäministeriö. Luentoreferaatit. 117 pages.

Larox Corporation Annual Report, 2000. WWW-document [ref. 20.9.2001].
<http://www.larox.com>.

Larsson, Håkan 2001. Logistiikkaseminaari Finlandia-talo 8.2.01. Luentoreferaatit 117 pages.

Liikanen, Erkki 2001. Logistiikkaseminaari Finlandia-talo 8.2.01. Luentoreferaatit 117 pages.

Luomala Juha, Heikkien Juha, Virkajärvi Karri, Heikkilä Jukka, Karjalainen Anne, Kivimäki Inra, Käkölä Timo, Uusitalo Outi, Lähdevaara Hannu, 2001. Tekes. Digitaalinen verkostotalous. Teknologia katsaus 110/2001. ISBN 952-457-040-8. 86 pages.

LUT, 2001. Lappeenranta University of Technology home page. WWW-document [ref. 27.9.2001].
<http://www.lut.fi>

Maltz, A B 1994 The relative importance of cost and quality in the outsourcing of warehousing, Journal of Business Logistics, pp-34-61.

McKinnon, Alan C, 1999. Global logistics and distribution planning. School of Management, Herriot-Watt University. Strategies for management, 3rd edition. Edited by Donald Waters. Pp. 215-234.

Metallitekniikka, 2002. Anilinker verkottaa Eurooppaa. Text Juha-Pekka Kervinen. 5/2002.

Metso Corporation Annual Report, 2000. WWW-document [ref. 24.10.2001].
<http://www.metso.com>.

Ministry of Transport and Communications, 1997. Logistiikkaselvitys 1996-1997. Publication 33/97. Helsinki. ISBN 951-723-134-2. Pages 120.

Ministry of Transport and Communications, 2001. Logistiikkaselvitys 2001. Publication 52/2001. Helsinki. ISBN 951-723-442-2. Pages 160.

Nissinen, Tarja, Tsupari, Pekka, Urrila, Penna 2001. Confederation of Finnish Industry and Employers. Kohti strategisia yritysverkostoja. Osaraportti I. Teollisuuden verkottumisen yleiskatsaus. Pages 42.

Partner Laatuverkko – PKT Foundation. Consulting Union Oy & Kuopion konsulttiverkko. 2001. WWW-document [ref. 1.11.2001].
<http://www.pkt.fi/laatuverkko>.

PE Consulting, 1996. The changing Role of Third-Party Logistics – Can the Customer Ever Be Satisfied, Institute of Logistics, Corby, Northants.

Peltonen, Heini, 2002. Logististen Palvelukonseptien kehittäminen. Lappeenranta University of Technology. Department of Industrial Engineering and Management. 94 pages.

Sakki, Jouni 2001. Tilaus-toimitusketjun hallinta. Logistinen b to b –prosessi. Jouni Sakki Oy. 5th edition. ISBN 951-97668-2-0. Pages 234.

Sorkamo, Ritva 2001. Asiakasinfo. Uuden talouden It-ratkaisut. 3/2001. Novo Group.

Storbacka, Kaj 2000. Transpress. VR Cargon asiakaslehti 1/00. Teksti M.Holopainen.

Suolanen, Jouni 2001. Taloussanomat 20.9.01.

Tekes, 2001. Tekes Home page. WWW-document [ref. 28.09.2001].
<http://www.tekes.fi>

TPG 2000. TPG Annual Report, 2000. WWW-document [ref. 24.09.2001].
<http://www.tntpost-group.com>

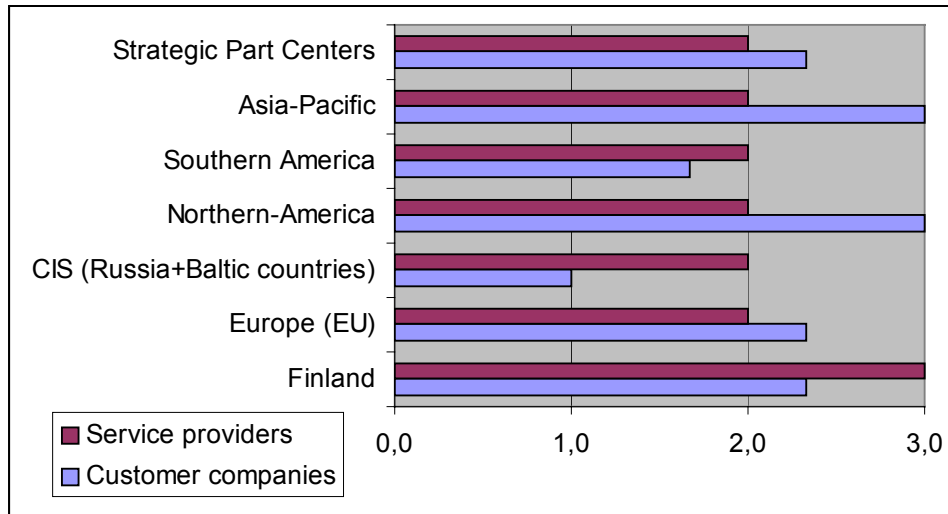
Tucker, F G and Zivan, S M 1987, Create integaretd logistics logistics third parties: spin them off, in Proceedings of the 7th Interbational Logistics Congress, ed J Williams, IFS, Bedford.

TX Logistik AG 2001. A010806-WN TXCM Strategie. PowerPoint presentation.

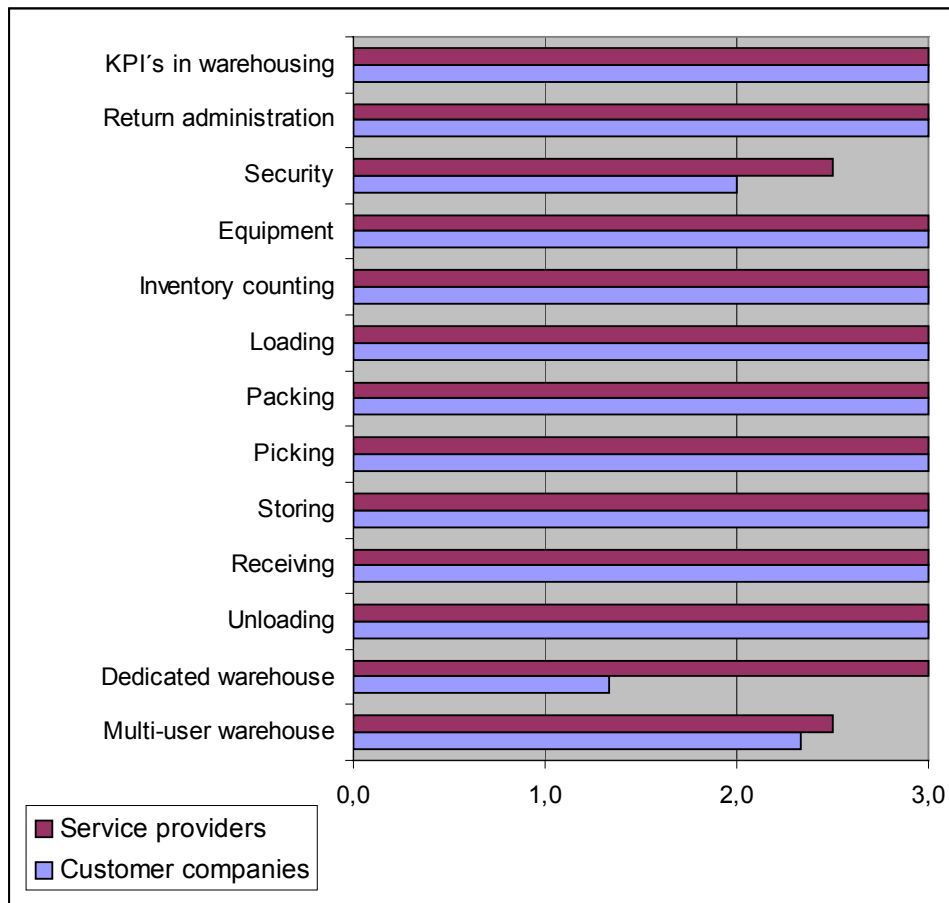
ValLog, 2002. ValLog home page. WWW-document [ref. 1.7.2002].
<http://www.vallog.fi>.

End Note: Fourth Party Logistics™ is a trademark of Andersen Consulting LLP.

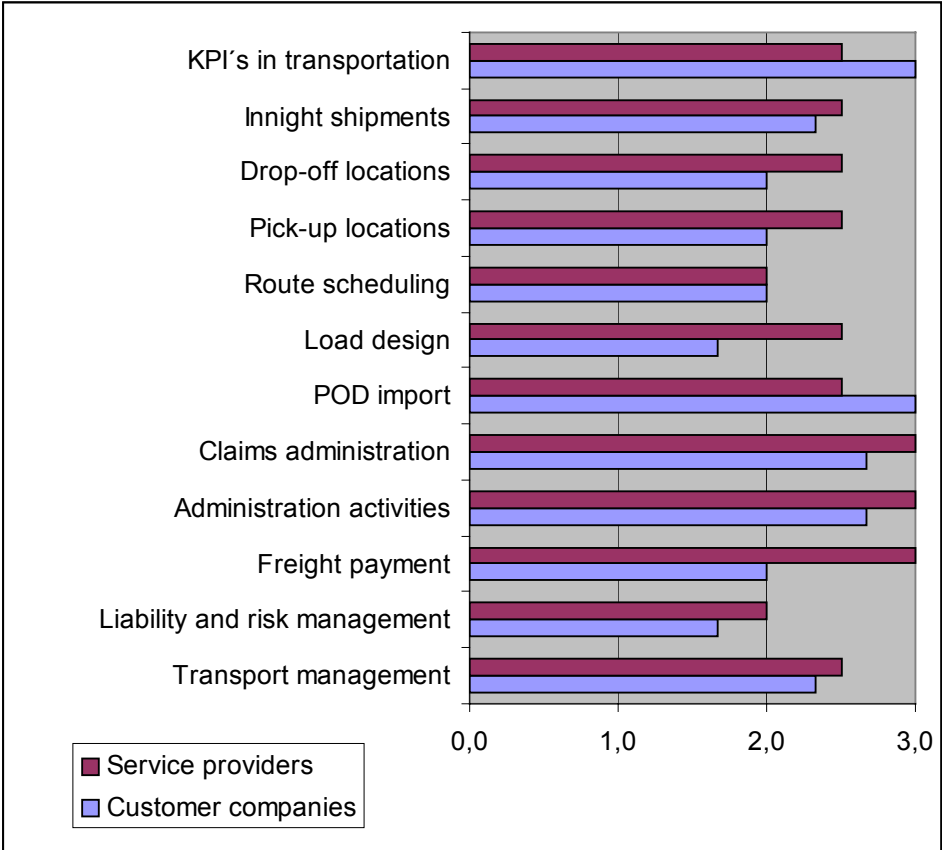
1. Warehouse (actual site and location)



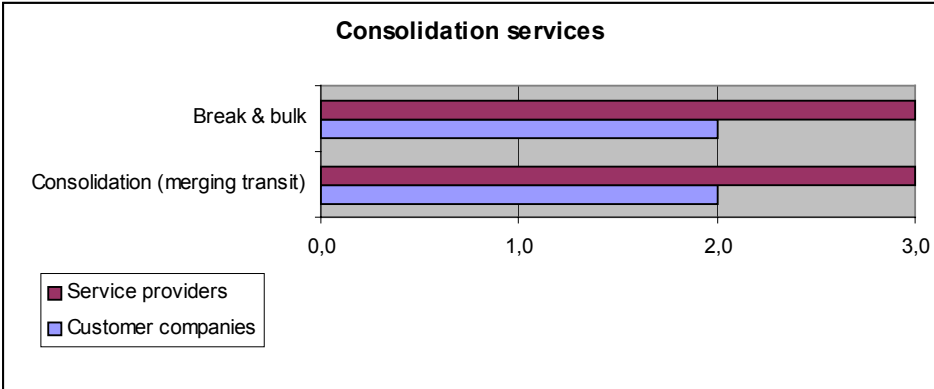
2. Warehouse services (basic activities in warehouse)

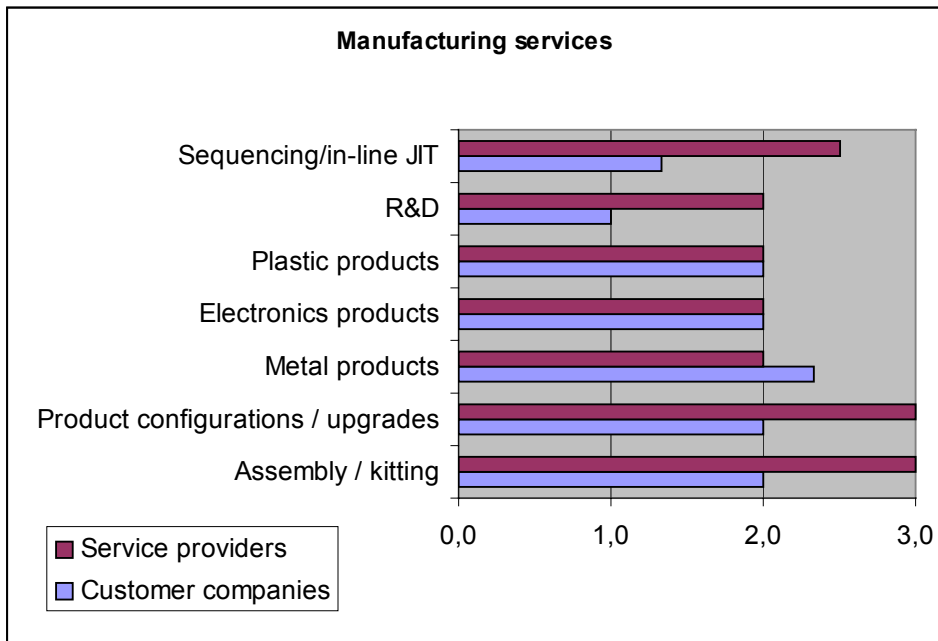
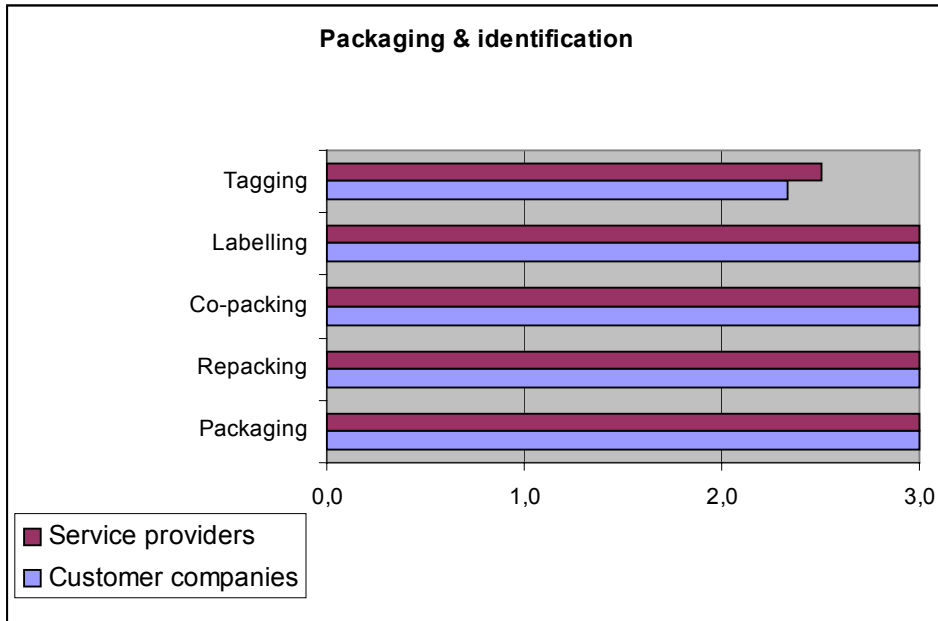


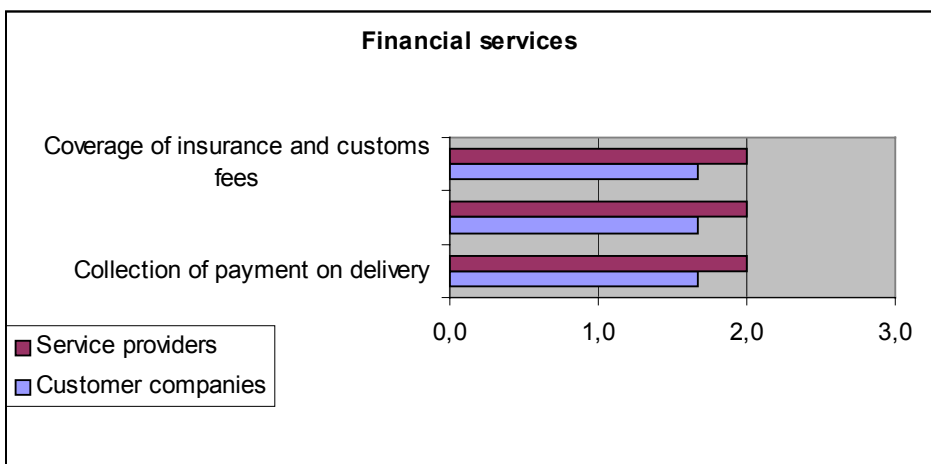
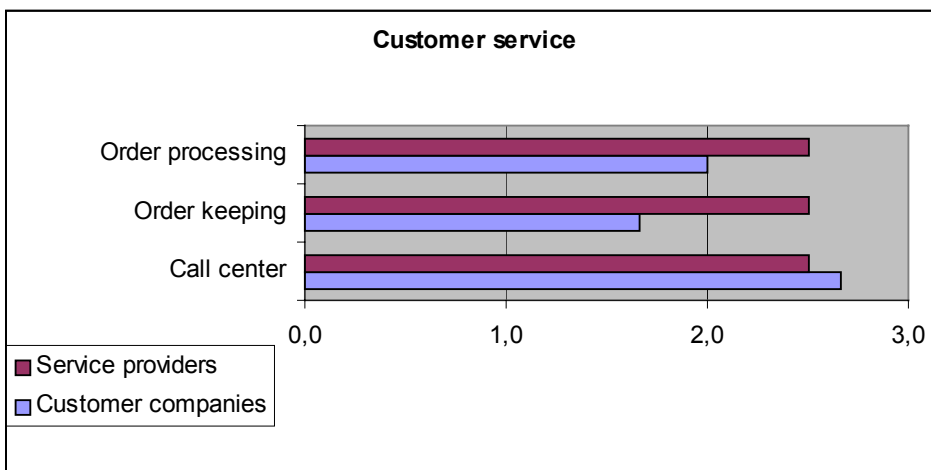
3. Transportation services



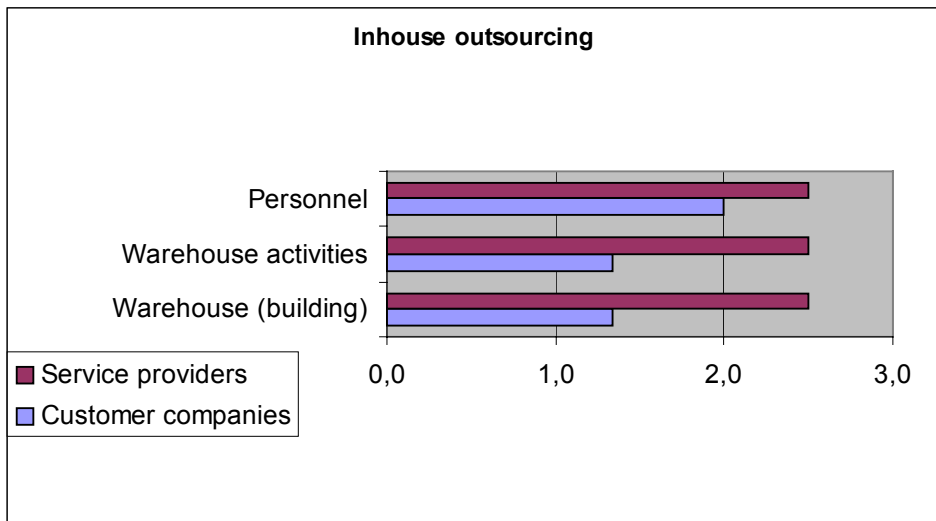
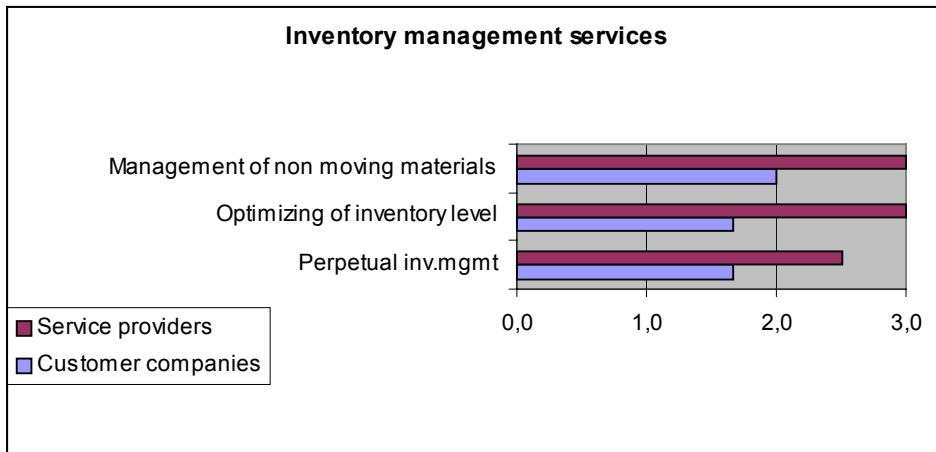
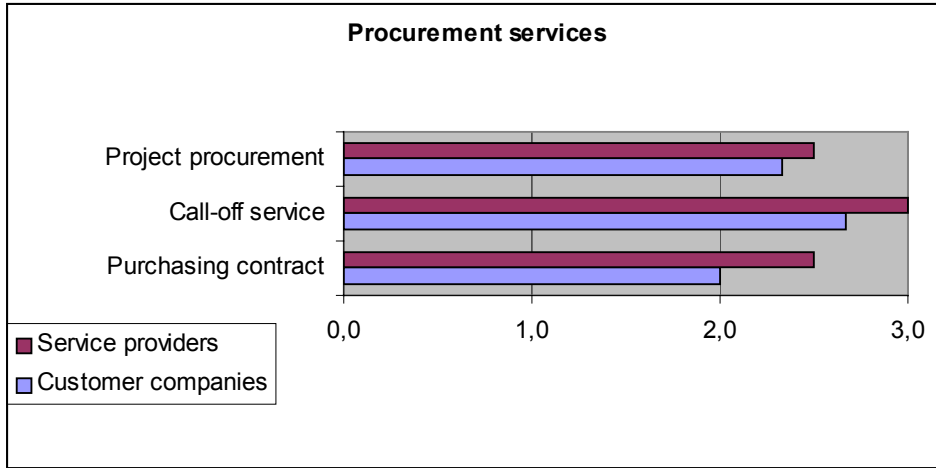
4. Value added services

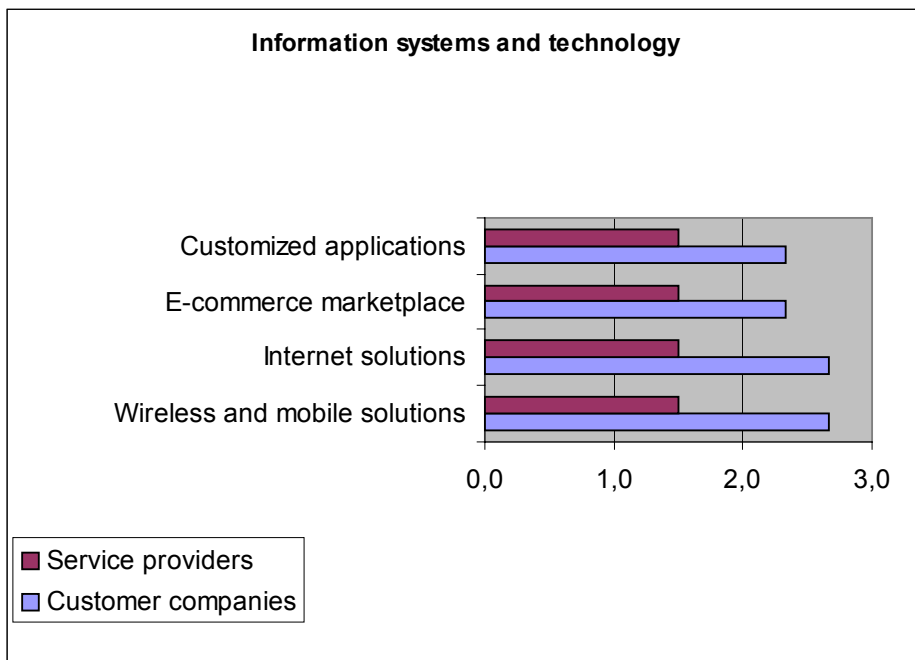
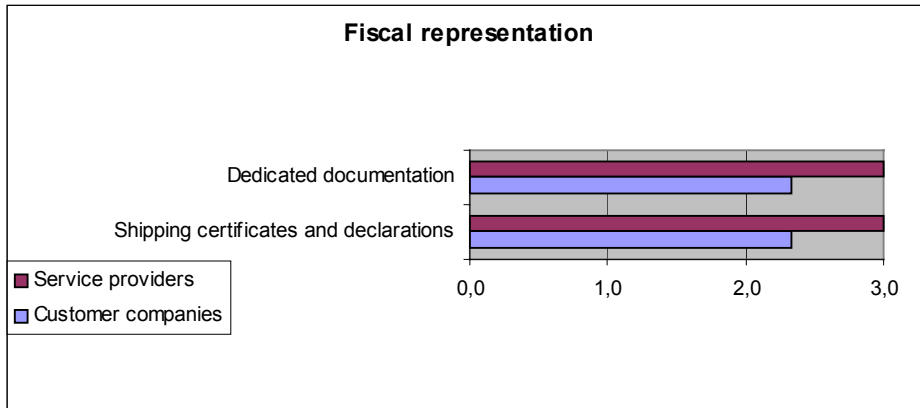


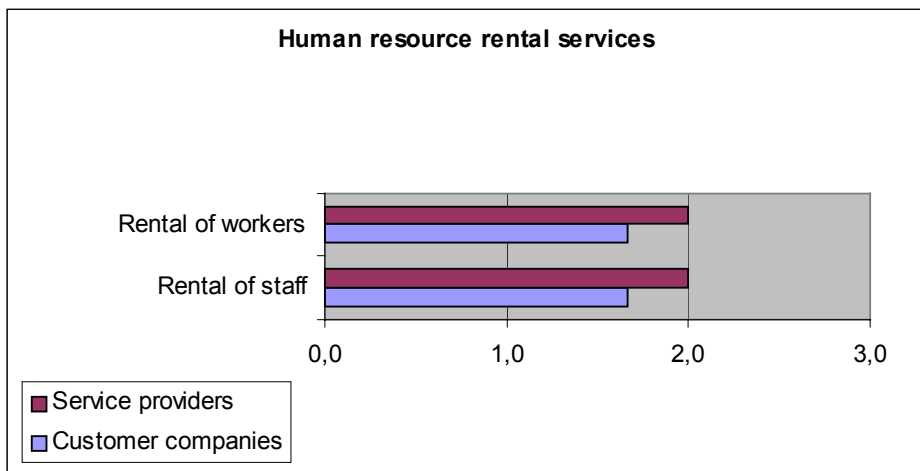
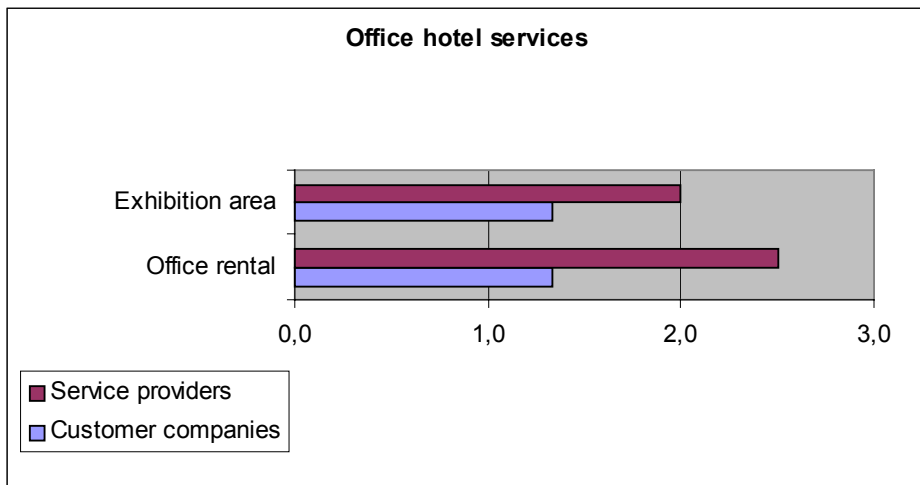
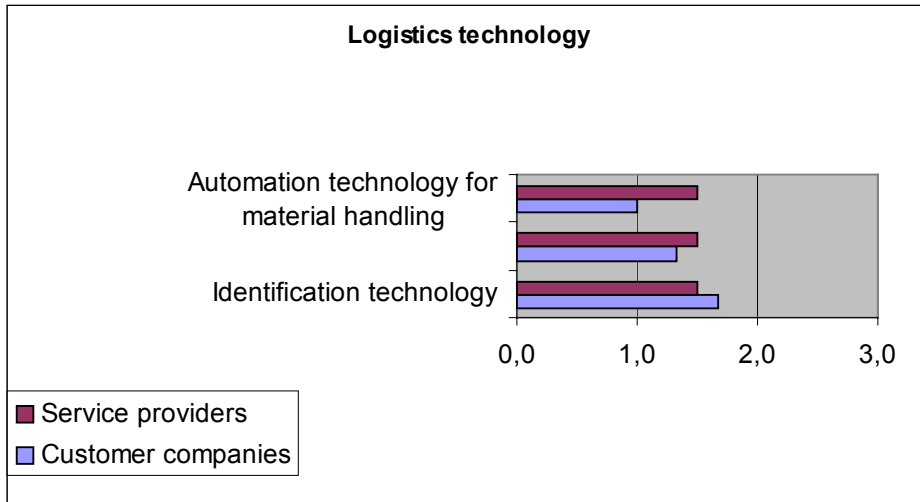


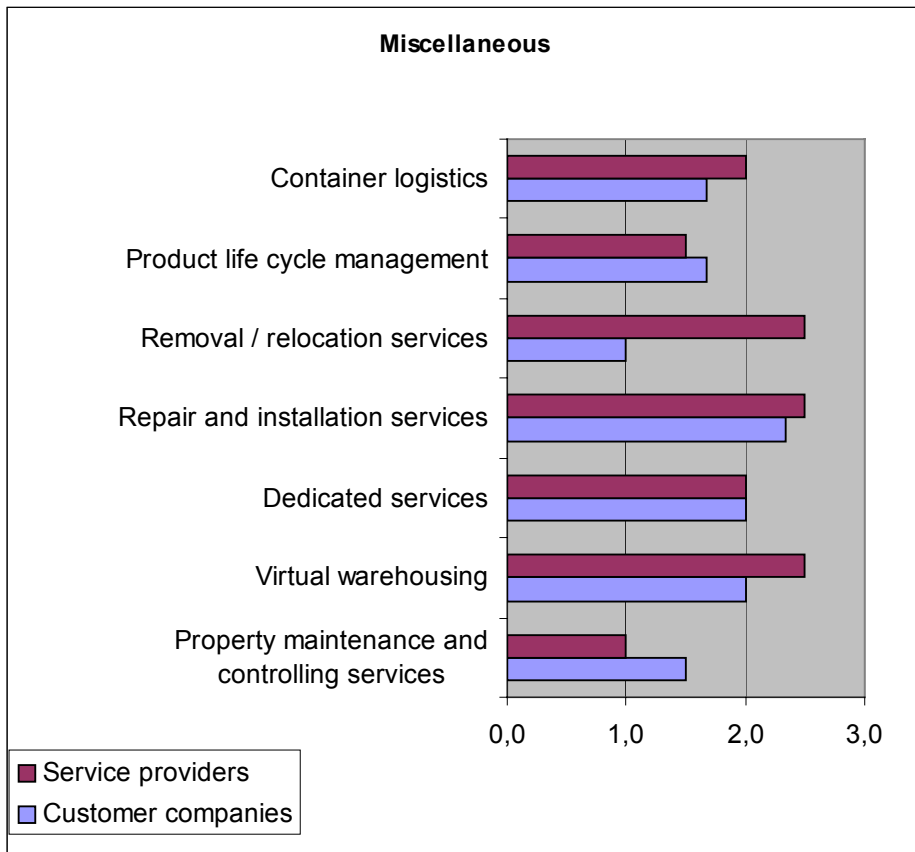


APPENDIX 1.









5. 4PL services

