



TAMPEREEN AMMATTIKORKEAKOULU
UNIVERSITY OF APPLIED SCIENCES
BUSINESS SCHOOL

FINAL THESIS REPORT

TAMK Logistics Innovation Laboratory
Project Logivo

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Degree Programme in International Business
12 / 2010
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TAMPERE 2010



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Degree Programme(s): Degree Program In International Trade

Title: TAMK Logistics Innovation Laboratory, Logivo Project

Month and year: 12/10

Supervisor: Mr. anasse Bouhlahl

Pages: 53

ABSTRACT

Introduction and objectives

A logistic innovation laboratory will be set up in Tampere University of Applied Sciences (later TAMK) in co- operation with TUT, PHL Limburgh University based in Belgium, small and medium size businesses in Pirkanmaa area and other partners. It will constitute of an information communications laboratory (later ICT-laboratory) and Disaster and Emergency supply Chain Management module. TAMK Logistics Innovation Laboratory will serve small and medium size businesses (later SME) as a tool to analyse supply chains and as a neutral testing facility for enterprise resource planning systems (later ERP), radio frequency identification (later RFID) systems. Innovation laboratory is also used in contact teaching for TAMK logistics module students and other logistics professionals creating a unique learning environment.

A new logistics module has been added in the curriculum for TAMK. This is called disaster and emergency supply chain management. It was established in co- operation with Tampere Technical University (TTU). This module is aimed for logistics students as well as for professionals working in the emergency and rescue field. This module is an innovative project and is established since there is very little this kind of teaching globally and almost non existent in Finland. In this way TAMK will increase its appeal as a learning facility. The TAMK Logistics Innovation Laboratory will be used as a teaching tool in this course to simulate crisis situations.

My thesis will explain the functions and importance of the logistics innovation laboratory established in TAMK. Thesis gives the reader an understanding of the basic logistic concepts which are needed to understand the functions of the innovation laboratory. Thesis also takes a look into the on going trends in the logistics sector.

This work has been challenging because the innovation laboratory is unique in Finland. Therefore collecting material for it has proven to be very difficult. Without being involved in this innovation laboratory project as an assistant to Mr. Anasse Bouhlahl, it would have been almost impossible to complete this thesis. On the other hand, the process of writing this thesis has been an interesting project for the exact same reasons.

Keywords: Information Communications Technology Laboratory Logistics
Innovation Logivo

Table of Contents

1. What is logistics?	1
2. Logistic activities	2
3. Supply chain	3
3.1. Structure of supply chain	4
3.2. Upstream and downstream supply chain	4
3.3. Benefits of the supply chain	5
3.4. Risks in the supply chain	5
3.5. Risk assessment	6
4. Supply chain management (SCM)	6
5. Operations management	8
6. Logistics management	8
7. Logistic activities	9
7.1. Transport and distribution	9
7.1.1. Road transport	9
7.1.2. Rail transport	10
7.1.3. Sea transport	11
7.1.4. Air freight	12
7.1.5. Intermodal transport	13
7.1.6. Pipeline	14
7.2. Warehousing	14
8. On- going trends in the logistics sector	16
9. Logistic integration	17
10. Information management	17
11. Warehouse management	18
11.1. Barcode system	19
11.2. Radio frequency identification (RFID)	20
11.2.1. Technology	20
11.2.2. RFID in logistics	21
11.2.3. Benefits of RFID	22
11.2.4. Investing in RFID	22
11.2.5. Challenges with RFID	22

12. Enterprise Resource Planning (ERP).....	23
12.1. What is an ERP system?.....	23
12.2. Implementation of an ERP system.....	24
12.3. Should every business implement an ERP system?.....	25
12.4. The significance and benefits of ERP software and systems.....	26
12.5. What return can be expected from an ERP investment?.....	26
12.6. How long does it take for companies to see return on an ERP investment?..	27
12.7. Why do some companies have more success with ERP than others?.....	27
13. Improved communications and e- business.....	28
14. Humanitarian logistics.....	29
15. Pirkanmaa logistics center and Logiera.....	31
15.1. Greener city logistics.....	31
15.2. Green integrated logistics.....	32
15.3. Smart network logistics.....	32
15.4. The results and influences of logistics center.....	33
16. TAMK Logistics Innovation laboratory, The Logivo project.....	33
16.1. Functions of the TAMK Logistics Innovation Laboratory.....	34
16.1.1. Logistics Innovation laboratory in education.....	34
16.1.2. ICT- Laboratory for commercial organisations.....	35
16.2. The cost of setting up the Logistics Innovation Laboratory.....	36
17. Application for finance to EAKR (Euroopan Alue Kehitys Rahasto).....	39
18. Conclusions and summary.....	47
Appendixes.....	48

1. What is logistics?

Logistics is still commonly understood as moving goods around with boats, trucks and other vehicles. The flow of materials from suppliers into an organisation, their movement within the organisation through variety of operations and finally out to customers is one definition of logistics (Waters 2003, 5). This flow of materials can be divided into three categories. First there is inbound, or inward logistics, which means the material flow into an organisation from suppliers. Secondly there is the material flow within the organisation which is called materials management. Finally when the materials or products move out from the organisation it is called outbound or outward logistics.

There is much more to the term “logistics operations” than just physical movement of goods. Increasing interest in logistics is the movement of real time information between clients and customers and how to share information effectively and to minimize errors in communication. As the sharing of information between parties today is wireless the amount of information and the speed of communicating increase everyday.

Logistic actions are responsible approximately 10-15 % of the price for end customers. This constitutes from logistic related activities such as procurement, transport, receiving, warehousing, inventory management, materials handling, order processing, distribution, recycling, location decisions, information processing and other related functions. This is an amount to be recognized with especially today when the economy is in the downfall. Effective logistic actions will hence lower the costs for companies as well as for end customers and therefore increase profits.

2. Logistic activities

As mentioned earlier the term logistics is responsible for the movement and storage of different materials throughout the supply chain. Logistics include several activities which are needed to move the materials through an organisation. Some of these are:

- *Procurement or purchasing.* This activity initiates the flow of materials through an organisation by sending a purchase order to the supplier. This activity also sees that everything is done in getting the materials into the organisation such as terms and conditions are right, delivery is organised and insurance and payment are taken care of.
- *Inward transport.* This activity actually moves different materials from suppliers into the organisation. Transporting is done by road, rail, air, sea or intermodal transport, which is a combination of two or more transportation modes. Also the deliveries must be on time, all the legal and safety measures must be met, costs are reasonable, routes are planned, and the best transport operator is chosen and so on.
- *Receiving.* This activity checks the ordered delivery. Unloading of materials is done, damage control is done, materials must correspond to the order, receipt is acknowledged and sorting of the materials is done
- *Warehousing or storing.* Warehousing makes sure that all the materials are kept in the right place and in the right condition for them to be used later. Special attention must be paid when storing e.g. frozen goods, animals, alcohol, drugs hazardous materials such as chemicals and other materials that require special attention.
- *Stock control.* Overall inventory is set by stock control. It considers such things as materials to store, overall investment, customer service, stock levels, order sizes and order timing.
- *Order picking.* Finds and removes materials from stores. Picking does all the necessary preparations for the materials to be sent to the customer.
- *Materials handling.* Moves materials through the operations within the organisation
- *Outward transportation.* Delivers the prepared materials to customers with similar concerns to inward transport.
- *Physical distribution management.* These are activities that deliver physical goods to customers including outward transport. It has strong connection with marketing and forms an important link with downstream activities.

- *Recycling, returns and waste disposal.* An important activity which follows the deliveries to customers and makes sure that materials are right and delivered with no problems. It takes care of recycling and materials that are returned to the supplier e.g. for safe disposal. It is an important activity when industries are moving more and more towards greener logistic values. Activities that return materials back to an organisation are called reverse logistics or reverse distribution.
- *Location.* Location makes sure that all the necessary activities can be carried out if these activities are done in different locations.
- *Communication.* This activity links all parts of the supply chain. This activity is very complex and it is described that supply chain competitiveness is based upon the value-added exchange of information. (Waters, 2003: 13-14)

Depending on the circumstances many more activities can be included in logistics. I will discuss more of some of the key activities in the commercial logistics and humanitarian logistics later in this thesis.

3. Supply chain

When materials move through organisation, or many organisations, from supplier to the end customer and are processed with series of operations and activities this creates the supply chain. Materials can be tangible (raw materials) or intangible (information). Supply chain is especially emphasised when talking about the movement of these materials through organisations.

As there are an infinite variety of products there can be found as many supply chains for these products. Thus every different product has its own unique supply chain. The supply chain describes the total journey of materials as they move from the first stage of raw materials to the last stage of end product or recycling.

The term supply chain describes the movement of materials in general. Other chains also exist. Other chains of activities are process which describes operations in an organisation, value chain when value is added by every different organisation that

materials pass through and demand chain when customer demands are met and satisfied.

3.1. Structure of supply chain

The most simple supply chain is when one product moves through a series of organisations and every organisation adds value to the product. There is a two way flow of materials in the supply chain. Materials move one way and money moves the other way. Information between two parties must move both ways to maximize the control of the chain. (Figure 1.) In addition to this there can also be other flows in the supply chain. These are people, knowledge and skills. These flows become more apparent and important in a special field of logistics such as humanitarian logistics.

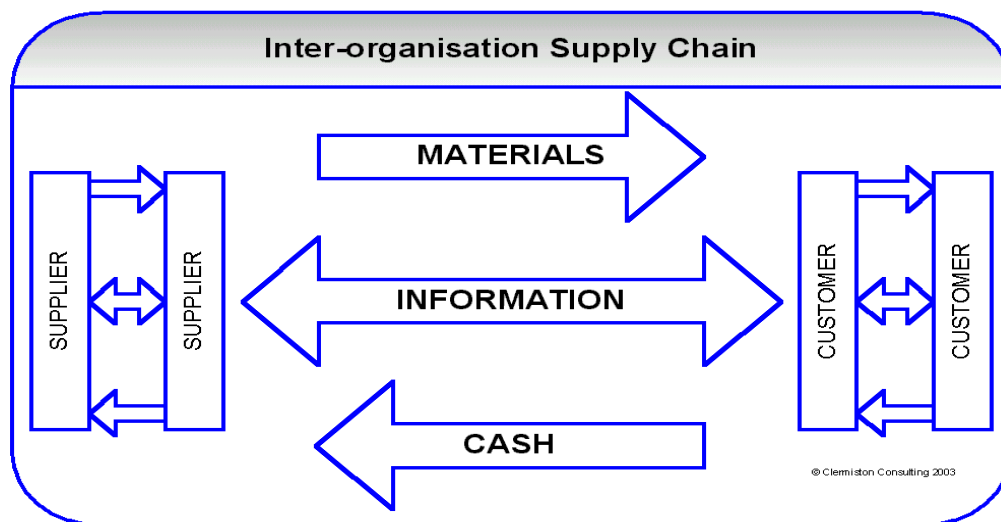


Figure 1. Movement of different components in the simple supply chain model

3.2. Upstream and downstream supply chain

When the materials move inwards from a supplier to an organisation this is called an upstream activity. A downstream activity occurs when an organisation moves a finished or semi- finished product or service outwards to a customer. Upstream activity would be providing a factory with raw materials and downstream activity would therefore be money flowing from customer to supplier.

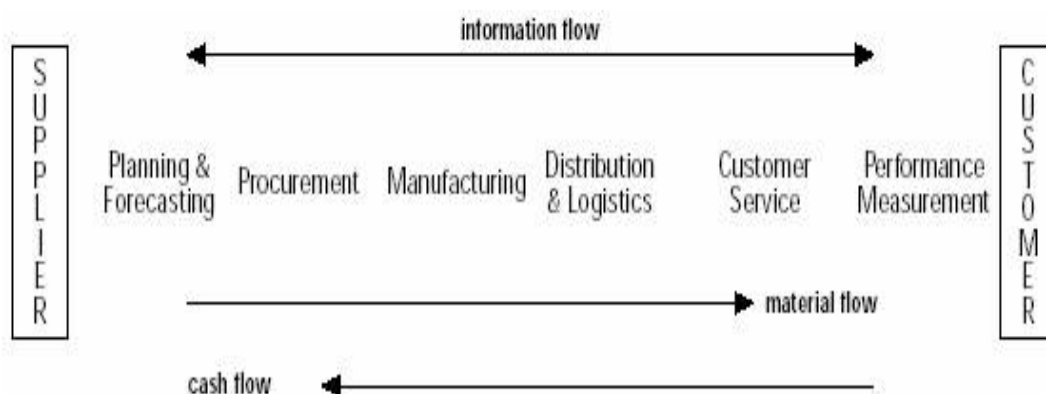


Figure 2. Showing material flow from upstream to down stream, cash flow from down stream to up stream and two way flow of information.

3.3. Benefits of the supply chain

There are occasions when the supply chain is non-existent, for example when a producer of goods sells their product straight to the end customer. This could be the case when a customer purchases food straight from the producer. However, supply chains exist because of the distance between suppliers, manufacturers and customers. Normally manufacturers are far away from the raw materials or manufacturing is moved closer to the raw materials and therefore manufacturing is far away from end customers. Supply chains close these gaps in an efficient way.

3.4. Risks in the supply chain

As doing business today is global for even small companies, the supply chains of companies are targeted with a multitude of risks. These can be divided roughly into two categories, internal and external risks. Internal risks come from inside the organisation and external risks from outside. Internal risks are therefore controllable.

Internal risks may occur from poor forecasting, lack of managerial competence or poor way of doing business. Even a breakdown of manufacturing machines is a risk for a company. The more logistic activities there are within an organisation, the more likely

something is to go wrong. Assessing these risks is an important task for a reliable way of doing business.

External risks are usually something that a company cannot control. These risks can affect the whole supply chain, both upstream and downstream. For example natural disasters, terrorist attacks or other unexpected world events affect the supply chain. When the twin towers were attacked in New York City in 2001, the whole air traffic in NYC was shut down for a long period of time. This kind of an event surely affects the supply chain in a global magnitude.

3.5. Risk assessment

Avoiding these risks an organisation must somehow prepare itself. In the financial business world risk management is an established tool. The same applies with logistics and the concept of supply chain management. Most of the companies have some tools to identify and manage risks. These are e.g. strategic planning, marketing to understand customer requirements, knowledge of the laws affecting the industry, insurances, good operations management, good customer service and internal audit that evaluates the effectiveness of each of the risk functions and recommends improvements.

Even though organisations have taken measures to avoid risks they can never avoid them completely. Therefore it must be imperative not only to be prepared but to be able to bounce back and continue doing business. Ofcourse sometimes events are so great that an organisation cannot cope with them and nothing is to be done to recuperate.

4. Supply chain management (SCM)

Sometimes a clear distinction between supply chain management and logistics is hard to define. Logistics are the functions responsible for moving materials through their supply chain such as transport and warehousing. Controlling and managing all these operations and activities is called supply chain management as seen in figure 3. below.

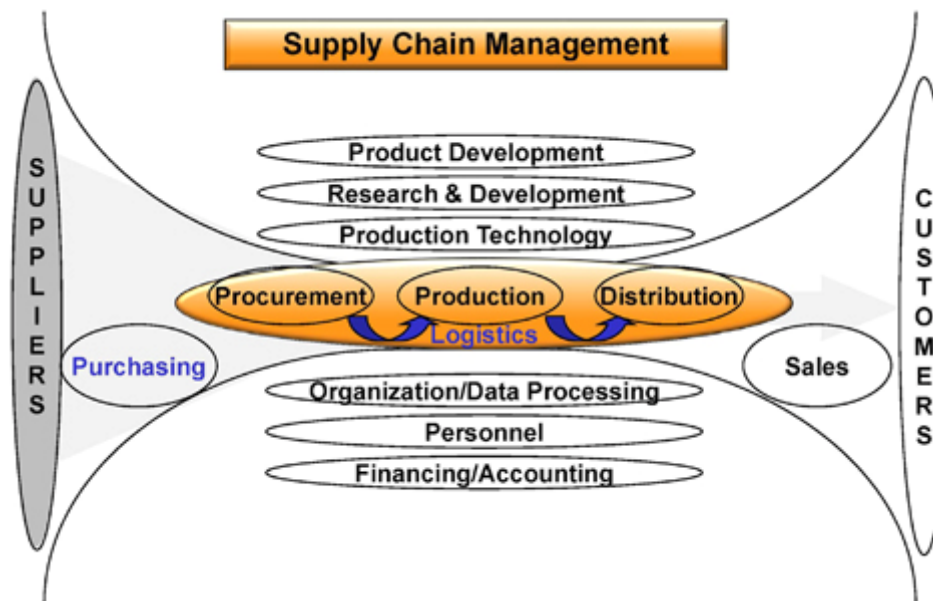


Figure 3. explaining the difference between logistics and supply chain management

The primary goal of SCM is to produce the best product for the customer in the most efficient way. Because the logistic operations are expensive to execute there is a need to control these operations well. In other words SCM is a tool to get the finished product to the end user at the lowest, but acceptable, cost. SCM uses number of tools to do just this.

As mentioned earlier the logistics operations constitute from a number of single activities such as transportation, manufacturing, warehousing, communication and so on. To effectively control these activities SCM uses many different IT-systems. The most important SCM- systems are Management Information Systems (MIS), Enterprise Resource Systems (ERP), Order Management Systems (OMS), Material Requirements Planning (MRP), Transport Management Systems (TMS, external and internal) and Warehouse Management Systems (WMS). In other words all these different IT-systems are used to control the flow of information in the supply chain and within the organisation. each of these systems are constructed to manage a certain area of business. The challenge is to decide which systems to implement into an organisation. This is called information management.

The best result is achieved when these systems are linked to work together which is very hard to accomplish. A lot of suppliers who obviously, because of their commercial goal, market their product solution as optimal and fully compatible with other applications are present in the market. Clearly this is not the case. Most of the different systems are not compatible with each other which creates a problem when implementing these systems. Often the lack of resources and budgets causes erroneous and costly decisions.

5. Operations management

Operations management, in a simple way, means managing the operations to manufacture and distribute goods and services in the most efficient way to maximize the profit of an organisation. Supply chain management is one part of operations management. Other important functions of operations management include for example warehouse management, information management, inventory management, order management and transport management. Today most of these areas are managed with IT- systems as seen previously.

6. Logistics management

The purpose of logistics management is to integrate all activities from acquisition and materials movement to storage activities to gain efficiency of operations. When the costs of logistic activities are significant it is appropriate to take a closer look in logistics management. Some organisations manage their logistic operations themselves, but when these operations become more complex it may be wise to outsource.

Outsourcing logistic operations is common. Logistic companies have the capacity and the skills to effectively carry out these operations. Often these companies have e.g. tracking technology which reduces transportation losses and supports delivery schedules. Improved logistic actions may result in increased competitive advantage by reducing costs and enhancing customer service.

As mentioned earlier logistic actions have a significant effect to the price for the end customer. Organisations realize this and are constantly evaluating and seeking more cost effective means of distribution. Being efficient and more cost effective in logistic actions benefits both the organisation and the end customer.

7. Logistic activities

In the following chapter I will discuss some of the key logistic activities which are in my opinion the most important ones.

7.1. Transport and distribution

7.1.1. Road transport

Road transport is still the most common way to transport and distribute materials in Finland. This is affected by low population density, scattered settlement and structure of industry. Road transport is the most flexible of all the transport modes. Organisations are able to move large quantities as end-to-end transports, perform pick up services, as well as distribute to many locations on one route.

There is not one correct or general method to plan road transport, because road transport has many different categories. These include transit, pick up and distribution and return and random transports. Road transport is mostly domestic, but with ever increasing markets in the East, transports to Russia increase annually. This rapid growth of transition transports to East and badly functioning border procedures have created big distribution problems.

Special demands in road transport arise from restrictions and limitations of road networks, weight and size restrictions of the equipment and composition of transport capacity and demand. Legal and legislative rules pose general requirements for equipment, personnel and licenses. Outside EU, in Switzerland for example, the transport of large trucks is heavily restricted because of its geographic position. Without restrictions Switzerland's environment would be strained by heavy pass through traffic.

Switzerland has therefore developed so called Huckepack- system. This system in practice means that trailers are loaded on trains at the border and are transported through the country by rail. At the other border the trailers are again connected to trucks. (Karrus, 1998: 114)

The development of technology contributes to the efficiency of road transport. GPS in trucks reduces erroneous routes, weather monitoring helps in planning the route and time tables. Transport management systems assist in scheduling, tracking and tracing, loading order of goods and optimizing in number of vehicles involved. Challenges for road transport arise from congestion of cities. Safety, maintenance and traffic fluency are main concerns of connecting roads to main road network.

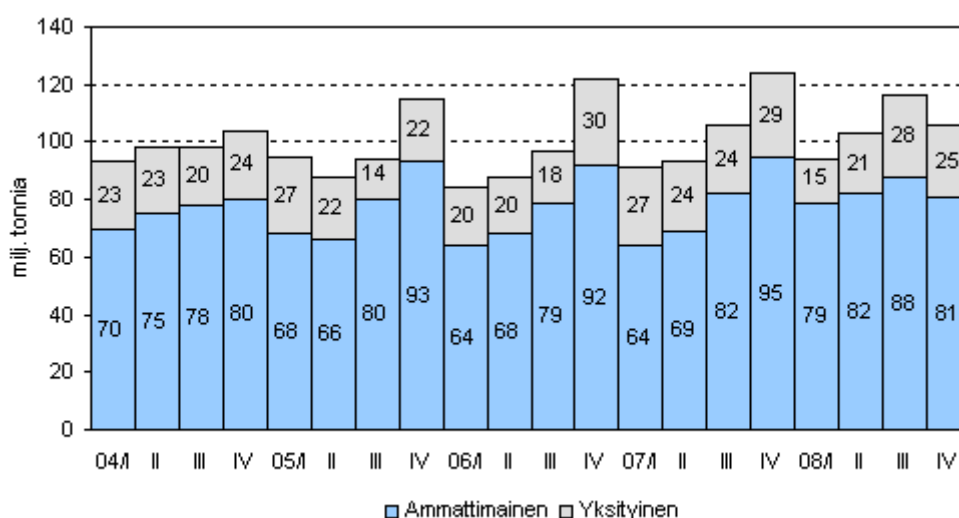


Figure 4. The amount of materials moved by road in million tons in 2008. Blue is professional transport and grey private. (tilastokeskus)

7.1.2. Rail transport

Rail transport is another traditional mode in Finland when moving bulk materials. Many of the Finnish companies and warehouses have their own branch terminal line which enable the inbound and outbound movement of materials. Rail transport's greatest strong point is schedule reliability. It is the most coordinated of all of the transport modes because of the solid structure of rail network. The equipment used today is very versatile and can answer to every domestic demand. The most important use ranges of

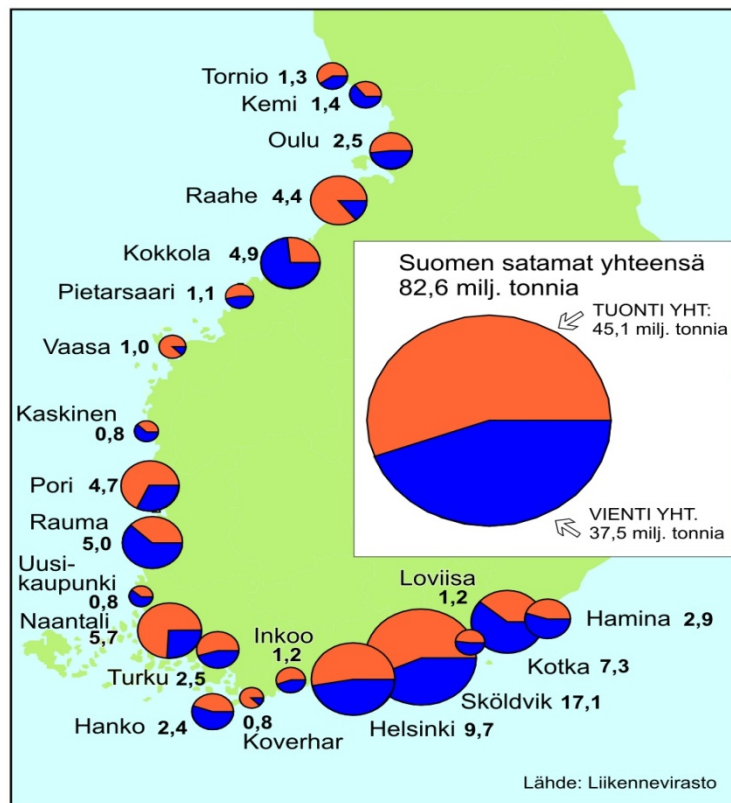
rail transport are transit transports to Russia and paper industry's raw material transports into Finland and to warehouses close to Finnish borders. A benefit for rail transports in Finland is the same rail width with Eastern Europe.

Cargo transports have tried to compensate the diminishing amount of people travelling on rails in several countries. However political pressure and environmental issues in many countries have convinced people to use railroads more again. Long distances and moving masses of materials is rail transport's strength. Challenges in rail transport arise from enhancing load-bearing capacity in some key areas. Improvement of functionality and condition some rail yards, which are connected to harbors, should be made immediately.

7.1.3. Sea transport

Sea transport is one of the oldest ways to move materials. Some of the procedures and traditions date back to time when sailing vessels were used. Hence some edicts and procedures have a very old tradition.

A big amount of international cargo is moved by sea. In Finland sea transport is mainly used for import and export materials. 90% of exports and 70% of imports in Finland are shipped by sea. Sköldvik is the biggest import harbor in Finland. The most important export harbors are Kotka, Hamina and Helsinki (Picture 1.). There are close to 50 harbors in Finland of which approximately 20 are corporate owned. Harbors usually form an essential nodal point. Therefore it is important that there are good connections to rail road networks as well as road networks.



Tavaraliikenne Suomen satamissa vuonna 2009 (milj. tonnia)

Pic.1. Amount of import (orange) and export in Finnish harbors (million tons)

In Europe sea transport will become more and more important because of transport costs and environmental reasons. EU will support short distance sea transport by creating “Sea highways” which are linked to European traffic networks (rhk.fi). This will improve the logistic chain in sea transport.

Usually sea transport in Finland is a part of a bigger logistic chain because materials arrive and leave harbors by road or rail. This is called intermodal transportation.

7.1.4. Air freight

Obviously air freight is the fastest mode of transport in long distances and especially in intercontinental routes. The high cost per ton or per cubic meter has kept the air freight a poor option for bulk transports. Air freight is chosen for rush deliveries and small in size. For example concentration of expensive spare parts manufacturing close to the

airports have created a special customer group for air freight forwarder. It is also possible to use commercial air lines for moving some materials.

7.1.5. Intermodal transport

Intermodal transportation is the combination of two or more transport methods mentioned earlier. The bottle neck in sea transport is the low capacity of harbors. The same problem is evident also at the airports. Harbors cannot therefore solve their competitive problems by themselves. Road and rail transport must also be improved at both ends and coordinating all the processes carefully.

Coordination will become even more greater issue as the stoppage time of the vessels in harbor will decrease. This means that loading and unloading operations must be efficient and fast. This is imperative for intermodal transport. The time used to move the materials from a vessel to another must be minimized. Every extra hour in the harbor is very expensive and during that time the materials are not moving towards the customer.

Several solutions have been developed for intermodal transport problems. One solution is to create logistic hubs near harbors which support rail, road and distribution activities. More attention has been given to the speed of handling of the materials. Activities that increase speed are e.g. ro-ro (roll-on roll-off) vessel solutions and using pallets and containers. When using containers enhancing tools are container cranes, self loading and unloading vessels and automated container transport and storage.

The best advantage that containers possess is that the materials are in one "box" during the whole transport. This diminishes handling costs, protects the materials and can even prevent criminals from stealing the goods. Intermodal transport is popular for environmental reasons. Rail transport is especially popular in Switzerland as mentioned earlier. Some organisations favour the rail transport for ethical reasons even though it might be a bit more expensive.

7.1.6. Pipeline

Pipeline transport is used when gas, liquid or solid materials are transported constantly. The most well known and visible are the Alaskan oil pipes. Pipelines are also used to transport water and heat and in sewerage. If pipeline is needed it means firstly big financial investment. Therefore pipeline has to transport vast volumes of material or the material flow must be constant and long term.

7.2. Warehousing

Although storing goods or materials in the warehouse costs money it is a necessity. The value in warehousing is having the right product in the right place at the right time. In this way warehousing provides time and place utility which adds value for an organisation. Materials that need warehousing are goods or raw materials that are difficult to access but are absolutely indispensible or their consumption is very quick. Information is also stored in various databases. Warehousing goods and materials is one of the most expensive activities for an organisation so it is vital to control warehousing efficiently.

If production and demand are progressing in a different pace warehouse acts as a buffer. From the warehouse materials are accessible when there is demand for them. Warehouse therefore separates production from demand into two different actions both which are controlled differently. These are *production into* warehouse and the other is *consumption from* warehouse.

The value and physical amount of materials in the warehouse are crucial for an organisation and its economy. This concept is called inventory. In the most economical situation warehouse holds the exact right quantity of materials. This is called just in time (JIT) concept. There is no shortage or unnecessary or overly large buffer stocks. There are several other warehousing models. Their use depend on what the material is and its demand. Sometimes it may be appropriate to just guarantee the availability of materials and let another party in the supply chain take care of the warehousing.

Warehouses can be used in other activities than just physical storing of materials. They can be used to inspect, sort materials and break bulk. They can also be used for finishing products, labelling, packaging, making products ready for retailers, operating information systems and so on.

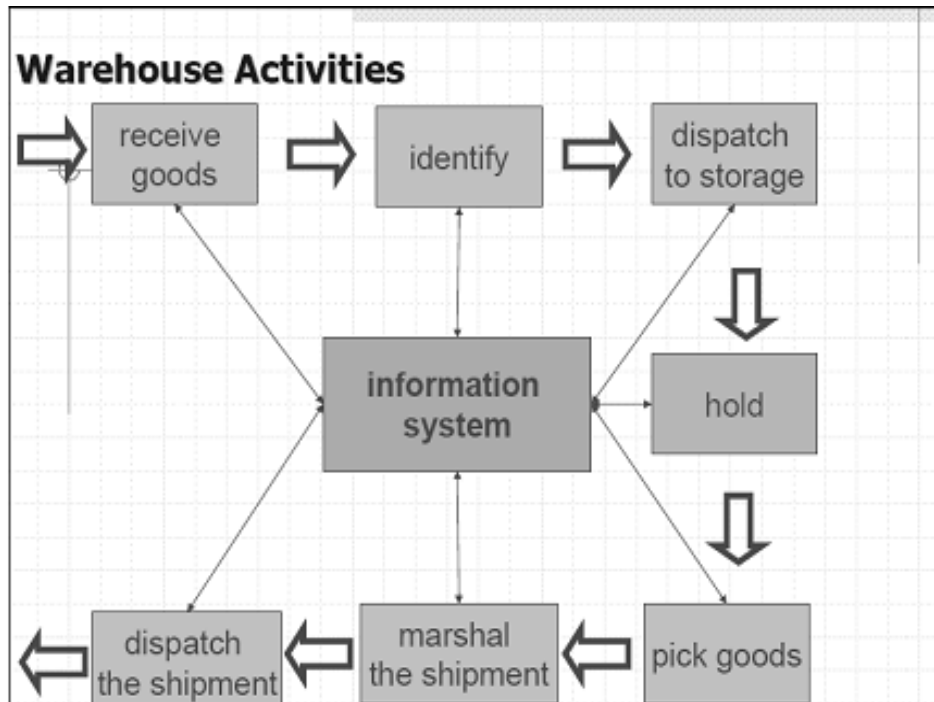
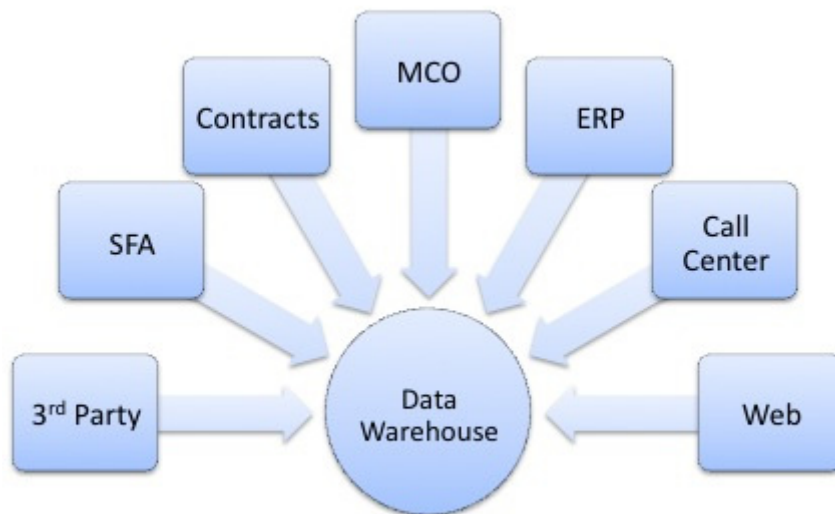


Fig. 5. Warehouse activities



Pic. 3. Example of a data warehouse

8. On- going trends in the logistics sector

The logistics sector is growing due to the increasing outsourcing of logistics functions by companies that want to focus on their core business. High demands regarding organisation is also a major issue in the logistics sector. Key elements are time, quality, high amount of customer relationships, languages, flexibility and reliability of performance.

Growing pressure for greener logistics and environmental concerns are also today's trend which enterprises are taking seriously. Logistics traditionally does not have a very good reputation for environmental protection. This is demonstrated by e.g. emissions from heavy truck traffic and oil spills in the sea to mention just a couple. But logistics is clearly moving towards greener practices. One aspect of this is reverse logistics, which includes the collection and recovery of end- life products and return and reuse of packaging. There is a growing recognition that careful management can bring both environmental protection and lower costs.

The sector therefore demands a highly specialised infrastructure, e.g. special warehouse management system with advanced techniques, powerful software, capable and

qualified personnel on all levels such as handling, deskfunctions, management and knowhow. The ability to efficiently use these resources requires logistical knowledge whereby one should be able to locate and acquire this knowledge.

9. Logistic integration

Today most of the companies have integrated their logistic actions. There are three levels of integration. The first has logistic actions as separate activities within the organization; the second has internal integration to bring them together into a single function. The third has external integration, where organizations look beyond their own operations and integrate more of the supply chain. (Waters 2007, 6)

Logistic integration makes it possible for organizations to respond rapidly to customer activities, which is vital for organization's competitiveness in the market. Efficient customer response (ECR) allows the organization to react immediately and send necessary information throughout the supply chain to keep the stocks, manufacturing and so on up to date in real time. Having an ERP system in the company will help the business to communicate in real time, not only within the company, but with customers and partners as well.

10. Information management

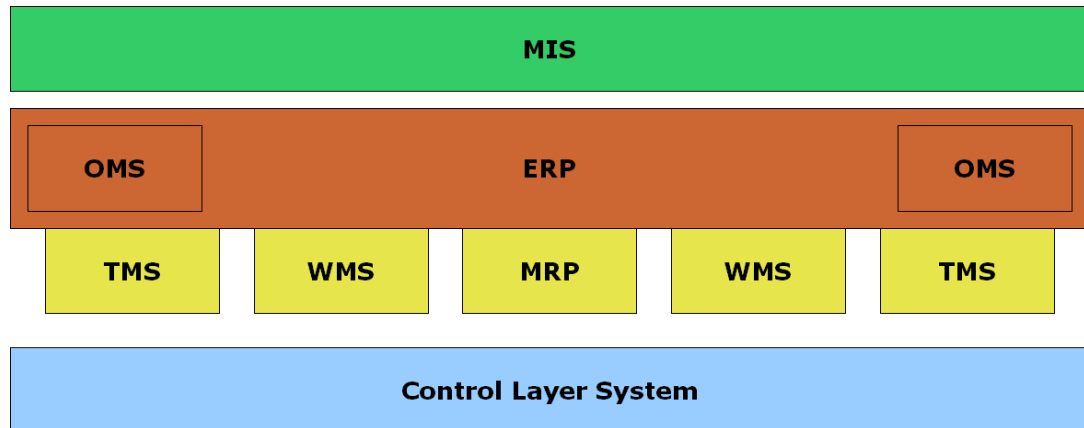
Managing the flow of information in the logistics sector has become quite technical. The market power of logistics enterprises is becoming more and more dependent on IT-systems. A lot of value added logistics (VAL)-activities are the result of the ability to effectively use these tools.

Value Added Logistics can only be realized through:

- using the latest and greatest technologies
- optimising customer service
- minimising delivery times
- using the best in storage- and transportsystems
- the availability of an optimal and balanced infrastructure

- an accurate understanding of logistics workflows

The flow of information passes through several components of the logistics chain.



Pic. 4. Overview of the different components of the logistics chain. (Tony Fonteyn)

11. Warehouse management

To be able to control the warehousing functions an organisation must have tools for it. Normally organisations use some kind of warehouse management system. Warehouse management is a key part of the supply chain. Its primary aim is to control the movement and the storage of materials within the warehouse. These are shipping, receiving, storage and picking. All the information must be available in real time for an organisation to be competitive.

Warehouse management system (WMS) provides a set of computerised procedures to handle the receipt of stock and returns into a physical warehouse facility. It is also used to model and manage the logical representation of the physical storage facilities, manage the stock within the facility and manage a seamless link to order processing and logistics management in order to pick, pack and ship the product out of the facility. (wikipedia 2010)

WMS utilize technology such as barcode, mobile computers, wireless LAN and radio frequency identification (RFID) to monitor the flow of products. These systems can be so called stand-alone systems or modules of an enterprise resource planning system (ERP). When the needed data is collected it is synchronized with a central database. This

database is then used to provide reports about the status of goods and materials in the warehouse.

Warehouse management is not just managing within the boundaries of a warehouse. Other systems and applications used in an organisation are all related to warehouse management. These are inventory management, inventory planning, cost management, IT applications and communication technology. Today even production management is greatly dependent on warehouse management.

Poor warehouse management can lead to many problems. Common problems are increase in back orders, increase in warehousing costs, decline of customer satisfaction, order cancelling, lack of storage space, strong fluctuation in warehouse cycle and increased amount of outdated and obsolete products in storage.

11.1. Barcode system

The barcode system has been in use for decades. It is best known to be used in daily consumer goods. Barcode system was developed to replace data collection by hand. Most of the warehouses globally use barcode system alongside other automated data collection systems.



Pic. 5. A barcode

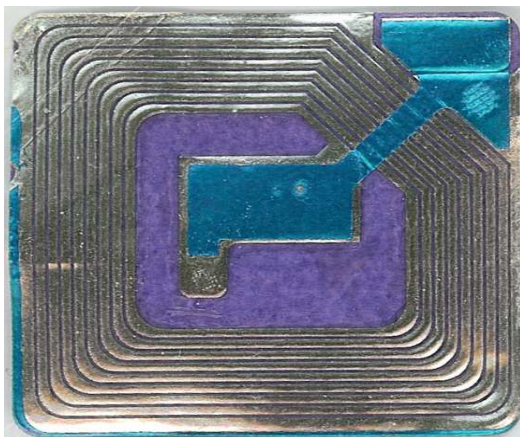
11.2. Radio frequency identification (RFID)

11.2.1. Technology

RFID is a general term for techniques that use radio frequency to recognize, observe and individualise materials and products. Technology is based on wireless data gathering with identification tag and a scanner, either a port or hand held, using radio waves. The idea is very simple. A tag is attached to a desired product. Information in the tag can be written or read with an RFID scanner. Information can be processed with IT-system linked to RFID system.

RFID is widely used alongside the barcode system. Its benefit compared to the barcode is that an item equipped with an RFID tag can be recognised without visual contact. In addition the information contained in the tag can be altered, where the information in the barcode is unchangeable after it is printed. RFID tag is more durable than barcode sticker in industrial conditions.

Technology has been available for decades and is widely used e.g. in access keys and animal tagging. Industrial organisations use RFID technology to enhance production, in quality control, to monitor the flow of materials and in many track and trace applications. UPM Raflatac is the biggest manufacturer of RFID tags and Nokia is the leading manufacturer of RFID scanners. Finland is also one of the leading countries in R&D in the field of RFID technology.



Pic 6. RFID tag

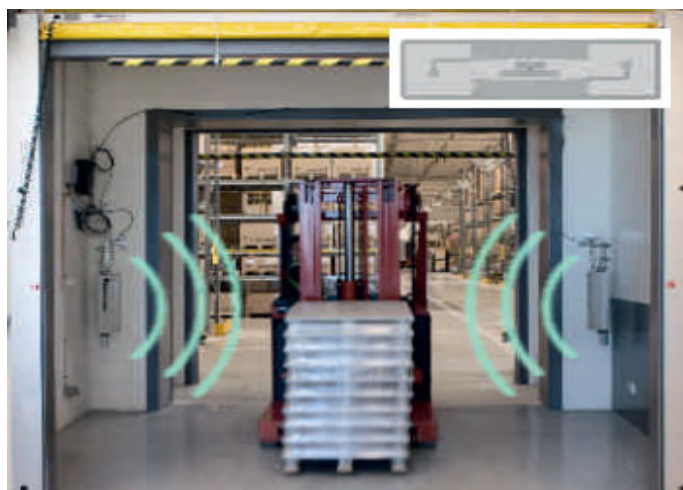


Pic. 7. Portable RFID scanner

11.2.2. RFID in logistics

RFID will not bring great changes in comparison to e.g. barcodes and other procedures used. In reality the changes will be production enhancing. The barcode system requires an IT- system for data processing so shifting to RFID technology will not necessarily mean expensive investments in replacing IT- systems. In the best scenario IT systems can be integrated to use barcode system and RFID system side by side and barcode stickers can be attached on top of RFID tags. Total expenses constitute of the unit prices of tags, scanners and ports, installment costs, other equipment expenses, software, training and maintenance.

Pic. 8. RFID port



11.2.3. Benefits of RFID

Implementing RFID can benefit organisations in various ways. These benefits are productivity enhancement and quality of operations which both affect organisation's profitability. Profitability in turn improves cost effectiveness. Better security and better work atmosphere is created by automating monotonous and heavy work routines. Automation will also diminish data processing errors. Shorter delivery times and better level of service are created by faster operations, which will increase customer satisfaction.

11.2.4. Investing in RFID

Investing in RFID technology is both strategic and productive. If organisation wants to be seen as a pioneer or it gains advantage compared to its competitors by using the most modern technology, investment is considered to be strategic. Efforts to rationalise production make the investment productive. The amount invested in RFID technology will become smaller by lower employee expenses and improved production.

11.2.5. Challenges with RFID

If the operating environment contains a lot of metal objects radio waves may reflect from these structures. During transportation containers are subject to rough handling and RFID tags may be damaged. New technology may be incompatible with other partners' systems and the lack of standardisation may limit cooperation. RFID technology is still relatively expensive. This limits implementation especially for small businesses.

12. Enterprise Resource Planning (ERP)

12.1. What is an ERP system?

For a long period of time businesses had unintegrated information systems that only supported the activities of individual business functional areas. Thus, a company would have a marketing information system, a production information system, and so on, each with its own hardware, software and methods of processing data and information (Pic. 4).

Such unintegrated systems might work well within individual functional areas, but to achieve company's goals, data must be shared throughout functional areas. When a company's information systems are not integrated, costly inefficiencies can result. Suppose two functional areas each have their own unintegrated system. To share data an employee in one functional area must print out data from another functional area and then type the information into her area's information system. Not only does this data input take twice the time, it also doubles the chance of data entry errors.

Alternatively, the process might be automated by having one information system write data to a file to be read by another information system. This would reduce the probability of errors, but it could only be done periodically, usually over night or on a weekend, to minimize the disruption to normal business transactions. Because of the time lag in updating the system, the transferred data would rarely be up to date.

By contrast, ERP programs can integrate a company's operations by acting as a company-wide computing environment that includes a shared database. An ERP system's impact on costs and operational efficiency can be startling. For example "IBM Storage System division reports that it can now reprise its product inventory in five minutes rather than five days. Shipping a replacement part now takes three days instead of 22 days. Doing a customer credit check takes three seconds instead of 20 minutes" (Brady, Monk, Wagner 2001, 16). These dramatic improvements in efficiency can lead to lower costs and more satisfied customers.



Pic. 9. Graph explaining an ERP system

12.2. Implementation of an ERP system

The implementation phase is not as simple as to take the old system out and putting the new one in. ERP package in itself is a highly expensive investment and more added cost comes from implementing the ERP package into the company and training the employees to use the software. These are time consuming and expensive operations but still mandatory.

The old ERP package, if existing, has to be run down and removed from the company's system without losing the information vital to the company's operations. This saved data has to be input into the new system for the operations to continue working. Implementation phase may in some cases take up to a year to be fully functional.

Gardner Denver Oy, located in Tampere and formerly known as Tamrotor, implemented SAP software as their ERP system. This had to be done because Gardner Denver's headquarter is located in USA and information flow between Tampere and

USA had to happen in real time. It took over a year for full implementation including employee education. Even after implementation Gardner Denver had to train some personnel to work, what they call, SAP super users. These employees received more extensive training in SAP usage. When problems appeared with SAP program the super user had to correct errors, because regular employees did not have access to all areas of the system or they did not have the necessary skills.

In some cases it may be possible that a company is not ready for ERP software or simply does not need it. These reasons may result from business's financial situation, business size, number of partners and their location and a variety of other reasons. In many cases ERP implementation difficulties result when management does not fully understand its current business processes and cannot make implementation decisions in a timely manner. Again the ICT- laboratory will provide an answer to these problems which companies face when planning to purchase an ERP package.

12.3. Should every business implement an ERP system?

ERP packages imply, by their design, a way of doing business, and they require users to follow that way of doing business. Some of a business's operations, and some segments of its operations, might not be a good match for an ERP package's requirements. It is often very difficult for enterprises to make the correct objective choice regarding these systems.

Most of the time enterprises do not own all the knowledge needed, especially SMEs. Therefore it often occurs that logistic automating systems are implemented too fast and without a solid and thorough plan. These errors result in enormous problems concerning integration and communication. Not daring to take crucial steps towards automating systems due to a lack of knowledge also reflects a major error which could easily be made by enterprises. Therefore, it is imperative for a business to analyze its business strategy, organization, culture and operation before choosing an ERP approach.

12.4. The significance and benefits of ERP software and systems

The significance of ERP lies in its many benefits. Integrated information systems can lead to more efficient business processes that cost less than those in unintegrated systems. ERP systems have the following benefits:

- ERP allows easier global integration: Barriers of currency exchange rates, language, and culture can now be bridged automatically, so data can be integrated.
- ERP not only integrates people and data, but it also eliminates updating and repairing many separate computer systems.
- ERP allows management to manage operations, not just monitor them. For example getting an answer to a company wide question requires data from each business unit and then putting the data together for a comprehensive, integrated picture. The ERP already has all the data, allowing the manager to focus on improvements of business processes. This enhances management of the company as a whole, and makes the organization more responsive when change is required.

12.5. What return can be expected from an ERP investment?

The benefits provided by an ERP system can be difficult to calculate because sometimes ERP increases revenue and decreases expenses in intangible ways that are difficult to measure, and some changes take place over such a long period of time, that they are difficult to track. However there are some factors affecting the return on an ERP investment.

Because ERP eliminates redundant effort and duplicated data, there can be a savings in operations expense. A study indicated that 33% of companies saw a cost savings in sales order management, and 34% of companies said their ERP system significantly reduced their personnel needs. (Tom Stein, "making ERP add up," Information week.com, May 24, 1999)

Because an ERP system can help move goods and services through the pipeline faster, more sales can be generated every month. In some instances, a company that doesn't

implement an ERP system might be wedged out of business by competitors who have an ERP system.

A smoothly running ERP system can save a company's personnel, suppliers, distributors and customers much frustration. This is a benefit that is real but difficult to measure and quantify. Both cost savings and increased revenues occur over many years, it's difficult to put an exact amount of money accrued from original ERP investment.

Because ERP implementation takes time, there may be other business factors affecting the company's costs and profitability, making it hard to isolate the impact of the ERP system alone.

12.6. How long does it take for companies to see return on an ERP investment?

The return on investment (ROI) for an investment project is calculated by dividing the value of the project's benefits by the value of the project's cost. An ERP system's ROI can be difficult to calculate because of so many intangible costs and benefits, as previously mentioned. Some companies do not even try to make the calculation, on the grounds that the package was absolutely a necessity for the company. Companies that do make the ROI calculation have seen radically different results.

Some companies claim that an acceptable ROI began to accrue almost immediately, some companies wait longer to measure their ROI and some companies have even said that high ERP costs adversely affected profits and put them out of business.

12.7. Why do some companies have more success with ERP than others?

A low percentage of companies have reported that they have experienced a smooth rollout of their new ERP systems and immediately begin receiving the benefits they anticipate. All kinds of software implementations can suffer from delays, cost overruns and performance problems. This has been one of the information systems field's major problems since the early days of business computing.

Usually, a bumpy start and low ROI are due to people problems rather than computer malfunctions. Some executives hope that new software will cure fundamental business problems that are not curable by any software, they do not take enough time for a proper analysis during the planning and implementation phase or some executives and IT managers skimp on employee education and training.

Many ERP implementation experts stress the importance of proper education and training for both employees and managers. A company's managers and employees will resist changing the way they have done their jobs. Analysts have noted that active top management support is crucial for successful implementation.

Some companies willingly part with funds for software and new hardware, but do not properly budget for employee training. ERP software is complex and can be intimidating at first. Typically, ERP training costs 10 000 Euros- 20 000 Euros per employee (Stoker Richard, SAP: A hot skill-The current #1 resource planning software package, Inforing Press, online, 2000). Some analysts recommend allocating 11% of the project's budget for training (Wheatley Malcolm, 2000). The cost includes training employees how to use the software to do their job, employees' nonproductive downtime during the training and educating employees how the data they control affects the entire business operation.

The cost of poor training can be very high because with an ERP system, a data entry error can not be easily corrected with a reversing keystroke or a phone call. The error creates a ripple effect throughout the business's entire operation. Sometimes the training is so time consuming that a whole production line has to be shut down.

13. Improved communications and e- business

The benefit of e- business, or electronic business, lies in its standard formats for instant communication between systems. This does not just improve purchasing. It allows whole new types of logistics, with the emphasis moved from physical materials to information. Now enterprises are able to control the stocks with instant information

about actual demand instead of keeping expensive safety stocks and making unreliable forecasts.

The need for logistic control arises on every level of the enterprise's organisational structure, and even so in SMEs. SMEs have a need to control these processes and flows of information in an efficient and economically responsible way. Only by doing this, they can increase their market power with respect to the competitors.

Real time information flow through out the supply chain makes the lead time shorter. The ideal situation for an enterprise is to make lead time to one or zero, but this is just a theoretical target. These improved ways of communication make it possible for supply chain integration. They are the way for enterprises to exchange information both internally and externally.

This enhanced way of communication makes it possible for any enterprise to act globally. Today a vast amount of SMEs are engaged in import activities, export activities or both. They can broaden their supplier and customer bases to buy, transport, store, manufacture, sell and distribute in a single worldwide market.

14. Humanitarian logistics

When a disaster happens it may destroy the whole infrastructure of a city, province or even the whole country. Earthquakes or floods may take down roads and airports to make it very difficult to get on site and deliver supplies. Political conditions can be such that it may be life threatening to get to the site. Humanitarian logistics must therefore adapt the supply chain with existing environment and very often overnight.

Although humanitarian logistics use more or less the same model of SCM as private organisations, its operations are very different in nature. Where private SCM aims to control and manage the material flow by IT management systems, forecasting and careful planning, the humanitarian SCM must be prepared to function without reliable forecasts. It is obvious that no one can forecast a natural disaster 100% accurately.

In humanitarian logistics planning is also carried out. But instead of planning, preparedness might be the proper word. Logistics is an essential tool in preparing for humanitarian aid, along with surveillance, rehearsal, warning and hazard analysis or risk assessment.

On site tools include efficient ways to identify people, wireless telecommunication solutions, enhancing security of humanitarian operations through technology and information, high- resolution earth monitoring for humanitarian actions and energy technologies for humanitarian operations.

In comparison to private SCM the humanitarian SCM has very limited and narrow resources. This meaning that the humanitarian logistics need highly educated professionals to carry out very demanding and specific operations. These operations must be deployed rapidly and there is very little room for errors because human lives are constantly at stake. According to Tomasini and Van Wassenhove speed of reaction is of the utmost importance in the first 72 hours in order to save a maximum of human lives after a sudden disaster (Tomasini, Van Wassenhove: 11).

Ofcourse some characteristics between humanitarian supply chain and private supply chain are similar. Both need to be agile, aligned and adaptable. These characteristics are high- lighted in the humanitarian supply chain but are also important in the commercial side. Major difference arises from the lack of information management systems of humanitarian supply chains.

It becomes apparent very quickly that even though commercial logistics and humanitarian logistics are driven by different logics, both have same goals. Both want to excel, reduce the risks of disruptions and constantly improve supply and demand coordination.

Cross learning between humanitarian logistics and commercial logistics is essential and greatly benefits both. Both parties possess unique skills in their own sectors and therefore can greatly learn from each other, even though commercial logistics aim for profits rather than saving human lives. The biggest global logistics companies have

identified a match between their competencies and activities and those humanitarian aid agencies that specialise in emergency relief (Tomasini, Van Wassenhove: 134).

Learning laboratories will play an important role in the future of humanitarian aid. These facilities are able to simulate disaster conditions and environments realistically. The work of humanitarian aid personnel is not limited only when disaster is happening. As an important task is to constantly educate logistics and humanitarian professionals and raise preparedness and awareness in between disasters.

15. Pirkanmaa logistics center and Logiera

There is a plan to establish a logistics center in Pirkanmaa area to serve vast number of SMEs in the area and also to develop and enhance greener logistics in Pirkanmaa. The project is titled Logiera. It is one of the projects of Tampere Region Economic Development Agency (Tredea Oy) and it should be finished by the end of year 2011. The project leader is Mr. Jari Saarenpää who is a logistics director.

The objective of this project is to maximize intermodality in Pirkanmaa which is not yet truly existing. All the possibilities to improve this area are not nearly utilised. The goal of the project is to make sure that businesses in Pirkanmaa stay vital and competitive during the next decade. Tredea's vision of this project is: greener city logistics, green integrated distribution channels and smart network logistics.

This project will enhance effectiveness and sustainability of logistics. It will significantly contribute to Pirkanmaa area businesses' competitiveness and is especially aimed towards SMEs in Pirkanmaa. Project makes an effort to attract local, national and international visibility in order to make Pirkanmaa area a functional and attractive logistics environment.

15.1. Greener city logistics

The concept of greener city logistics is simple. Since Pirkanmaa is a logistic bottleneck because of its location, the logistics center is hoped to mitigate this problem. Trucks

will unload the cargo in large terminals located outside the city, where the goods are sorted by address. From there, smaller vehicles will distribute the sorted goods. Some vehicles will distribute the goods to hubs located in the city and from there, the goods are delivered by smaller vehicles, powered by electricity or gas, to the city center. Each vehicle is responsible for one city block or other specific designated area. Additionally vehicles that deliver the goods also take care of possible item returns and collect recyclables.

15.2. Green integrated logistics

The logistics center will improve the distribution of goods by integrating logistics. An inland terminal is built for international market goods. Terminal carries out inbound and outbound distribution activities (loading and unloading). Trains from Finnish harbours are able to unload their cargo straight into the terminal, and it will also function as a distribution center for the local industry.

The logistics center also provides warehouse operations and value adding logistics services such as vendor managed inventories, order fulfillment, picking and assembly services and product testing. In addition, the center acts as a link for materials transported between Pirkanmaa and Far- East. Tampere- Pirkkala airport serves as an unloading point of air cargo to be delivered domestically, to Scandinavia and to Northern Europe. Tampere will also function as an unloading point of trains carrying materials from China.

15.3. Smart network logistics

A centralised and open database enables access for all companies that need information in real time. This will make it possible to plan and manage supply chains with SCM systems. A variety of medium is used to make sure, that teaching and working methods for professionals are constantly improved. Logistic processes, education services and best available practises and procedures are all accessible in the integrated network. Smart network logistics ensure fast, reliable and personalised services to all customers by comprehensive networks and fluently operated processes.

15.4. The results and influences of logistics center

Pirkanmaa area is a bottleneck when thinking logistically. The objective of the logistics center is to reach a new level in logistics efficiency in Pirkanmaa. The flow of materials will be planned and controlled using real time information. This enables the flow of materials to be efficient, fluent and meaningful. These improvements help organisations to understand, that logistic services are perceived as services that are an important part of businesses' and customers' value chain. Logistic services are not just individual functions, but an imperative part of companies' value chain and value adding services for customers.

Sustainable development is the one principle, that guides the operations of the new Pirkanmaa logistics center. Overlapping and unnecessary operations are eliminated and therefore traffic will become more efficient, thus creating less strain on the environment.

(tredea.fi)

16. TAMK Logistics Innovation laboratory, The Logivo project

TAMK Logistics Innovation Laboratory has been an on going project for several years now. A goal for TAMK has been to set up an innovative logistics laboratory which would serve both the business community, especially Pirkanmaa SMEs, as well as TAMK and TTU logistics students. The optimistic view for the laboratory to be ready and functional is by the end of 2010, but due to lack of adequate finance the realistic time frame is now spring 2011.

Reaching this goal will also require participation of local SMEs in the project. Local SMEs will bring much needed additional financing, know how and opportunities to acquire inexpensive or even free software. Logistics Innovation Laboratory project goes by the name Logivo. The project manager is Mr. Jari Saarenpää who is also the CEO of Pirkanmaa logistics center project.

The ICT- laboratory, which is a part of the TAMK Innovation laboratory functions, is similar with one existing in Provinciale Hogeschool Limburgh in Belgium. The ICT-laboratory will be a collaboration between TAMK, TUT and Log- IC of PH Limburgh Research Institute. The laboratory in Limburgh will provide servers and server management for the TAMK ICT- laboratory. TAMK also has the opportunity to use the existing know how, server infrastructure and software hosting. In this way TAMK avoids double investments and diminishes the set- up cost of the laboratory.

The research institute Log-IC in Belgium has already begun a research project on the creation of a “tracking and tracing system” at a rental business. The problems which arise at these fastgrowing SMEs are illustrative for logistic ICT questions which are present at enterprises of this size.

16.1. Functions of the TAMK Logistics Innovation Laboratory

TAMK Logistics Innovation Laboratory will serve as a tool in contact teaching for logistics students and logistics professionals. It also functions as a technical support center and a neutral ERP system testing facility (ICT- laboratory) for SMEs in Pirkanmaa area. ICT- laboratory analyses supply chains and possible problems in them by using various ERP systems. ICT- laboratory also has a fully operational RFID port and software for the same purposes. (see figure 6.)

16.1.1. Logistics Innovation laboratory in education

Laboratory provides TAMK and TTU logistics students with the most modern learning environment using simulation models based on real cases. It will take the logistic studies and logistics research and development to a whole new level, with real- life types of logistics simulations and cutting edge IT solutions. The TAMK Logistics Innovation Laboratory is unique in Finland, and is hoped to attract multitude of logistics students in the future. The full potentials of the laboratory are yet to be known, since the project is not completed. A new logistics module has been added into TAMK curriculum which is based around the laboratory. This module is called Disaster Management and Emergency Supply Chain. (see figure 6.)

16.1.2. ICT- Laboratory for commercial organisations

One major consequence that an enterprise can experience is the diminishing market power with respect to its competitors. It is therefore obvious that there are clear needs for knowledge in these enterprises, especially regarding management and interfacing of the logistic flows of information.

Larger enterprises obviously have more resources to attract logistical ICT knowledge. This ICT- laboratory is aiming foremost at supporting SMEs in their struggle to control flows of information and also at the interfacing of the logistic components in their organisation.

The ICT- laboratory will provide answers through a structured analysis and effective testing to questions such as:

- Which information has to be stored in what system?
- Which system will become the master system?
- Are the links as efficient and simple as they are represented?
- Where are the traps and weaknesses?
- What steps need to be taken in order to link the different components together?

Only in recent years there has been actual data collection from crisis situations, so that logistics performances could be measured and evaluated. The data analysis is essential in educating the humanitarian aid professionals. TAMK Logistics Innovation Laboratory is an ideal tool for humanitarian logistics. With the IT solutions in the laboratory, it will be possible to simulate crisis situations as realistically as possible. As mentioned earlier in this thesis, this type of education is extremely beneficial for humanitarian aid professionals.

16.2. The cost of setting up the Logistics Innovation Laboratory

As mentioned earlier the TAMK ICT- Laboratory is set up in co- operation with the research institute Log- IC of PHL Limburgh and TTU. Other partners in Logivo project are TAYS, TKL and VTT. A major part of the funding is provided by Pirkanmaan liitto which granted the Logivo project 300 000 euros of EAKR (Euroopan aluekehitysrähoitus) money. Still more funds are needed because this amount is calculated for a year and this includes also the wages for the professionals working in the laboratory. Some additional funds will be provided by TAMK and TTU.

TAMK has to invest in buying the necessary software and hardware for the RFID- system, such as RFID- ports and scanners, as well as ERP systems. As these acquisitions are very expensive the project needs plenty of outside funding.

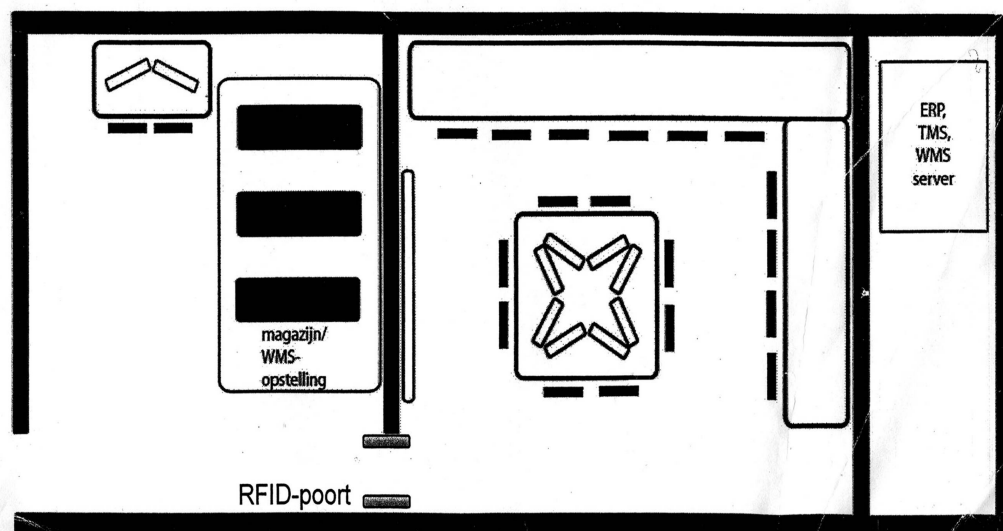
One program is already acquired. The program is called Simflex. This program is a SCM simulation program and luckily was a free software. Another acquisition is a mobile ERP device, but this device is only a demo version. There is a plan to purchase a voice recognising warehouse picking system called Optiscan. This program uses voice recognising, RFID technology and barcode technology to integrate ERP and WMS.

The greatest difficulty appears, not only in the very expensive price tag, but also how to integrate all the programs to fully and reliably function with each other. As this project is unique in Finland it is very hard to find professionals who are able to integrate and work with all the programs needed. There are ongoing discussions with Logy Ry on how they could be involved with the project, either financially or provide much needed know how.

The more effectively this laboratory can be marketed to the commercial sector the more it will cut the set up expenses. It will also bring together humanitarian side of logistics and commercial logistics. This is a greatly needed and much appreciated networking and collaboration.



Log-IC LAB



Pic. 10. A layout of ICT- laboratory in limburgh, Belgium (Tony Fonteyn)

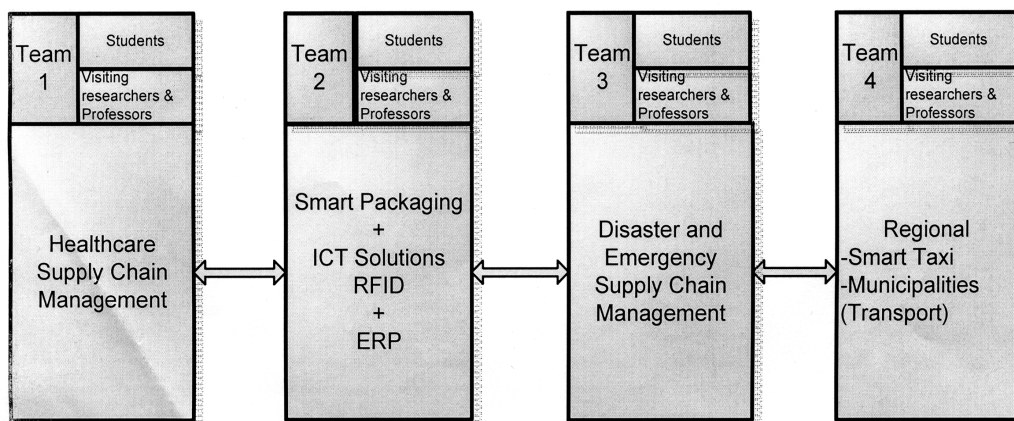
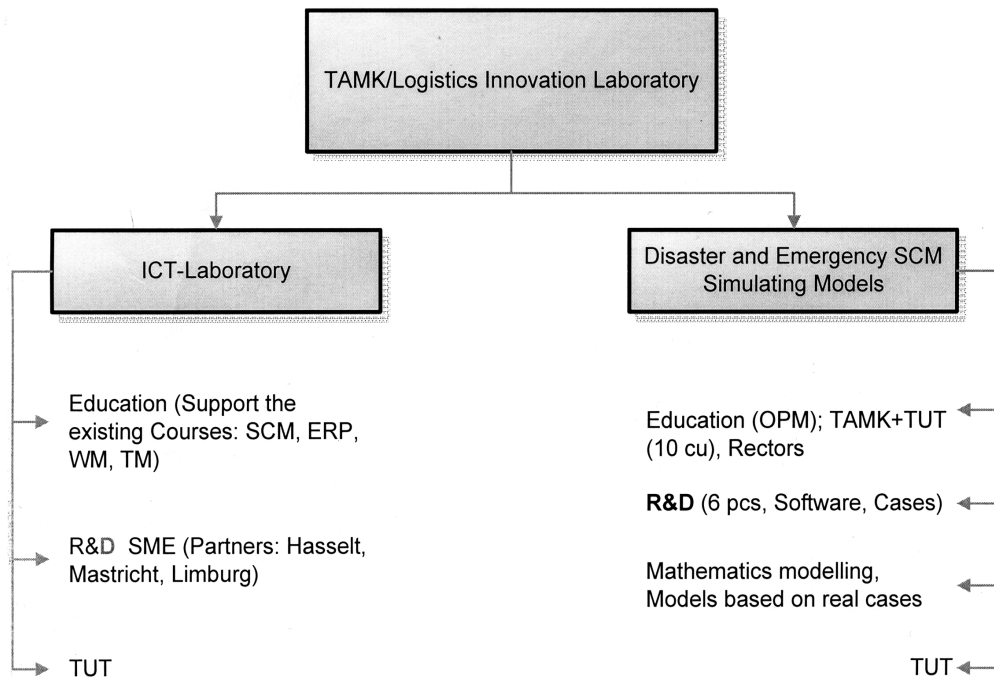


Fig. 6. Configuration of TAMK Logistics Innovation Laboratory (Hakala 2008)

17. Application for finance to EAKR (Euroopan Alue Kehitys Rahasto)

As mentioned earlier in this thesis funding was received from Pirkanmaan liitto. The following chapter is a translation of the EAKR application form. It will give an insight on the complexity of the application process and how detailed the description of the project needs to be in order to receive funds from EAKR. This chapter also gives more detailed information of the whole Logivo project.

The following is the translation of the original application which is attached in the appendix.

Translation:

In order to receive EU funding for the TAMK Logistics Innovation Lab, an application must be filled. There are certain guidelines to follow and questions to be answered in the application form for the period of 2007 – 2013.

4 THE DESCRIPTION OF THE APPLYING ORGANIZATION AND ITS COLLABORATORS.

4.1

The applying organization must clarify its part and function in the implementation of the project.

This consists of whether the applicant is due to implement the project solely on its own, partially on its own and partially outsourced, partially on its own – partially outsourced including one or more separate individual implementator/s, or whether the applicant is implementing the project completely as a procurement service.

4.1.1

Considering the implementation model above, the applicant must define and name the separate implementation parties and provide the partnering and/or intention contracts and agreements.

4.2

The applicant must inform the EU funder of all the parties that have taken part in the preparation of the project and how.

In this particular case the project has been prepared in collaboration between TAMK and the Technological Institute of Tampere. TAMK has been in control of the planning, equipment and software of the logistics lab including the international cooperation between the Provinciale Hogeschool Limburg – (polytechnic university) in Belgium.

The Tech. Institute of Tampere has had the responsibility of all parts having to do with modeling and simulating the logistical processes.

4.3

The planned group of the project management consists of representatives from TAMK, the Tech. Institute of Tampere, Pirkanmaan Liitto and parties from local businesses.

4.4

All other projects or plans that the financial support is possibly linked to must be listed individually. In this case the **contact surfaces** (ks.liittymäpinta) exist between the Tampere – Pikkala Logistics Center. See publications of the union D 86 and D 90.

5. THE NEED AND POSSIBLE FUTURE DEMAND OF THE PROJECT

5.1

The solution to the project at hand is forecasted to increase transparency in the larger companies and development of employee know-how in the small to medium companies. The need for development in these areas has been established according to a preliminary research made by the Tampere – Pirkkala Logistics Center. The most important developmental targets to the logistics companies are collaboration networking and developing better customer service.

Even though the usage of logistics information systems (such as ERP systems) has increased in Finland, it is still minimal in comparison to the global scale. The most common obstacles of generally used information systems in logistics are the pricing of the equipment and the disjointedness of transportation and logistics businesses. Outsourcing of logistical procedures is predicted to increase among all the services. In particular, the need to outsource will most likely be centered around the so called information logistics services, such as the information systems for logistics, billing and order handling.

In order to meet the need for development in the corporate sector, mentioned above, TAMK and TTY are jointly developing a logistics - innovation laboratory which consists of a fully equipped ICT lab and software. The lab will serve to help companies in practice with their changing logistical needs. These needs consist of, among others, managing the logistical information flows and ERP systems and efficient use of other automated systems in a simulation – learning environment. The lab will also improve the education of logistics in Pirkanmaa.

5.2 ALL THE PRELIMINARY INQUIRIES FOR THE NEED AND DEMAND FOR THE PROJECT AND HOW THE INQUIRIES HAVE BEEN UTILIZED?

A preliminary interview has been made to local businesses, where the need for development of logistical education has been mapped and the willingness of the

companies' cooperation in the project has been established. There are 12 local businesses in Pirkanmaa that have expressed their interest in collaborating on this project.

6. THE GEOGRAPHICAL AREA OF PROJECT IMPLEMENTATION AND DESCRIPTION OF THE TARGET GROUP.

6.2

The exact target groups and the businesses in them should be determined. The target of the project is to develop the learning environment of logistics in TAMK IB program and to develop the learning and research environment of logistics in TTY.

6.3 INTERMEDIARY TARGET GROUPS AND OTHER FACETS THE PROJECT IS DIRECTED TO.

An intermediary learning environment, created by this project, will mostly serve the students and teachers of TAMK and TTY. They are the facets that will be using the lab during the study modules. Other beneficiaries of the lab will also be the students of other education facilities and the local companies in need of logistical knowledge.

6.4 THERE ARE 10 BUSINESSES AND COMPANIES THAT ARE ESTIMATED TO TAKE PART IN THE PROJECT.

6.6 HOW WILL THE PROJECT MEET THE GOALS OF EAKR?

The project will serve to develop the degree program and the learning environments of TAMK and TTY. It will also utilize new technology to enhance the quality and attractiveness of higher education. The project supports the usage and utilization of new technology and production processes. It will also support and strengthen the know-how of TAMK and TTY including multi faceted collaborations. The lab will develop business knowledge and business process knowledge especially in the parts of logistic processes. It will enhance the transportation of technology, the usage of new innovations and the development of product and production technology. The project will generate new innovations and processes to model and develop logistics.

6.7 THE ROLE OF THIS PROJECT IN ENHANCING THE GOALS OF OTHER NATIONAL AND LOCAL PROJECTS.

This project supports numerous other local projects of learning and knowledge in Pirkanmaa area. These projects are involved in the development program of 2007 – 2010. In order to develop the goals of the Tampere city area center program 2007 – 2010 (Treen kaupunkiseudun aluekeskusohjelma 2007 – 2010) this lab will create the conditions to condense the cooperation between the business and learning environments and the education facilities.

7. THE GOALS, RESULTS AND IMPACTS OF THE PROJECT.

7.1

The goal of this project is to create a logistics laboratory and a simulation environment, where logistical processes and information flows are tested and improved. The lab will produce analyzing tools, process manuals and simulations, as well as simulations to improve logistics. The learning environment will be utilized by the younger students of logistics, the university students and the students involved in additional and continued adult education. The role of the companies is to introduce information from the business world of logistics, the current situation and the needs for developing of the logistical knowledge and processes. Detailed information of the current processes is gathered from the companies to make the basis of case material for the learning environment.

7.2 THE EMPLOYMENT EXPECTATIONS OF THE PROJECT.

It is currently estimated that the project will employ two people, one of them being a position for a female.

7.2.1 RESEARCH AND DEVELOPMENT POSITIONS OF THE NEW EMPLOYMENT.

The goal is to have two new positions of R&D, one of them being a position for a female employee.

7.3 THERE ARE NO ESTIMATED NEW BUSINESSES THAT THIS PROJECT WILL CREATE.

7.4 THE QUALITY IMPRESSIONS TO THE TARGET GROUP AND THE PROCESS ENVIRONMENT AND THE QUALITY ASSURANCE ESTIMATIONS.

The quality of logistics education will improve due to the learning environment developed by the project. The demonstration possibilities of logistic processes and practice will be possible in the new learning environment. This way the hands-on learning and the overall knowledge of the students will be improve to better meet the standards of the actual business world.

The evaluation will be made by following and monitoring the feed back from the students and teachers who have used the lab as a learning tool during education modules.

7.5 THERE ARE NO EQUALITY ISSUES ENTAILED IN THIS PROJECT.

7.6

This project is an equal opportunity project to both males and females.

7.7 THE POSSIBLE ENVIRONMENTAL EFFECTS OF THE PROJECT.

The project is considered to have no direct environmental affects. Indirectly, the development of logistics and the improvement of know how is estimated to have a

positive affect to energy efficiency, reducing of emissions and to further advance the recycling of materials.

8. THE PROJECT OPERATIONS AND THE PRODUCTS DESCRIPTION.

8.1

The central functions of the project.

- Planning the learning environment of the logistics innovation.
- Building the laboratory of logistics innovation.
- Piloting the lab using logistical case examples. Virtual schemes will be made according to these examples.
- Modeling, definition and simulation of the logistics schemes in the virtual learning environment.
- International cooperation with Provinciale Hogeschool Limburg in Belgium.(1/2010 – 11/2012)

The Provinciale Hogeschool Limburg in Belgium is the operations partner of TAMK. The Limburg lab has improved its own learning environment in Belgium. The collaboration will consist of exchanging information on the implementation and development of the learning environment. There are approximately two people from TAMK and TTY, dedicated to the initial collaboration. This will include the trips to Belgium for a few days to get acquainted in the learning environment in Belgium and exchanging information on their experiences.

8.2 The new products (i.e. learning materials, processes, programs and such), services and processes including a plan to develop them.

- Logistics innovation lab with its equipments and sotwares.
- The virtual simulated learning environment of logistics.
- The learning materials and the education modules used in the logistics innovation lab and the learning environment.

8.3 The long term affects of the lab and how to make the project to an ongoing function.

The conventional operators of this lab will consist mainly of the staff of TAMK and TTY. Therefore the usage of the lab and the virtual learning environment will ossify to a permanent operating system during the developmental project.

9. PROJECT IMPLEMENTATION PLAN

9.1 An itemized description of performance implementation, responsibilities and the phasing of the project is described below in yearly increments.

2010

- Planning of the logistics innovation lab and learning environment 1 – 4 /2010 TAMK and TTY
 - Beginning seminar 3/2010
 - Building of the lab 5/2010 – 12/2010 TAMK & TTY
 - Modeling, definition and simulation of the model logistics scenarios and schemes for the virtual learning environment. 4/2010 – 12/2010 TTY & TAMK
 - Pilot phase of the lab using case examples. Schemes of the virtual models will be made according to these examples. 8/2010 – 12/2010 TAMK & TTY
 - International cooperation with Provinciale Hogeschool Limburg in Belgium.
- 2011
- Modeling, definition and simulation of the model logistics scenarios and schemes for the virtual learning environment. 1/2011 – 12/2011 TAMK & TTY
 - Pilot phase of the lab using logistical case examples. 1/2011 – 12/2011 TAMK & TTY
 - International cooperation with Provinciale Hogeschool Limburg in Belgium.
- 2012
- Modeling, definition and simulation of the model logistics scenarios and schemes for the virtual learning environment. 1/2012 – 6/2012 TTY & TAMK
 - Piloting and finalizing the lab using logistical case examples. 1/2012 – 10/2012 TAMK & TTY
 - International cooperation with Provinciale Hogeschool Limburg in Belgium.
 - Completion seminar 10/2012

9.2

Synopsis of the project for information services (goals, planned actions and results)

The goal of the project is to create a logistics laboratory with a simulation environment where logistics processes and information flows can be tested, developed and managed. This project will produce analytical tools, procedure manuals and models, as well as simulations that can be used in determination and solving the future ICT-problems.

A logistics innovation lab will be planned and built during this project. The project will also produce a virtual learning environment which will demonstrate other logistics processes. As a result of this lab, the level of logistics education will improve due to demonstrations and practice of logistic processes is made possible in a virtual learning environment. This way the know-how of the students will better improve to meet the requirements of the actual business world.

• Procurement	46 000
• Travel costs	8 500
• Machine and equipment purchases	13 000
• Buildings and land	0
• Rental costs	8 800
• Administration costs	2 000
• Other costs	0
• TOTAL	290 000
With income of	0

All sales taxes will remain as the responsibility of the applicant.
The diversion of financial assistance

EAKR and the government	199 500
Counties	55 500
Other public funding	30 000
Private funding	5 000
TOTAL FUDING OF	290 000

15. OTHER FINANCIAL ASSISTANCE THAT MAY HAVE BEEN APPLIED FOR.

15.1

TAMK, TTY and the collaboration parties (companies) of the project will be responsible for the deductible amount for the financing.

15.2 There is no other financial assistance that has been applied for.

15.3 The rule of Deminimis does not apply in this case.

16. ATTACHMENTS

16.1

Mandatory attachments include; a citation from the Chamber of Commerce and a proof of no tax debts accrued. For this project there are several other attachments that apply. A complete list of attachments and contracts needed for this project is found on the original financial application.

18. Conclusion and summary

Global market expansion and integration has changed Finland's international trade and logistical environment. Production is centralised more and more to Asia and South-America, where costs of productions are low and markets are close. The high volume of production and specialisation in global and EU markets, demand effective logistics management.

Business processes are developed to be faster with electronic information systems. If an organisation today wants to be competitive in global markets, it needs to react to changes in customer demands even faster. The economic growth of Russia, other Eastern- European countries and Asia have opened up great opportunities for exporting Finnish goods and growth for transition traffic services. On the other hand, never before seen challenges in developing the infrastructure of harbours, roads, railways and border crossing stations have emerged.

Even though the controlling the flow of information and logistic operations and activities are becoming more and more automated, the systems do not provide benefits by themselves. The management and employees who use these systems must have at least a basic understanding of the organisations logistic activities and their importance for the organisation. People are always needed to use these systems, so personal skills and know how can never be underestimated. This has to be taken in serious consideration, especially in managerial sector which is moving towards the use of automated management systems. This should be the corner stone argument, when discussing the marketing of TAMK logistic innovation laboratory to the commercial sector.

As I ran out of time when writing this thesis I could not complete the interviews for SMEs in Pirkanmaa area. These interviews should be made at this point to collect data of logistic challenges, problems and future visions of these companies. These questions will provide extremely useful information and at the same time helps marketing of the laboratory for these organisations. Interview questions for organisations are attached in appendix page.

Appendixes

The following is a rough estimate of the set-up costs from the Limburg Research Institute in Belgium for the TAMK ICT lab in Finland.

Module 1 (sharing of blade server system):

- 1 TAMK bladeserver located in the ICT- center of the PHL 5803,- euros
 - service contract of the blade supplier 455,- euros
 - VM ware licence 5814 ,- euros
 - 10 citrix user licences 530,- euros
- total of 12 602,- euros

Module 2 (server support)

This includes:

- assistance at the installation of logistical software which is delivered by TAMK. If necessary temporary administrative access can be given under monitoring of the PHL Limburgh.
- administrative support on the blade server
- continuous running of the blade server platform
- technical interventions and controlling
- regulations of the remote connections

Total of (0,25 full time equivalent) 14 040,- euros annually.

For extra support which falls outside above services a compensation will be charged for 60,- euros/ hour.

(Tony Fonteyn, PHL limburgh)

On top of this the RFID- hardware and software including e.g. RFID- gates: a total of approximately 25 000,- euros (estimate given by the representatives of Basware Oy).

When mentioned this sum it came apparent that this is too expensive an investment for TAMK and another offer from a competing company is needed.

These estimates were given by Mr. Tony Fonteyn of PHL Limburgh and the representatives of Basware Oy in 2009.

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Interview questions for SMEs

Kysely yrityksille

1. Yrityksen nimi ja haastateltavan nimi ja titteli
2. Mitkä ovat logistiset pullonkaulat yrityksessänne tällä hetkellä?
3. Onko käytössänne toiminnanohjausjärjestelmä?/mikä?
4. Aiotteko hankkia lähitulevaisuudessa toiminnanohjausjärjestelmän tai aiotteko sijoittaa pääomaa logistiikan parantamiseen lähitulevaisuudessa?
5. Miksi ostitte/ostatte toiminnanohjausjärjestelmän?
6. Millaisia parannuksia toiminnanohjausjärjestelmä tuo/toi yrityksenne, missä käytätte sitä?
7. Millaisia hankaluuksia kohtasitte toiminnanohjausjärjestelmän käyttöönotossa?
8. Onko toiminnanohjausjärjestelmä vastannut odotuksianne?

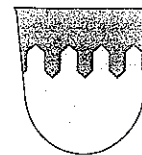
9. Onko hinta/hyötysuhde ollut se mitä odotitte?
10. Onko talossa osaavaa henkilökuntaa työskentelemään toiminnanohjausjärjestelmän kanssa?
11. Oletteko tutustunut RFID- teknologiaan?
12. Kiinnostaako RFID-teknologia tulevaisuudessa?
13. Olisitteko valmis osallistumaan TAMK:in RFID-laboratorion toimintaan? Jos kyllä, niin miten?
14. Mitä hyötyä toivoisitte yrityksenne saavan ICT (informaatio- ja kommunikaatioteknologia)-laboratoriolta?
15. Millaista osaamista yrityksenne kaipaa valmistuvista logistiikan/liiketalouden osaajista?



Euroopan unioni
Euroopan aluekehitysrahasto

EAKR-PROJEKTIHAKEMUS

Euroopan aluekehitysrahaston osittain rahoittamat
projektit



Ohjelmakausi 2007 - 2013

PIRKANMAAN LIITTO

Viranomaisen merkintöjä

Saapumispvm	30.4.2009	Diaarinumero	LSLH-2009-3459/Ha-7
Käsittelijä	Mia Kangasniemi	Puhelinnumero	03 248 1284
Hakemusnumero	802696	Projektikoodi	
Hakemustyyppi	Uusi hakemus	Tila	Jätetty viranomaiskäsittelyyn (4) 10.03.2010

1. VIRANOMAINEN, JOLLE HAKEMUS OSOITETAAN

Pirkanmaan liitto

2. PROJEKTI, JOLLE HAETAAN RAHOITUSTA

Projektin nimi	LOGIVO - Logistiikan virtuaalinen oppimisympäristö		
Ohjelma	Länsi-Suomi		
Toimintalinja	2 : Innovaatiotoiminnan ja verkostoitumisen edistäminen sekä osaamisrakenteiden vahvistaminen		
Projektityyppi	Sekä investointi- että kehittämisprojekti		
Aloituspäivämäärä	1.1.2010	Päätymispäivämäärä	31.12.2012

3. PROJEKTIN HAKIJAN TIEDOT

Hakijan nimi	Pirkanmaan Ammattikorkeakoulu Oy, Tampereen Ammattikorkeakoulu (TAMK)		
Hakijatyyppe	Ammattikorkeakoulu		
Y-tunnus	1015428-1		
Lähiosoite	Kuntokatu 3	Puhelinnumero	+358 3 245 2111
Postinumero	33520		
Postitoimipaikka	Tampere	Faksinumero	+358 3 245 2222
Pankkiyhteys	Sampo	Tilinumero	851997-10000645
Web-osoite	www.tamk.fi		
Projektin vastuuhenkilön nimi	Mikko Naukkarinen		
Asema organisaatiossa	Vararehtori		
Sähköpostiosoite	mikko.naukkarinen@tamk.fi	Puhelinnumero	+358 500 772 269
Taloushallinnon vastuuhenkilön nimi	Annika Hannu		
Asema organisaatiossa	Controller		
Sähköpostiosoite	annika.hannu@tamk.fi	Puhelinnumero	+358 40 774 7090
Projektipäällikön nimi	Juhani Kurppa		
Sähköpostiosoite	juhani.kurppa@tamk.fi	Puhelinnumero	+358 40 829 3075
Seurantayhdysenkilön nimi	Juhani Kurppa		
Sähköpostiosoite	juhani.kurppa@tamk.fi	Puhelinnumero	+358 40 829 3075
Hakemusvaiheen yhteysenkilön nimi	Petri Murtomäki		
Sähköpostiosoite	petri.murtomaki@tamk.fi	Puhelinnumero	+358 40 777 0956

4. HAKIJAORGANISAATION JA YHTEISTYÖTAHOJEN KUVAUS

4.1 Hakijaorganisaation osuus ja tehtävät projektin toteutuksessa

- Hakija toteuttaa projektin kokonaan itse
 Hakija toteuttaa projektin osittain itse ja osittain alihankintana
 Hakija toteuttaa projektin osittain itse, osittain alihankintana ja osittain toteutuksesta vastaa yksi tai useampi osatoteuttaja
 Hakija toteuttaa projektin kokonaan ostopalveluna

4.1.1 Osatoteuttajien määrittely, nimeäminen, Y-tunnukset ja toteutusosuudet (kumppanuus- tai aiesopimukset)

Osatoteuttajan nimi	TTY-säätiö
Y-tunnus	2286106-3
Sanallinen kuvaus toteutusosuudesta	
Tampereen teknillisen yliopiston vastuulla on logististen prosessien mallintamiseen ja simulointiin liittyvien hankeosioiden toteutus.	

4.2 Mitkä tahot ovat olleet mukana projektin valmistelussa ja miten?

Hanke on valmisteltu Tampereen ammattikorkeakoulun ja Tampereen teknillisen yliopiston yhteistyönä. Tampereen ammattikorkeakoulun vastuualueena on ollut logistiikkalaboratorion suunnittelu laitteistoinen ja ohjelmistoinen sekä asiaan liittyvä kansainvälinen yhteistyö mm. Provinciale Hogeschool Limburg - korkeakoulun kanssa Belgiassa.

Tampereen teknillisen yliopiston vastuulla on ollut logististen prosessien mallintamiseen ja simulointiin liittyvien hankeosioiden suunnittelu.

4.3 Projektin ohjausryhmän suunniteltu kokoonpano

Ohjausryhmä koostuu Tampereen ammattikorkeakoulun, Tampereen teknillisen yliopiston, Pirkanmaan liitto sekä yritysten edustajista.

4.4 Muut projektit tai projektikokonaisuudet, joihin haettava projekti mahdollisesti liittyy, mukaan lukien rakennerahastoista (ESR ja EAKR) rahoitetut projektit

Hankkeella on liittymäpintoja Tampere - Pirkkalan logistiikkakeskus - hankkeeseen, ks. Pirkanmaan liiton julkaisut D 86 ja D 90.

5. PROJEKTIN TARVE JA KYSYNTÄLÄHTÖISYYS

5.1 Mihin tarpeeseen projektilla haetaan ratkaisua?

Tampere-Pirkkalan logistiikkakeskus -esiselvityksen mukaan kehitystarve logistiikassa suurilla yrityksillä on läpinäkyvyyden lisääminen ja pienillä yrityksillä puolestaan henkilöstön osaamisen lisääminen.

Logistiikkayrityksille yhteistyöverkostojen ja asiakaspalvelun kehittäminen ovat tärkeimmät kehityskohteet.

Logistiikan tietojärjestelmien käyttäminen on yleistynyt Suomessa, mutta on silti kansainvälisesti katsottuna

vähäistä. Tietojärjestelmien yleistymisen esteenä on logistiikka- ja kuljetusalan hajanaisuus sekä laitteiden hankintahinta. Logistiikkapalveluiden ulkoistamisen ennustetaan kasvavan kaikkien osapalveluiden osalta. Tarve ulkoistaa keskittyyne tulevaisuudessa ns. informaatiologiikan palveluihin: logistiikan tietojärjestelmät, laskutus ja tilausten käsittely.

Yllämainittuja yrityssektorin kehittämistarpeita palvelemaan TAMK ja TTY yhteistyössä kehittävät logistiikka-innovaatiolaboratoriota, joka koostuu ICT-laboratoriosta laitteistoinen ja ohjelmistoinen käytännössä esiintyviin erilaisiin logistisiin tarpeisiin. Näitä ovat mm. logististen tietovirtojen hallinta sekä toiminnanohjausjärjestelmien ja muiden automaatiojärjestelmien tehokas hyväksikäyttö simulaatio-oppimisympäristössä. Laboratorion avulla kehitetään logistiikka-alan koulutusta Pirkanmaalla.

5.2 Onko projektin tarpeesta ja kysynnästä olemassa esiselvityksiä, ennakoitietoa tms. ja miten sitä on hyödynnetty projektin valmistelussa?

Projektin tarpeesta on tehty kysely , missä yrityksiltä on selvitetty logistiikka-alan koulutuksen kehittämistarpeita Pirkanmaalla sekä yritysten kiinnostusta osallistua kehittämistyöhön. Tässä yhteydessä 12 Pirkanmaalla toimivaa yritystä on ilmaissut kiinnostuksensa yhteistyöhön.

Hankkeella on liittymäpintoja Tampere - Pirkkalan logistiikkakeskus - hankkeeseen, ks. Pirkanmaan liiton julkaisut D 86 ja D 90.

6. PROJEKTIN TOTEUTUSALUE JA KOHDERYHMÄN KUVAUS

6.1 Projektin toiminnan maantieteellinen kohdealue

Maakunnat

Pirkanmaa

Seutukunnat

Luoteis-Pirkanmaan

Kaakkois-Pirkanmaan

Etelä-Pirkanmaan

Tampereen

Lounais-Pirkanmaan

Ylä-Pirkanmaan

Kunnat

Akaa

Hämeenkyrö

Ikaalinen

Juupajoki

Kangasala

Kihniö

Kuhmalahti

Kylmäkoski

Lempäälä

Mänttä-Vilppula

Nokia

Orivesi

Parkano

Pirkkala

Punkalaidun

Pälkäne

Ruovesi

Sastamala

Tampere

Urjala

Valkeakoski

Vesilahti

Virrat

Ylöjärvi

6.2 Mitkä ovat projektin varsinaiset kohderyhmät ja ovatko kohderyhmään kuuluvat yritykset tiedossa?

Projektin kohteena on Tampereen ammattikorkeakoulussa liiketalouden koulutusohjelman yhteydessä tehtävän logistiikka-alan koulutuksen oppimisympäristön kehittäminen ja Tampereen teknillisen yliopiston logistiikan oppimis- ja tutkimusympäristön kehittäminen.

6.3 Mitkä ovat projektin varsinaisten kohderyhmien lisäksi sellaiset välilliset kohderyhmät ja muut tahot joihin projektin toiminta kohdistuu?

Projektin tuloksena syntyvän oppimisympäristön välillisenä kohderyhmänä ovat lähinnä Tampereen ammattikorkeakoulun ja Tampereen teknillisen yliopiston opettajat ja opiskelijat, jotka oppimisympäristöä tulevat opintojaksojen toteutuksessa käyttämään.
Välillisiä hyötyjiä ovat myös muiden oppilaitosten opiskelijat sekä logistiikka-alan osaamista toiminnassaan tarvitsevat Pirkanmaalaiset yritykset.

6.4 Projektiin osallistuvien yritysten arvioitu lukumäärä yhteensä

10

6.5 Projektiin osallistuvien muiden organisaatioiden arvioitu lukumäärä

0

6.6 Miten projekti edistää alueellisen EAKR-toimenpideohjelman tavoitteita?

Projekti kehittää Tampereen ammattikorkeakoulun ja Tampereen teknillisen yliopiston koulutusjärjestelmää ja oppimisympäristöjä.

Projekti hyödyntää uutta teknologiaa korkeakoulutuksen laadun ja vetovoimaisuuden kehittämiseksi.

Projekti tukee uuden teknologian ja tuotantomenetelmien hyödyntämisessä ja käyttöönotossa.

Projekti tukee ja vahvistaa Tampereen ammattikorkeakoulun ja Tampereen teknillisen yliopiston osaamista ja monialaista yhteistyötä.

Projekti kehittää liiketoimintaosaamista ja liiketoiminnan prosessiosaamista erityisesti logististen prosessien osalta.

Projekti edistää teknologian siirtoa, uusien ideoiden hyödyntämistä sekä tuote- ja tuotantoteknologian kehittämistä. Projekti tuottaa uusia innovaatioita ja menetelmiä logistiikan mallintamiseen ja kehittämiseen.

6.7 Miten projekti edistää muiden kansallisten ja maakunnallisten ohjelmien tavoitteita?

Projekti tukee useita Pirkanmaan maakuntaohjelman 2007 - 2010 osaamisen ja koulutuksen kehittämiseen liittyvien tavoitteiden toteuttamista.

Tampereen kaupunkiseudun aluekeskusohjelmaa 2007 - 2010 tavoitteita projekti toteuttaa luomalla

edellytyksiä yrityselämän ja tutkimus- ja koulutuslaitosten yhteistyön tiivistämiselle.

7. PROJEKTIN TAVOITTEET, TULOKSET JA VAIKUTUKSET

7.1 Mitkä ovat projektin tavoitteet, projektin arvioidut tulokset ja vaikutukset ja kuka niitä hyödyntää?

Tavoitteena on luoda logistiikkalaboratorio ja simulaatioympäristö, jossa testataan ja kehitetään logistisia prosesseja ja tietovirtojen hallintaa. Projekti tuottaa analysointityökaluja, menettelytapamanuaaleja ja mallinnuksia sekä simulaatioita logistiikan kehittämiseen.

Oppimisympäristöä hyödynnetään logistiikka-alan nuorisosteen, yliopisto-opiskelijoiden sekä lisä- ja jatkokoulutuksessa olevien aikuisopiskelijoiden koulutuksessa.

Yritysten rooli on tuoda tietoa elinkeinoelämän logistiikan nykytilanteesta ja siihen liittyvistä osaamis- ja kehittämistarpeista. Yrityksiltä kerätään myös yksityiskohtaisempaa käytännönläheistä tietoa oppimisympäristöön sisällytettävien case-aineistojen pohjaksi.

7.2 Kuinka monta uutta työpaikkaa projekti saa aikaan?

Tavoite	2 kpl	joihin työllistyy naisia	1 kpl
---------	-------	--------------------------	-------

7.2.1 Uusista työpaikoista tutkimus- /tutkimus- & kehitystyöpaikkoja?

Tavoite	2 kpl	joista naisten työpaikkoja	1 kpl
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7.3 Kuinka monta uutta yritystä projekti saa aikaan?

Tavoite	0 kpl	joista naisten perustamia	0 kpl
---------	-------	---------------------------	-------

7.4 Mitkä ovat projektin laadulliset vaikutukset kohderyhmään ja toimintaympäristöön ja miten niitä arvioidaan?

Projektin kehittämän oppimisympäristön vaikutuksena logistiikka-alan koulutuksen taso paranee, kun logististen prosessien havainnollistaminen ja harjoittelu on mahdollista oppimisympäristössä. Näin opiskelijoiden osaaminen kehittyy nykyistä paremmin työelämässä vaadittavalle tasolle.

Arviointi tehdään seuraamalla oppimisympäristössä opiskelleiden antamaa palautetta opintojaksoittain.

7.5 Onko projektilla tasa-arvovaikutuksia:

ei tasa-arvovaikutuksia

7.6 Onko projektia suunniteltaessa tehty sukupuolivaikutusten arviointi? Jos on, mitkä ovat arvioinnin tulokset?

Projekti on vaikutuksiltaan sukupuolineutraali.

7.7 Onko projektilla vaikutuksia ympäristöön? Jos on, minkälaisia vaikutuksia ?

Projektilla ei ole suoranaisia ympäristövaikutuksia. Välillisesti logistiikan kehittäminen ja osaamisen lisääntyminen vaikuttaa myönteisesti energiatehokkuuteen, päästöjen vähentämiseen ja edistää materiaalien kierrättämistä.

7.7.1 Ympäristövaikutukset

Vaikutuksen kohde	Vaikutusaste				Sanallinen selitys
	Haitallinen	Neutraali	Vähäinen myönteinen	Merkittävä myönteinen	
Vaikutuksen ilmastomuutokseen					
- energiatehokkuuden parantumiseen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
- uusiutuvien energialähteiden käytön lisääntymiseen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- ilmastomuutoksen aiheuttamien riskien vähentämiseen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
- fossiilisten hiilidioksidipäästöjen vähentämiseen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Vaikutukset päästöihin					
- vesistöön	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
- maaperään	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
- ilmaan	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Vaikutukset kulutukseen ja tuotantoon					
- jätteiden määrän vähentämiseen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
- hyötykäyttöön ja kierrätykseen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
- energia- ja materiaalitehokkuuteen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
- paikallisten uusiutuvien raaka-aineiden ja palvelujen käyttöön	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Vaikutukset luonnonolosuhteisiin ja yhdyskuntiin					
- maisemaan	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- kulttuuriympäristöön	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

- luonnon monimuotoisuuteen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- Natura 2000 ohjelman kohteisiin	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Vaikutukset ihmisiin					
- elinoloihin ja viihtyvyyteen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- terveyteen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- turvallisuuteen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Vaikutukset liikenteeseen					
- henkilöautoliikenteen kasvun hillitseminen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- kuljetustarpeen vähenemiseen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
- logistiikan tehostamiseen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
- joukkoliikenteen tai kevyen liikenteen osuuteen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Vaikutukset tutkimiseen ja koulutukseen					
- ympäristöteknologiaan	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
- ympäristöjärjestelmien käyttöönottoon	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
- ympäristöosaamiseen ja tietoisuuteen	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

8. PROJEKTIN TOIMENPITEIDEN JA TUOTTEIDEN KUVAUS

8.1 Mitkä ovat projektin keskeiset toimenpiteet?

1. Logistiikka-innovaatio-oppimisympäristön suunnittelu 1 - 4/ 2010 TAMK ja TTY
2. Aloituseminaari 3 / 2010.
3. Logistiikka- innovaatio laboratorion rakentaminen 5 / 2010 - 12 / 2010 TAMK ja TTY
4. Laboratorion pilotointi logististen case-esimerkkien avulla. Virtuaalimallien skenaariot tehdään näiden pohjalta. 8 / 2010 - 10 / 2012. TAMK ja TTY.
5. Virtuaaliseen oppimisympäristöön mallinnettavien logistiikkaskenaatioiden mallintaminen, määrittely sekä simulointi. 4 / 2010 - 10 / 2012. TTY ja TAMK
6. Kansainvälinen yhteistyö Provinciale Hogeschool Limburg - korkeakoulun kanssa Belgiassa. 1/2010 -11/ 2012

Provinciale Hogeschool Limburg on TAMKin yhteistyökumppani Belgiassa, joka on kehittänyt omaa logistiikan oppimisympäristöään. Yhteistyö on tiedonvaihtoa oppimisympäristön toteutukseen ja kehittämiseen liittyvää. Yhteistyöhön liittyy n. 2 henkilön, TAMKin ja TTY:n henkilöitä, matkat pariksi päiväksi Belgiaan tutustumaan sikäläiseen oppimisympäristöön ja kokemusten vaihtoon.

8.2 Projektissa kehitettävät uudet tuotteet (opetusmateriaalit, menetelmät, ohjelmat yms.), palvelut ja toimintatavat sekä työsuunnitelma niiden kehittämiseksi

1. Logistiikka- innovaatio laboratorio laitteineen ja ohjelmistoineen
2. Logistiikan virtuaalinen simuloitu oppimisympäristö
3. Logistiikka-innovaatio laboratoriossa ja oppimisympäristössä käytettävä oppimateriaali sekä koulutusmodulit.

8.3 Projektin pysyvät vaikutukset; (miten juurrutetaan pysyväksi toiminnaksi)?

Projektissa käytännön toimijat ovat pääasiassa Tampereen ammattikorkeakoulun sekä Tampereen teknillisen yliopiston henkilökuntaa, joten laboratorion ja virtuaalisen oppimisympäristön käyttö vakiintuu kehittämishankkeen aikana pysyväksi toimintamuodoksi.

9. PROJEKTIN TOTEUTTAMISSUUNNITELMA

9.1 Vuosittain eritelty toiminnan kuvaus toimenpiteiden toteutuksesta, vastuista ja projektin vaiheistamisesta

2010

1. Logistiikka-innovaatio-oppimisympäristön suunnittelu 1 - 4/ 2010 TAMK ja TTY
2. Aloitusseminaari 3 / 2010
3. Logistiikka- innovaatio laboratorion rakentaminen 5 / 2010 - 12 / 2010 TAMK ja TTY
4. Virtuaaliseen oppimisympäristöön mallinnettavien logistiikkaskenaatioiden mallintaminen, määrittely sekä simulointi. 4 / 2010 - 12 / 2010. TTY ja TAMK
5. Laboratorion pilotointi logististen case-esimerkkien avulla. Virtuaalimallien skenaariot tehdään näiden pohjalta. 8 / 2010 - 12 / 2010. TAMK ja TTY.
6. Kansainvälinen yhteistyö Provinciale Hogeschool Limburg - korkeakoulun kanssa Belgiassa. Provinciale Hogeschool Limburg on TAMK:n yhteistyökumppani Belgiassa, joka on kehittänyt omaa logistiikan oppimisympäristöään. Yhteistyö on tiedonvaihtoa oppimisympäristön toteutukseen ja kehittämiseen liittyvää. Yhteistyöhön liittyy n. 2 henkilön, TAMK:n ja TTY:n henkilöitä, matkat pariin päiväksi Belgiaan tutustumaan sikeläiseen oppimisympäristöön ja kokemusten vaihtoon.

2011

1. Virtuaaliseen oppimisympäristöön mallinnettavien logistiikkaskenaatioiden mallintaminen, määrittely sekä simulointi. 1 / 2011 - 12 / 2011. TTY ja TAMK
2. Laboratorion pilotointi logististen case-esimerkkien avulla 1 / 2011 - 12 / 2011. TAMK ja TTY.
3. Kansainvälinen yhteistyö Provinciale Hogeschool Limburg - korkeakoulun kanssa Belgiassa. Provinciale Hogeschool Limburg on TAMK:n yhteistyökumppani Belgiassa, joka on kehittänyt omaa logistiikan oppimisympäristöään. Yhteistyö on tiedonvaihtoa oppimisympäristön toteutukseen ja kehittämiseen liittyvää. Yhteistyöhön liittyy n. 2 henkilön, TAMK:n ja TTY:n henkilöitä, matkat pariin päiväksi Belgiaan tutustumaan sikeläiseen oppimisympäristöön ja kokemusten vaihtoon.

2012

1. Virtuaaliseen oppimisympäristöön mallinnettavien logistiikkaskenaatioiden mallintaminen, määrittely sekä simulointi. 1 / 2012 - 6 / 2012. TTY ja TAMK
2. Laboratorion pilotointi ja viimeistely logististen case-esimerkkien avulla 1 / 2012- 10 / 2012. TAMK ja TTY.
3. Kansainvälinen yhteistyö Provinciale Hogeschool Limburg - korkeakoulun kanssa Belgiassa. Provinciale Hogeschool Limburg on TAMK:n yhteistyökumppani Belgiassa, joka on kehittänyt omaa logistiikan oppimisympäristöään. Yhteistyö on tiedonvaihtoa oppimisympäristön toteutukseen ja kehittämiseen liittyvää. Yhteistyöhön liittyy n. 2 henkilön, TAMK:n ja TTY:n henkilöitä, matkat pariksi päiväksi Belgiaan tutustumaan sikäläiseen oppimisympäristöön ja kokemusten vaihtoon.
4. Päätösseminari 10 / 2012

9.2 Tiivistelmä projektista Internetin tietopalvelua varten (tavoitteet, toimenpiteet, tulokset)

Tavoitteena on luoda logistiikkalaboratorio ja simulaatioympäristö, jossa testataan ja kehitetään logistisia prosesseja ja tietovirtojen hallintaa. Projekti tuottaa analysointityökaluja, menettelytapamanuaaleja ja mallinnuksia sekä simulaatioita, joita voidaan käyttää tulevaisuuden ICT-ongelmien määrittelyyn ja ratkaisuihin nykyistä tehokkaammin.

Oppimisympäristössä koulutetaan nuorisoasteen opiskelijoita, yliopisto-opiskelijoita sekä lisä- ja jatkokoulutuksessa olevia opiskelijoita.

Projektissa suunnitellaan ja rakennetaan logistiikka- innovaatio laboratorio. Projektissa tehdään myös logistiikan prosesseja havainnollistava virtuaalinen oppimisympäristö.

Projektin kehittämän oppimisympäristön vaikutuksena logistiikka-alan koulutuksen taso paranee, kun logististen prosessien havainnollistaminen ja harjoittelu on mahdollista oppimisympäristössä. Näin opiskelijoiden osaaminen kehittyy nykyistä paremmin työelämässä vaadittavalle tasolle.

10. TAVOITTEIDEN TOTEUTUMISEN SEURANTA, RAPORTOINTI JA TOIMINNAN ARVIOINTI

10.1 Miten projektin toimintaa arvioidaan ja miten asiakaspalaute kerätään?

Projektin toimintaa arvioidaan itsearviointina. Oppimisympäristön käyttäjiltä kerätään kirjallinen palaute.

11. TIEDOTUS JA TULOSTEN LEVITTÄMINEN

11.1 Miten projektista tiedotetaan?

Seminaareissa ja messuilla, joiden kustannukset ovat tavallisen osallistumismaksun tasolla, sekä lehtiartikkeleissa ja muissa kontakteissa alan yrityksiin, oppilaitoksiin ja muihin sidosryhmiin tiedotetaan projektista ja sen etenemisestä.

Tampereen ammattikorkeakoulun ja Tampereen teknillisen yliopiston henkilöstöllä on kattava yhteistyöverkosto, jota käytetään hyvien käytäntöjen levittämisessä.

11.2 Aikataulutettu suunnitelma projektin tuloksista tiedottamisesta ml. hyvät käytännöt

Projektista tiedotetaan Tampereen ammattikorkeakoulun ja projektille laadittavien internet-sivujen kautta. Projektin tuloksista laaditaan tiedotteita, joiden kohderyhmänä ovat yliopistojen, korkeakoulujen ammattikorkeakoulujen sekä ammatillisten oppilaitosten logistiikan kehittämisestä vastaavat henkilöt.

12. HALLINTOON LIITTYVÄT TOIMENPITEET PROJEKTIN PÄÄTTYTTYÄ

12.1 Kenen haltuun projektille hankitut materiaalit, tarvikkeet ja laitteet jäävät projektin päätyttyä ja missä säilytetään kirjjanpitoaineisto?

Projektille hankitut laitteet jäävät projektin päätyttyä Tampereen ammattikorkeakoulun haltuun. Projektille hankitut ohjelmistot ja lisenssit jäävät projektin päätyttyä sekä Tampereen ammattikorkeakoulun että Tampereen teknillisen yliopiston haltuun.

Projektiin liittyvät asiakirjat ja tositteet säilytetään Tampereen ammattikorkeakoulun arkistossa rahoittajalta saatujen ohjeiden mukaisesti.

13. KUSTANNUSARVION TIIVISTELMÄ (täydellinen kustannusarvio taustalomakkeissa)

Toteuttajan projektkirjanpitoon tulevat kustannukset

Arvonlisävero jää hakijan lopulliseksi kustannukseksi. Ilmoitettaviin kustannuksiin sisältyy alv.

	2010 - 2012 yhteensä
1. Henkilöstökustannukset	211 100
2. Ostopalvelut	46 000
3. Matkakustannukset	8 500
4. Kone- ja laitehankinnat	13 000
5. Rakennukset ja maa-alueet	0
6. Vuokratkustannukset	8 800
7. Toimistokulut	2 000
8. Muut kustannukset	600
9. Luontoissuoritukset	0
KUSTANNUKSET YHTEENSÄ	290 000
10. Tulot	0
NETTOKUSTANNUKSET YHTEENSÄ	290 000

14. RAHOITUSSUUNNITELMAN TIIVISTELMÄ (täydellinen rahoitussuunnitelma taustalomakkeissa)

Rahoitus toteuttajan maksamiin kustannuksiin

	2010 - 2012 yhteensä
1. Haettava EAKR- ja valtion rahoitus	199 500
2. Kuntien rahoitus	55 500
3. Muu julkinen rahoitus	30 000
4. Yksityinen rahoitus	5 000
RAHOITUS YHTEENSÄ	290 000

15. MUUN KUIN TÄLLÄ HAKEMUKSELLA HAETUN EAKR:N JA VALTION RAHOITUKSEN JÄRJESTÄMINEN

15.1 Onko rahoitussuunnitelmassa esitetyistä muun julkisen rahoituksen, kuntarahoituksen ja yksityisen rahoituksen osuuksista olemassa sitovia sopimuksia tai aiesopimuksia?

TAMK, TTY ja hankkeeseen osallistuvat yritykset vastaavat projektin omarahoitusosuudesta.

15.2 Onko projektiin haettu rahoitusta erillisellä hakemuksella muilta rahoittajilta? Mistä ja milloin rahoitusta on haettu? Paljonko rahoitusta on myönnetty?

Muuta rahoitusta ei ole haettu

15.3 De minimis -sääntöselvitys

Tällä hankkeella yrityksille ei kohdistu De minimis -säännön mukaista tukea

16. LIITTEET

16.1 Pakolliset liitteet

Liite	toimittamatta	paperilla	sähköisenä
Kaupparekisteriote	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Verovelkatodistus	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

16.2 Muut hakijan omat liitteet

Liite	paperilla	sähköisenä
TTY Verovelkatodistus	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sopimus EAKR-hankkeeseen LOGIVO	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Toimintasääntöte	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Kehittämistyöhön kiinnostuksensa v.2007 ilmaisseet yritykset	<input type="checkbox"/>	<input checked="" type="checkbox"/>
TTY-säätiö kaupparekisteriote	<input type="checkbox"/>	<input checked="" type="checkbox"/>
TAMK alv	<input type="checkbox"/>	<input checked="" type="checkbox"/>
TAMK allekirjoitukset	<input type="checkbox"/>	<input checked="" type="checkbox"/>
TAMK tilakustannukset 2009	<input type="checkbox"/>	<input checked="" type="checkbox"/>
TAMK VIPS	<input type="checkbox"/>	<input checked="" type="checkbox"/>

HAKEMUKSEN KÄSITTELYN EHDOT

Hakija suostuu siihen, että tämä hakemus voidaan siirtää tai jäljentää valtion- ja aluekehitysviranomaisille sekä kaikille rahoitussuunnitelmassa ilmoitetuille tahoille ja asiantuntijalausannon antamista varten muullekin tarpeelliselle taholle. Hakija vastaa kuitenkin hakemuksen hallintolain mukaisesta vireillepanosta toimivaltaisessa viranomaisessa.

Hakija on tutustunut tähän hakemuslomakkeeseen olennaisesti liittyvään täyttöohjeeseen ja noudattanut siinä annettua ohjeistusta hakemuslomaketta täyttäessään. Hakija tietää, että tuen myöntämisen ehdot saattavat muuttua rahoitushakemuksen vireille tulon, rahoituspäätöksen ja hankkeen mahdollisen aloittamisen jälkeen ja ettei valtionapuviranomainen vastaa siitä mahdollisesti aiheutuvista vahingoista.

Hakemuksen allekirjoittaja vakuuttaa, että hakemuksessa mainitut henkilöt ovat kirjallisesti suostuneet tässä hakemuksessa esiintyvien tietojen rekisteröimiseen rakennerahasto-ohjelmien seurannan tietojärjestelmiin henkilötietolain (523/1999) mukaisesti. Hakija vakuuttaa, että hakemuksessa on ilmoitettu tätä hanketta koskevat muut rahoitushakemukset ja/tai -päätökset. Hakija sitoutuu toteuttamaan hankkeen tässä hakemuksessa ilmoittamiensa tietojen mukaisesti ja vakuuttaa nämä tiedot oikeiksi.

Hakija on tietoinen siitä, että asiakirjoihin, jotka ovat viranomaisen hallussa, noudatetaan lakia viranomaisen toiminnan julkisuudesta (621/1999). Sen lisäksi, mitä viranomaisten toiminnan julkisuudesta annetussa laissa säädetään salassa pidettävien tietojen luovuttamisesta, sovelletaan rakennerahastolakia (1401/2006).

Hakija on tietoinen siitä, että hakemuksen jättäminen merkitsee myös sen hyväksymistä, että hakemuksessa esitetyt tiedot julkaistaan komission asetuksen (EY) N:o 1828/2006 7 artiklassa tarkoitetussa tuensaajien luettelossa, jossa julkaistaan sähköisesti tai muulla tavalla luettelo tuensaajista, toimien nimistä ja toimille osoitetun julkisen rahoituksen määrästä. Hakija hyväksyy myönteisen rahoituspäätöksen saaneiden projektien tiivistelmien julkaisemisen rakennerahastotietopalvelussa Internetissä. Allekirjoituksellaan hakija hyväksyy julkistamisen.

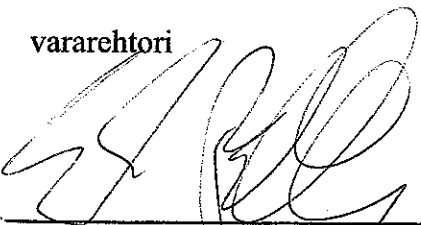
Ennen rahoituspäätöstä hakija toteuttaa hanketta omalla vastuullaan.

Päiväys ja hakijaorganisaation allekirjoitus (hakijatahon nimenkirjoitusosoikeuden omaava henkilö)

8.3.2010


Mikko Naukkarinen

vararehtori


Samuli Rekkola
laitosjohtaja

Tampereen teknillinen yliopisto,
osatoteuttaja

13. KUSTANNUSARVIO

13. Toteuttajan projektikirjanpitoon tulevat kustannukset

Arvonlisävero jää hakijan lopulliseksi kustannukseksi. Ilmoitettaviin kustannuksiin sisältyy alv.

13.1 Henkilöstökustannukset (palkat, palkkiot, lomapalkat, eläkevakuutus-, tel-, sotu-, ym. pakolliset henkilövakuutusmaksut ine.)

Kokoaikainen / osa-aikainen	Henkilötyökk	Tehtävät	2010	2011	2012	Yhteensä
osa-aikainen	9	Projektipääliikkö, TAMK	12 000	18 000	18 000	48 000
osa-aikainen	11	Projektituumittelijat TAMK	9 000	17 300	19 950	46 250
osa-aikainen	3	Projektin johto ja taloushallinto TAMK	2 500	2 500	2 500	7 500
osa-aikainen	12	Projektinukija TTY	13 000	17 000	13 000	43 000
osa-aikainen	12	Projektinukija TTY	12 000	16 000	12 350	40 350
osa-aikainen	2	Projektin johto ja hallinto, TTY	3 000	3 000	2 000	8 000
osa-aikainen	6	Projektsihteeri/TAMK	6 000	6 000	6 000	18 000
Yhteensä	55		57 500	79 800	73 800	211 100

13.2 Ostopalvelut (ulkopuolisilta palveluntuottajilta ostettavat palvelut)

Kustannus	2010	2011	2012	Yhteensä
Tiedotus ja markkinointi	2 000	2 000	2 000	6 000
Ohjelmistohankinnat	40 000	0	0	40 000
Yhteensä	42 000	2 000	2 000	46 000

13.3 Matkakustannukset (koti- ja ulkomaan matka- ja majoituskustannukset)

Kustannus	2010	2011	2012	Yhteensä
Ulkomaan matka				
EU alue/TAMK	0	1 250	0	1 250
EU alue/TTY	0	1 250	0	1 250
Ulkomaan matkat yhteensä	0	2 500	0	2 500
Kotimaan matka				
Suomi/TAMK	1 000	1 000	1 000	3 000
Suomi/TTY	1 000	1 000	1 000	3 000
Kotimaan matkat yhteensä	2 000	2 000	2 000	6 000
Yhteensä	2 000	4 500	2 000	8 500

13.4 Kone- ja laitehankinnat (isot aineelliset hankinnat)

Kustannus	2010	2011	2012	Yhteensä
Tietokoneet 6 kpl, RFID-portit, ym. kalusto	13 000	0	0	13 000
Yhteensä	13 000	0	0	13 000

13.5 Rakennukset ja maa-alueet

Kustannus	2010	2011	2012	Yhteensä
Yhteensä	0	0	0	0

13.6 Vuokrakustannukset (tila- ja laitevuokrat)

Kustannus	2010	2011	2012	Yhteensä
Työhuonekulut/TAMK	1 400	1 500	1 500	4 400
Työhuonekulut/TTY	1 400	1 500	1 500	4 400
Yhteensä	2 800	3 000	3 000	8 800

13.7 Toimistokulut (puhelin-, posti-, yms. kulut)

Kustannus	2010	2011	2012	Yhteensä
Posti	100	100	200	400
Puhelin	300	300	400	1 000
Tarvikkeet	100	100	400	600
Yhteensä	500	500	1 000	2 000

13.8 Muut kustannukset (poistot ym. kustannukset joita ei kirjata muille kustannusluokille)

Kustannus	2010	2011	2012	Yhteensä
Ohjausryhmän tarjoitukset	200	200	200	600
Yhteensä	200	200	200	600

13.9 Luontoissuoritukset (talkootyö ja muut luontoissuoritukset)

Kustannus	2010	2011	2012	Yhteensä
Tehtävä työ				
Tehtävä työ yhteensä	0	0	0	0
Muut luontoissuoritukset				
Muut luontoissuoritukset yhteensä	0	0	0	0
Yhteensä	0	0	0	0

KUSTANNUKSET YHTEENSÄ

Projektin kokonaiskustannukset	2010	2011	2012	Yhteensä
1. - 9. Yhteensä	118 000	90 000	82 000	290 000

13.10 Tulot

Tulo	2010	2011	2012	Yhteensä
Yhteensä	0	0	0	0

NETTOKUSTANNUKSET YHTEENSÄ

Rahoitettavat kustannukset yhteensä	2010	2011	2012	Yhteensä
1. - 10. Yhteensä	118 000	90 000	82 000	290 000

14. RAHOITUSSUUNNITELMA

14. Toteuttajan projektikirjanpitoon tulevat rahoituserät

14.1 Haettava EAKR- ja valtion rahoitus

Haettava EAKR- ja valtion rahoitus	2010	2011	2012	Yhteensä
Yhteensä	81 176	61 914	56 410	199 500

14.2 Kuntien rahoitus

Kuntien rahoitus	2010	2011	2012	Yhteensä
Omarahoitus (kunta osallistuu projektiin itse)	22 583	17 224	15 693	55 500
Muu kuntien rahoitus (kuntien avustus projekteille)	0	0	0	0
Luontoissuoritukset, tehtävä työ	0	0	0	0
Luontoissuoritukset, aineet ja tarvikkeet	0	0	0	0
Yhteensä	22 583	17 224	15 693	55 500

14.3 Muu julkinen rahoitus

Muu julkinen rahoitus	2010	2011	2012	Yhteensä
Muu julkinen rahoitus	12 207	9 310	8 483	30 000
Yhteensä	12 207	9 310	8 483	30 000

14.4 Yksityinen rahoitus

	2010	2011	2012	Yhteensä
Yksityinen rahoitus				
Omarahoitus	0	0	0	0
Muu yksityinen rahoitus	2 034	1 552	1 414	5 000
Luontoissuoritukset, tehtävä työ	0	0	0	0
Luontoissuoritukset, aineet ja tarvikkeet	0	0	0	0
Yhteensä	2 034	1 552	1 414	5 000

RAHOITUSSUUNNITELMA YHTEENSÄ

Toteuttajan projektkirjanpitoon tulevat rahoituserät	2010	2011	2012	Yhteensä
1. - 4. Yhteensä	118 000	90 000	82 000	290 000