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Reallocating local transport bus fleet for competitive tendering contracts

Case: Koiviston Auto Corporation

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ABSTRACT

This master's thesis focuses on the consequences of competitive tendering on the Finnish bus companies' local transport bus fleet reallocation process. Competitive tendering will change the bus fleet requirements in many Finnish tendering areas. Many bus operating companies need to invest in new buses. In addition, it is important to find suitable options for reallocating their bus fleet not suitable for the contracts awarded or if the contracts are awarded to another operator.

The case company chosen for this research is Finland's biggest bus transport company Koiviston Auto Corporation. It offers services as the biggest bus transport operator in several medium-sized cities in Finland. This study investigates different options for the case company's bus fleet reallocation process and how operating costs ought to be taken into consideration. The objective is to make recommendations to when the case corporation should use each reallocation option. In addition to interviews, force-field analysis, cost-benefit analysis and decision tree will be used to evaluate three common bus types in Koiviston Auto Corporation.

The research suggests that buses with low operating costs and meeting the requirements ought to be reallocated within the case corporation. Although bus sales in the domestic market can be challenging, there are potential market areas where buses with high operating costs ought to be sold. Buses that do not meet the requirements and have low selling value could be sold as scrap metal to external partners. Finally, buses that have low operating costs and are suitable for rehabilitation could be modified to meet the fleet requirements. The study points out that given the high annual mileage in tendering contracts, the operating costs have substantial role in the corporation's financial structure. However, it is important to investigate whether the buses have been serviced thoroughly to avoid extensive repair and service costs during the contract.

Further research is suggested to focus on the environmental effects of each reallocation option. Also, investigating how emission control device retrofitting could be made more reliable would help the operating companies to use their existing fleet better. Finally, the partnership between the operating companies and external partners purchasing used buses should be analyzed.

Key words: Competitive tendering, bus fleet management, fleet reallocation

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Tämä opinnäytetyö analysoi kilpailutuksen tuomia eri vaikutuksia paikallisliikennekaluston uudelleenjärjestelyyn suomalaisissa linja-autoyrityksissä. Kilpailutuksen johdosta on odotettavissa uusia kalustovaatimuksia, jotka edellyttävät linja-autoyrityksiltä kalustoinvestointeja. Tämän lisäksi linja-autoyrityksien tulee löytää ratkaisuja käytettyjen uusiin vaatimuksiin sopimattomien linja-autojen varalle. Edellä mainittu tilanne voi syntyä riippumatta siitä voittaako vai häviääkö yritys kilpailutuksen kohteita.

Tutkimuksen case-yritys on Suomen suurin linja-autoyritys Koiviston Auto -konserni. Kyseinen konserni tarjoaa joukkoliikenteen palveluita isoimpana yrityksenä useassa keskisuuressa kaupungissa Suomessa. Tutkimus etsii ratkaisuja case-yritykselle heidän kaluston uudelleenjärjestelyyn kilpailutetussa paikallisliikenteessä. Tutkimuksessa pyritään suosittelemaan Koiviston Auto – konsernille sopivia uudelleenjärjestelyvaihtoehtoja eri menetelmien avulla. Lisäksi tutkimus pyrkii selvittämään käyttökustannuksien vaikutusta uudelleenjärjestelyn aikana.

Tutkimus suosittaa uudelleenjärjestelyyn linja-autokaluston siirtoa konsernin sisällä käyttökustannuksiltaan alhaisille linja-autoille, jotka täyttävät tilaajan vaatimukset. Vaikkakin linja-autokaluston myynti on kotimaassa vaikeutunut, käyttökustannuksiltaan korkeille ja sopimuksiin soveltumattomille linja-autoille on mahdollisia markkina-alueita Euroopan Unionin ulkopuolella. Linja-autot joiden arvo on selkeästi alhaisempi kuin kierrätyksen kautta saatu romumetallin hinta, tulisi kierrättää yhteistyökumppaneiden kautta. Mikäli sopivilla käyttökustannuksilla olevat linja-autot eivät täytä päästövaatimuksia, on syytä tutkia päästöjen jälkikäsittelylaitteiston asennusta.

Jatkoanalyysien tulisi keskittyä eri uudelleenjärjestelyvaihtoehtojen ympäristövaikutuksiin. Lisäksi on tärkeää selvittää miten jälkikäsittelylaitteiston asennuksesta saadaan luotettavampi vaihtoehto, jolloin nykyisen kaluston käytettävyys paranee. Linja-autoyritysten sekä ulkomaalaisten linja-autoja ostavien yritysten yhteistyötä tulisi myös kehittää myynnin kehittämiseksi.

Avainsanat: linja-autoliikenne, kilpailutus, kaluston uudelleenjärjestely

CONTENTS

ABBREVIATIONS

CO	Carbon monoxide
NOx	oxides of nitrogen, especially as atmospheric pollutants.
LCA	Life cycle assessment
Trafi	Finnish Transport Safety Agency
ELY center	Center for Economic Development, Transport and the Environment
HSL	Helsingin Seudun Liikenne (Helsinki Regional Transport Authority)
DPF	Diesel Particulate Filter

1 INTRODUCTION

The subject of this research is the Finnish bus transport industry and more specifically the local public transport in middle-sized Finnish cities. The main focus point will be the bus fleet reallocation process of Finnish bus operating companies. With the help of literature, interviews and calculation tools the aim is to find out what options the case corporation has in its bus fleet reallocation process and when different options become suitable. The case corporation in this research will be Koiviston Auto Corporation that is a bus operating company located in Finland.

1.1 Background

The Finnish bus transport industry is going through its biggest changes in its history as the European Union regulations are being gradually introduced. In many middle-sized tendering areas in Finland competitive tendering is introduced in local public transport for the first time. Previously the tendering authorities were using negotiated contracts in most middle-sized cities in Finland. At the same time long-distance services are opening up for free competition after a transition period. After the transition period, cities and municipalities take responsibility of organizing the public transport in their respective areas. There will be additional risks involved for the tendering authorities compared to the situation before competitive tendering.

For bus operating companies the impact will be that in many tendering areas the risk of ticket revenue will be handled by the tendering authority. However, the operators being awarded the contracts have to ensure that they can be profitable with their offer. The operating companies might have to make large investments including bus fleet.

The tendering authorities have to define the service level for their tendering area. Part of the tendering authorities' responsibilities includes designing bus fleet requirements or grading for offered bus fleet in their respective tendering areas. Helsinki, Turku and Tampere have been familiar with local public transport competitive tendering already for certain years and there older buses have been

replaced with newer due to the fleet requirements. In local public transport the tendering authorities can explicitly define the requirements and award the public transport contract to the operator offering the lowest price. Another possibility is to award the contract to the most economically advantageous tender. There the bus fleet has a certain weighting compared to the price, and companies offering environmentally friendly buses are rewarded with better fleet points.

Some of the tendering authorities in middle-sized cities are using the most economically advantageous tender system for public bus transport. Therefore bus operating companies have to offer new environmentally friendly buses in order to be successful in competitive tendering. The operating companies also need to manage their existing bus fleet, as part of their bus fleet might become unsuitable for the tendered contracts. In other words, Finnish bus operating companies have to find suitable options for buses not meeting the fleet requirements. Given the large number of new buses purchased for the middle-sized tendering areas, there will be large number of unusable buses.

When observing the type of buses purchased by Finnish bus operating companies in 2014, it can be seen that low fuel consuming buses have become increasingly popular. As the annual kilometers in a contract can rise up to a million kilometers, there is motivation for the operating companies to save on operating costs. Existing bus fleet could be too expensive to operate with and therefore companies might have to consider selling buses to domestic markets or abroad. Occasionally the demand for certain bus types can be non-existing and bus companies can consider recycling as an option. External partners are offering services where buses are rehabilitated. In some tendering areas this procedure lowers the age of a bus and in some cases the emission standard level is promoted.

1.2 Research questions and objectives

The main objective of this thesis is to analyze how bus companies and the case corporation in particular should handle their bus fleet reallocation process. The first step in the research is to understand how the competitive tendering is functioning and how it affects the bus industry. The second step is to learn what possible options Finnish bus operating companies have reallocating their bus fleet

after the tendering results are known. Finally the found options will be evaluated and their suitability is investigated. The focus of this research will be on the case corporation Koiviston Auto Corporation and the competitive tendering in its most important tendering areas Jyväskylä, Oulu, Lahti and Kuopio local bus transport. The case corporation is introduced in Chapter Three as well as the significance of competitive tendering in the current situation.

The primary research question of this study is:

How should the case corporation reallocate its bus fleet in the future reallocation processes?

The secondary research question is:

How should the case corporation take into consideration operating costs when planning bus fleet reallocation?

This study focuses on the following objectives:

- Studying how competitive tendering affects the Finnish bus industry and bus fleet reallocation in particular.
- Finding out what different opportunities the case corporation has for bus fleet reallocation
- Comparing different bus fleet reallocation options using calculation tools and interview information and suggesting the most suitable ones for Koiviston Auto Corporation.

Meeting the bus fleet requirements in the contracts that are being awarded is essential but another important issue is keeping operating costs low. Therefore some of the most common bus types used in Koiviston Auto Corporation are evaluated by comparing costs and benefits.

1.3 Knowledge base of the research

One of the biggest difficulties researching this topic is the changing environment in the Finnish bus transport industry. Bus operating companies in different competitive tendering areas have to face different issues and therefore each

reallocation process is depending on the particular circumstances. The author is working for the case corporation, but has not participated in the reallocation or bidding process in any form. However, the author has worked in the industry for several years and therefore has become familiar with certain features of the Finnish bus transport industry.

Chapter	Topics	Knowledge source
2	Public Procurement, Tendering, Bus transport industry, Bus fleet management	Literature, contemporary articles, other studies
3	Research methods, Case corporation	Literature, corporation's own material
4	Bus fleet reallocation options	Interviews and calculations
5	Conclusions and recommendations	Analyzed interpretation of the research data

Table 1. Knowledge sources and topics of the research

In order to form an impartial and comprehensive enough image of the current issues in bus fleet reallocation several interviews in different organizations were needed. The list of used material and references are listed in the sources section at the end of this document.

1.4 Research approach and methods

The focus will be on single case company and the research will be conducted using qualitative research method. The primary qualitative research method is interviewing the managers and directors involved in the offer making and bus fleet reallocation processes. Although the research is qualitative, calculations are

used to compare the different fleet reallocation options. Calculations will illustrate what costs there are using different reallocation options as well as how operating costs affect the price of different bus types.

In order to capture the situation in whole Finland, besides the case corporation, other companies and individuals in Finnish bus industry key positions will be interviewed. Different tools will be studied and the adaptability of different bus fleet reallocation methods will be tested using the tools found. The reallocation options will be evaluated using force-field analysis, which takes into consideration forces for and against the option. The analysis will be tailored to suit Koiviston Auto Corporation's bus fleet and market situation in order to produce relevant recommendations.

Cost-benefit analysis will be conducted to see what costs and benefits exists using different reallocation options and what is financially the most beneficial. In addition, a decision-tree designed by the author is used to investigate cost and benefit issues as well as other important decisions during the reallocation planning.

The main purpose of this research is to produce recommendations and models how to reallocate bus fleet after competitive tendering in different situations for the case corporation. As the local public transport is the main strategic market area of the case corporation, the issues are relevant and contemporary. Because Koiviston Auto Corporation has purchased buses on part payment, reallocation process is an important part of the case corporation's business to achieve high return on investment. The focus will be on the financial side of the reallocation process and on how different reallocation models affect the financial situation currently and in the future. In order to assist the decision making during reallocation process, calculation tools and a decision tree are recommended for the case corporation. Furthermore, the aim is to understand the strategic importance of this process and how it affects the companies' overall financial situation. The results and recommendations of this research are represented in Chapter Five. The chapter includes recommendations for the case corporation.

1.5 Scope and limitations of the research

The scope of this thesis is to study how the biggest bus companies operating in Finland have undergone their bus reallocation process after competitive tendering in local public bus transport. The research will explain the public procurement system in European Union as the legislation defines how competitive tendering should be organized by the tendering authorities.

Koiviston Auto Corporation was chosen for this research as a case corporation due to the fact that it is the biggest bus company in Finland based on the number of buses and staff in 2013. Furthermore, it has been operating in middle-sized cities in Finland for many years, and the cities where it has been operating for years are going into competitive tendering for the first time in 2014. Therefore its reallocation process is the biggest conducted in the Finnish industry currently. The findings and reallocation models from Koiviston Auto Corporation will be compared to other similar bus companies operating in Finland, but the main focus will be on the case company. The research will focus on local public bus transport and the bus fleet reallocations process concerning local transport buses. Intercity and regional public transport is not discussed largely, even though some companies involved in this research operate in these sectors as well. Furthermore, the research part concentrates only on bus fleet reallocation instead of other elements of the competitive tendering.

There are certain limitations for this research. Because the research focuses on the financial side of the reallocation process, the aim is to avoid mixing up environmental issues with the financial benefits. Environmental issues are introduced in the literature review section as part of the bus fleet requirements affecting bus operating companies. As explained in this research, reducing emissions is another goal for many of the competitive tendering authorities. It is important to point out that the research does not directly focus on investing on new bus fleet, although it affects the reallocation process, as it is explained in the recommendation section. Some of the findings of this research might be useful for other public transport sectors that operate in areas where competitive tendering takes place. However, the author believes that finding out the special features of the tendering environment is crucial for successful reallocation process.

1.6 Structure of the research report

This thesis has five chapters. The first chapter gives background information of the topic by explaining the phenomenon and current trends in the Finnish bus transport market. Furthermore, the first chapter explains the research strategy and structure of this thesis. The second chapter introduces the public procurement and competitive tendering in European Union. The second chapter also introduces bus fleet management and how requirements affect operating companies. The Finnish bus transport industry along with the bus fleet situation is briefly introduced as well. The third chapter contains explanation of the research tools and methods used in this thesis. This chapter also introduces the case corporation and its fleet reallocation process. The empirical research part in chapter four introduces the reallocation options used by Finnish transport companies interviewed in this research. The tools used for evaluation are force-field analysis, cost-benefit analysis and decision-tree. Chapter Five includes recommendations and conclusions for this research. The conclusion part in Chapter Five is a summary of this thesis explaining the topic in a shortened form. The final part reviews the reliability and validity of the research and suggests issues that ought to be studied further.

2 COMPETITIVE TENDERING IN THE FINNISH BUS TRANSPORT MARKET AND BUS FLEET

This chapter focuses on four key elements of this research:

1. Public procurement
2. Competitive tendering
3. Bus transport industry
4. Bus fleet management

The aim is to clarify what competitive tendering in European Union is and how it affects the Finnish bus companies that take part in the process of bidding for contracts. Companies that have been part of the competitive tendering or negotiated contracts might have to reallocate their existing bus fleet after purchasing new buses. This chapter will therefore discuss also bus fleet management and bus fleet reallocation. In order to understand these concepts, the bus transport industry and bus fleet issues are introduced.

2.1 Public procurement in European Union

Public procurement can be described as a process of governmental institution or local authority purchasing goods or services (Parikka-Alhola&Nissinen 2012). According to the Finnish Ministry of Employment and the Economy (2014) the purpose of public procurement is to improve the efficiency of tax payers' money as well as boosting the European businesses' competitive capability. For instance in Finland the Finnish procurement laws state the following:

> *"all contracts should be subject to an open bid and all bidders should be treated impartially"*

The European Union procurement directives were introduced in the Treaty of Rome in March 1957. The purpose of these principles was to increase transparent procurement and the free movement of services, goods, capital and people between the member states. Furthermore, the aim was to create effective competitive environment for public contracts. The specifications are intended to be standardized and the market should have adequate information prior to the procurement. Public procurement in European Union should follow Good Procurement Practice guidance. The guidance advices setting clear objectives and

specification. The suppliers, service providers and contractors ought to be selected carefully as well as the award criteria. The contracts require management from the authorities and the contract and supplier performance should be monitored constantly. After the contract agreement has been made, the contract authority has to pay the agreed price for the work and the supplier or service provider has to carry out the work (Baily&Farmer&Crocker&Jessop&Jones (2008).

European Union procurement laws define how the contracting authorities can purchase goods or services and how the contracts can be awarded to companies. Contracting authorities could be governmental institutions such as the state, local municipal or other regional institution. In public procurements the procurements are funded by tax-payers as opposed to the private sector getting their income from various sources. Public procurement law in European Union is a combination of national laws, European laws and certain directives. During the 1970s the first public procurement European Directives were introduced because national governments were favoring local suppliers. The contracting authorities being responsible for public procurement also have to follow regulations from GATT (General Agreement on Tariffs and Trade) and WTO (World Trade Organization). This means that the contracting authorities have to understand the complicated legislation well enough to avoid confusion with the operating organizations (Weele 2010, p. 107&109).

A good public procurement process should be transparent, fair, efficient as well as competitive. The objectives ought to be defined and they should be made clear to the possible operators or suppliers. In addition, budgeting and affordability are important issues and it is essential to know how much resources can be spent on individual projects. In case the government does not comply with the public procurement rules, companies can sue them for not following the required directives (Weele according to HM Treasury 2010).

European Union has introduces the following types of public procurement procedure:

- Open procedure
- Restricted procedure
- Negotiated procedure

- Competitive dialogue
- Electronic auctions

There could be constant pressure to save taxpayers' money, but at the same time the public sector should produce good quality with the given and occasionally limited resources. One of the important tasks for the contracting authority is to set up specifications of the goods or services being purchased. These specifications ought to be non-discriminating and therefore naming explicitly brands or suppliers is not allowed. It is important to define what the required output is in order to achieve the quality and performance criteria (Baily&Farmer&Crocker&Jessop&Jones 2008).

There might be political objectives such as willingness to support local suppliers or developing countries. These objectives may interfere with the economic objectives of purchasing at the lowest possible price to maximize tax-payers value for money. Financing decision of government have effects on public procurement as some contracting authorities might receive less funds for the following year should the not spend the budgeted amount (Weele 2010 p.108).

There is also a possibility that some companies might have participated earlier in the defining stages of tendering. These companies should not be allowed to take part in the tendering. Also, companies can be excluded if they have substantial financial or tax problems. Violating professional or ethical code of conduct or giving false information is classified also as an adequate reason for excluding companies to take part (Weele 2010 p.117-118).

Public procurement with European Union directives functions well in areas where the organization is structured and centralized. Decentralized areas tend not to perform as well due to the lack of co-ordination between different stakeholders such as departments and agencies (Baily&Farmer&Crocker&Jessop&Jones 2008).

2.2 Competitive tendering

Each business that is registered in European Union has the right to take part in competitive tendering for public contracts whether it is held in their own home

country or another European Union country. Certain rules are to be applied when the monetary value exceeds threshold value. These threshold values are introduced in table 2. Otherwise national rules are being followed, even though there are principles that have to be respected. The aim of this procedure is to level the playing field for all businesses in European Union. Only in specific cases can the tendering authority award a contract to an organization without publishing call for tenders. These reasons include emergency situations and very specific technical issues or exclusive rights for instance (European Union 2014).

In case the bidder places an invalid offer or the offer is considered to be exceptionally low, the tendering authority can reject an offer. However, simply having doubts whether the bidder can fulfill its required tasks is not enough as there has to be proof. The company that placed the offer might be asked to give further clarification about its capabilities. The placed offer might be low due to new cost saving innovations or company's strategic desires to gain market share (Ministry of Employment and the Economy 2014).

Cambini and Filippini (2003) describe competitive tendering to be the main mechanism to create competitive pressure in markets where totally free competition is not for some reason possible. They describe that there are usually two different models for the local authority to organize the competitive tendering. The first model is the gross cost contract where the risks are borne by the tendering authority and the second one is the net cost contract where the companies take the risk concerning profitability and production. The companies involved in the competitive tendering usually set a price that they require to run the services indicated by the tendering authority.

Walters and Cloete (2008) describe that there are certain benefits with both tendered and negotiated contracts. They point out that the results are more transparent in tendered contracts, for instance due to the lack of market test for pricing. The pricing is set up by the market in competitive tendering, whereas in negotiated contracts the price is often calculated using certain benchmarking methods. In addition, tendered contracts allow new entrants to become part of the industry more easily. On the contrary, expertise could be lost in tendered model as operating companies change more frequently opposed to the negotiated model.

Also, flexibility and innovative solutions are more likely to be seen in negotiated models, as the tendering is not done according to a specific set of requirements. The effects of cost pressures in the tendered model might be seen in the lack of training and development.

Weele (2010) explains that the principle is that national governments cannot prefer local or domestic organizations. All European Union suppliers should be able to place an offer regardless whether they are located in the particular country that tendering is taking place. When certain threshold values are exceeded, the governmental institutions are obliged to publish the contracts in concern. This is related to transparency as these contracts are put to Tender Electronic Daily, which is a database of European Union tenders. Typically, there are three different types of formal notices: The prior information notice, contract notice and finally the contract award notice. Baily&Farmer&Crocker&Jessop&Jones (2008) point out that the European Union directives guide how to produce an estimate of the threshold value.

Contract type	Threshold amount (euros)
Supply and service contracts	414 000
Public works contracts	5 186 000
Design contests	414 000

Table 2. Threshold values in the European Union Section 12 of the Act on public contracts of entities operating in the fields of water, energy, transport and postal services sector from 1st of January 2014 (Ministry of Employment and the Economy, 2014).

In Finland, public procurements can be categorized by their threshold value into three groups. Firstly the ones that exceed the European Union threshold value, secondly the national threshold value exceeding procurements and finally the

minor procurements. The ones that do not exceed European Union or national threshold values are not obliged by the Public Procurement Act (European Union 2014).

Weele (2010) explains that tendering for public sector has much more legal issues to be considered compared to the private sector. Tendering authorities ought to ensure that the domestic and the European Union legislation is followed. Key issues include keeping the tendering process open and transparent. Another important aspect is using customer feedback to produce logical tendering invitations. The size and scope of the contracts might also have an effect on what sort of companies take part in the tendering (Atkins Ltd&TAS Partnership Ltd 2013 p.8).

The tendering authorities have two options evaluating the offers, either by lowest price or the most economically advantageous tender. In the latter, the tendering authority uses an award system where the companies making offers can receive points for quality, technical solutions and cost-effectiveness for example. The weighting for different aspects could be missing some key points if the tendering authority has not had accurate information. The European Commission suggests that in order to find out the environmental impact of different decisions life cycle assessment (LCA) ought to be used when designing the competitive tendering (Parikka-Alhola&Nissinen 2012). Baily&Farmer&Crocker&Jessop&Jones (2008) explains that when choosing the operator based on lowest price only option, the tendering authority cannot evaluate any other factor besides the price. The most advantageous tender option leaves more space for tendering authorities to emphasize certain quality aspects.

2.3 Tendering in transport industry

Public transport is one of the services that belong to public procurement (Parikka-Alhola&Nissinen 2012). European Union believes that the public authorities should influence the market situation as little as possible and merely set the service level for the public transport. Public authorities may intervene should it be necessary to ensure the quality and quantity of public transport services. The

requirements for public transport services vary a lot depending on the area (Repo 2014).

When the tendering authority chooses a contract type, it should consider how the financial risks are shared between the operator and the authority. When evaluating different types of contracts, the following characteristics can be found:

- Management contracts where the operator does not have risk as the tendering authority manages infrastructure and assets. The operators run the daily services as agreed with the tendering authority
- Gross – cost contract where the operator has a risk involved in the cost structure of its operations. The tendering authority collects ticket revenue and pays the costs to the operator (not operational).
- Net – cost contract where the operators bear both cost and ticket revenue risk. The operator manages the bus fleet according to the quality standards.

In the net-cost contract there can be a risk for the tendering authority that the operator focuses more on the profitable and highly populated areas. However, gross-cost contracts can become unprofitable for the tendering authority. Due to European Union legislation the maximum contract length can be 10 years except for special reasons. The aim of extending the contract period is to allow operators to depreciate the investments associated with the contracts (Papaioannou&Adamantidou&Komnianou&Vizmpa&Xenidis 2014).

Passenger transport public procurement can be seen as a large business and financially it has a large role in the authorities' budget structure. Certain specific skills are required from the tendering authorities due to the special features of public transport. Being proactive with the suppliers and taking into consideration flexibility and specialist knowledge will benefit the tendering authorities in public transport sector. One of the major issues and challenges is objectively evaluating quality in public transport tenders (Atkins Ltd&TAS Partnership Ltd 2013 p.8).

Figure1 Elements of public authority transport provision (Atkins Ltd&TAS Partnership Ltd 2013 p.14).

Many public authorities face a challenge trying to offer a high service level when having limited financial resources for public transport. Furthermore, there are many different customer groups that have various requirements for the services. As the contracted services are being operated by external companies, the needs and requirements need to be specified in advance. The service levels needs have different attributes and dimensions concerning operative issues and also technical features of the bus fleet. In Sweden, the public authorities emphasized the importance of vehicles in public transport and therefore specified the requirements for the buses. Some of the contracts were specified more detailed, whereas others much loosely. Service quality factors in public procurement can be categorized into three levels: the rhetorical level, the strategic level and the operational level. Each level describes the quality factors from a different perspective (Camen, 2010). Constant monitoring and reporting problems are effective ways of letting both the tendering authority and operators know how they are meeting the quality requirements (Atkins Ltd&TAS Partnership 2013 p.34).

The competitive tendering in 2014 for the middle-sized cities' public transport was organized using open public procurement procedure. In the Finnish open

public procurement procedure the tendering authority publishes the contract notice and the organization interested can place an offer. In open public procurement procedure the validity check of bidder is conducted after the offers have been received (Ministry of Employment and the Economy 2014).

2.4 Finnish bus transport industry

The changes mentioned in Chapter One relate to Finnish passenger transport laws and European Union laws and regulations (869/2009) introduced on the 3rd of December 2009. They affect both the tendering authorities and the bus operating companies. There will be a transition period in order to allow the Finnish bus transport companies to adjust to the new situation before the competitive tendering is put on operation. All transport licenses that are needed to operate public transport in Finland were made temporary for the transition period. The first licenses expired on the 1st of July 2014 and the last licenses in the end of 2019. Based on Linja-autoliitto's statistics, over 346 million bus journeys are made yearly in Finland and 60% of all public transport journeys are made by bus. Outside Helsinki region the figure is even higher, being over 80% of all public transport journeys. There are over 35000 bus services each day in Finland and nearly one million bus journeys are made daily. As there are over 2 million people in Finland without a driving license, public transport has an essential role in their everyday life. Most of the Finnish bus companies belonging to Linja-autoliitto are small-sized as over 40% of the companies own fewer than 5 buses. The Finnish bus transport industry provides a working place for over 12000 employees in Finland (Linja-autoliitto, 2013).

One of the tasks that the Finnish Ministry of Transport and Communication have is to prepare legislation concerning bus and coach transport (Ministry of Transport and Communication 2014). The Finnish Transport Agency is a central government agency and responsible for maintaining and developing the service level in the state-managed transport infrastructure (Finlex 2009). In order to take part in competitive tendering in Finland and to operate transport services in exchange of compensation, bus companies must acquire a public transport permit. There are over 300 bus companies having the transport permit for public transport

services in Finland (Linja-autoliitto 2013). On the 3rd of December 2009 the operating permits were changed into transitional period permits and therefore valid only for certain period of time. National public transport law had to be changed as it clashed with the European Union regulations. ELY-Centers and 26 municipal authorities are the competent authorities in bus and coach transport in Finland. Their task is to plan and design the suitable service level for their own area. These authorities together purchase and develop services using the allocated appropriations. European Union regulations guide the process by making rules how the local authorities can intervene with the competitive tendering. For instance the transition period for competitive tendering cannot be extended by national procedures. The Finnish Transport Agency emphasized that the changes were the biggest in the industry for many decades and that it affects all partners in the industry (Finnish Ministry of Transport and Communication 2014).

Finnish Transport Agency, Finnish Ministry of Transport and Association of Finnish Local and Regional Authorities sent an open letter (2013) to the municipalities and ELY-Centers about the changes in public transport. They stated that keeping the current service level in public transport requires more support from the state and municipalities. However, another argument was that the users of public transport would benefit by having better services and the costs and administration would become more transparent. The tendering authorities were categorized to four groups as follows:

- Municipal public transport authority cities (eg. Vaasa)
- Municipal public transport regional authority cities (eg. Lahti)
- Municipalities belonging to a regional authority (eg. Nastola)
- Municipalities in whose territory ELY-Center is the public transport authority (eg.Parainen)

In case the designed service level cannot be achieved through market-based model, the tendering authorities organize the public transport using methods defined by European Union regulation. If the market-based model is used, the use of public support is prohibited excluding certain types of tickets.

The main models of organizing public transport in Finland are: 1) market-based model 2) gross procurement model 3) regional contract model 4) route based contract model (Ministry of Transport and Communication 2012).

In most middle-sized cities with bus transport tendering contracts starting in July 2014, the call for tenders happened in the summer of 2013. The requirement documents indicated that each of the middle-sized Finnish cities had different desires about the bus fleet. The city of Oulu emphasized the price, merely giving a maximum and average age for the buses required, added with minor requirements. In other words it used the lowest price tendering system where the price is the deciding factor. The tendering authorities of Lahti and Kuopio gave more points in the competitive tendering based on the bus fleet offered using the economically advantageous tender system. For instance Lahti offered the biggest possible points for the companies offering electric buses. Below is the formula that was used in Kuopio to decide the company to be awarded a contract. Kuopio tendering authority weighted the price offered 95% and bus fleet 5%.

Formula: $Z = X / Y \times 95$ where Z equals the price points that are calculated by dividing the cheapest offer with the particular offer being evaluated and then multiplied with 95. The maximum bus fleet points were 5 and the specific bus fleet evaluation was:

Euro emission level	Points
Euro 3	0
Euro 4	2
Euro 5	3
EEV	4
Euro 6	5

The Euro emission levels are introduced in Chapter 2.5.3 Bus fleet requirements

2.5 Bus fleet management

Vendors' maintenance programs are a crucial part of keeping the operating costs in control. There are six cost center elements that are usually being monitored and

controlled by the vendors. The elements are:

* Fuel
* Labour
* Tires
* Tools and equipment
* Parts and supplies inventories
* Facilities and vehicles

Operating companies might have to report the operating costs to national agencies. The amount of vendor involvement of managing these costs varies a lot but their importance is obvious. Regardless of the transport mode, these issues are relevant to all companies operating in the transport industry. There is often lack of communication where the management of bus fleet between different partners fails. For instance the change in cost per mileage should be reported constantly in order to tackle the issue early enough. The goal is to keep the buses operating in their assigned task and not having to repair them on a regular basis (King 2003).

Regional Transport District (2011) in Colorado, Denver did an evaluation on their bus cost allocation model to determine whether it provided trustworthy results. They emphasize the importance of cost information in allocation decision making. One of the crucial parameters is the cost per unit (€ per km for instance) and all operating costs ought to be added up for the calculations. Given the importance of having buses operating quickly after the required service procedures, the service of the buses should be done thoroughly and quickly. As many of the components are sophisticated and require software to be inspected, the bus companies or their vendors ought to have adequate tools (King 2003).

Diesel engines have several advantages such as reliability, fuel economy and the repairing being relatively easy. Diesel engines usually last up to 20 years and reach a couple of million kilometers. One of the major disadvantages is emissions (particulate matter and oxides of nitrogen) that diesel engines emit (Manufacturers of Emission Controls Association 2009).

According to Transeco (2013) electric buses have developed substantially and are

becoming competitor for the traditional diesel buses. Electric buses have had problems with reliability in the Finnish circumstances. Tendering authorities are interested how different technology solutions perform and how they suit the particular environment. If the tendering authorities are only focusing on the price, the operating companies are not willing to spend on uncommon technology as the payback time tends to be too high (Transeco 2013).

Bus transport companies cannot fully control the risks involved in new technologies required in the bus fleet requirements. The technologies in some cases can be expensive to use and also unreliable compared to the well-known technologies. Another risk is the possibility to use the new bus fleet after the first contract has expired due to bus fleet requirements or not being awarded new contracts. For instance in the HSL tendering area the requirements differ from the ones used in Central-Europe and thus suitable buses can be seen less in the market. Also, having uncommon setting of doors or number of seats can hamper the possibility to sell the buses later on (Karvonen 2012 according to Nykänen 2011).

Bus manufacturers that sell new buses to bus companies such as Volvo have emphasized on their blog and web site the importance of having new and environmentally friendly buses. The argument is that emission problems that lead to costs for society can be avoided with new buses starting from greenhouse effect to other direct health problems. In addition, Volvo argues that the pay-back for the new bus investments can be approximately five years when hybrid buses are purchased and the bus replacement life cycle is changed from 15 years to 10 years (Jobson 2009).

Volvo and Scania have developed systems for bus operating companies to manage their bus fleet. Volvo (2011) describes that parameters such as fuel consumption, emissions and other indicators about the bus performance can be followed. Others, such as the case corporation have developed their own bus fleet management system as it is explained later in this study.

2.5.1 Bus fleet in Finland

There were 15,309 buses in Finland (30th September 2013) out of the 5,790,706 vehicles in total (Trafi 2013). Trafi's statistics do not give a balanced view of the distribution of buses within Finland, as the buses are being categorized by their owner's home municipality. For instance, Koiviston Auto Corporation's buses are all registered to Päijät-Häme province, even though physically they are scattered all over Finland. Therefore it is relatively difficult to accurately point out what is the current amount of buses in each tendering area.

Traditionally, the Finnish bus companies have purchased bus fleet opposed to leasing buses for their use. However, the situation is changing and currently in Finland some of the banks, bus suppliers and especially leasing companies own the buses. In most cases, the leasing is done for the first tendering contract and should the operating companies lose the contract in competitive tendering, the buses can be returned to the leasing company. Leasing can usually be extended or the buses can be purchased at a reasonable price should the operating bus company have need for them (Kuukankorpi 2014).

Bus manufacturers sell buses for Finnish operating companies with different lengths and weights. The operating companies in most areas have currently two-axle buses, tri-axle and minibuses. Different new bus types such as natural gas buses and electric buses create challenges for the operating companies as the requirements for depots grow (Karvonen 2012).

Common features in Finnish local transport buses include being low-floor and having several doors as well as room for prams. Engines are usually less powerful than in buses that are intended for intercity traffic for instance. Earlier in Finland many of the buses were high-floor, but recently many competitive tendering areas such as HSL have prevented companies offering these types of buses. Although two-axle buses are currently the most popular bus type in local public transport, due to legislation changes concerning maximum length of buses, the tri-axle buses have become more popular. The benefit with tri-axle bus is that it can take more passengers compared to a two-axle bus. The problematic issue with a tri-axle bus is that the rear of the bus moves much more sideways causing accidents. Buses

running on diesel fuel are evidently most popular in Finland followed by natural gas buses, electric buses and ethanol buses. Electric buses have had enormous problems and the charging capacity is currently low. Natural gas buses have been expensive to maintain and therefore companies such as Helsingin Bussiliikenne Ltd have tried selling their natural gas buses (Kuukankorpi 2014).

Finnish Public Transport Association estimated that because of the legislation changes, over 230 new local transport buses would be imported to Finland. The tendency is towards having bigger capacity and low-emission Euro standard level buses. Finnish Transport Agency's expert Marja Rosenberg believes that bus fleet is a critical component of public transport service level. Rosenberg argues that the attractiveness and easiness of public transport is improved having better bus fleet. Mika Mäkilä from Linja-autoliitto believes that long contracts allow companies to make substantial investments for new buses, even though companies have been cautious for some time (Repo 2014).

The Finnish Transport Agency, local city authorities and the Association of Finnish Local and Regional authorities aimed to keep the tendering documents similar for the tendering. This was performed by co-operating in the process with the operators. Another goal was to keep the bus fleet requirements similar and enable the existing bus fleet to be used in the upcoming contracts. Statements were asked from the Finnish bus interest group Linja-autoliitto about public procurement and bus fleet requirements (Finnish Transport Agency 2013)

However, Project Manager of Linja-autoliitto Mikko Saavola pointed out that the different requirements make it difficult for the companies to take part in different competitive tenders. Saavola also mentioned that strict requirements lead to big investments and thus raise the offer prices. Bus operating companies have decreased their bus purchases for local bus transport due to the known upcoming changes (MTV3 2013). This phenomenon can also be seen on Trafi's statistics, as just over 300 new buses were registered in Finland in the year 2013. For instance in 2009, 596 new buses were registered and even in 2012 there were 533 new bus registrations. In 2013 the bus purchases had plummeted over 32% compared to previous year (Talouselämä 2013). Kokko (2014) points out that because of the

competitive tendering in several middle-sized Finnish cities, the 567 new buses were registered between January 2014 and September 2014.

Tendering areas have clearly different number of passengers. For instance, in Tampere the annual passenger amount is around 30 million, whereas in Oulu the number of passengers is around 7 million. The areas where competitive tendering in public transport has taken place for several years, such as Helsinki, Turku and Tampere are less affected of the changes. Finnish bus interest group Linja-autoliitto's Chief Executive Officer Mika Mäkilä believes that the primary problem of public transport still exists after competitive tendering. Mäkilä explains that it is problematic to have adequate amount of bus fleet for the peak times in the mornings and evenings, as the same buses are not needed at quiet times during the day (Repo 2014).

Most of the city authorities in Finland require certain European emission standard levels in the buses used in their local bus transport. Euro6 was introduced in 2014 and it was said to reduce the emissions of NOx from 180mg/km to 80mg/km (European Union 2012). Most of the buses that are purchased in 2014 will have Euro6 emission level engine installed. However, some of the Euro6 emission level bus fleet required by the authorities did not even exist when the competitive tendering documents were published (ESS 2013).

Former Scania Bus Director Per Gustav Landen estimated that providing the new bus fleet for the Finnish market in 2014 in time would be problematic given the scale and available time for competitive tendering in Finland. The competitive tendering authorities ought to have better understanding on the bus fleet manufacturing process and also on reasonable bus fleet requirements, keeping in mind companies' long-term investment strategies (Remes 2014).

Koiviston Auto Corporation's fuel consumption statistics point out that buses light in weight and having smaller engine consumer less fuel. VDL Bus&Coach's Managing Director Rémi Henkemans (2014) argued that their strategy of manufacturing lightweight buses was proven successful when Koiviston Auto Corporation purchased 64 low-floor buses from VDL. Koiviston Auto Corporation's Chief Executive Officer Antti Norrlin (2014) praised the fuel

consumption economy of the particular bus type and said it meets the requirements of the organization perfectly.

Linja-autoliitto's Project Manager Mikko Saavola estimated that out of the 12000 buses operating in Finnish professional bus transport, 3000 buses do not meet the European emission standard level Euro3, which is required in many competitive tenders. Chief Executive Officer of Lehtosen Liikenne Ltd Kyösti Lehtonen regretted that those 3000 buses will not have any use should the requirements continue to be as strict as in the early stages of the competitive tendering (MTV 2013).

Competitive tendering was introduced in the late 1990's in the city of Turku and the maximum age for buses was also regulated. Some of the companies operating in Turku have struggled trying to sell their bus fleet. Juha Jalo, the Chief Executive Officer of Juha Jalo Ltd suggests that selling bus fleet was earlier possible to Russia, Estonia and even to Africa. Since then the situation has changed radically and now the buses are left to rust away. Jalo sees new buses as a good thing for the main routes. However, as some buses only operate only few short services each day, Jalo believes that large investments are needed as the 15 year maximum age requirement applies to all buses. Andersson Ltd has occasionally managed to sell their bus fleet but the process has become increasingly difficult. Linjaliikenne Muurinen Ltd does not consider the profit gained from selling used buses to be substantial. Therefore they have taken their buses to a demolition center and that has been less expensive for the bus company. Linjaliikenne Muurinen Ltd does not see the 15 year age limit problematic as they consider the buses to be already in bad condition after being driven 70 000 – 120 000 kilometers each year (Rintakangas 2012).

Matti Vainio (2014) argues that the customer expectations and required level for bus transport in middle-sized cities such as Jyväskylä, Oulu, Kuopio and Lahti is very different to big cities such as Helsinki, Tampere and Turku. When evaluating even smaller cities, the volume of transport and attractiveness is completely on another level. Therefore copying the competitive tendering process of HSL area could be financially disastrous for a smaller tendering authority as has happened for instance in Porvoo. The environmental effect scale is totally different in HSL

area where almost 180 million boardings are made annually (Helsinki Regional Transport Authority, 2013) compared to for instance Salo where there are only four routes in the whole area. Therefore the impact of having bus fleet with lower European emission standards is minimal compared to the issue of not being able to offer existing bus fleet for the contracts. The overall environmental effects of manufacturing, using and wrecking are often forgotten when designing the bus fleet requirements.

Olli Hirvonen (2012) points out that when Autolinjat Ltd took part in Lappeenranta area competitive tendering, Savonlinja Corporation, to which Autolinjat Ltd is part of, had prepared transferring 20 buses to other subsidiaries had they lost market share. However, Hirvonen suggested that the transfer process might cause difficulties for the regional traffic that Autolinjat Ltd still would have in the Lappeenranta area. In other words, Savonlinja Corporation still needed buses in that region for other purposes, even though they might have lost market share. Chief Executive Officer of Väinö Paunu Ltd Martti Paunu points out that they have 150 buses from which 40 will become useless in the new market situation due to strict requirements (Talouselämä 2013).

Matti Vainio, the chairman of the Finnish bus transport interest group Linja-autoliitto believes that the process of compiling the bus fleet requirements by the tendering authorities ought to be simplified. The process requires a lot of knowledge in the market areas and in bus technology in particularly. The complicated relationships between different authorities have resulted in problems with fare collection systems and in bus fleet as well. Having invalid and far too strict requirements will cut down the number of companies placing an offer for some contracts. The future bus fleet requirements are often difficult to predict, making it risky to invest in buses before the tendering results are being published (Vainio 2014).

The chairman of the Turku public transport committee Riitta Koskimies emphasized the meaning of the emission reduction and said it to be the primary goal in developing public transport. Secondary goals include customer satisfaction and attractiveness. The planning manager of the public transport office Pekka Kirjavainen rejected Jalo’s idea of easily installing emission reducing filters.

Kirjavainen stated that monitoring of the installation would be difficult and customers often complain about bus fleet being in bad condition. The Chief Executive Officer of Turun Kaupunkiliikenne Ltd Heikki Lepistö believes that the situation in Turku cannot be compared to the Helsinki model. Lepistö pointed out that as the buses operate much less kilometers on a daily basis in Turku, they last longer than the buses in Helsinki. He also concluded that other aspects, such as whether the buses are used during peak times and how many passengers are on average travelling on the buses. The city owned company Turun Kaupunkiliikenne Ltd had donated buses as they have found it hard to sell their unusable bus fleet (Rintakangas 2012).

2.5.2 Bus fleet reallocation

Bus fleet reallocation is a process where an organization rearranges its existing buses. As pointed out by table 5, larger organizations such as Koiviston Auto Corporation could have substantial number of buses to reallocate after the competitive tendering results are published. The process is especially relevant for companies such as Koiviston Auto Corporation that have purchased buses on part payment instead of leasing. Other Finnish bus companies with large number of buses are facing the same issue as explained below.

South Africa's Department of Transport introduced tendered contracts gradually similar to the Finnish model, as they wanted the operators to "get fit" for the new situation. This included bus fleet reallocation as the operators did not have possibilities to recapitalize their bus fleet due to the requirements such as age of the bus (Walters&Cloete 2008, page 4).

Equitable and optimal fund allocation for purchasing, operating and maintaining bus fleet is a difficult and complicated process. The measure of effectiveness in transport allocation is often evaluated by net present cost. Minimizing the net present cost helps allocating bus fleet when there are different options to choose from and certain service level has to be maintained. Furthermore, it is said that it is useful to solve the resource allocation problems with mathematical modeling, as these problems often have very specific formulation, stated objectives and

constraints. The focus is often on bringing down the costs and maximizing service life (Sabyasachee 2013).

One of the possible reallocation options is remanufacturing or rehabilitating the bus fleet. Remanufacturing is a process where the bus is repaired to its original standards. Rehabilitation means building the bus to the manufacturer's original specification. This can be done at a more comprehensive level depending on the service level needs. In this research the model remanufacturing or rehabilitating is seen as a process where large number of older buses are undergoing to process to be suitable for certain contract. Companies might have to modify certain buses when reallocating within their own organization as explained in that particular reallocation. However, remanufacturing and rehabilitation is seen as a larger process where not only minor changes are conducted to meet the obligatory requirements (Sabyasachee 2013).

Some of the tendering authorities encourage operating companies to rehabilitating their bus fleet. This is done either by defining how many years will be deducted from the age of the bus or whether the Euro emission level can be upgraded (Oulu and Helsinki tendering documents 2013). The tendering documents show that in Oulu for instance, the remanufactured buses were considered to be 8 years old after completing the repairing for the contracts in 2014. This included changing the interior (flooring, seating and upholstery) and servicing transmission, suspension, brakes and engine (Oulu tendering documents 2013). However, this can only be done once for each bus and in many tendering areas the age compensation does not exist.

Retrofitting emission control devices can help reducing emissions. There are several retrofitting technologies which are listed below:

Particulate matter are being controlled with the following technologies

- Diesel oxidation catalysts (DOCs)
- Diesel particular filters (DPFs)
- Flow through filters (FTFs)
- Closed crankcase ventilation (CCV)

Oxides of nitrogen are being controlled with the following technologies

- Exhaust gas recirculation (EGR)
- Selective gas reduction (SCR)
- Lean NOx catalysts (LNCs or HC-SCR)
- Lean NOx traps (LNTs)

It is important to investigate which buses are suitable for retrofitting and choose the correct technology for a particular vehicle. The engine ought to be remanufactured according to original specification to gain optimal results. Due to the fact that diesel engines are durable, it is unlikely that engines will be replaced with better emission standards soon. Therefore retrofitted emission control devices can be considered as a notable option. In the United States, there are several sources where funds can be collected for retrofitting emission control devices (Manufacturers of Emission Controls Association 2009).

In case a bus is not needed for extensive period of time, it is usually laid up for certain period. However, these buses are not removed from the register completely. Although this process usually happens during times when there are less services to operate, it is also done when competitive tendering results affect the bus fleet situation. In addition, buses are laid up when the bus operating company is waiting for a buyer for the bus. Laying up buses cannot be seen as a permanent reallocation option (Kuukankorpi 2014).

The owner of the JV Bussi Group Ltd Jukka Vesanka explains that lots of local transport buses in good condition are being recycled or dismantled although there would be demand in emerging markets. Used buses were earlier going to the Baltic States and Russia, but currently only spare parts are being exported to these market areas (Perttilä 2014).

Koiviston Auto Corporation's Chief Executive Officer Antti Norrlin explains that although being in adequate condition the used older buses are being recycled through external partners. This is because there is non-existing demand for these buses. The potential selling price for older used buses would be 4000-5000 euros compared to the original purchase price of 200 000 euros. The private buyers are searching for long-distance buses which are usually in better condition as opposed to local traffic buses (Kokko 2014).

2.5.3 Bus fleet requirements

Bus fleet requirements are part of competitive tendering in public transport like pointed out earlier in this chapter. For bus transport industry, one of the key issues is the bus fleet requirements and how environmental aspects are being evaluated in the award systems.

Tendering authority i.e. the purchaser defines the equation how to calculate the environmental points. For instance, the price might be weighted to 70 % of the total points and environmental performance of the buses to 30 % (Parikka-Alhola&Nissinen 2012).

One of the crucial issues of the bus fleet requirements are the European emission standard levels of the engine. The emission standard levels in question concern all new motor vehicles that have technically permissible maximum laden mass over 3,500 kg (Dieselnet 2012).

European emission standard level	Implementation year	CO g /KWh	NOx g / KWh
Euro 1	1992	4,5	8,0
Euro 2	1996/1998	4,5	7,0
Euro 3	2000	2,1	5,0
Euro 4	2005	1,5	3,5
Euro 5	2008	1,5	2,0
Euro 6	2013	1,5	0,4

Table 3. (Dieselnet, 2013). European emission standard levels for heavy-duty diesel engines and the maximum values for carbon monoxide and oxides of nitrogen.

As seen from the table 3, the European emission standard levels have been in place for over 20 years and the number of carbon monoxide and oxides of nitrogen have come down during that period.

Compared to the beginning of public transport in Finland where only minor specifications existed, currently very detailed requirements are set concerning minor details of the bus fleet. However, the requirements have been stricter in other European Union countries such as Sweden where the maximum age for buses has been lower. Larger tendering authorities such as the Helsinki region has used the most economically advantageous tendering system where the bus companies can offer buses and receive points based on their emission levels and other features. In the particular tendering model the bus companies also offer a price for the contract and receive points accordingly. The company with most overall points is being awarded the contract as explained earlier in this chapter (the most economically advantageous tender). In the second model the bus companies merely offer a price and the tendering authority defines the bus fleet requirements for the contract (Karvonen 2012).

The company that is being awarded the contract has to meet the requirements when the contracted services begin. Should the operating company not meet the requirements, it may face sanctions by the tendering authorities. Likewise, companies can receive compensation in some tendering areas for using environmentally friendlier bus fleet than required (Oulu, Jyväskylä, Lahti and Kuopio tendering documents 2013).

3 RESEARCH CONTEXT AND METHODS

This chapter explains the research methods and approaches used in this study. In addition it explains the environmental factors that have influenced the research process. The main methods include interviews and calculation tools. Furthermore, books, journals and electronic sources will be used to learn suitable methods and tools to help with the bus reallocation process. Force field analysis will be used in order to investigate the different factors in each main option concerning bus fleet reallocation.

Bus fleet data of the case corporation will be collected from Koiviston Auto Corporation's bus fleet management system. As explained in the first chapter, the main approach of this research is to find financially viable solutions for the case corporation's bus fleet reallocation process. The current bus fleet market situation will be discovered through the information followed by looking at commonly used marketplaces for used bus fleet in the Finnish market area. The aim is to find out what are the commonly used marketplaces currently for used buses and are bus companies able to sell their bus fleet through these market channels.

3.1 Research approach

The research uses qualitative research methods as the primary approach. More specifically when evaluating the most suitable approaches and methods for this thesis, depth interviews and calculation tools are identified as vital sources. The main reason is that the competitive tendering process is relatively new in the Finnish bus transport industry and therefore the people who are involved in the process also possess the key information. Case study research will be used to investigate more specifically how the situation is handled by one particular Finnish bus transport organization. Data is collected from the case corporation's systems and used in the calculations in chapter 4. The conclusions are made based both on these calculations and interview material.

3.1.1 Qualitative research

Cibangu (2013) had found out in his research that qualitative research cannot be merely defined by being a description for it is more of a combination of literature and life world surroundings. Silverman (2011) explains that in qualitative studies the number of cases being studied is smaller than in quantitative research. In addition, the data can be analyzed with several different research models that could even clash with each other.

Applied qualitative research methods are often used when the traditional methods, such as basic surveys are inadequate to conduct the research. Compared to quantitative research methods, the qualitative approach is less structured. The qualitative approach emphasizes the value of the data instead of the amount of it. Qualitative research has relevance when it is applied and therefore it is ideal for policy making as it is based on experience. As the data could be highly unstructured in qualitative research, the researchers ought to explain carefully how the people and methods were selected. Furthermore, the analysis of the data can be difficult for the same reason and the researcher need to take use of the interview material as much as possible and study it thoroughly. The reporting differs from quantitative research as the results are usually more impression based instead of raw data such as tables and numbers. Instead the researcher will focus more on the opinions and behavior that is backed up with evidence that comes up from the interviews (Walker 1993).

Qualitative approach is more open and flexible compared to quantitative research and the focus is on diversity instead of having large number of results. The study might handle multiple problem areas, but the information is gained from fewer sources (Kumar 2011).

Opposed to traditional surveys or other basic statistics examination, qualitative research methods can reveal issues and reasons leading to the results. Research questions often affect the research methods used. Qualitative approach often has the ability to reveal the correlations between different issues (Silverman 2011).

In order to understand and conceptualize events well enough, the particular context and surroundings must be investigated thoroughly. Qualitative research

ought to be an interactive process and the people interviewed should be able to express their own opinions and views on the subject. During the research the questions and viewpoints are changed and become more focused. In qualitative research the questions should be specific enough to provide valuable information. On the other hand if the questions are too specific, the narrow focus might limit the information gained (Ely 2003).

3.1.2 Interviews

One of the most important tasks was to discover the correct people for depth interviews. Furthermore, it is also vital to assess which companies are suitable to be compared with the case company. The companies ought to be in a similar situation, have bus fleet that might have to be reallocated and the company has to answer the questions truthfully in order to have reliable results. The depth interviews were analyzed and transcribed individually and the new information and ideas gained was used in the following interviews. The interviews were documented in writing and the interviews took place in Finnish cities Lahti, Helsinki, Tampere and Salo during the year 2014. The questionnaires can be found in appendices 1, 2 and 3.

Open-ended interviews are used to gain rich data by giving freedom to the interviewed person to answer in own terms. Active listening is important because it builds trust especially in sensitive topics. Therefore interaction in interviewing is important in qualitative research. Although interaction is essential part of the interview process, the interviewer should not dictate the interview excessively (Silverman 2011).

Depth interviews are used to gain information from the person being interviewed by allowing to share experience, attitudes and own terms. The interviewer is not limited to using a strict questionnaire, as the aim is to build up new ideas about the subject (Walker 1993).

Position held in the company	Company	Name of the person interviewed
Chief Executive Officer	Koiviston Auto Corporation	Antti Norrlin
Technical Director	Koiviston Auto Corporation	Jouko Nykänen
Spare Part Manager	Koiviston Auto Corporation	Mika Mäkinen
Business Controller	Koiviston Auto Corporation	Hannu Haavistola
Chief Executive Officer	Koiviston Auto Ltd	Mikko Markkula
Operations and Planning Director	Veolia Transport Ltd	Tom Roth
Service Engineer	Veolia Transport Ltd	Aku Tuokila
Traffic Director	Helsingin Bussiliikenne Ltd	Mika Seppänen
Vice Chief Executive Officer	Väinö Paunu Ltd	Jarmo Paunu
Chief Executive Officer / Chairman	J. Vainion Liikenne Ltd / Finnish bus interest group	Matti Vainio

Table 4. The list of interviewed persons for the research. First column shows the position in the organization, second column the organization represented and the third column the name of the interviewed person.

The case corporation's technical director and spare part manager are in key positions when deciding about bus fleet reallocation and therefore they possessed vital information concerning the process. As during the research process new issues came apparent, same persons were interviewed again to gain more knowledge on the issue. The Chief Executive Officer and Business Controller of the corporation understand well the strategic importance of the process and therefore they were interviewed. In order to gain broader view of the situation in Finland, people in other companies in similar positions was interviewed. The people interviewed in Helsingin Bussiliikenne Ltd, Veolia Transport Finland, Väinö Paunu Ltd and Vainion Liikenne Ltd have comprehensive experience of reallocating bus fleet in their own organization. Other organizations were asked to participate in the research but some of the organizations asked refused.

Intense interviews involve interaction and more than just asking the question planned. A major purpose is to see the situation and issue from the perspective of the person being interviewed. It is important to capture and record as much information as possible and then later on analyze it after finalizing the interview. The interviews are often audiotaped or videotaped and also possibly transcribed to recall the interview better. Participant observation is often used as a term to describe interviewing, recording and analyzing the results gained through the process. However, listening, asking and looking are also vital parts of the method. The researcher has to find a suitable role for the particular industry or field and choose whether to stay as a mute observer or as an active member of the group for some time. Being objective might be difficult in some cases and the choices concerning what is being noted and seen is reflected in the results (Ely 2003).

3.2 Case study research

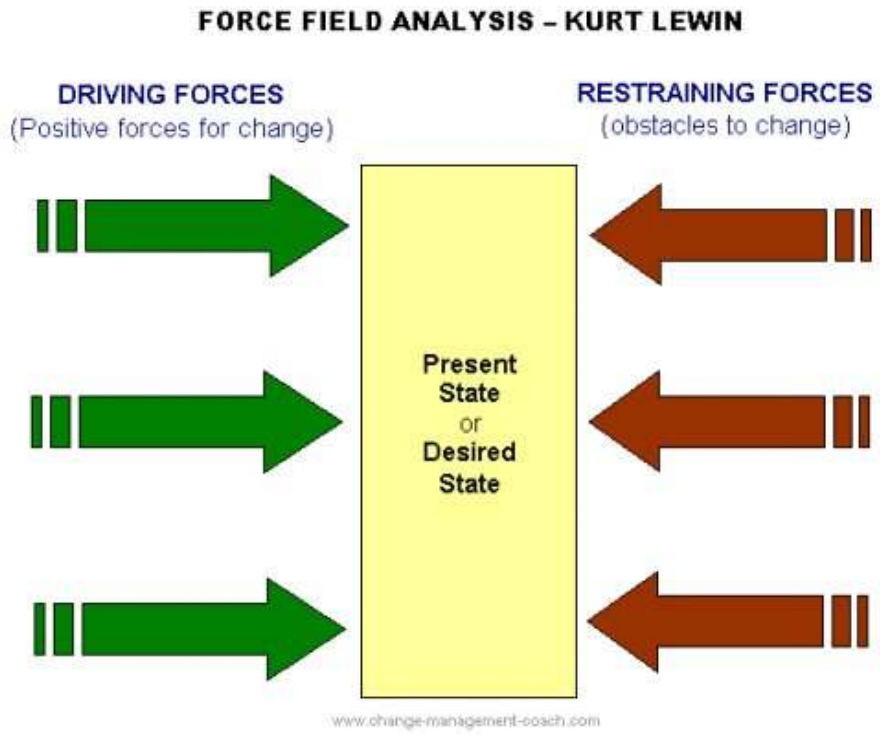
Case study research is usually linked with qualitative research although it is suitable for both qualitative and quantitative research. In other words it can combine both techniques for the analysis. Case study research ought to be holistic, comprehensive examination of the topic. The evidence material should be relevant real-life content. Usually the researcher focuses on single phenomenon or example although it is possible to incorporate several cases. However, as the cases must be

investigated thoroughly, the researcher should limit the number of cases in the research. Case study research may have one case that is observed more intensively and other cases are investigated more superficially. One of the main differences between case study research and other methods is the approach to use evidence from one case to prove features of a more holistic set of cases (Gerring 2007).

Case study research was chosen for this research because each competitive tendering reallocation process is unique. As mentioned earlier, the history, existing bus fleet as well as operating area have a substantial effect on the process. The findings found from the case corporation can be useful for other bus companies or even to companies operating in different transport industries. However, the author believes it is useful to investigate a particular organization and its reallocation process to illustrate the important factors during the process. The case corporation is in a situation where because of its operating areas has the opportunity to consider several options when reallocating its bus fleet.

3.3 Force field analysis

Kurt Lewin described force field analysis as a time-honoring action planning and problem solving tool. Force field analysis can be used in many stages of the planning process and iteratively. It is often used to investigate the current problem and strategic situation before creating an action plan. Many leaders are using force field analysis as a tool in change management, as it helps identifying and pointing out the key issues in their processes. At first, the aim is to respond to the challenges in the present situation and then force field analysis is repeated in order to find the forces that will have an impact in the future. It is important to find out what are the factors that influence the plan of reaching the desired future (Schwering 2003). An example chart of the force field analysis can be seen below (Change management coach 2013):



Force-field analysis investigates what are the driving and restraining forces in certain situations. In the chart above the green arrows present the driving forces and the red arrows the restraining forces. Schwering (2003) points out that force-field analysis aim to give a possibility for the team members to consider all aspects of the given issue, including the advantages and disadvantages.

Stakeholder dialog is an essential part of the force field analysis and the stakeholders should be chosen carefully. In this research, force field analysis will be used to compare the advantages and disadvantages of each considerable option that has appeared during the interviews. This advantages and disadvantages will be evaluated keeping in mind the case corporation's financial performance.

Driving forces and restraining forces can be ranked based on their strength. In other words, benefits are compared to costs, drawbacks, risks and other factors that could be against the changes. The aim is to find different affecting forces that could be political, based on emotions or on logic and thus anticipate different scenarios that could happen. With a diverse team, building a plan that takes into consideration the obstacles and helps different stakeholder forming a bigger

picture becomes more likely. In practice, the planning process can be done with post-it notes or on a chart to visualize the ideas of the project team (Destination innovation).

The material gained through literature review and interviews were evaluated using force-field analysis and the results can be seen in chapter section 4.5 Force field analysis on each considerable reallocation option. Given that force-field analysis is suitable for change management and takes into consideration different aspects for different plans, the author found it useful for the research.

3.4 Cost-benefit & cost-effectiveness analyses

The author believes that even though the cost-benefit and cost-effectiveness analyses are often used to evaluate new investments, it can be used to find out benefits and costs of different reallocation options. However, given the differences between reallocation options, these analyses are not used as a primary method for decision making. The aim is to illustrate examples of benefits and costs of each reallocation option in certain scenarios and assist the decision making.

When conducting a cost-benefit or cost-effectiveness analysis, costs are being compared to the possible benefits of a certain program. Also social cost-benefit issues can be taken into account by including non-monetary parameters to calculations. The process usually starts by defining the objectives of the program and deciding which one of the two analyses is being chosen. Cost-effectiveness analysis requires more decision making from the person in charge, but is less time consuming compared to cost-benefit analysis. One of the challenging aspects of the analysis is that in some cases the scenarios have not occurred yet which leaves room for assumptions and predictions. One of the important tasks in the analysis is to find as many costs and benefit parameters as possible. Categorizing costs and benefits can be challenging as it is not always clear whether certain issue is a cost or a benefit (Cellini&Kee 2010).

Mishan&Quah (2007) also argue that both cost-effectiveness and cost-benefit analysis can be useful, but the latter usually provides more relevant information for the decision maker.

3.5 Decision tree methodology

Decision tree methodology or more specifically decision tree classifiers are used to analyze various areas where difficult and complex decision making has to be divided to simple decisions. It is important to decide about the structure and strategy of the tree as well as for the individual decision nodes. Individual nodes ought to have only single feature that is being evaluated and there should not be too many features (Safavian&Landgrebe 1991).

The author believes that decision tree methodology suits bus fleet reallocation planning because the complicated calculations in this research can be divided into smaller decision nodes. In addition, the important issues and crucial factors found during the interviews can be used as nodes that lead the decision making process.

3.6 Case corporation and its situation in the Finnish bus market

Koiviston Auto Corporation was founded in 1928 by Toivo Tommola. The corporation was established in a village called Koivisto and the corporation's name originates from that particular place. Koiviston Auto Ltd was a small bus operating company till the late 1960's when the owner Martti Tommola made a strategic choice of expanding the corporation through acquisitions. Koiviston Auto Corporation has followed this strategy ever since and the latest large acquisition was made in 2008 when corporation's biggest subsidiary Satakunnan Liikenne Ltd was purchased. When observing the history of bus fleet it can be pointed out that the acquisitions have had an impact on the corporation's bus fleet. It has received different types of buses when the companies have been merged with the subsidiaries.

Kabus Ltd is the bus manufacturing subsidiary of corporation that manufactured buses for corporation's own use. Kabus Ltd discontinued manufacturing buses in 2014, as the designing and manufacturing of buses had become more expensive

and difficult given the volumes needed to produce. Norrlin (2014) pointed out that it is extremely difficult for a small manufacturer to stay in the bus manufacturing market. Kabus Ltd stopped manufacturing buses for the local bus transport earlier already as the new bus fleet requirements were unknown. Koiviston Auto Corporation has 174 Kabus buses (situation 29.9.2014) in its bus fleet. 129 buses of these are for local public transport (Koiviston Auto 2014).

The corporation operates in local public transport, local regional services, intercity services as well as charter services. The change from negotiated contracts to competitive tendering in corporation's main tendering areas meant that it was going through the biggest changes in its history. Koiviston Auto Corporation's Chief Executive Officer Antti Norrlin (2014) states that as the new situation were acknowledged after the new legislation took place; the corporation had made preparations concerning financing and investments. One of the complicated issues for the whole process was that the corporation had to make decisions for one tendering area before knowing the results from all the other tendering areas. It was extremely important for Koiviston Auto Corporation to be awarded adequate amount of contracts in order to maintain the volume level in the new situation (Norrlin 2014).

In the end of the year 2013, Koiviston Auto Corporation took part in the competitive tendering in areas they already had been operating. Jyväskylän Liikenne Ltd participated in the Jyväskylä area competitive tendering; Koskilinjat Ltd in the Oulu area, Koiviston Auto Ltd in Lahti region and Kuopion Liikenne Ltd in the Kuopio area. The tendering documents show that each competitive tendering had totally different bus fleet requirements, as other tendering authorities put emphasis on the price than others. Oulu and Jyväskylä tendering authorities gave clear requirements concerning bus fleet by using the lowest price award system. Lahti and Kuopio tendering authorities gave bus companies the option to receive extra points for their offered bus fleet by using the most economically advantageous tender system. Companies offering buses with better Euro emission standard levels would receive more points for their bus fleet.

Figure2. Routes operated by Koiviston Auto Corporation in 2013. The cities indicated with blue color and bigger font are cities in which Koiviston Auto Corporation has an office and large amount of buses operating from the depot. The complete organization chart can be found in appendix 5.

Jyväskylä, Kuopio, Lahti and Oulu were the biggest cities that organized competitive tendering for the first time. Before the changes in July 2014, those cities organized their local public bus transport with negotiated contracts, Koiviston Auto Corporation's subsidiaries being the biggest operators. Therefore the results in each of these tendering areas had major effect on the whole corporation (Koiviston Auto Corporation 2014).

The first results came from Jyväskylä and the news shocked the whole bus transport industry. A low-fare company Onnibus Ltd won four tendering items out of five and Jyväskylän Liikenne Ltd were left to operate with only one tendering item having three buses. Jyväskylän Liikenne Ltd made a court case in the Finnish Market Court because it felt that Onnibus Ltd had given false information in their offer and would not be financially capable to operate public bus transport in Jyväskylä. This made the Jyväskylä case extremely complicated for all parties as the final decisions could not be made before getting the results from Finnish Market Court. The Finnish Market Court did not overturn the decision made by the city of Jyväskylä and therefore Onnibus Ltd was awarded 4/5 of the contracts. However, Onnibus Ltd eventually sold the business in March 2014 for Koiviston Auto Corporation and therefore Jyväskylän Liikenne became the sole operator in Jyväskylä (The city of Jyväskylä 2014).

After the competitive tendering of Jyväskylä, Oulu published the following competitive tendering results. Norrlin (2014) explains that the results from Oulu were extremely good as Koskilinjat Ltd won 90% of the possible tendering items. The third results Koiviston Auto Corporation received for competitive tendering came from Lahti. The results were not as good as the results in Oulu, but however satisfying as Koiviston Auto Ltd won 60% of the tendering items. The last tendering authority to publish its results was Kuopio where the terms were more complicated than in other cities. Kuopio included a condition that one company could not win more than three out of five tendering items in order to avoid monopoly situation. Kuopion Liikenne Ltd won three items in Kuopio tendering area where the bus companies design part of the route and timetable planning whereas in the three other cities the tendering authorities take care of the planning. The contract lengths vary from 4 years up to 7 years in the tendering areas introduced above. In addition there are options an extension period should both the tendering authority and the operating company agree. The extension periods were mainly 2 years, but in some contracts a year or three years (Koiviston Auto Corporation 2014).

3.6.1 Case corporation's bus fleet reallocation

The case corporation Koiviston Auto Corporation has purchased its buses on part payment regardless whether the buses were manufactured on its own bus factory or purchased from an external bus manufacturer. In other words, Koiviston Auto Corporation has not used leasing as an option to finance the purchasing of buses and has to reallocate its bus fleet should it lose a contract where buses were offered. Also, if some of the buses are not suitable for the contracts awarded, the same reallocation process takes place. The reason for purchasing buses on part payment is that Koiviston Auto Corporation has estimated to use the buses for several years before taking the buses to demolition centers. The bus fleet investment depreciation according to plan is 12 years in the corporation. Koiviston Auto Corporation has operated previously in areas where competitive tendering has not taken place and therefore short contracts have not created problems. The scale of the corporation and different requirements allow the corporation to take better use of the existing bus fleet (Haavistola 2014).

Koiviston Auto Corporation had to invest in new local traffic buses in order to be able to make considerable offers for the competitive tenders. The tendering documents show that vehicle manufacturers can be freely chosen as long as they meet the requirements set by the tendering authority. As a result, when the results were published and contracts awarded, Koiviston Auto Corporation purchased a large number of new local traffic buses for the traffic beginning in July 2014. As Koiviston Auto Corporation had been operating with approximately the same amount of buses, it meant that large amount of buses were made redundant. After every tendering process, the corporation has to evaluate its bus fleet situation and consider the best methods for its unusable buses. Koiviston Auto Corporation's local transport buses reallocated within own organization and the local transport buses recycled can be seen in table 6 and figure 6.

When observing Koiviston Auto Corporation's reallocation process, the stages for 2014 competitive tendering were (Koiviston Auto Corporation reallocation chart 2014):

1. After the tender documents were published, the corporation investigated the fleet requirements and finds out whether it has suitable buses to offer.
2. When the results were published, Koiviston Auto Corporation purchased new buses for the contracts that required it. Used buses that were suitable for other contracts were reserved.
3. Several buses were transferred from subsidiary to another permanently and some for the duration of repainting and modification works.
4. When the required buses are being allocated to the new contracts, Koiviston Auto Corporation re-evaluates the bus fleet situation.
5. Buses that are unsuitable for contracts or market-based local transport are being then recycled through external partners.

Technical Director Jouko Nykänen (2014), points out that as the average age is calculated on the operated kilometers, it is important to allocate newer buses to the long distance contract items. According to Nykänen (2014) having won certain amount of contracts that are about to expire at different times, Koiviston Auto Corporation could potentially reallocate large amount of buses within its own organization. For the contracts beginning in 2014, subsidiaries in Oulu and Jyväskylä would be able to reallocate buses from other subsidiaries due to the less strict bus fleet requirements. Another approach that can be used in the future is reallocating some of the new buses purchased in 2014 to other subsidiaries where bus fleet requirements permit. This scenario becomes relevant if the corporation is not awarded the same contract in the next competitive tendering. Koiviston Auto Corporation invested in bus technology that is likely to be valid in most of its competitive tendering areas in the future. For instance, when some of the buses reallocated to Oulu in July 2014 are reaching the maximum age after few years, the corporation has to find replacement buses. The newly bought buses for Kuopio that are also approaching the maximum age allowed could be transferred to Oulu and considered suitable according to the requirements. This will then bring down the average age of buses in Oulu and Jyväskylä where used buses were initially allocated (Nykänen 2014).

According to Nykänen (2014) selling the bus fleet too early would have been a major mistake, as suddenly there was a large need for used buses that based on the

earlier results were unusable. Koiviston Auto Corporation's reallocation process was affected also when the tendering authority in Porvoo region did not find the appropriations for the tendered contracts. This meant that the public transport was organized with market-based model and there were no longer bus fleet requirements (Yle Uutiset 2014). The impact in practice was that Koiviston Auto Corporation could now allocate bus fleet that became unsuitable in other tendering areas to Porvoo tendering area.

The Chief Executive Officer of Koiviston Auto Corporation Antti Norrlin points out that used buses should not be sold if the price remains too low as the spare parts can be used later. In order to avoid negative publicity, Koiviston Auto Corporation requires that the buyer repaints the bus. This is usually the barrier for selling buses as the repainting can be expensive (Kokko 2014).

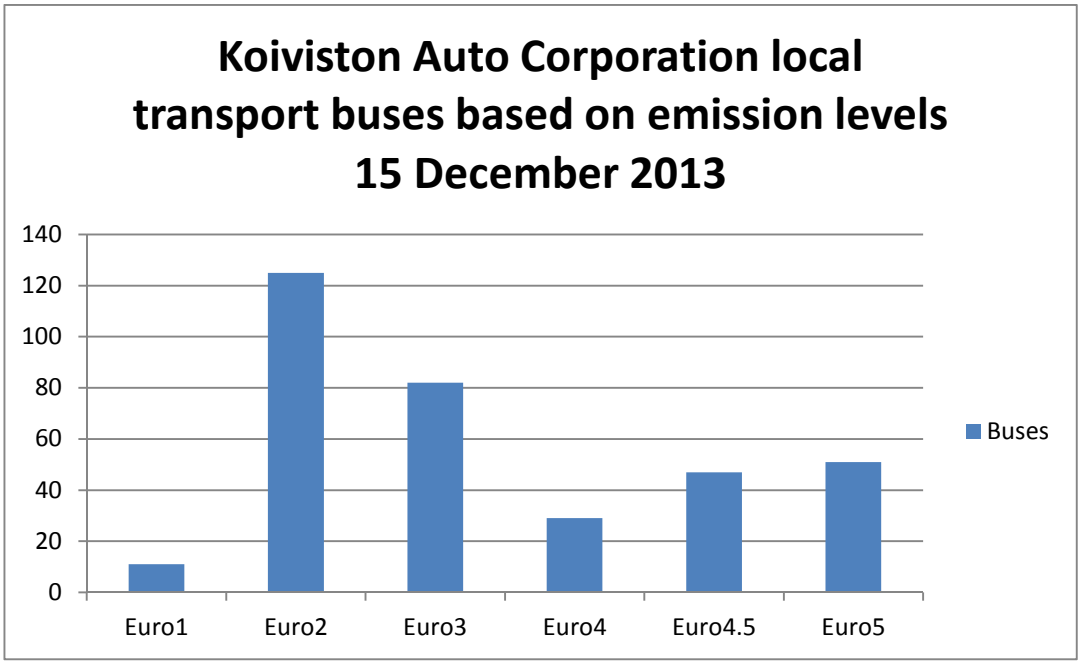


Figure3. Koiviston Auto Corporation buses (15th of December 2013) based on their European emission standard levels of the bus engines.

As seen in the figure3, Koiviston Auto Corporation had large number of Euro2 emission level local transport buses that cannot be used any longer in the tendered contracts in the cities that it had been operating earlier. More detailed figures on each Koiviston Auto Corporation's subsidiaries can be found in the appendices.

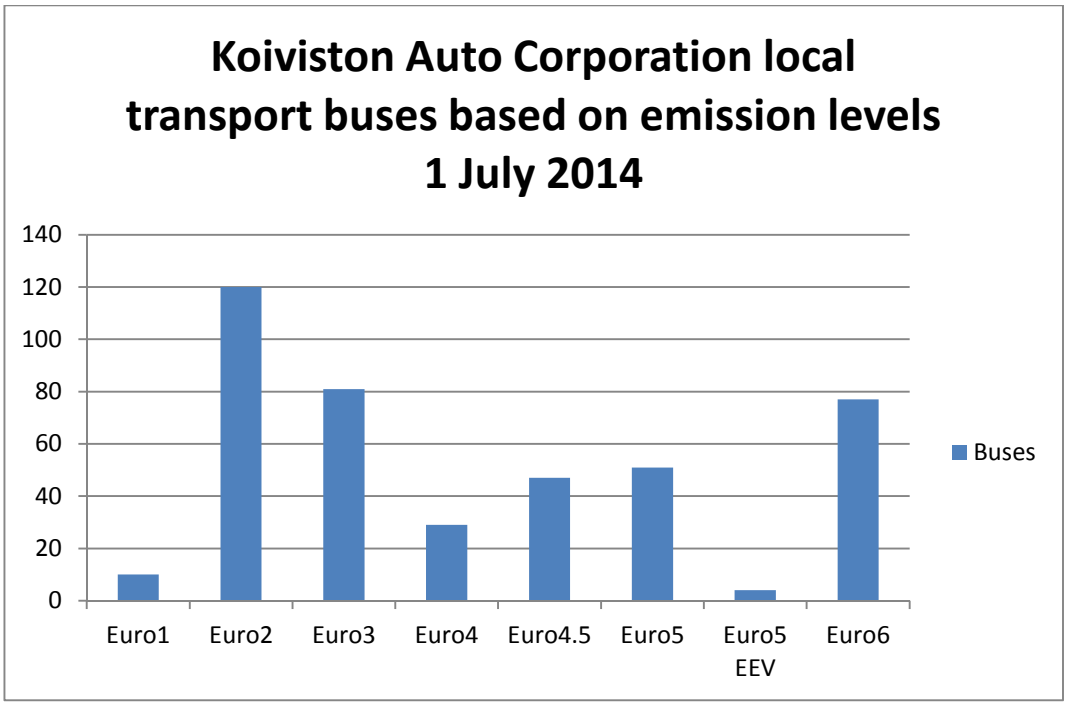


Figure4. Koiviston Auto Corporation local transport buses (1st of July 2014) based on their European emission standard levels of the bus engines.

As seen in the figure 4, the existing bus fleet had stayed intact after the results were published. New Euro6 buses were purchased on the other hand for the contracts beginning in July 2014.

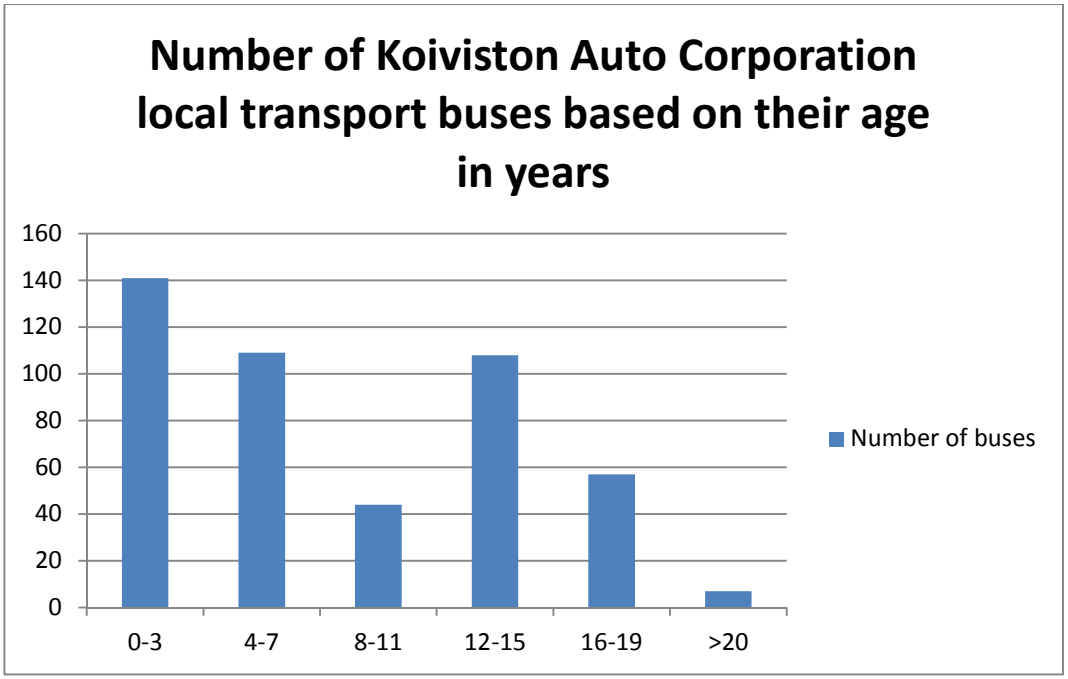


Figure5. Koiviston Auto Corporation local transport buses (1st of July 2014) based on their age.

The figure 5 shows that having purchased large number of new buses for the contracts, Koiviston Auto Corporation possesses almost 150 local transport buses that are less than 3 years old. Given the new bus fleet requirements, the most challenging age groups are 12-15 and 16-19 year old buses that bring up the average age up in some of the contracts. Furthermore, in many contracts the maximum age requirement prevents offering buses from those age groups (Oulu, Jyväskylä, Lahti, Kuopio tendering documents 2013).

Tendering area	Buses needed in the competitive tendering area	New buses
Jyväskylä	77	33
Lahti	86	76
Oulu	90	2
Kuopio	71	39

Table 5. The amount of new and overall buses needed in competitive tendering areas where Koiviston Auto Corporation made an offer. Jorasmaa (2014)

Table 5 illustrates Koiviston Auto Corporation's bus fleet requirements for July 2014 in their four biggest local public tendering areas. Koiviston Auto Ltd had offered 50 Euro6 buses, which had to be purchased as the corporation did not own any beforehand. Kuopion Liikenne Ltd had 13 Euro4 and Euro5 buses that could be used in the new situation.

Company name	Required buses	Buses reallocated	Buses

	after the results were published	from other subsidiaries	reallocated to other subsidiaries
Jyväskylän Liikenne Ltd	100	41	28
Koiviston Auto Ltd	63	0	35
Koskilinjat Ltd	105	52	33
Kuopion Liikenne Ltd	54	0	12

Table6. Koiviston Auto Corporation's bus fleet needs for contract beginning in July 2014 and reallocation within own organization Koiviston Auto Corporation reallocation chart (2014).

Table 6 illustrates Koiviston Auto Corporation's bus fleet reallocation situation. It shows the number of buses needed after the results were published as well as the number of buses reallocated between the subsidiaries. Spare buses for the contracts are included in the calculations. The data was retrieved on the 3rd of September 2014 (Koiviston Auto reallocation chart 2014).

Table 6 points out that Koiviston Auto Corporation has reallocated 108 buses within the organization where the bus fleet requirements allowed it. Koiviston Auto Corporation invested in 112 new local transport buses, from which 50 were purchased for Koiviston Auto Ltd, 29 for Kuopion Liikenne Ltd and 33 were assigned to Jyväskylän Liikenne Ltd. As mentioned earlier, there were average age requirements for buses in Oulu and therefore bus fleet investments were planned for 2016 (Koiviston Auto Intranet, 2013). Nykänen (2014) mentioned that there was a need to temporarily reallocate buses while the buses were being repainted. Otherwise, Koiviston Auto Corporation would not have had enough buses to operate before the tendered contracts began. The only operating companies in the organization that received used buses were Jyväskylän Liikenne

Ltd and Koskilinjat Ltd because the bus fleet requirements in the awarded contracts allowed in the initial stage to offer used buses. Koiviston Auto Ltd and Kuopion Liikenne Ltd had enough existing buses to meet the future requirements.

When observing the crucial months before beginning the services and contracts in July 2014, it becomes clear that Koiviston Auto Corporation had to make decisions on timing the reallocation. For instance, there were several buses that were needed until July 2014, but definitely not after summer 2014. Repairing these buses extensively would have been financially unprofitable given the mileage these buses would give and knowing that they might be recycled soon. Furthermore, Koiviston Auto Corporation had to monitor closely the inspection of motor vehicle timetables and decide whether to repair them to pass the inspection. Mäkinen (2014) explains that usually the subsidiaries take care of the inspection process and central warehouse along with the top management are in charge of the reallocation process. Therefore co-operation and proper communication methods are needed to avoid confusion and unnecessary operations.

Smaller companies in Finland often know their bus fleet extremely well including all the minor details. Big corporations in Finland on the other hand might have hundreds of buses to manage and therefore information technology systems are essential when planning reallocation. Koiviston Auto Corporation has programmed and is constantly developing its own bus fleet management system. Especially when competitive tendering was in its crucial state, the importance of having all the vital information easily available became more important. The in-house information technology department modified the bus fleet management system to present information that was directly linked with bus fleet requirements. Koiviston Auto Corporation uses also other information systems to plan which buses are being assigned to which subsidiary and when certain buses are being transferred. The timing of transfers can be an essential part of the process because the companies need to operate the current bus traffic with the current buses. There is also need to find out when each bus needs to be transferred and whether there is need for temporary transfers. These temporary transfers can occur when buses need to be modified or repainted according to tendering authorities' bus fleet requirements (Nykänen 2014).

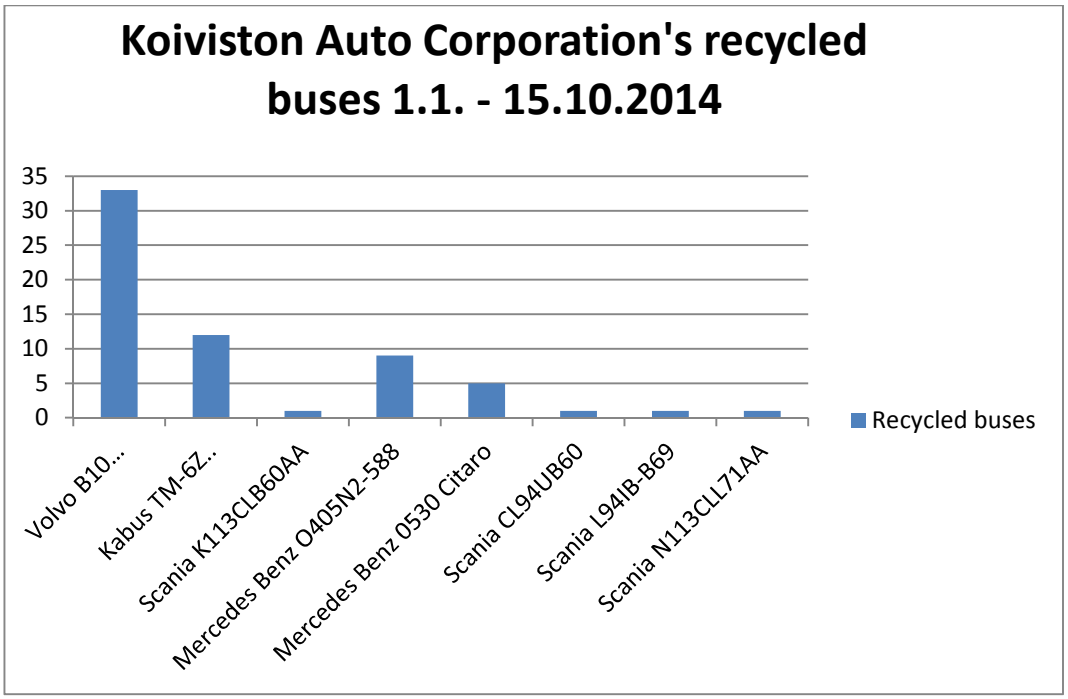


Figure6. Koiviston Auto Corporation's recycled buses during 1.1.2014 – 15.10.2014

Figure 6 illustrates bus types that Koiviston Auto Corporation has recycled in 2014. Almost all of the buses are over 15 years old and therefore they would either be unsuitable for contracts or raise the average age in the contract.

4 EMPIRICAL RESEARCH ON DIFFERENT FLEET REALLOCATION OPTIONS

This chapter includes empirical analysis and results on the different reallocation options found during the research interviews and calculations. The analysis focuses on case corporation Koiviston Auto Corporation.

Based on the interviews, similar options for bus fleet reallocation for Finnish bus transport companies have been found. These options include bus reallocation within the corporation, selling the unneeded bus fleet to another organisation, recycling the bus fleet and rehabilitating the bus fleet. The different reallocation methods are being introduced and evaluated with three bus types in this chapter using cost-benefit analyses and a decision tree.

4.1 Reallocation within the own corporation

The meaning of the term "bus fleet reallocation within own organization" in this research is the action when an organization transfers bus fleet between subsidiaries or when bus fleet is used in another contract in the same subsidiary. Kuukankorpi (2014) points out that certain companies that operate in different market areas can transfer bus fleet between competitive tendering areas instead of selling unusable buses.

Finnish bus operating companies reallocating bus fleet within own organization

Service engineer of Veolia Transport Finland Aku Tuokila explains that even if the operating company would have let-over buses available, modification costs have to be evaluated carefully. Another challenging aspect of this option is that when the buses are being transferred to another subsidiary they usually have to be repainted based on the requirements of the tendering authority. Veolia Transport Finland Ltd has found it difficult to reallocate bus fleet within its own organization. Different bus fleet requirements are seen as a barrier because the buses need to be modified heavily to meet the strict requirements of Helsinki tendering area. In addition, the buses have to be repainted according to the tendering authorities' requirements. Veolia Transport Finland has previous had

negative experiences about reallocating bus fleet within its own organization. The organization was earlier known as Linjebuss Ltd and during that time its operations in Denmark ended. Around 100 buses were transferred to Helsinki area from Denmark and the problems became apparent relatively quickly. The servicing concepts were totally different compared to Finnish servicing standards and the buses had to undergo large repair and modifying procedures in order to meet the requirements in HSL area (Tuokila 2014).

Helsingin Bussiliikenne Ltd's Traffic Director Mika Seppänen explains that their corporation's aim is to offer its used 5-7 year old buses for the tenders. In theory the buses would be suitable for the contracts in HSL tendering area as the requirements are not explicitly defined. However, this would often give the competitors too much advantage due to the fact that in the HSL tendering area the margins are small for the company being awarded the contract. The companies offering older bus fleet would have to lower the price offered substantially in order to ensure being awarded the contract or even to be competitive. Helsingin Bussiliikenne Ltd believes that the ideal situation would be purchasing new bus fleet, using the buses approximately 7 years for a contract and then offering the buses for another contract (Seppänen 2014).

Vice Chief Executive Officer of Väinö Paunu Ltd Jarmo Paunu (2014) explains that their organization has offered a mixture of new and used buses for different contracts to use their bus fleet economically. The upcoming tendering processes are already kept in mind, even though the next contracts would expire after some years. Some of the used buses could be offered as replacement buses for the upcoming tenders. Receiving a minor 200 € penalty for not meeting the requirements is not considered to be substantial compared to the overall turnover of the contract structure (Paunu 2014).

Case corporation reallocating bus fleet within its own organization

Technical Director of Koiviston Auto Corporation Jouko Nykänen (2014) points out that especially for bigger bus companies in Finland reallocation within their own corporation is financially a necessity. Maximum bus fleet age requirements have to be taken into consideration and there is need to observe and control the

situation of bus fleet age constantly. In some contracts the average age requirements mean that older buses increase the overall average age enormously. Some of the subsidiaries of Koiviston Auto Corporation are operating regional routes where the local transport buses could be used. The requirement is that cargo is not transferred in these routes, as the local transport buses do not have space for this purpose. Many of the tendering areas have a requirement that the bus ought to be repainted according to the tendering authorities' specifications. During the repainting, replacement buses have to be assigned to subsidiaries where the buses are taken from (Nykänen 2014).

Spare Part Manager of Koiviston Auto Corporation Mika Mäkinen sees that having similar type of buses also requires less different type of spare parts opposed to having several different types of buses. Level of servicing prior to the reallocation within organization is important. The subsidiary that is giving the bus to another subsidiary might neglect some extensive repair works. One of the possible reasons could be that the original owner is willing to enhance their financial performance. Also, if there is a possibility that the bus is unlikely to have a suitable contract, large repair works might be delayed until its future is known. The company receiving the bus might have to repair the bus comprehensively if the servicing has been neglected earlier (Mäkinen 2014).

Having a scattered collection of bus fleet can be problematic for servicing and training the staff for several different bus types. In addition the subsidiaries have to keep sufficient amount of spare parts for different makes which can become expensive and difficult to manage (Nykänen 2014).

4.2 Selling the unneeded bus fleet

Finnish bus operating companies selling the unneeded bus fleet

If the bus operating companies are not awarded intended contracts or its bus fleet becomes unsuitable for a particular contract, selling some of the bus fleet can be considered. The period of time needed for selling a bus varies enormously in Finland. At times the buses are being sold immediately after the contract has ended, but in some cases the selling process could take years. Occasionally the

buses cannot be sold and therefore they are taken to demolition centers. Most buses eventually are taken to former Soviet Union countries either directly by customers or through an external partner (Kuukankorpi 2014).

Traffic Director of Helsingin Bussiliikenne Ltd Mika Seppänen (2014) points out that Scania and Volvo seem to be the most popular used bus makes when selling bus fleet for Finnish bus operating companies. Even if the purchaser could not repair the buses manufactured by Scania and Volvo, they can easily find other partners that are able to service the buses. Vice Chief Executive Officer of Väinö Paunu Ltd Jarmo Paunu (2014) believes that the rareness of particular bus can make the selling process difficult. One reason is that the bus companies want to purchase well-known bus technology that can be serviced either in company's own garage or at the manufacturer's representative garage. Chief Executive Officer of J.Vainion Liikenne Ltd Matti Vainio (2014) has experienced that selling buses manufactured in Finland to the Central Europe might be difficult due to the fact that they are less common there. In some cases the actual condition of the bus might be less important compared to the bus make and type.

Veolia Transport Finland Ltd's Service Engineer Aku Tuokila explains that selling buses to Russia and former Soviet Union countries was previously easier and a common procedure. Russia imposed regulations for importing used buses and at the moment the emission levels have to meet Euro4 standards. There would be even domestic demand for buses manufactured in 2007 or 2008. Veolia Transport Finland Ltd's leftover buses are however reaching already the maximum age requirements in many tendering areas. Therefore selling these buses to other bus companies in Finland is highly unlikely (Tuokila, 2014).

Helsingin Bussiliikenne Ltd similarly believes that there could be some demand for buses manufactured in 2006 or 2007. However, one important aspect is that what types of buses are being sold. Helsingin Bussiliikenne Ltd has experience selling their bus fleet and has experienced the problems selling buses that involve uncommon technology. As a part of the savings program for Helsingin Bussiliikenne Ltd, one of the crucial methods was to put 47 natural gas buses on sale. The company was realistic about the selling the natural gas buses quickly and were aiming for foreign markets. Natural gas buses require certain technology

to be available at the depots where buses are being kept. The purpose of selling was not only to gain profit from sales but to decrease the high operating expenses compared to diesel or hybrid buses. The Chief Executive Officer Juha Hakavuori calculated that the 47 natural gas buses' yearly servicing expenses were 1 million euros higher than having same number of diesel buses. Furthermore, the natural gas buses had to be called for service on average after every 3000 kilometers compared to the 10000 kilometers that is the company's own estimate for a diesel bus to be called for service. In other words, even though the buses would have been still eligible for certain contracts, the company decided that the operating expenses were too high and the buses had to be sold.

There have been external partners mainly from Estonia that have purchased used buses from bus companies in Helsinki region. The external partners have gathered a collection of similar buses and then sold them to locations such as Kazakhstan and Belarus. When selling buses to these markets, the buses ought to be having basic technology that the potential buyer has experience and knowledge (Seppänen 2014).

One of the possible opportunities could be selling some of the bus fleet abroad using an external partner. The external partner should take responsibility and organize the money transfers between the bus company and the buyer. In addition, the external partner should be responsible for after-sales issues in the target country and thus not consuming the bus company's already limited resources during the tendering process. Some external partners have contacted bus companies about a partnership on selling buses to Africa. Collateral securities would be needed to ensure that the seller receives the money after the purchase, but often the smaller buyers do not possess the required assets. In order to help with the selling process, certain bus manufacturers such as VDL and Volvo have purchased used buses and tried to sell them through their own used bus centers in Central Europe (Seppänen 2014).

J.Vainion Liikenne Ltd's Chief Executive Officer Matti Vainio (2014) believes that due to the strict requirements, selling local transport buses in Finland has become extremely difficult. Along with others interviewed, Vainio points out that Russia and Estonia were popular market areas for used buses. Selling bus fleet to

Estonia used to be also a more profitable option, but the situation has changed as the detailed requirements have made lot of the Finnish bus fleet unsuitable for the aforementioned market area. Nevertheless, for instance when Vainion Liikenne Ltd is selling buses to Estonia, they do not expect to gain substantial profits from the process. Currently, Africa and Syria are still potential market areas, but finding reliable partners in those particular areas can be difficult. External partners have sold some of Vainion Liikenne Ltd's bus fleet to other bus companies in Finland and this is not seen as a legal risk. In addition, Vainion Liikenne Ltd has not experienced any after-sales issues with selling and considers selling to be in general more profitable option compared to recycling through Stena or Kuusakoski for instance. Vainion Liikenne repairs and refurbishes the buses regularly in order to be able to sell knowing that the condition of the bus will not become an issue (Vainio, 2014).

Vice Chief Executive Officer of Väinö Paunu Ltd Jarmo Paunu has been able to sell some of the corporation's unusable bus fleet and the largest group is buses manufactured in 2002 and 2003. The only market area has been Finland which has minimized problems with payments and collateral securities. The potential buyers usually search for common bus models and makes such as Volvo and Scania. Buyers often appreciate that the buses are in good condition and therefore the buses ought to be serviced throughout their history more frequently and thoroughly. This decision is a strategic choice which is done in order to enhance the attractiveness of used buses. Companies selling their buses as waste metal usually have different servicing strategy. Furthermore, Väinö Paunu Ltd has usually purchased new buses with comprehensive features which help selling the used buses. Knowing the current market situation in Finland has helped selling and contacting possible buyers and the company has been active with their selling process. The only market channel currently is Väinö Paunu Ltd's own web site, although occasionally some external partners are used to help the process (Paunu 2014).

There are certain popular market places on internet for used buses and based on author's observation the following are the most popular in Finland:

Nettikone (www.nettikone.com) is a Finnish web portal for used heavy-duty

equipment vehicles where users can sell their bus fleet for potential customers. Nettikone belongs to Nettix Ltd which is part of the Otava Corporation. Nettix Ltd also owns Nettiauto web portal which is the most popular web site for used cars in Finland. An Estonian company Busland Ltd which specializes in car remanufacturing and rehabilitation has put some buses for sale on Nettikone. Most of the buses sold in Nettikone are for charter or for intercity use and only few local traffic buses are being sold (situation in January 2014). It is important to point out that Nettix Ltd is not selling the heavy-duty equipment themselves, as it is more of a marketplace for sellers and buyers.

Mascus (www.mascus.fi) is a web portal where users can sell their heavy-duty equipment. Mascus is a multi-national company that established its web services in 2000. Its web portal is more versatile concerning searching than Nettikone and users can browse buses outside Finland as well. However, there did not seem to be very many local traffic buses on sale in spring 2014 as most of the buses were for charter use. However, in the summer of 2014 there were 130 used local city buses and the price range was from 1900 € up to 199 000 € (situation on the 6th of June 2014).

VDL Bus Center is a separate division of bus manufacturer VDL Bus and Coach which both have their headquarters in the Netherlands. VDL Bus Center has not restricted the sales of buses to their own brand, as they specialize on selling and purchasing buses regardless of types and brands of the buses. Furthermore, the company is participating in both domestic and foreign sales of the used buses. VDL has subsidiaries in the Netherlands, Germany and France added with agents in different European locations. Customers can search and bid for used buses and on the 9th of July 2014 there were 139 public transport buses on sale. The price range is from 5500 € up to 199 000 € (VDL, 2014).

Scania Used Vehicles (http://www.scania.com/products-services/used-vehicles/) is a web site where bus manufacturer Scania is selling their used buses. The price range was on 26.9.2014 from 9000 € up to 228 000 € but some buses do not have a price and customers can ask for an offer.

Case corporation selling the unneeded bus fleet

Koiviston Auto Corporation believes that selling the unneeded bus fleet in Finland is extremely difficult due to the non-existing demand. In addition, finding the correct channel for selling can be difficult. Potential customers often have certain web sites and online web shops that they follow closely when purchasing buses. Companies willing to sell their bus fleet to Finland need to be aware of upcoming competitive tenders and furthermore upcoming bus fleet requirements. Certain possible market areas including Russia have other difficulties such as tolls and restrictions for older buses with lower emission levels. Selling the bus fleet directly to customers (other bus operating companies or private individuals) involves risks and liabilities that have to be taken into consideration. Selling buses to centers owned by bus manufacturers could be worth exploring, but their location in Central Europe might become an issue (Nykänen 2014).

Koiviston Auto Corporation's spare part manager Mika Mäkinen sees selling the buses directly to other companies as a risk. The official liability risk involved in the selling becomes even higher when selling buses to private individuals. Management's time could be wasted dealing with after-sales issues of the used buses which are far from Koiviston Auto Corporation's core competences and the main strategic areas (Mäkinen 2014).

Koiviston Auto Corporation might consider using its own spare part web shop for used buses in case it wishes to sell its bus fleet to other companies or private individuals. Some of the bus operating companies, including Helsingin Bussiliikenne Ltd, Väinö Paunu Ltd and Vainion Liikenne Ltd advertise used buses on their own web site. However, selling bus fleet intact is seen as a different process compared to spare part sales and therefore selling bus fleet on the spare part web shops is a strategic question that has to be decided (Nykänen 2014).

4.3 Recycling the bus fleet through external partners

One option for the bus operating companies to organize the unneeded bus fleet is to recycle the bus fleet through external partners. Based on European Union's directive 2000/53/EY, demolition and recycling centers are required to recycle 95% of the vehicle by year 2015. Demolition centers need a permit from the environment center to operate in the recycling and demolition business. Instead of

merely collecting waste metal, demolition centers gather spare parts and sell them for customers (Finnish Car Demolition Center Union 2014).

Finnish bus operating companies recycling their bus fleet

There are only few operators in the Finnish bus demolition and recycling business by stating that, but those are very professional and responsible. Although the recycled parts usually end up to other Finnish operating companies, buyers from Russia, the Baltic countries and Africa are interested occasionally. JV Bussi Group Ltd sees the reliability and traceability of the spare parts important and therefore Finnish bus companies are willing to purchase critical spare parts Perttilä (2011).

Helsingin Bussiliikenne Ltd has experience on selling buses as scrap metal to several partners, including small operators in Estonia. Traffic Director Mika Seppänen points out that through past experience, they have learned to make regular checks that the buses are being dismantled properly and as promised by external partners. In addition to avoiding hazardous environmental effects, the company's objective is to maintain good reputation and image. Especially being a city owned company, bad publicity on neglecting buses to ruin the environment has to be avoided. Along with other bus companies in Finland, it has earlier found its own bus fleet in places such as Russia without the promised repainting done. The company has since been more cautious when selling buses for recycling or dismantling (Seppänen 2014).

Chief Executive Officer of J.Vainion Liikenne Ltd Matti Vainio has sold buses as waste metal because some of the buses have not been able to sell. The situation is seen unfortunate as the buses are in good condition and well maintained, but no longer suitable for contracts even in smaller tendering areas. Recycling buses through external partners is not seen as financially beneficial option for Vainion Liikenne Ltd due to the price received for scrap metal (Vainio, 2014).

Vice Chief Executive Officer of Väinö Paunu Ltd Jarmo Paunu (2014) points out that their company is having a partnership with demolition centers that return beforehand selected spare parts for the company. The problematic issue is that age

requirements often make spare parts useless as there is often a maximum age requirement for the bus. The company has not sold bus fleet to other recycle centers such as Kuusakoski or Stena Recycling in exchange of money (Paunu 2014).

Case corporation recycling its bus fleet

Koiviston Auto Corporation's Technical Director Jouko Nykänen (2014) explained that the corporation has recycled buses through different external partners. There have been small companies such as JV Bussi Group Ltd and E.Heikkilä Ltd as well as companies with extensive network including Kuusakoski Ltd and Stena Recycling Ltd. Depending on the agreement, the smaller external partners could be selling either spare parts or the entire bus. Koiviston Auto Corporation has sold buses to external demolition centers where the bus is either sold as such or dismantled into spare parts. The benefit by doing this is that the customers using the buses operate through these demolition centers instead of Koiviston Auto Corporation. This reduces management work and responsibility issues. One of the benefits with recycling companies such as Kuusakoski is that the condition of the bus does not become an issue. Management's effort and time would not be therefore spent explaining the history and negotiating about the repair history with the customer (Nykänen, 2014).

Koiviston Auto Corporation's Spare Part Manager Mika Mäkinen (2014) explains that recycling companies, such as Stena and Kuusakoski could be paying Koiviston Auto Corporation approximately 80-90 € / 1000 kg. However, roughly estimated 15-20% of the bus is toxic waste and those parts of the bus would not be compensated. Those parts include windows, tires, plywood flooring and seat stuffing. Usually in a local transport bus this figure could be less as there is less space for luggage and also less stuffing in the seats. In addition, bus companies are able to remove useful and essential spare parts for their own use before delivering the bus to the recycling center. Buses can be delivered intact as well, leaving for instance all the motor oil, drive gear and other fluids for the recycling center. Another matter that affects the price received from a bus is the current world price of metal which is determined by a special factor. Buses that are approximately ten years have useful parts that can be used in other buses not taken

to recycling. Another important issue is that the having possessed the buses, the corporation knows the condition of the spare parts. However, if bus operating companies are intending to abandon certain bus type then collecting spare parts could be ineffectual.

Koiviston Auto Corporation has more experience selling long distance buses to recycling centers all around Finland. The money received from recycling centers in different areas does not vary substantially. By selling buses locally to different recycling centers in Finland, Koiviston Auto Corporation saves money on the delivery costs compared to first either towing or driving the buses to the headquarters in Lahti. Demolition centers could be located further away from the operating company or headquarters and therefore the towing and delivery costs could be substantial compared to the buses' total price.

Koiviston Auto Corporation would have private buyers for buses that could be dismantled to spare parts. However, the corporation is solely selling buses to partners possessing environmental license and knowing the recycling process well enough. Demolition centers (JV Bussi Group Ltd and E Heikkilä) have been receiving buses and then charging the bus operating companies for the toxic waste costs that occur when taking the unused parts to recycling centers. Companies might have to also cover towing or delivery costs depending where the buses are located. The overall cost for a bus given for a demolition center is usually around 400-600 €, again depending on where the delivery or towing is taking place. In return, the demolition centers have been removing and giving back spare parts for Koiviston Auto Corporation. However, given the current requirements and life cycle of local traffic buses, the spare parts are becoming increasingly unusable for bigger bus operating companies (Mäkinen 2014).

4.4 Rehabilitating the bus fleet

In this research rehabilitating is considered either as remanufacturing the bus in order to lower the bus age to 8 years based on the tendering requirements. Another approach is retrofitting emission controlling device which in some tendering areas updates the Euro emission standard level of the bus.

Finnish bus operating companies rehabilitating bus fleet

According to Veolia Transport Finland Ltd's Service Engineer Aku Tuokila has purchased used buses from bus operating companies that have lost contracts in other tendering areas. The company has then modified the buses to suit the HSL tendering area's requirements. However, this approach is not done to lower the bus age or to promote Euro emission standard levels. If the company is not familiar with the bus model, then usually the official importer modifies the bus according to the requirements. However, this is more expensive compared to modifying the buses on company's own garage. Therefore the aim is to gain enough knowledge and competence being able to modify the buses. One of the usual requirements is repainting and that process can be problematic and time consuming. Bus companies often have several options as to how the bus fleet requirements are reached with modification, but the buses must pass the motor vehicle inspection and meet the weight requirements (Tuokila 2014).

Traffic Director Mika Seppänen from Helsingin Bussiliikenne Ltd points out that there is no age compensation in HSL tendering area. However, Helsingin Bussiliikenne Ltd has rehabilitated its bus fleet to enhance the buses instead of merely making them eligible for certain contracts. Flooring in some of the buses purchased earlier has been in bad condition and therefore rehabilitation work has been done in Helsingin Bussiliikenne Ltd's own garage and by external partner in Estonia (Seppänen 2014).

Similar to the HSL tendering area situation, rehabilitating a bus does not lower the buses' age in Tampere tendering area. However, Väinö Paunu Ltd has taken buses to Busland in Estonia to be rehabilitated. Vice Chief Executive Officer Jarmo Paunu explains that the reason is linked with the strategic decision to maintain buses throughout their history, making them more attractive in the sale process later on. When the bus conditions are compared between HSL area and Tampere area buses with same mileage, usually the HSL area buses are in worse condition (Paunu 2014).

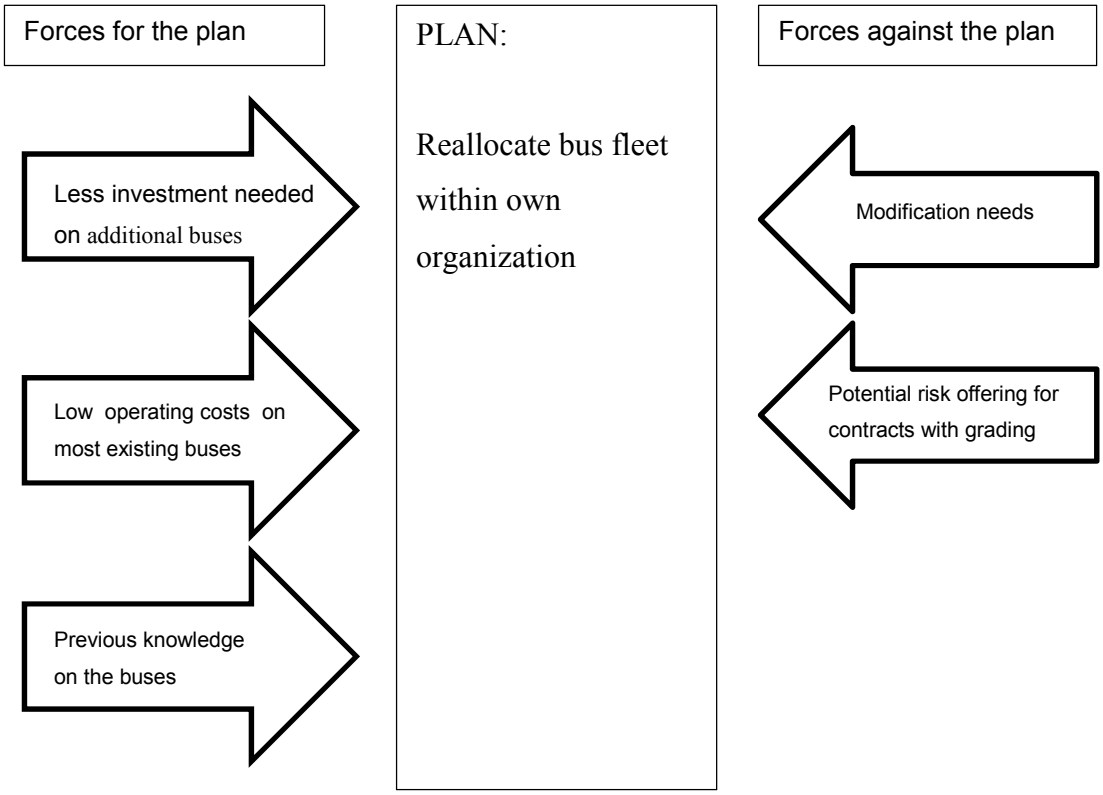
Case corporation rehabilitating bus fleet

Technical Director of Koiviston Auto Corporation Jouko Nykänen argues that although technically retrofitting a DPF would be possible there are issues to be considered. For instance the bus fleet age limitations in the tendering requirements mean that companies would in any case have to renew the buses after the maximum age is reached. It would not be financially beneficial to retrofit Euro2 buses if they could be used only few years as the solutions could cost almost 20000 € for the corporation depending how they are made. Based on the bus fleet requirements made by the middle-sized cities' tender authorities, the retrofitted buses could not be used for many years. Modifying the engine in order to achieve Euro6 emission levels from Euro4 or Euro5 type engines has been problematic for the case corporation. Often it is easier and cost effective to install devices and features to new buses and through this extra points can be awarded in competitive tenders that promote for instance air conditioning.

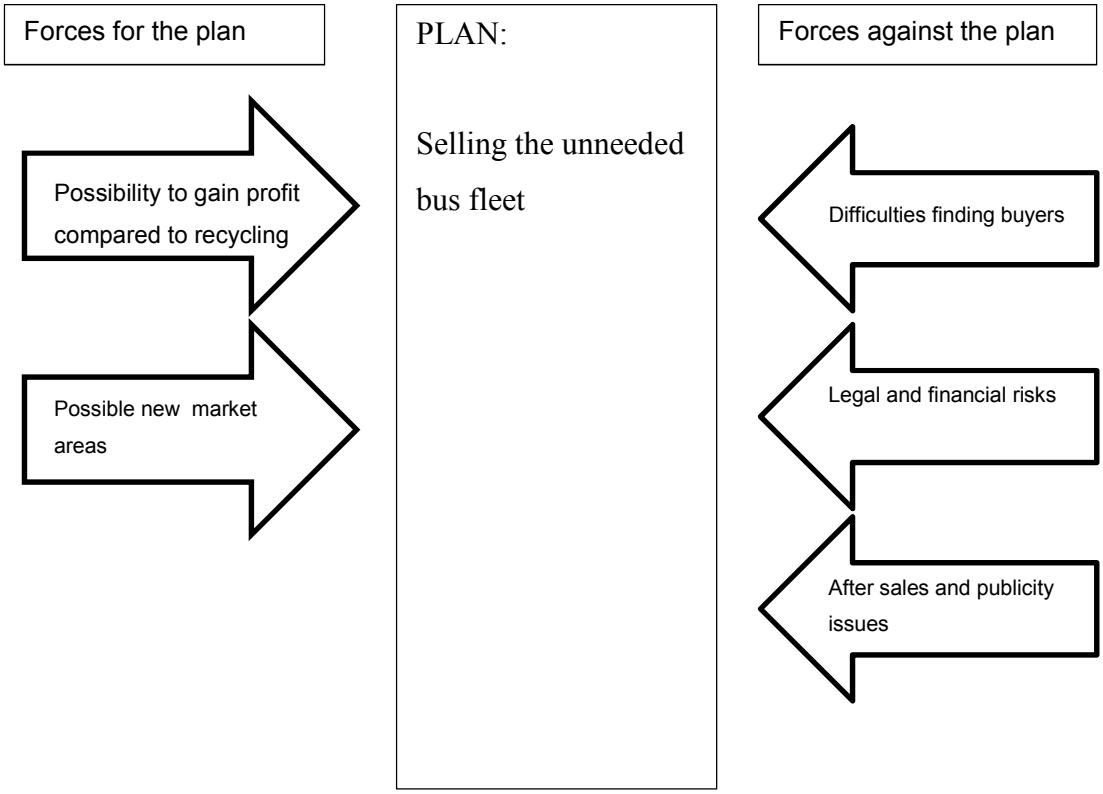
Rehabilitation to lower age is more suitable for regional contracts done with ELY-Center where the maximum age requirement can be up to 16 years. One of the subsidiaries of Koiviston Auto Corporation Gold Line Ltd has taken some of its buses for rehabilitation to Estonia and has had positive experiences of the process. The external partner who did the rehabilitation was Busland Ltd, which is an Estonian company that has expanded to offer its services in Finland (Nykänen 2014).

4.5 Force-field analysis on each considerable reallocation option

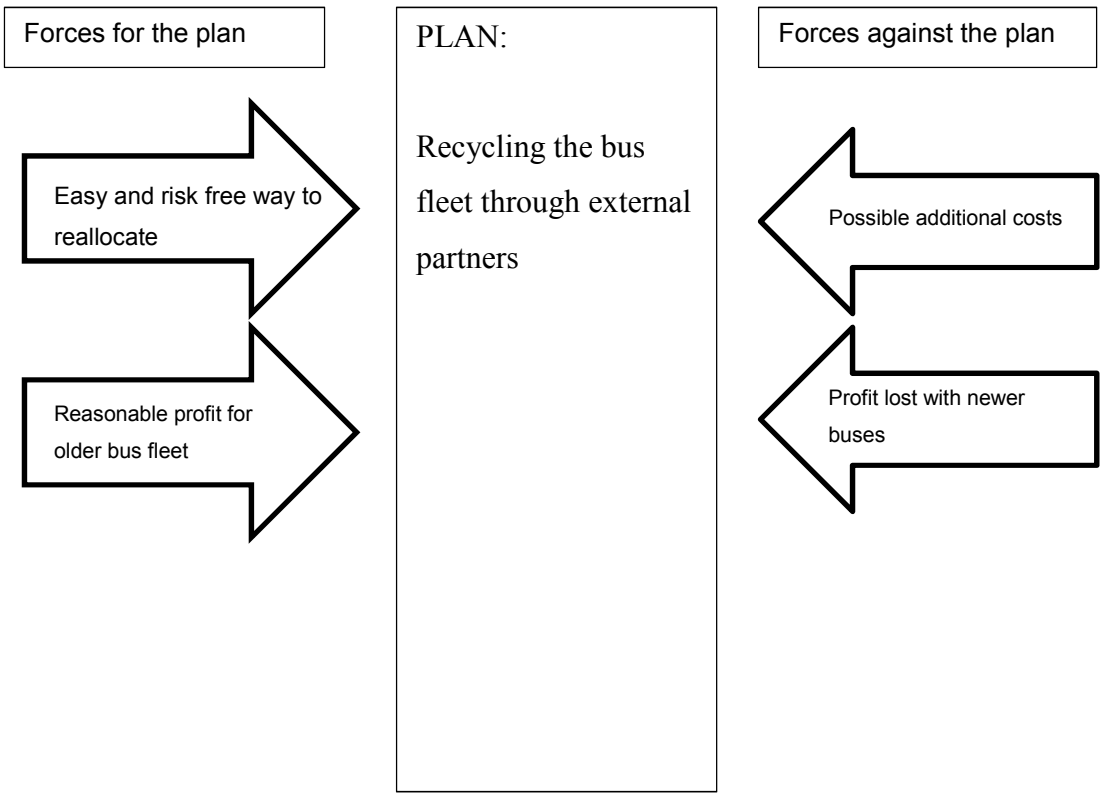
Based on the interviews and observation on the subject being researched, the suitable options are being analyzed using force-field analysis. The options are evaluated based on the case corporation's needs and considering its market areas and strategic plans. Therefore the force-field analysis summarizes the data in order to make suggestions for the case corporation. The issues that have become apparent more often and that the persons interviewed have emphasized are shown higher up in the force-field analysis charts.



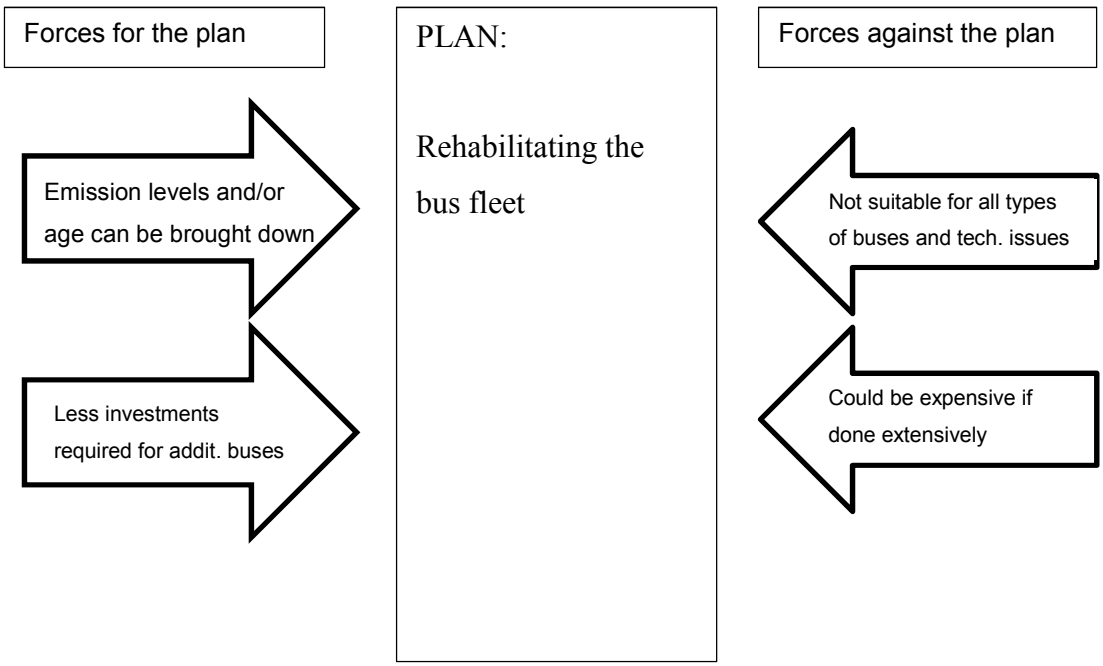
Above is the force-field analysis for reallocating bus fleet within own organization. The first driving force for the plan is that the corporation does not have to invest as much in new or used bus fleet when the existing buses are reallocated to another contract. Koiviston Auto Corporation has large number of used buses that are suitable for contracts where used 5-10 year old buses can be allocated. Secondly, given the investment and manufacturing strategy that Koiviston Auto Corporation has had, the buses have been mainly chosen based on their low operating expenses, such as fuel consumption and reliability. Finally, the corporation has extensive knowledge servicing and repairing the existing buses. Therefore, the servicing and repairing can be done at a reasonable cost. The main force against the plan is the modification works that might have to be conducted based on tendering authorities' requirements. The most usual modifications works for the corporation are usually repainting and ignition interlock device, but there could be additional large modification needs. Second force against the option is that in contracts were companies get extra points for offering new bus fleet, it is a risk to offer used buses and therefore giving competitive edge to other companies. In contracts where the bus fleet requirements are known beforehand the risk does not exists.



Above is the force-field analysis for selling the unneeded bus fleet. The driving forces include gaining better profit compared to recycling in certain cases where the age and features meet the buyer's requirements. Even though domestic and market areas near Finland have become quiet, Africa and former Soviet Union countries could be a potential areas with the help of an external partner. The primary driver against selling buses is the difficulty to directly find buyers for used buses that Koiviston Auto Corporation possesses. For instance, the case corporation is the only operating company to have Kabus buses. Furthermore, as the corporation is not specialized selling bus fleet the after sales process might become time consuming compared to the profit received. These issues might become apparent with the buses that have not been maintained extensively due to the fact that requirements have been unknown. There is a publicity risk should the buyer not repaint the bus or leave it to rust in the environment. Making sure the buyer has got the financial capabilities to purchase buses can be difficult and often the external partners do not have possibilities to place collateral securities.



Above is the force-field analysis for recycling the bus fleet through external partners. As the recycling companies take usually care of the whole process excluding transporting the vehicle in some cases, this reallocation option is easy and risk free. This is important for buses that have not been serviced thoroughly when the requirements have been unknown. Given that the buses are usually no longer used, the buses' condition does not become an issue or a legal risk to the bus operating company. With the current world price of scrap metal, the recycling companies are paying the case corporation relatively good profit for older used buses. However, the profit gained is not as good for newer buses compared to the price that could possibly be gained through selling. Bus operating companies have to evaluate the occurring towing and toxic wastes costs and choose where to recycle the buses to avoid towing and driving costs.



Above is the force-field analysis for rehabilitating the bus fleet. As mentioned earlier in this research, the reallocation option can lower the age of a bus in some contracts. Furthermore, by installing emission control devices the emission level standard can be upgraded to higher level in some tendering areas. Another benefit of this approach is that the corporation has to invest less in additional buses. However, some of the older buses could be in bad condition and therefore other issues become apparent although they would technically suit the requirements. The emission control devices can be installed only to certain types of buses and therefore the approach is not suitable in every case. Installation creates substantial costs as well and therefore the corporation must evaluate the lifecycle of bus before choosing the option. There have been technical issues with retrofitted solutions and therefore are not seen yet as reliable option.

4.6 Cost-benefit analysis on different reallocation options

The cost-benefit analysis is conducted using an example from the Koiviston Auto Corporation. The possible contract where the bus would be reallocated is situated in Oulu tendering area. The experiment will be done on tendering item 2 which lasts 4 years 11 months and requires 8 buses. The bus fleet requirements state that the bus ought to be at least on Euro 3 emission level and the maximum age

requirement is 15 years. However, the average age requirement of the bus fleet in Oulu was 8 years. The contract kilometers are calculated based on the tendering documents and divided by the amount of buses in order to find out the kilometers per bus.

The evaluated buses are commonly used bus types in the case corporation. First bus in the comparison is Kabus TC-4A4 registered in 2006, second bus is Scania Omnilink CL94UB60 registered in 2000 and finally Volvo B7RLE-60 registered in 2006. Another reason for choosing these buses is that they are established bus types in the Finnish bus transport industry and therefore more attractive for buyers. As the maximum age is reached in Scania Omnilink's case during third year, the company must assign and another bus for the contract and this is taken into consideration. The replacement bus in this study that the corporation would have to purchase if it would sell or recycle the bus is Scania Omnilink CL94UB60 purchased from Sweden. The price was estimated using the bus selling web portals mentioned in this chapter. The estimate for operating costs has been calculated using the average operating costs of the particular bus type in Koiviston Auto Corporation.

The present value is calculated to include time value of money using 0,50 % interest rate. The operating costs are being calculated from the time period 1.9.2013 – 1.9.2014. The operating costs per kilometer are being calculated with the following formula:
Fuel costs: consumption per 100 km * 1 / 100
Annual repair costs: Hours spent on the bus * 30 € + spare part costs
When the operating costs are lower than in the replacement bus, then the difference is put to benefits. Vice versa, when the operating costs are higher compared to the replacement bus, then the difference value is seen as cost.

The row items in cost-benefit analysis and their explanation can be found in appendix 6. There is a summary table end of this sub chapter on each evaluated bus type illustrating the calculation results.

Firstly, the overall operating costs of Scania Omnilink were the lowest of the three evaluated bus types. However, fuel costs per kilometer were higher in Scania

Omnilink than in the two other bus types. The annual fuel expense difference between the lowest Kabus and Scania based on the average calculations is 11931, 54 € per bus in favor of Kabus.

Overall findings of the cost-benefit analysis

The author has made the following observations from the cost-benefit calculations:

- Operating costs have substantial effect on the overall results
- Modification costs and other issues pointed out in the interviews have minor role in the cost-benefit analysis

Below is each of the buses analyzed for the particular example contract:

Kabus TC-4A4/645

	Reallocation within own organization	**Selling the bus**	**Recycling**	**Rehabilitating**
Costs	14799,40 €	40480,00 €	41260,00 €	44259,49 €
Benefits	35800,00 €	24699,50 €	14379,49 €	36790,10 €
Total	21000,50 €	-15780,50 €	-26880,50 €	-7469,40 €

Table 7. Cost-benefit analysis results for Kabus TC-4A4/645

The suggested option for Kabus TC-4A4/645 would be reallocating the bus to a contract in Oulu. The biggest factors leading to this result are the suitability for the complete length of the contract and low fuel costs. Operating costs are also only annually just over 1800 € more than with the replacement bus. Selling and recycling is not suggested as in addition to the required replacement bus purchase the operating costs would increase. Rehabilitation would not be beneficial either according to the analysis as the procedure is expensive. The particular bus is already 8 years old and the main benefit of rehabilitation in this case is age reduction. Therefore this option would not bring essential benefits compared to

the occurring costs.

Scania Omnilink CL94UB60

	Reallocation within own organization	**Selling the bus**	**Recycling**	**Rehabilitating**
Costs	45059,40 €	59554,43 €	75491,18 €	34560,00 €
Benefits	43615,87 €	10900,00 €	6250,50 €	55864,53 €
Total	-1443,54 €	-48654,40 €	-69241,18 €	20404,53 €

Table 8. Cost-benefit analysis results for Scania Omnilink CL94UB60

The suggested reallocation option for Scania Omnilink CL94UB60 is rehabilitation as it would remove the need of purchasing bus after two years into the contract. Scania Omnilink would be considered 8 years old instead of the real age of 14 years. Recycling would be financially the worse option as the operating costs would increase annually by 4000 € and there are only minimal benefits through scrap metal selling. Although the operating costs are the lowest out of these three buses, required bus purchase after two years makes reallocation within own corporation unbeneficial.

Volvo B7RLE-60

	Reallocation within own organization	**Selling the bus**	**Recycling**	**Rehabilitating**
Costs	57084,39 €	40480,00 €	41260,00 €	86544,39 €
Benefits	35800,00 €	86984,39 €	55900,39 €	36790,10 €

Total	-21284,39 €	46504,39 €	14640,39 €	-49754,29 €

Table 9. Cost-benefit analysis results for Volvo B7RLE-60

The suggested reallocation option for Volvo B7RLE-60 is selling as its annual operating costs are over 10000 € higher compared to the replacement bus. Its estimated selling price is also the highest of the three evaluated bus types. Rehabilitating would be the least beneficial option due to the expensive rehabilitation and high operating costs. Similarly to Kabus, the age compensation would not help in this case as the bus is already 8 years old.

4.7 Decision tree for bus fleet reallocation

The author has designed a decision tree to examine the fleet reallocation options suggested for Koiviston Auto Corporation. The decision tree takes into consideration the information gained through interviews and the cost-benefit analysis calculations. The aim is to provide a decision tool for the fleet reallocation process and especially pay attention to issues that cost-benefit analysis cannot handle thoroughly. The same buses used in the cost-benefit analysis will be used in the decision tree and their suitability for different options is investigated. The following requirements have to be met for each reallocation option:

In order to reallocate a bus within own organization the corporation should be able to use the bus for the whole length of the contract. The next step is to evaluate is it beneficial to reallocate within own organization based on the cost-benefit analysis. If operating costs exceed 0,56 € per kilometer, it should give a signal to the organization that the particular bus might not be economically viable option. The average for corporation's buses manufactured between 2000 and 2009 is 0,53 € per kilometer. Furthermore, the fuel costs ought to be 0,38 € per kilometer to proceed to the next decision node. Finally, as the operating costs are also depending on the previous service and repair works, the corporation must examine whether it has done the scheduled service procedures. Should the particular bus

meet all the listed requirements on decision nodes, the suggested option is to reallocate within own organization.

If the particular bus would not meet the requirements for the complete length of the contract, then it is important to find out what is the corporation's value for the bus. The author recommends that in order to sell the bus, the current depreciation value according to plan should be at least 10% of the original value. The next evaluation is to find out what are the cost-benefit analysis results and whether selling is the primary option. These conditions need to be met in order for the decision tree to suggest selling.

In case the bookkeeping value is below the 10% of the original value, the author believes that the selling profit would become too low compared to the costs and effort. Therefore recycling is the recommended option in that case for the case corporation. Also, if firstly selling and later rehabilitating is not recommended by the cost-benefit analysis, the suggested option is recycling the bus through external partners.

In case the bookkeeping value is over 10% of the original value, rehabilitation could be beneficial if suggested by the cost-benefit analysis. The corporation must investigate whether the tendering authority promotes rehabilitation in the fleet requirements and bus would become suitable for the contract. If these conditions are met and selling is not seen as financially beneficial, then rehabilitation becomes the suggested option.

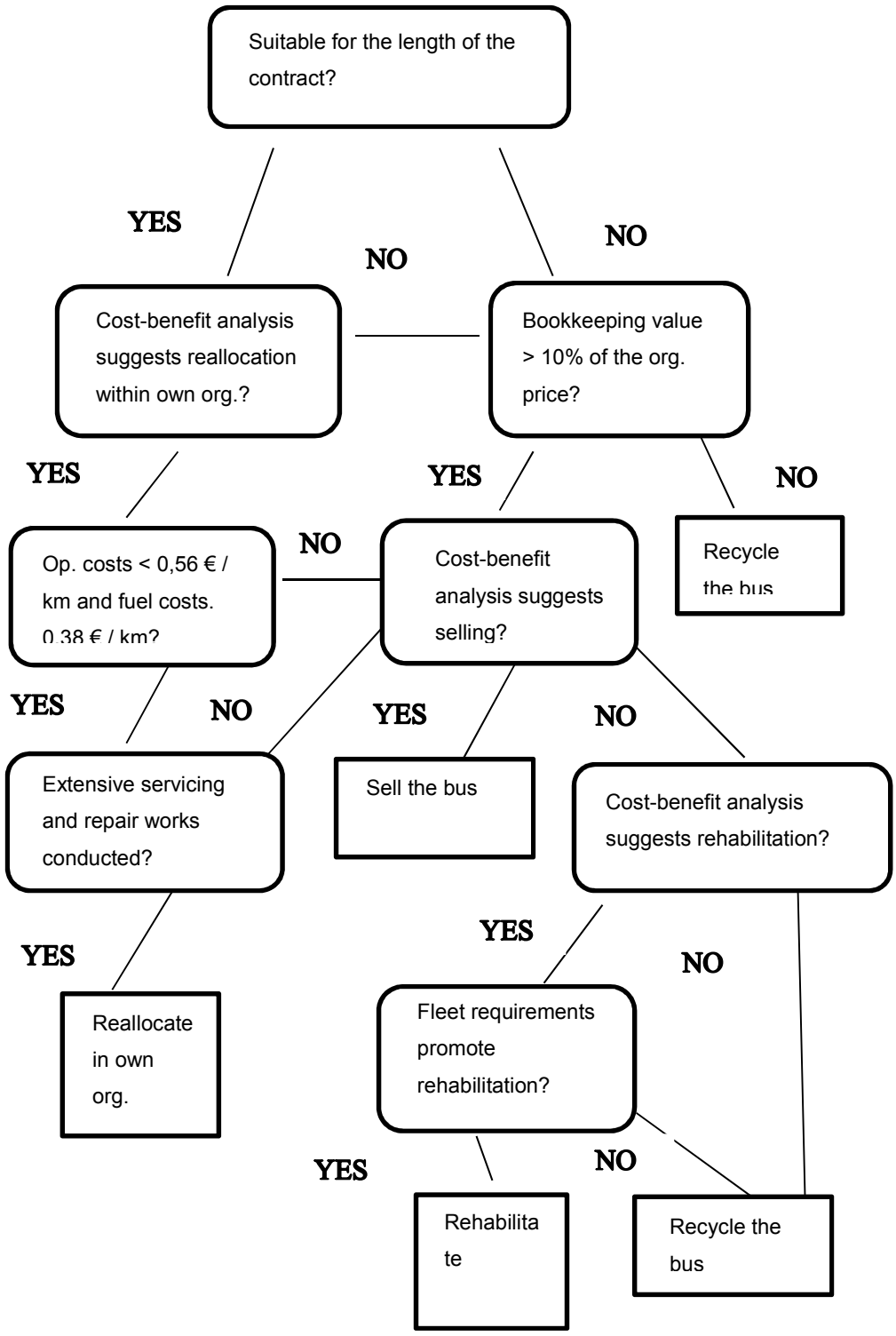


Figure7. Decision-tree for bus fleet reallocation.

When evaluating the three bus types used in the cost-benefit analysis the following results were found:

Scania Omnilink CL94UB60:

Suitable for the length of the contract: NO
Bookkeeping value > 10% of the original price ?: NO
Decision-tree suggestion: Recycle the bus

Although rehabilitation was suggested option for Scania Omnilink in the cost-benefit analysis, the decision tree suggests recycling to be the main option for the particular bus. The reason is that decision tree takes into account the tendering area and that the age requirements would force the corporation to purchase a replacement bus during the contract. In addition, as the bus does not have any bookkeeping value anymore for the corporation, it is highly unlikely that the corporation would receive substantial profit compared to the effort.

Kabus TC-4A4/645:

Suitable for the length of the contract: YES
Cost-benefit analysis suggests reallocation within own org: YES
Op. costs < 0,56 € / km and fuel costs. 0,38 € / km: YES
Extensive servicing and repair works conducted: YES
Decision-tree suggestion: Reallocate within own organization

The decision tree points out that Kabus TC-4A4/645 is eligible for reallocation within own organization as suggested by the cost-benefit analysis. As the fuel and operating costs remain below the boundary values the bus would benefit the corporation compared to the replacement bus. Finally as indicated by the spare part manager the bus has been serviced and repaired extensively throughout its history and therefore it is more likely that major repair works would not come up during the contract.

Volvo B7RLE-60:

Suitable for the length of the contract: YES
Cost-benefit analysis suggests reallocation within own org: NO
Bookkeeping value > 10% of the original price: YES

Cost-benefit analysis suggests selling: YES

Decision-tree suggestion: Sell the bus

Similarly to the cost-benefit analysis the decision tree is suggesting that Volvo B7RLE ought to be sold. However, in the decision tree the operating costs do not have as dominating role as in the cost-benefit analysis. There are also other nodes that have less impact on the cost-benefit analysis but are important in practice such as the suitability for the whole contract length.

5 CONCLUSIONS AND RECOMMENDATIONS

This chapter concludes the findings of the research and suggests recommendations for the case corporation's current and upcoming reallocation processes.

5.1 Recommendations for the case corporation

Based on the interviews and other analyses conducted earlier in Chapter Four, the author has listed recommendations for the case corporation. The recommendations will be done for the bus types used in the evaluation. In addition, the author recommends what reallocation option the case corporation should use in different situations.

After the next contracts will expire in the upcoming years, Koiviston Auto Corporation could have almost new buses to be reallocated. It should carefully pay attention finding out how well these buses suit the current tendering areas and potential new market areas. Similarly, in the current situation there are several used buses that are not suitable for the case corporation's contracts. The calculations prove the importance of reallocating buses that have low operating costs although it is essential to ensure that servicing has been done properly.

The current issues in bus fleet reallocation for the case corporation are meeting the fleet requirements and keeping operating costs low in the contracts awarded. In order to achieve these goals, Koiviston Auto Corporation ought to focus on the following with the three buses evaluated:

Kabus TC4A4: The buses should be reallocated within own organization when the fleet requirements are being met. These buses ought to be maintained extensively in the upcoming years. Rehabilitation and retrofitting emission controlling devices should be considered if the bus fails to meet the fleet requirements in the future.

Scania Omnilink CL94UB60: The buses can be used currently as replacement buses due to their low operating costs. The main option should be recycling through external partners if the maximum age requirements prevent using the particular bus for the whole length of the contract.

Volvo B7RLE: The buses to be sold after current contracts expire if buyers can be found and the potential selling price is near the bookkeeping value. The buses ought to be serviced adequately in order to be suitable for selling.

Reallocation within own organization

Koiviston Auto Corporation should reallocate within own organization when most of the following statements are true with the evaluated bus

- There is a suitable contract for the particular bus
- The particular bus does not significantly bring up the average age in the contract
- The bus has been serviced and repaired extensively throughout its history
- Operating expenses are less than 0,56 € / km and fuel expenses less than 0,38 € / km

Given the amount of available used buses purchased on part payment and the tendering area structure, reallocation within organization is suggested to be the main option. This would allow the corporation to invest in buses more gradually in contracts where the requirements match the existing buses. In the current situation the Kabus TC4A4 is the most suitable bus type for reallocation within own organization. The decision tree and cost-benefit analysis both suggest reallocating this bus type to tendering areas where the bus fleet requirements are suitable.

Should the case corporation decide to take part in a new tendering area either in Finland or another European Union country, it should ensure that the bus fleet suits both the requirements and the circumstances. In case Koiviston Auto Corporation would not be awarded the same volume of contracts in the upcoming tendering areas, it might have to consider entering new tendering areas. Given the tightening bus fleet requirements and the need to focus on operating costs, the buses reallocated to new areas should be the VDL Citea LLE-120 buses purchased in 2014.

Selling the unneeded bus fleet

The case corporation should sell its bus fleet when most of the following statements are true with the evaluated bus

- There is no suitable contracts for the bus
- Potential buyer will pay the bookkeeping value of the bus which is higher than recycle value
- There is trustworthy external partner to assist with the selling process, especially when selling to foreign markets
- The operating costs and fuel costs in particular are too high

The primary requirement for selling a bus is that the corporation cannot find a contract for the bus. Another reason for selling could be that the bus is too expensive to keep for the case corporation. The interview data points out that selling buses to the domestic market has become difficult, especially for the case corporation. Therefore the partnership with bus manufacturers' bus centers abroad and foreign external partners ought to be investigated more carefully. This will become more important if contracts are not awarded in tendering areas where buses manufactured in 2014 are used. The case corporation should investigate the service history of buses before selling in order to avoid legal and after-sales issues. For the case corporation, buses that have higher bookkeeping value and operating costs such as Volvo B7RLE-60 could be sold if buyers can be found. Both the cost-benefit analysis and decision tree recommend selling this particular bus type.

Recycling the bus fleet

The case corporation should recycle its bus fleet when most of the following statements are true with the evaluated bus

- The condition of the bus is less suitable for selling
- Recycling price is higher than the bookkeeping value of the bus
- Euro emission standard levels are lower than Euro3

Recycling should be carried out through trusted partners with buses that are no longer suitable for future contracts. When the recycling price is only slightly lower than selling price, the corporation should recycle in order to avoid after-sales issues. Given corporation's earlier maintenance strategy for the older bus fleet, recycling is beneficial for buses that have not been maintained thoroughly. As the world price of scrap metal is fluctuating, it is important to evaluate constantly whether this option is financially beneficial for the corporation. The decision tree suggests recycling Scania Omnilink CL94UB60 bus, but the cost-

benefit analysis sees this as the worst financial option because of its low operating costs.

Rehabilitating the bus fleet

The case corporation should rehabilitate its bus fleet when most of the following statements are true with the evaluated bus

- Bus could be made suitable for a contract with rehabilitation
- Operating and fuel costs of the particular bus will reduce costs compared to an alternative bus
- The solution is proven reliable and work improve the bus quality

As the rehabilitation creates substantial costs for the corporation, the buses being rehabilitated must have a specific suitable contract. If the tendering authorities require higher Euro emission standard levels in the future, the case corporation should experiment emission controlling devices in buses that have low operating costs. The cost-benefit analysis suggests that Scania Omnilink bus type would be suitable for rehabilitation that helps with the fleet average age issue. However, the decision tree does not suggest rehabilitation as the particular bus is not suitable for the whole length of contract.

5.2 Conclusions

The first objective was to find out how competitive tendering affects the Finnish bus industry and bus fleet reallocation in particular. This was conducted by studying how the public procurement system is organized in European Union and how it affects the bus transport industry. This was reflected to the Finnish situation and how the fleet requirements affect the reallocation process. It was found that when the public transport contract exceeds certain threshold value, the tendering authority is obliged to organize fair and transparent competitive tendering (European Union 2014). According to (Papaioannou&Adamantidou&Komnianou&Vizmpa&Xenidis 2014) the risks in operations are shared between the operators and tendering authorities based on the contract model. Many middle-sized tendering authorities in Finland have chosen the gross contract model for local public transport. This means that operating companies have a risk in the operating costs rather than in the ticket revenue.

Parikka-Alhola&Nissinen (2012) points out that the tendering authorities decide whether the contract is awarded based on the lowest price or to the most advantageous tender. Bus operating companies that are awarded contracts need to meet the specified fleet requirements which often specify what the maximum and the minimum Euro emission standard level are. Should the bus operating companies have buses that are not suitable for contracts or the contracts are awarded to other companies, buses have to be reallocated elsewhere.

Second objective was to suggest what reallocation options the case corporation has in its bus fleet reallocation processes. Interviews with both the case corporation's management and competitor's management were conducted. Also, the case corporation's current reallocation situation was reviewed. The found options were 1) reallocation within own organization 2) selling the unneeded bus fleet 3) recycling the bus fleet 4) rehabilitating the bus fleet. As the case corporation is operating in several tendering areas it can reallocate its bus fleet to subsidiaries where bus fleet requirements are suitable. Selling buses to bus centers or operating companies is an option, but the usual requirements are that the bus has been serviced extensively and that the bus type is common. External partners such as Stena Recycling Ltd and Kuusakoski Ltd recycle buses and pay the case corporation partly based on the world scrap metal price. Also, there are small companies that recycle buses and sell some of the spare parts to bus operating companies. If buses do not meet the fleet requirements, buses can be rehabilitated either to receive age compensation for the bus or to enhance the Euro emission level. These rehabilitation operations are promoted in some tendering areas where Koiviston Auto Corporation currently operates.

The third objective was to suggest suitable reallocation options for the case corporation. Firstly, based on the interview data, force-field analysis was used to analyze the different options and their suitability for the case corporation. Keeping in mind the corporation's bus fleet and the size and structure of the corporation, reallocating existing buses within own organization reduces costs. Selling buses can be more profitable than recycling, but there are risks concerning after-sales issues, especially with buses that have not been serviced thoroughly. Rehabilitation is still a new method for local traffic buses and therefore technical

issues exist and it is not suitable for all bus types. In addition, adding features for new buses is more cost-efficient than retrofitting features for used buses.

Cost-benefit analysis was conducted and the suitability of reallocation options was tested with three local traffic bus types in one contract. The analysis suggested that because Kabus TC4A4's operating costs are low and it can be used for the whole length of the contract, this bus type ought to be reallocated within own organization. The analysis recommends rehabilitating Scania Omnilink CL94UB60 to meet the age requirements mainly because the operating costs are the lowest of the three evaluated bus types. The recommended option for Volvo B7RLE is that the bus is sold as its operating costs are high compared to the two other bus types. In addition, the estimated selling price of the particular bus is the highest.

Finally different scenarios were tested using decision-tree designed by the author with the three bus types mentioned earlier and in the same contract. The aim of the decision tree was to combine interview results and cost-benefit analysis. The results showed that Koiviston Auto Corporation should reallocate Kabus TC4A4 buses within own organization. In addition to the issues covered with cost-benefit analysis, the decision tree investigated that the bus was serviced thoroughly and that the bus is suitable throughout the contract. Scania Omnilink CL94UB60 is not suitable for the whole length of the contract and as the bookkeeping value is low the suggested option is recycling. Although meeting the fleet requirements for the whole contract, Volvo B7RLE's recommended reallocation option is selling because of its operative costs and higher bookkeeping value. Table 10 illustrates the recommendations based on different tools.

Bus type	Interview recommendation	Cost-benefit analysis recommendation	Decision-tree recommendation
Scania Omnilink CL94UB60	Reallocation within own organization +	Rehabilitation	Recycling

	recycling		
Kabus TC4A4	Reallocation within own organization	Reallocation within own organization	Reallocation within own organization
Volvo B7RLE	Reallocation within own organization	Selling	Selling

Table10. Recommendations for the analyzed common bus types in Koiviston Auto Corporation.

5.3 Further study

The author suggests that the environmental effects of different reallocation options are being researched further. Given the large amount of functional local transport buses being currently unsuitable, it is important to find out how they could be responsibly reallocated. This will become increasingly important for the case corporation when the next tendered contracts end and there could be almost new buses without a contract.

In addition, the development and reliability of retrofitted emission control devices ought to be studied further. This option could make many Koiviston Auto Corporation's used buses eligible for contracts requiring buses with higher euro emission level. Currently the solutions are not seen reliable enough and therefore the potential of this option is not utilized. Investigating how other features, such as the air conditioning could be retrofitted cost-effectively to used buses is important. These features giving extra points in tendering are usually included in new buses and therefore emission device retrofitting can become less viable.

Finally enhancing the co-operation between external partners purchasing used buses and bus operating companies ought to be studied further. As the fleet requirements are less strict in former Soviet Union countries and Africa, there is large potential to sell older used buses to these areas. Operating companies have

limited resources and capability to sell directly to the customers and therefore external partners are needed. The focus ought to be aimed at helping the external partners with issues pointed out in Chapter Four.

5.4 Validity and reliability

The interviewees for this research have either actively participated in the reallocation processes in their organizations or made strategic decisions that concern fleet reallocation. The companies that participated in the research represent various tendering areas and different companies.

The data gathered for cost-benefit analysis calculations was retrieved from the Koiviston Auto Corporation's fleet management system. The review period for operating costs was 1.9.2013 – 1.9.2014. The operating costs of the particular buses chosen were compared to the average operating costs of the same bus type in the case corporation. The differences were all below 0,05 € compared to the average, which means that the particular buses being evaluated were not exceptional in operating costs. In the average operating cost calculation there were 58 Scania Omnilink CL94UB60 buses, 164 Kabus TC4A4 buses and 27 Volvo B7RLE-60 buses. Some incorrect values were found from the fleet management system concerning other buses than the three evaluated. However, the incorrect values were rare and therefore it is unlikely that they would have substantial effect on the results.

Even though the operating costs are an essential decision factor in the process, they can be misleading if some major repair and service work has been neglected. Therefore, fuel consumption is more reliable measurement than overall operating expense. However, the decision tree takes this issue into consideration by evaluating fuel economy separately.

Based on this information the reliability and validity can be considered good.

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LIST OF APPENDICES

APPENDICES

APPENDIX 1 – Questionnaire for technical directors

1. What is the current situation in your organization concerning the competitive bidding affecting the current bus fleet situation?

2. Did the corporation have different plans for different competitive tendering result scenarios? How these affect bus fleet reallocation?

3. What are the primary reallocation options in your organization after the competitive tendering results are known?

4. Are modification works conducted for the buses and to which extend to meet the bus fleet requirements?

5. Where could be buses be sold should some of them become not valid for the corporation? Could they be sold in the domestic market?

6. Is rehabilitation or remanufacturing financially viable solution for bus fleet reallocation? Has your organization considered installing devices that change the emission level?

7. How important are different information technology systems in your organization when planning reallocation of bus fleet? How are they used during reallocation process?

8. Do the bus manufacturers help and encourage companies to sell their bus fleet through their own channels?

9. Has your organization considered changing the financing model of bus fleet due to competitive tendering?

10. Is it financially more beneficial to sell the old bus fleet or recycle the buses considering the effort?

11. What issues affect the bus selling process? Are some makes more attractive and are the buyers purchasing individual buses or large number of buses at one time?

12. Which parameters are being calculated in order to find out operating costs for particular bus type?

APPENDIX 2 – Questionnaire for chief executive officers

1. How big strategic issue the reallocation of bus fleet is for the corporation?

2. Has your corporation made certain strategic models based on each result scenario for reallocation of bus fleet?

3. What is the primary reallocation approach in your corporation for the bus fleet left over after competitive tendering?

4. Which parameters are being calculated in order to find out operating costs for particular bus type?

5. Which alternative would you consider to become the most popular reallocation model in the Finnish bus transport market?

6. What tools are used to plan and execute the bus fleet reallocation process?

7. Are there certain barriers or problems preventing the corporation for selling the unneeded bus fleet for other partners?

8. What could be the possible markets and channels for selling the unneeded bus fleet? Could bus manufacturers help with this process?

9. Has your organization considered changing the financing model of bus fleet due to competitive tendering?

10. Is it financially more beneficial to sell the old bus fleet or recycle the buses considering the effort?

11. What issues affect the bus selling process? Are some makes more attractive and are the buyers purchasing individual buses or large number of buses at one time?

APPENDIX 3 – Questionnaire for spare part managers

1. Which elements you see the most challenging in bus reallocation in your organization?

2. Have you got certain models for various scenarios concerning spare part management and bus reallocation based on different results in the competitive tendering?

3. What role has information technology got in the reallocation process and how different tools are used during reallocation process?

4. Has your organization got capabilities and channels to sell bus fleet? Who could be the possible customers in the future? What will be sold to the customers compared to the current state?

5. What risks and liabilities are involved in different bus fleet reallocation options?

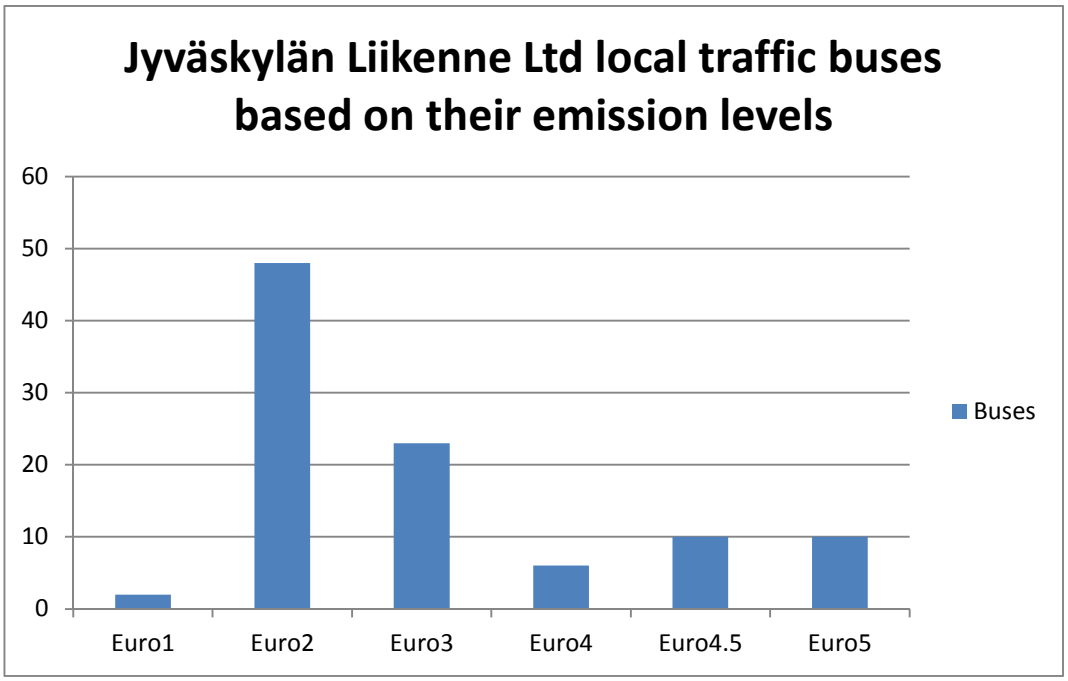
6. What is the expected average price for the buses that your organization would

have to reallocate and what are the primary selling channels?

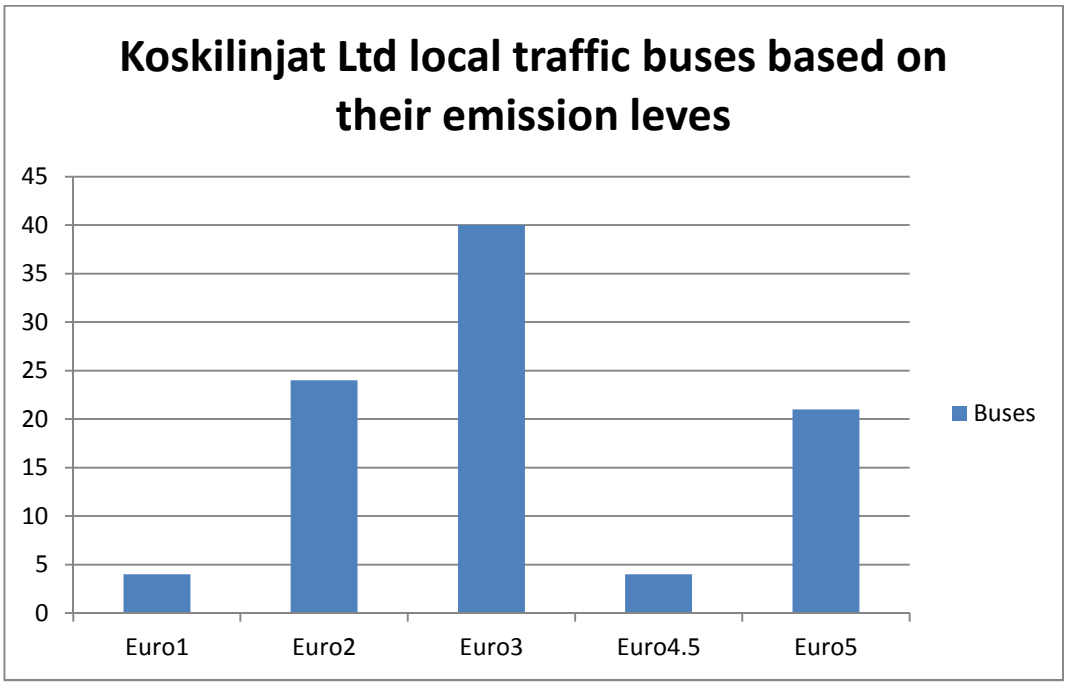
7. What issues affect the bus selling process? Are some makes more attractive and are the buyers purchasing individual buses or large number of buses at one time?

8. Which parameters are being calculated in order to find out operating costs for particular bus type?

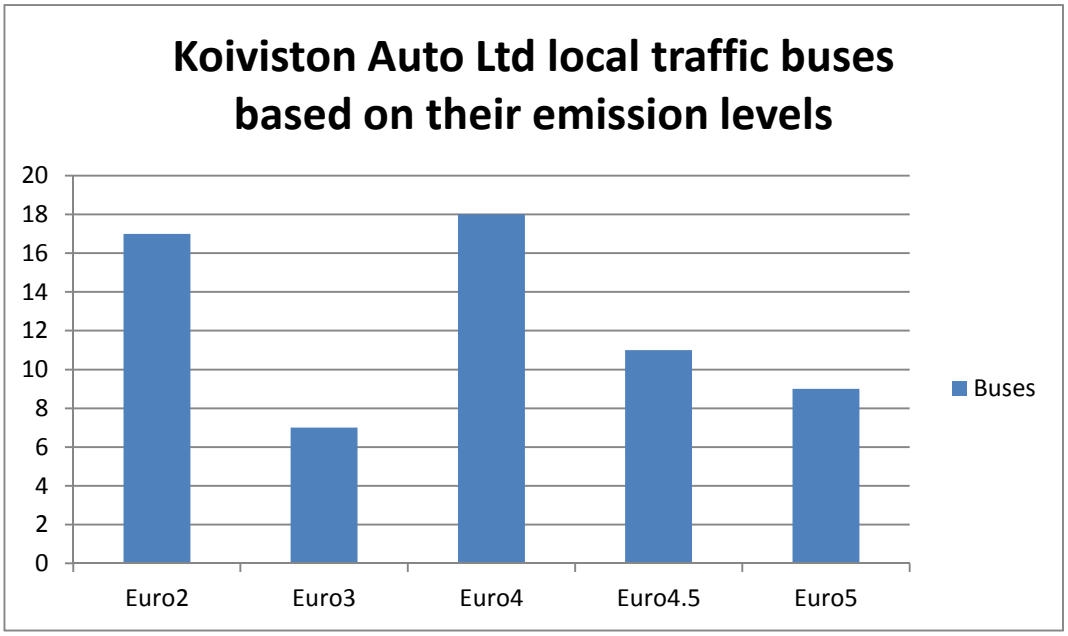
APPENDIX 4 – Koiviston Auto Corporation subsidiaries' local traffic buses based on their emission levels (15 December 2013)



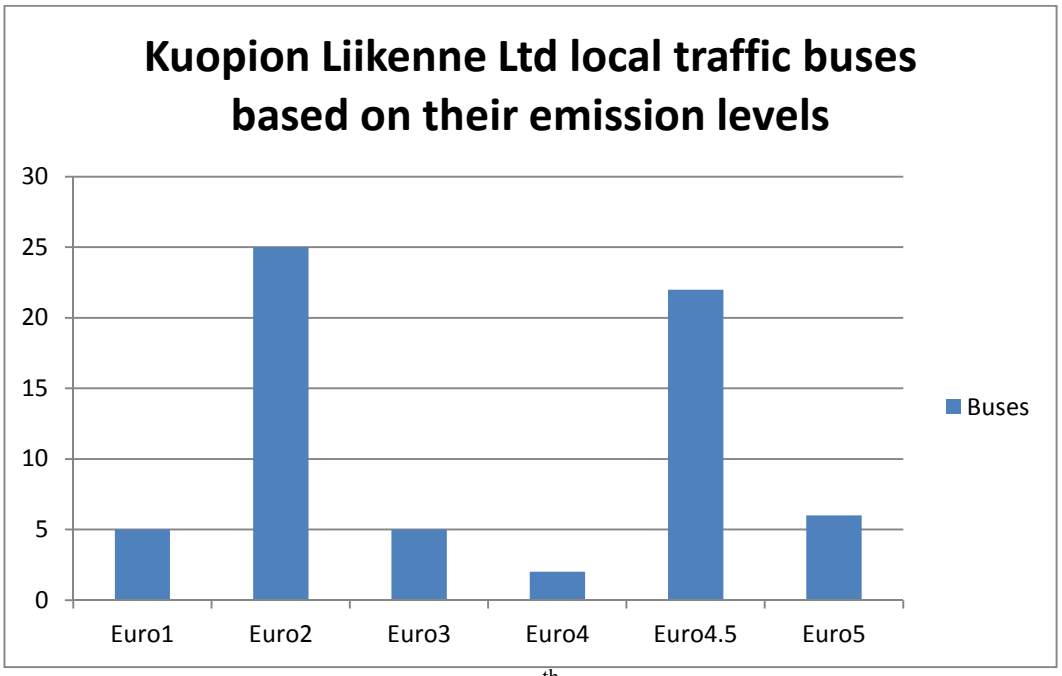
FigureX. Jyväskylän Liikenne Ltd buses (15th of December 2013) based on their European emission standard levels of the bus engines.



FigureX. Koskilinjat Ltd buses (15th of December 2013) based on their European emission standard levels of the bus engines.

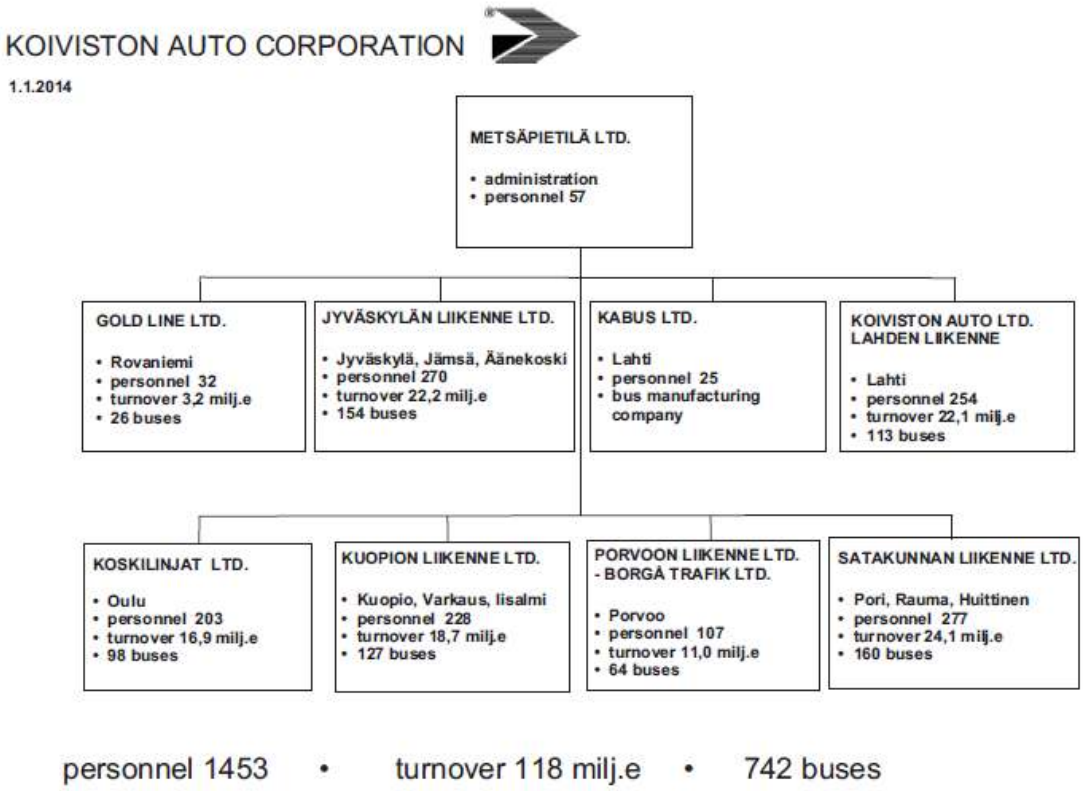


FigureX. Koiviston Auto Ltd buses (15th of December 2013) based on their European emission standard levels of the bus engines.



FigureX. Kuopion Liikenne Ltd buses (15th of December 2013) based on their European emission standard levels of the bus engines.

APPENDIX 5. Koiviston Auto Corporation's organization chart (1st of January 2014)



APPENDIX 6 – Cost-benefit analysis on each reallocation option for Koiviston Auto Corporation (cost and benefit explanations)

Reallocating bus fleet within own organization

Financial cost (to the organization)	Estimate and calculation method of the cost
Repainting the bus according to the bus fleet requirements	Delivery for the repainting and repainting (year 0)
Transferring the bus to the new subsidiary	125 litres of fuel, driver's salary for 10 hours (year 0)
Operating expenses	Fuel, spare part, service labour costs estimated based from years 2013-2014 (years 0,1,2,3,4)
Other required modifications to meet the requirements	Ignition interlock device (year 0)

The financial costs associated with reallocating an example bus within organization and how the costs were calculated

Financial benefit (to the organization)	Estimate and calculation method of the benefit
Purchase of bus avoided	Equivalent bus suitable for the length of the contract. Mascus web portal used to estimate the figure (year 0)
Operating expenses compared to the equivalent bus suitable for the contract	How much is the difference in operating expenses compared to the reallocated bus (years 0,1,2,3,4)

The financial benefits associated with reallocating an example bus within organization and how the benefits were calculated

Selling the unneeded bus fleet

Financial cost (to the organization)	Estimate and calculation method of the cost
Management of the selling process	Placing an advertisement and finalizing the paper work. 4 hours of managements work (year 0)
Replacement bus for the contract	Mascus web portal used to estimate the value of bus (year 0)
Repainting of the bus	Repainting the replacement bus according to the requirement (year 0)

The financial costs associated with selling an example bus and how the costs were calculated

Financial benefit (to the organization)	Estimate and calculation method of the benefit
Selling price of the bus	Selling the bus to another operating bus company. The suggested price is low enough in order to sell the bus immediatelly (year 0)
Ignition interlock device	The equivalent purchased bus is fitted with ignition interlock device (year 0)
Operating expenses compared to the	How much is the difference in

equivalent bus suitable for the contract	operating expenses compared to the reallocated bus (years 0,1,2,3,4)

The financial benefits associated with selling an example bus and how the benefits were calculated

Recycling the bus fleet through external partners

Financial cost (to the organization)	Estimate and calculation method of the cost
Transferring the bus for recycling	Driver's salary for two hours
Replacement bus for the contract	Mascus web portal used to estimate the figure (year 0)
Repainting the bus	Repainting the replacement bus according to the requirements (year 0)

The financial costs associated with recycling an example bus through external partners and how the costs were calculated

Financial benefit (to the organization)	Estimate and calculation method of the benefit
Selling price of the bus	Rotterdam scrap metal world price x pure scrap metal.
Spare parts removal	Engine, transmission, windows and other smaller parts removed for future use (year 0)
Operating expenses compared to the equivalent bus suitable for the contract	How much is the difference in operating expenses compared to the

	reallocated bus (years 0,1,2,3,4)

The financial benefits associated with recycling an example bus through external partners and how the benefits were calculated

Rehabilitating or remanufacturing bus fleet

Financial cost (to the organization)	Estimate and calculation method of the cost
Cost of rehabilitation	Rehabilitation taking place in Estonia by external vendor (year 0)
Other modifications required	Ignition interlock device (year 0)
Repainting the bus	Repainting the replacement bus according to the requirements (year 0)

The financial costs associated with rehabilitating or remanufacturing an example bus and how the costs were calculated

Financial benefit (to the organization)	Estimate and calculation method of the benefit
Purchase of bus avoided	Mascus web portal used to estimate the value of bus (year 0)
Operating expenses compared to the equivalent bus suitable for the contract	How much is the difference in operating expenses compared to the reallocated bus (years 0,1,2,3,4)
Less servicing and repairing due to rehabilitation	Estimated value of avoided service and repair works (year 0)

The financial benefits associated with recycling an example bus through external partners and how the benefits were calculated