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# Collaborative purchasing of logistics services at the Wanxingda Group

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Master's Thesis



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## Preface

This thesis was written in the autumn of 2011 at the Department of Engineering Logistics as a part of the Industrial Economics and Management graduate engineering program at the Faculty of Engineering, Lund University. The thesis was written at the Wanxingda Group in the city of Liaoyang, Liaoning Province, China, and investigated how increased inter-organizational collaboration can help reduce their distribution costs.

I would like to take the opportunity to thank the Chairman of the Board of the Wanxingda Group, Mr. Hu Kui, for giving me the chance to write this thesis and providing me with the support and resources needed to complete it. It has been greatly rewarding to apply the knowledge gained at the university to such a tangible and relevant problem that aligns so well with my education. Furthermore, I would like to thank Mr. Wu Wei, General Manager at Liaoning Boji Electric; Mr. Jin Huilong, General Manager at Liaoning Wanxingda Special Enamelled Wire; Mr. Kou Yanhong, Vice General Manager at Liaoning Hongchang Heavy Industries; Mr. Yu Haitao, Production Manager at Liaoning Hongyuan Electron, for all their help and assistance. Also, a big thanks to my supervisor at the university, Fredrik Eng Larsson, for his unwavering support and exceptional advice during these seven months. Finally, to everyone else who have helped and supported me along the way: thank you!

Lund, April 2012



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Johan Majtorp

# ***Collaborative purchasing of logistics services at the Wanxingda Group***

*Gemensam upphandling av logistiktjänster inom Wanxingda-koncernen*

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## **Nyckelord:**

Logistik, tjänster, kollaborativ, upphandling, inköp, horisontellt, samarbete, Kina

## **Keywords:**

Logistics, services, collaborative, purchasing, sourcing, horizontal, cooperation, China

## **Abstract**

### **Background**

Logistics and distribution of sold goods have traditionally been individually handled by each company in the Wanxingda Group with minimal coordination on group level. The strong relationships between the companies within the group and their close geographical proximity to each other indicate that there might exist potential for closer collaboration in this area. Furthermore, many of the adverse factors facing other cooperation initiatives spanning independent organizations might not be as prevalent in this case. Horizontal cooperation on logistics activities is a rather immature field compared to for example supply chain management. Research that span all three fields of logistics, collaboration and procurement are even scarcer, making this topic even more interesting.

### **Purpose**

The purpose of this thesis is to investigate whether it is possible for the Wanxingda Group to lower their distribution costs by working together when purchasing logistics services. Also, how any monetary benefit resulting from this kind of initiative is best shared between the companies involved is central to this study.

### **Method**

First, a literature survey was conducted to provide a solid theoretical foundation for the study and then a framework was developed for how to best approach an improvement project of this kind. A normative professional study with both a qualitative and a quantitative part was then carried out. It involved a pre-study with a series of open interviews to determine the scope of the thesis after which transportation data and costs were analyzed to create a Request for Quotation (RfQ). This RfQ was distributed to a set of local Logistics Service Providers (LSPs) and the analysis of the response constituted the bulk of the quantitative part. To better understand the attitude towards collaborating within the Wanxingda Group and find the, for them, most suitable form of cooperation a questionnaire was designed and handed out to each company's senior management. This completed the qualitative part of the study and also provided material for the final discussion.

### **Conclusions**

There is definitely potential to reduce costs through increased collaboration, but the logistics market and its actors are currently not mature enough to support a scheme based solely on purchasing activities. This result has led to a discussion of the Wanxingda Group's specific situation and other alternatives, all presented and discussed in this report.



## Table of Contents

1	Introduction .....	1
1.1	Background .....	1
1.2	The Wanxingda Group .....	2
1.3	Problem Discussion .....	6
1.4	Purpose and Goal of the Thesis .....	8
1.5	Delimitation .....	8
1.6	Disposition of the Report .....	10
1.7	Abbreviations .....	10
1.8	Map of China .....	11
1.9	Table Index .....	11
1.10	Figure Index .....	12
2	Theory .....	13
2.1	Overview .....	13
2.2	Procurement .....	14
2.2.1	Definition .....	15
2.3	Collaboration .....	17
2.3.1	Definition .....	17
2.3.2	Inter-organizational Collaboration .....	18
2.3.3	Reward Sharing .....	20
2.4	Logistics .....	22
2.4.1	Definition .....	22
2.4.2	Outsourcing Logistics Activities .....	24
2.4.3	Selection Criteria .....	24
2.4.4	Success Factors .....	25
2.4.5	Pitfalls .....	26
2.5	Transport Procurement .....	26
2.5.1	Definition .....	27
2.5.2	Characteristics of Transportation .....	29
2.5.3	Transport Carrier Economics .....	30
2.6	Joint Purchasing .....	31

2.6.1	Definition .....	31
2.6.2	Motivators and Potential .....	32
2.6.3	Forms of Collaborative Purchasing .....	34
2.7	Bringing it all together: a process for joint procurement of transportation .....	35
2.7.1	Define scope of collaboration .....	35
2.7.2	Understand current buy and needs .....	36
2.7.3	Market survey and RFQ.....	36
2.7.4	Analyse potential .....	37
2.7.5	Find suitable form of cooperation .....	38
2.7.6	Negotiate.....	38
3	Methodology.....	39
3.1	Research Approach .....	39
3.2	Research Method.....	42
3.3	Prestudy .....	43
3.4	Literature Review .....	44
3.5	Quantitative Study .....	44
3.6	Qualitative Study.....	47
3.7	Source Criticism and Credibility .....	50
4	Empirics.....	53
4.1	Define Scope of Collaboration .....	53
4.1.1	Liaoning Wanxingda Special Enamelled Wire .....	53
4.1.2	Liaoning Hongchang Heavy Industries .....	54
4.1.3	Liaoning Boji Electric .....	55
4.1.4	Liaoyang Hongyuan Electron.....	56
4.1.5	Chosen Scope and Focus Companies .....	57
4.2	Understand Current Buy and Needs .....	58
4.2.1	LHE .....	59
4.2.2	LBE.....	61
4.2.3	LWSEW .....	62
4.3	Market Survey and RFQ .....	65
4.3.1	Current Forwarders.....	65
4.3.2	Potential New Forwarders .....	67

4.3.3	Request for Quotation .....	68
4.3.4	Forwarder Selection .....	70
5	Analysis .....	72
5.1	Analyse Potential .....	72
5.1.1	Quantitative .....	73
5.2	Qualitative .....	77
5.2.1	Find Suitable Form of Cooperation .....	78
5.3	Negotiate .....	84
6	Conclusions .....	85
6.1	Findings .....	85
6.2	Recommendations .....	88
6.3	Steps Forward .....	88
6.4	Contribution of this Study .....	89
6.5	Possible Further Research .....	90
7	References .....	91
8	Appendix 1 .....	96
9	Appendix 2 .....	97



# 1 Introduction

*This chapter will provide the reader with an introduction to the background and purpose of this thesis and a discussion of the underlying problem that this study aims to solve. Lastly, the delimitations of this thesis are presented as well.*

## 1.1 Background

Globalization, the Internet age and changing consumer patterns have all served to create a trend of increasing and intensifying competition over the last 30 years. Deregulation of industries, intercultural homogenization and international trade agreements combined with the development of advanced information technologies and the increased connectivity enabled by the Internet has changed the scope of business for many companies. All of the above have helped organizations overcome the barriers of physical distance, which in turn has facilitated the internationalizing of business and the emergence new markets. It has also enabled companies to tap into low cost countries as potential sources of supply, increasing the availability of substitute products and at the same time enabled the entry of new players, all of which have served to increase competition in traditional markets. As if this was not enough, customers' concept of value has changed. In addition to price and quality, value now also includes such aspects as convenience of purchase, after-sales service, uniqueness and dependability. Especially the increasing demands for uniquely tailored products and solutions have challenged companies to continuously reduce costs, increase efficiency and innovate (van Weele, 2005; Mentzer, Myers and Stank, 2007).

Confronting these challenges has forced companies to change the way they are doing business. Efforts are increasingly focusing on purchasing and supply chain management in order to drive short-term financial performance and long-term competitive power, as they offer opportunities of considerably improving profitability (van Weele, 2005; Anderson and Katz, 1998). It has been realized that substantial savings can be realized by creating closer collaborative relationships with suppliers. These savings are materialized through analysing purchasing spend and creating purchasing and supplier strategies; focusing volumes and developing core suppliers; and standardizing business processes and reducing transaction costs with suppliers (van Weele, 2005). Anderson and Katz (1998) notes that the closer the relationship between the buyer and the seller and the more the alliance is tailored to the needs of both parties, the more likely it is to provide a unique competitive advantage. This is because competitors are unlikely to be able to establish and benefit from a similar arrangement.

These challenges are by no means exclusive to a specific country, industry or company size, although small and medium sized enterprises tend to have the most to gain from embracing this new strategic focus on purchasing. For many smaller businesses sudden and quick growth can lead to growing pains where not all business functions have the time to catch up. Furthermore, bigger companies and organizations usually have dedicated departments handling logistics, something that naturally lends greater attention to this issue.

Liaoning Province is one of the most important industrial and raw material production bases in China with a vibrant and quickly growing flora of companies. Located in the northeast of China facing the Yellow Sea, it is not only a prominent producer of pig iron, steel and metal-cutting machine tools; it is also home to big industrial ports such as Dalian and Yingkou. The high concentration of producers in these industries is a constant source of competition and combined with the recent downturn in the global economy the pressure has increased to find ways to increase profitability and reduce costs.

## **1.2 The Wanxingda Group**

The Wanxingda Group (WXDG) [万兴达集团] is one of many groups based and operating in Liaoning Province. It comprises four companies, three of which are located just south of the provincial capital of Shenyang in the city of Liaoyang, with the last one located in Tieling, north of Shenyang. Also located in Liaoyang is Liaoning Hongchang Heavy Industries (LHHI), which enjoys a special relationship with WXDG although there is no formal connection between them. The group has grown significantly in the last years both organically and by adding whole new enterprises to the group. Processes and systems for handling logistics have been developed independently based on the original legacy ones and the group currently lacks a unified strategy in this area.

All companies in the group are distinctively industrial in nature. The WXDG produces electrical cable core wire, winding wire, dry transformers, high voltage cable accessories, electronic components, and rolled steel products. More specifically: excavator track shoe plates, insulated copper and aluminium wire, transformers and degaussing coils. Altogether the group manufactures over 30 different product series and has the capacity to produce more than 4000 different products.

Products are sold on both domestic and international markets with Aluminum Corporation of China, China Railway Group, Chinese consumer electronics producers Haier Electric and Hisense Electric, South Korean Daewoo, and American Caterpillar as major customers. The group has assets of nearly 800 million Yuan, covers an area of more than 300 thousand square meters, of which more than 100 thousand square meters are production facilities. WXDG is currently ranked the 17<sup>th</sup> strongest private enterprise in Liaoning Province.

The group comprises five companies (including LHHI) industrial companies:

- Liaoning Wanxingda Special Enamelled Wire (LWSEW)  
[辽宁万兴达特种漆包线集团有限公司]
- Liaoning Boji Electric (LBE)  
[辽宁博际电气技术有限公司]
- Liaoyang Hongyuan Electron (LHE)  
[辽阳宏源电子有限公司]
- Tieling Aochang Non-Ferrous Metal (TANFM)  
[铁岭奥昌有色金属加工厂]
- Liaoning Hongchang Heavy Industries (LHHI)  
[辽宁宏昌重工股份有限公司]

The WXDG companies' core competence lies in the effective processing of raw materials and efficient assembly of components into finished goods. The one exception is LBE's dry type high-voltage transformers, which deal with a relatively new technology and is therefore adding value through this aspect as well. Profit and margins in these enterprises are therefore sensitive not only to changes in costs stemming from support activities such as procurement, but also from primary activities such as logistics and operations. As far as these activities are concerned, a penny saved is a penny earned. Also, a significant part of production is destined for export, which exposes the group to the fickleness and jumpiness of the global economy.

The WXDG companies, as well as LHHI, can all be considered raw material intensive, or at least raw material dependent, consuming large amounts of steel, copper and aluminium during production. But they are largely insulated from fluctuations in raw material prices since increased raw material costs are passed on directly to customers; sometimes customers even provide the group with the raw material themselves. The quest for reducing costs is instead focused on improving efficiency and operational excellence. The WXDG companies currently handle distribution independently of each other but management have identified logistics as a possible avenue for increasing collaboration and reducing costs. The WXDG is consequently interested in investigating ways of translating their close ties and small geographical distance into reduced distribution costs.

The head offices are located in Shoushan, Liaoyang County, just outside the city of Liaoyang, see Figure 1. Liaoyang City in turn is located only 64 km south of the provincial capital of Liaoning Province, Shenyang. The distance from Tieling to Shenyang is 52 km.



Figure 1 – WXDG’s presence in Liaoning Province

LHHI, although not officially affiliated with the WXDG, shares a very intimate relationship with these four companies. This is due to the ownership structure: Mr Hu Kui owns the WXDG (and also serves as chairman of the Board) and at the same time his personal investments in LHHI makes him its major owner as well, see Figure 2. Therefore these five companies enjoy a closer connection than what is perhaps the norm for enterprises of separate industries without any formal business relations (buyer-seller etc.). LHHI is for example included on WXDG’s website.

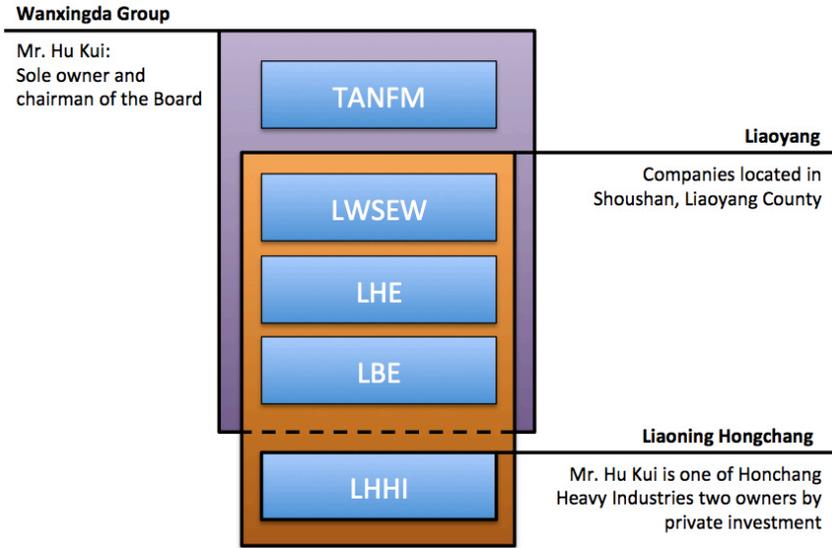


Figure 2 - Company relationships

LHHI, with all administration and production, is located in south Shoushan, while the WXDG is located to the west, just outside Shoushan. Originally, all four companies of the WXDG were located in Shoushan, but due to Tieling City's 1997 regional policies for promoting industrial growth it became more profitable for TANFM to move to Tieling than remaining in Shoushan. The remaining three companies are all located physically very near each other, see Figure 3. The WXDG head offices, LWSEW and LBE are found on the south side of Lantang Road, while LHE is located on the north side. LWSEW inherited TANFM's facilities next to LHE when it moved to Tieling, and now has factories and facilities on both sides.

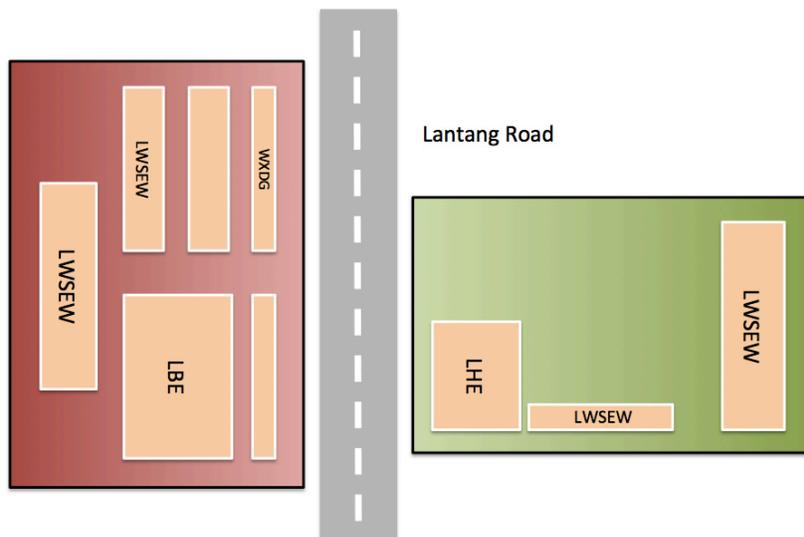


Figure 3 - The Wanxingda Group

Since the move, TANFM has become independent operationally to a quite high degree due to the distance (64 km from Shenyang, 116 km from Liaoyang). Another reason is the fact that TANFM is not dependent the products or expertise of any of the other WXDG companies, who, too, are not dependent on TANFM.

### **1.3 Problem Discussion**

Intimately connected with the potential for fruitful cooperation is proximity. According to Knoben and Oerlemans (2006), the three types of proximity that have the biggest impact on inter-organizational collaboration are organizational, technological and geographical proximity. Organizational proximity describes the extent to which rules and norms influence the interaction between two organizations. Technological proximity describes the ease (or difficulty) with which technological knowledge is shared and developed between two parties. Geographical proximity relates to the physical distance between two entities. Proximity in these three aspects is a prerequisite for successful inter-organizational collaboration and requires investments of both time and resources. Silicon Valley is mentioned as an example of an entire area with a high level of proximity in all dimensions. Actors in Silicon Valley are located close to each other, work within a few common industries and share many organizational norms and procedures, and hence collaboration has flourished despite the diverse cultural backgrounds of the entrepreneurs in the area. The intensive collaboration and knowledge exchange has in this case helped to spur innovation.

It can be argued that the same is true for Liaoning Wanxingda Special Enamelled Wire (LWSEW), Liaoning Boji Electric (LBE) and Liaoyang Hongyuan Electron (LHE) in the WXDG, although perhaps not to such an extreme extent. LWSEW provides LBE and LHE with all of their copper wire, which combined with the extremely close distance between the companies (they are all located in the same industrial park) can be regarded as a kind of naturally occurring virtual integration between supplier and customer, see Figure 4. The internal logistics, here the deliveries of copper wire, is carried out using forklifts in an ad hoc manner to a negligible cost. Moreover, the administrative functions of the three companies are also located very closely to each other; LWSEW and LBE are located in the same building and LHE on the other side of the road. This provides organizational and geographical proximity, and since they are all part of the same supply chain they can be said to share a common language when it comes to technology as well.

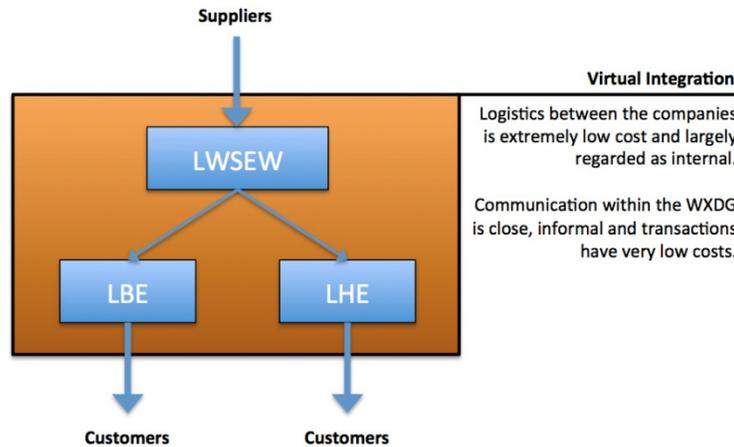


Figure 4 - Virtual integration at the WXDG

Despite the proximity on all these levels, they currently manage outbound logistics activities independently of each other, each enlisting the services of local logistics companies to handle shipping of goods to customers. This appears to be an opportunity to leverage the combined distribution volumes within the group to reach economies of scale, especially so since all three companies are responsible for the distribution of all products sold. Assuming that customers are content with the current prices, then any savings from reduced logistics costs would be a source of pure profit for the WXDG. If not, a reduction in expenditures would help their products stay competitive.

A common policy on transportation purchasing among the companies in the group would be a natural evolution of their relationship. It is tempting to think that a joint purchasing scheme at the WXDG would be more feasible than in other contexts, for example between competitors. Many of the common problems facing purchasing consortia, such as unwillingness to share sensitive information, lack of trust and fear of opportunism (Quayle, 2002; Morrissey and Pittaway, 2004), are likely to be less pronounced within a group of companies where channels for communication and a culture of belonging to a common entity are already in place.

Kraljic's (1983) framework for portfolio management in purchasing classifies products as one of four different categories depending on 1) the product's impact on overall profit and 2) the risk associated with sourcing it. The categories are *non-critical*, *leverage*, *strategic* and *bottleneck*, and each require their own distinct purchasing strategy. The products of these three companies can all be transported using standard vehicles, which reduces the complexity and requirements when purchasing logistics services. There is an abundance of hauliers and forwarders in Liaoning Province specializing in truckload transportation, adding to the buyer's negotiating power. Along this line of reasoning, logistics fits the description of a *leverage* commodity and the approach recommended for leverage items is to exploit buying power to negotiate favourable terms with suppliers (Gelderman and van Weele, 2003).

## 1.4 Purpose and Goal of the Thesis

The purpose of the thesis is to conduct a normative study to investigating the possibility of reducing costs by cooperating on purchasing transport services within a group of companies for the distribution of finished goods.

The goal is to answer the questions:

1. Is it possible to reduce distribution costs at the Wanxingda Group by working jointly on transportation procurement activities? If so, what level of reduction in costs would be possible?
2. How would any benefit derived from cooperating best be shared among the collaborators?

## 1.5 Delimitation

The thesis will be centred on the first two steps of the framework for industrial purchasing introduced by van Weele (2005). The steps are *determining specification, selecting supplier*, i.e., the first steps in the tactical purchasing part of the purchasing process. The implementation and evaluation of any beneficial solution found has been left outside the scope of the thesis (contracting, ordering, evaluation etc.) due to the limited time available and the strategic nature of the problem; this kind of initiatives are rarely implemented overnight because of a multitude obvious reasons. Focus will instead be on the relationship and interaction between the three focus companies and the effects of them joining forces on purchasing activities (and not on the dyad between the entity they comprise and a third party).

The focus will be on finding routes, products and volumes that can be aggregated in order to reach the critical volume needed to negotiate better prices from logistics providers. Land-bound transports represent the vast majority of the deliveries, by far, and will thus be given the most attention. Also, the thesis will focus exclusively on the distribution of finished goods and neither internal logistics nor inbounds transports will be considered. Internal logistics is almost non-existent and the scope of this thesis is not big enough to allow for a study of both inbound and outbound logistics. The reason this issue is given this much focus is that money is always a crucial factor when companies embark on new projects, regardless if independently or in groups. Moreover, money tends to be a very sensitive issue when it comes to collaboration, which further increases the relevancy of this issue. Lastly, if it is possible to save money by cooperating the biggest savings are most likely to come from price reductions, or at least such savings would be the easiest to measure. Although indirect savings and other benefits resulting from increased effectiveness and synergies are much harder to detect and measure they are still desirable and are often necessary for improvement projects to be sustainable in the long run. All products produced by these three companies will be considered in order to maximize potential synergies. No distinction will be made between products destined for export and the

domestic market. Express deliveries, small goods, spare parts, documents etc. will not be considered in this study. The Wanxingda companies do not have any distribution centres and no inventories other than those adjacent to the factories, so this aspect does not need to be investigated. Furthermore, the packaging of the products and the loading of goods on the trucks are outside the scope of this study. So are also route planning and the optimization of the size of the truck fleet, as external logistics companies will be enlisted to perform the actual shipping.

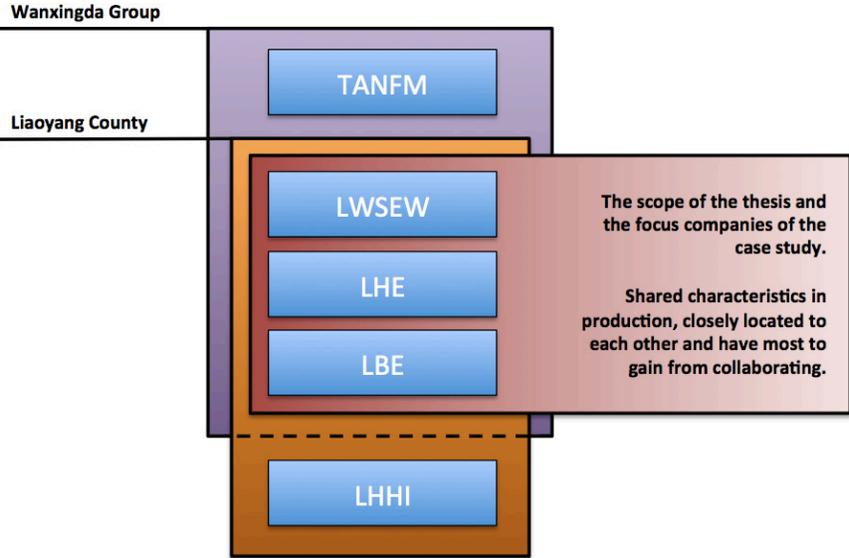


Figure 5 - Scope of this thesis

An interesting and very relevant aspect of inter-organizational interaction is how costs and rewards of joint activities should be shared between the participants. A good idea that is well implemented will still fall flat if the executing companies cannot agree on a way to handle how benefits reaped should be shared among them. The third question that this thesis seeks to answer is thus how potential benefit can be shared in a way that is perceived as fair by all of the participants. The thesis will seek to develop a framework based on relevant theory to aid in approaching the multifaceted problem that is collaborative procurement of transportation.

The scope of this study was set to only include LWSEW, LHE and LBE, since their conditions for successfully implementing cooperative purchasing appear to be the most favourable, illustrated graphically in Figure 5. TANFM was excluded not only due to the distance of Tieling from Liaoyang, but also because TANFM has grown independent of the WXDG in many aspects compared to the companies that remained in Liaoyang County. This reduces its organizational proximity with the WXDG, and therefore reduces the attractiveness of including TANFM in the study. LHHI was excluded because its products are big, heavy and often distributed as full truckloads using heavy trailers, making synergies difficult to realize.

## 1.6 Disposition of the Report

Below follows an introduction to the structure and contents of this report to help guide the reader.

### **Chapter 1 – Introduction**

Provides the reader with the background and purpose of this thesis along with the problem statement and delimitations.

### **Chapter 2 – Company Introduction**

Introduces the Wanxingda Group and the four focus companies.

### **Chapter 3 – Theory**

Presents previous research relevant to the topic of the thesis together with the framework developed to answer the research questions.

### **Chapter 4 – Methodology**

Describes and motivates the approach chosen for this study and the method used to execute it.

### **Chapter 5 – Empirics**

Information and data collected to support the analysis is presented here. All focus companies are described along with the current needs of the group and a market survey.

### **Chapter 6 – Analysis**

The empirical data is analysed both qualitatively and quantitatively.

### **Chapter 7 – Conclusions**

The findings of this thesis are summarized and discussed in this section.

### **Chapter 8 – References**

List of all sources relied upon during the writing of this thesis.

### **Chapter 9 – Appendices**

Documents of particular interest produced during this thesis.

## 1.7 Abbreviations

<i>WXDG</i>	Wanxingda Group
<i>LWSEW</i>	Liaoning Wanxingda Special Enamelled Wire
<i>LHHI</i>	Liaoning Hongchang Heavy Industries
<i>LBE</i>	Liaoning Boji Electric
<i>LHE</i>	Liaoyang Hongyuan Electron
<i>TANFM</i>	Tieling Aochang Non-Ferrous Metals

## 1.8 Map of China

A map for of China and its provinces for reference, Figure 6 below. Liaoning Province highlighted in grey.



Figure 6 - Map of China's provinces and provincial capitals

## 1.9 Table Index

Table 1	Transportation cost composition	pp. 30
Table 2	LHE summary, May	pp. 59
Table 3	LHE summary, September	pp. 59
Table 4	LBE summary, May	pp. 61
Table 5	LBE summary, September	pp. 61
Table 6	LWSEW summary (external transports), May	pp. 62
Table 7	LWSEW summary (external transports), September	pp. 63
Table 8	LWSEW summary (internal transports)	pp. 64
Table 9	LWSEW truck utilization	pp. 64
Table 10	Cost of shipments (RfQ)	pp. 69
Table 11	Costs summary	pp. 69
Table 12	Shipments to Dalian, summary	pp. 70
Table 13	Quotations comparison, summary	pp. 73
Table 14	Comparison, presented by scenario	pp. 74
Table 15	Quotations summary, Liaoyang-Dalian	pp. 76
Table 16	Comparison by scenario, Liaoyang-Dalian	pp. 77

## 1.10 Figure Index

Figure 1	WXDG's presence in Liaoning Province	pp. 4
Figure 2	Company relationships	pp. 5
Figure 3	The Wanxingda Group	pp. 5
Figure 4	Virtual integration at the WXDG	pp. 7
Figure 5	Scope of this thesis	pp. 9
Figure 6	Map of China's provinces and provincial capitals	pp. 11
Figure 7	Framework for the underlying theory on collaborative purchasing	pp. 14
Figure 8	Underlying theoretical framework: procurement	pp. 14
Figure 9	The industrial purchasing process	pp. 15
Figure 10	Underlying theoretical framework: collaboration	pp. 17
Figure 11	Mechanisms for lateral collaboration	pp. 18
Figure 12	Horizontal collaboration and the level of integration	pp. 19
Figure 13	Underlying theoretical framework: logistics	pp. 22
Figure 14	Views on logistics and supply chain management	pp. 23
Figure 15	Underlying theoretical framework: transport sourcing	pp. 26
Figure 16	Process for transportation purchasing	pp. 27
Figure 17	Underlying theoretical framework: joint purchasing	pp. 31
Figure 18	Business transaction reduction through joint purchasing	pp. 33
Figure 19	Process for evaluating the potential for cooperating	pp. 35
Figure 20	Research methods	pp. 40
Figure 21	Connection between theory and methodology	pp. 42
Figure 22	Comparison between qualitative and quantitative research	pp. 45
Figure 23	Step one: define scope of collaboration	pp. 53
Figure 24	Step two: understand current buy and needs	pp. 58
Figure 25	Destinations and deliveries, May	pp. 60
Figure 26	Destinations and deliveries, September	pp. 60
Figure 27	Step three: market survey and RFQ	pp. 65
Figure 28	Diesel price during 2011 (RMB per gallon)	pp. 66
Figure 29	Diesel price index during 2011	pp. 67
Figure 30	Step four: analyse potential	pp. 72
Figure 31	Step five: find suitable form of cooperation	pp. 78
Figure 32	Step six: negotiate	pp. 84

## 2 Theory

*The following chapter will present the theoretical foundation that this study is based as well as the framework developed to answer the research questions. The framework, joint procurement of transportation, draws from contemporary knowledge within the areas of logistics, procurement and collaboration to create a comprehensive process for approaching this multifaceted problem.*

### 2.1 Overview

The goal of this chapter is to create a framework for how collaborative purchasing is best evaluated and implemented within the setting of independent organizations working together. The framework will cover the assessment and analysis of opportunities to collaborate on purchasing activities, organizational forms suitable for this kind of initiatives and how any benefits resulting from cooperating should best be shared. The focus of this thesis is the area where the fields of logistics, procurement and collaboration intersects, as seen in Figure 7. There is plenty of published research in each field, but precious little on the combination of all three of them. The plentiful sources of theory will help create a sound foundation to support the framework and ensure that all aspects of this multifaceted problem will be given appropriate attention. An introduction will be given to each respective field followed by a review of existing research of their pair wise intersections, i.e., *transport procurement* and *joint purchasing*. Finally, a six-step method will be presented for how the interaction of these three fields can be evaluated for the purpose of this thesis. An important part of buying a product or service is the process leading up to the actual purchase. This includes defining what is needed, setting up criteria to evaluate quality, sourcing suppliers as well as developing suppliers. Especially the first steps of the procurement process is central to this thesis and the developed framework; definition of specifications, the sourcing phase where suppliers are found and the evaluation of purchasing activities to find synergies.

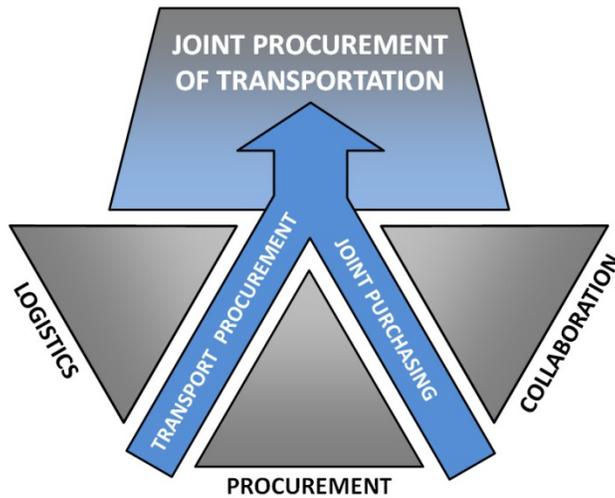


Figure 7 - Framework for the underlying theory on collaborative purchasing

First, procurement and strategic purchasing in industrial settings are described and defined along with the benefits that can be realized from proactively working in this area. The application of strategic purchasing within the field of logistics and common challenges are then presented. Second, collaboration between independent organizations in the context of supply chains is discussed along with different ways of collaborating on purchasing activities. How the gains of any joint initiative should be shared between the participants is also elaborated upon. Third, an introduction to the field of logistics is given along with a brief review of the issue of whether to outsource this function or not. In the last section, one possible approach for investigating the potential of collaborating in all three aspects is described.

## 2.2 Procurement

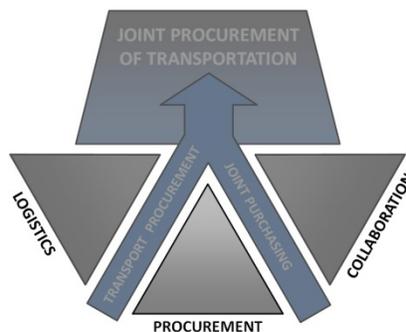


Figure 8 - Underlying theoretical framework: procurement

In order for purchasing to be an effective and useful tool a structured process is needed. This section introduces and describes the industrial purchasing process, which is central to the kind of collaborative projects investigated in this study, Figure 8.

### 2.2.1 Definition

The importance of procurement to manufacturing companies stem from one simple fact: purchased materials and services generally constitute a major part of the total cost of goods sold. Sourcing strategies and purchasing policies can therefore significantly contribute to business success in several ways. First and foremost, purchasing can improve margins by realizing cost savings; a dollar saved in purchasing is a dollar added to the bottom line. Secondly, purchasing can improve the capital turnover ratio of companies by improving the quality of purchased goods/services and logistics arrangements with suppliers. Lastly, suppliers engaged in the purchasing and product design processes can add significantly to the company's innovation processes. To help companies to realize these benefits van Weele (2005) presents a six-step framework of the purchasing process in a general industrial setting with the overarching goal of:

*Managing the company's external resources in such a way that the supply of all goods, services, capabilities and knowledge which are necessary for running, maintaining and managing the company's primary and support activities is secured at the most favourable conditions.*

This framework covers in detail the different phases of making a purchase and the accompanying activities, from the initial specification of the desired product to the evaluation of the quality of the received product, see Figure 9.

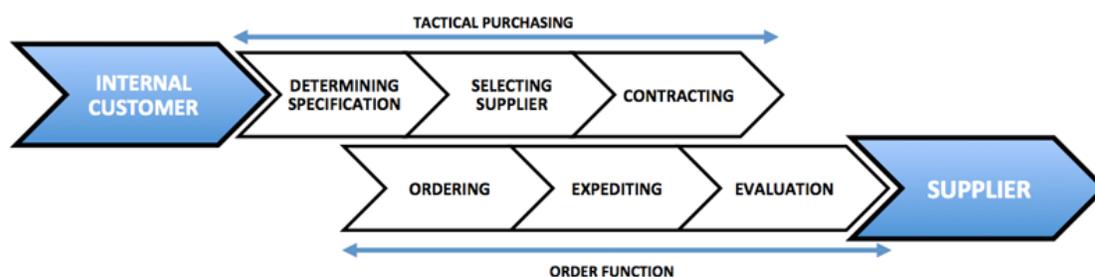


Figure 9 - The industrial purchasing process. Adapted from van Weele (2005)

With purchasing defined in this way, van Weele (2005) goes on to describe the principal activities in purchasing as:

- Determine specifications for all aspects of quality and value relevant to the goods or services to be bought;
- Finding and selecting the most suitable supplier;
- Preparing and conducting negotiations with nominated suppliers with the goal of establishing an agreement;
- Placing orders with the selected supplier;
- Monitoring existing orders to secure supply;

- Follow up on problems and evaluate the performance of suppliers.

Depending on the source there might and might not be a difference between purchasing and procurement. To some, procurement corresponds to the whole process of developing specifications, doing market research, tendering, negotiating and buying activities while purchasing to others simply means executing buying according to a contract. For the purpose of this thesis the Council of Supply Chain Management Professional's (CSCMP) definition will be used:

*The activities associated with acquiring products or services. The range of activities can vary widely between organizations to include all of [sic] parts of the functions of procurement planning, purchasing, inventory control, traffic, receiving, incoming inspection, and salvage operations. Synonym: purchasing.*

CSCMP's definition acknowledges that the two terms are used differently and sometimes interchangeably. This definition will be expanded slightly to also incorporate developing specifications and sourcing suppliers to better align with what van Weele's terms *tactical purchasing*. These two activities are central to this thesis and are described in detail below:

### **Determining Specification**

During the first phase of the purchasing process the actual needs of the organization are identified, prompting a make-or-buy decision. Production of which products (or services) should be kept in-house and which should be outsourced? If it is decided that enlisting external resources is the most beneficial course of action then the requirements of the products/service to be bought are specified. This can either be done by describing the functionality that the product is expected to provide the user with (a functional specification) or by describing the technical properties and characteristics of the product as well as the activities to be performed by the supplier (a technical specification). A functional specification gives the supplier more freedom to contribute with expertise and innovate, while technical specifications can easily lead to over specification and unnecessarily constrain the supplier. When buying logistics services the specification could include quantities to be delivered, the time window of the delivery, frequency of deliveries, the way the delivery should be carried out etc.

### **Selecting Supplier**

The second phase involves performing a market survey to identify potential suppliers. First, the type of subcontracting to be used is decided upon (a turnkey solution or partial subcontracting). Then a type of contract is chosen (fixed-price, lump-sum, cost-reimbursable or unit-rate). When these two issues are settled the tendering process begins. This process consists of the following activities:

- Based on the specifications produced in the first phase, summarize the prequalification requirements that suppliers have to meet.
- Assemble an initial bidders list (long-list) of suppliers deemed capable of providing the desired product/service. If the list is too short then a market survey can be conducted to identify new suppliers.
- Send out requests for information (RFI).
- Create a list of the most promising suppliers (short-list) based on the information received from the RFIs.
- Send out requests for quotations (RFQ). Preferably, the RFQ is designed in such a way that comparing bids from different suppliers is made easy.

At this stage the bids are compared and evaluated and when a supplier has been selected the delivery of the product is negotiated. Finally a risk analysis of the supplier is performed.

There is often an overlap between this phase and the first phase, as costs are estimated and the basic technologies to be used are decided when drawing up the specifications.

## 2.3 Collaboration

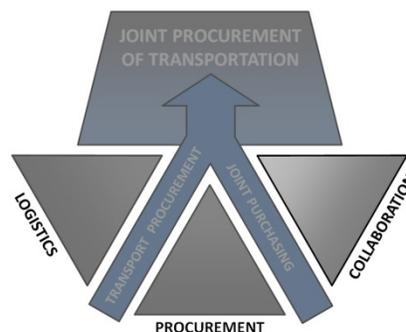


Figure 10 - Underlying theoretical framework: collaboration

Collaboration comes in many different kinds and scopes, but of particular interest to this study is horizontal or intra-organizational cooperation. Cooperation is crucial to any initiative where more than one independent organization take part and is also one of the cornerstones of the theoretical framework that this study relies upon, see Figure 10.

### 2.3.1 Definition

The cooperation between firms in different constellations has been called a number of different things in academic literature: cooperation, collaboration, alliance and partnership. These have all been used more or less interchangeably to describe the sharing of resources between organizations in different kinds of endeavours. Collaboration can be divided into two different kinds (vertical and horizontal) and then the combination of the two (lateral). Vertical collaboration concerns cooperation between different layers of suppliers and customers within

a supply chain. Simaputang and Sridharan (2002) define vertical collaboration as occurring when “two or more organizations such as the manufacturer, the distributor, the carrier and the retailer share their responsibilities, resources and performance information to serve relatively similar end customers”. Horizontal collaboration on the other hand is about identifying and exploiting win-win situations between two or more independent or competing organizations that are active at the same level of the supply chain (Simaputang and Sridharan, 2002; Cruijssen, Dullaert and Fleuren, 2007). These companies can be suppliers, manufacturers, retailers or customers. The third kind of collaboration is a combination of the two mentioned above. Lateral collaboration between two organizations aims to improve flexibility and response time by cutting across vertical lines of authority, empowering employees of both organizations to jointly solve problems at the level they arise instead of referring them upwards in the decision-making hierarchy (Huiskonen and Pirttilä, 2002).

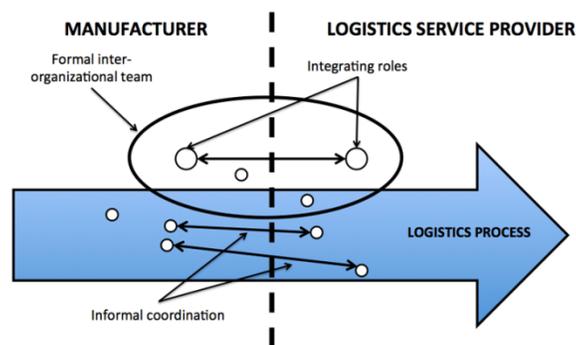


Figure 11 - Mechanisms for lateral collaboration. Adopted from Huiskonen and Pirttilä (2001)

For the purpose of this thesis the term “collaboration” will be adopted to simply describe the cooperation of two or more firms without any particular consideration paid to any nuances there might be between different terms. The focus will be squarely on horizontal collaboration, since the relationship of interest is that between the companies cooperating and not on the interface between them and an external supplier, as seen in Figure 11.

### 2.3.2 Inter-organizational Collaboration

A group of industry professionals interviewed by Mentzer et al. (2000) indicate that supply chain “collaboration” entails more than “cooperation” in terms of information, risk, reward and knowledge sharing. A spectrum of cooperation was presented by Cruijssen, Dullaert and Fleuren (2007), defining the two extremes at each end of the spectrum as well as three levels in between. Finally, Speckman et al. (1998) ranks the different levels of cooperation from least to most integrated as: *open market negotiations, cooperation, coordination and collaboration*.

Cruijssen, Dullaert and Fleuren (2007) present a spectrum of horizontal collaboration in transportation and logistics, see Figure 12. The two extremes at each end of the spectrum are defined, as well as three levels in between.

- *Arm's length relationship* – transactions are incidental in nature and there is no strong sense of commitment between parties.
- *Type 1* – both parties mutually recognized as partners, although coordination is only short-term and limited in scope and the number of transactions.
- *Type 2* – business planning is not only coordinative but integrative as well; collaboration is long-term with multiple functions of both companies involved.
- *Type 3* – operations of both parties are integrated to a significant level and are mutually regarded as an extension of itself.
- *Horizontal integration* – the merger between two organizations.

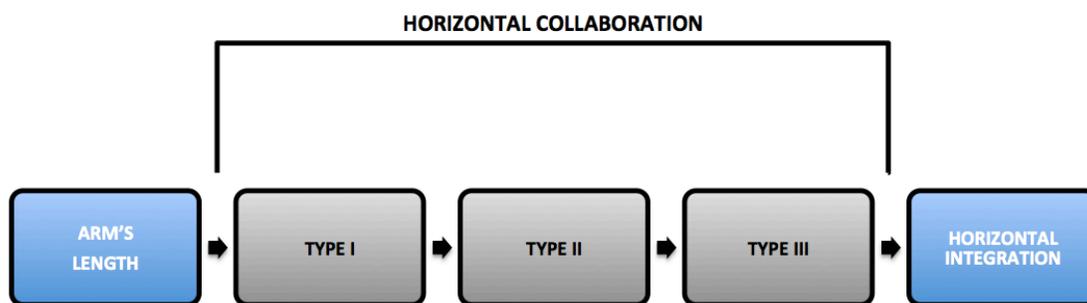


Figure 12 - Horizontal collaboration and level of integration

Looking at relationships between competitors in business networks, Bengtsson and Kock (1999) present four types of horizontal relationships. The first one is typical *competition* that forces companies to adapt and improve their business. *Cooperation* arises when a company requires one or more scarce resources that are held by a competitor. *Coexistence* in turn is the proper choice when a weak company lacks the resources of a competitor that is not interested in cooperating. Finally, the last type, *coopetition*, is a combination of competition and cooperation where competitors collaborate on non-core activities while competing on core activities. This concept is further elaborated upon by Bengtsson and Kock (2000). Regardless of the level of integration, central to all kinds collaboration is that they should result in a competitive advantage greater than the companies could have accomplished individually on their own. Also, it is stressed that an important aspect of collaboration is that it is based on mutual trust and openness, with risks and rewards shared in a fair manner; the competitive advantage should benefit all parties, not just one or a few. It has been found that many of the most successful partnerships have contracts with the fewest provisions, and that open contracts based on trust is the most suitable form of formalizing horizontal collaboration as the pursuit of common goals often depends on future conditions which are difficult to capture in contractual agreements (Crujssen, Dullaert and Fleuren, 2007). In alliances between manufacturers and suppliers of services the contract is in many cases seen as an administrative necessity that carries little practical importance. If there is a contract it is common to use standardized evergreen

contracts to specify things such as return on investment, asset management, and payment terms, but would not be crucial to the alliance on operational and strategic levels. In general, informal social contracts are much more important in long-term alliances (Frankel, Schmitz Whipple, Frayer, 1996). Hoffman and Schlosser's (2001) empirical survey into the success factors of strategic alliances between small and medium-sized enterprises (SMEs) revealed four factors that stood out as critical to success. The overall two most critical factors relate to the actual content of an alliance ("precise definition of rights and duties", "contributing specific strengths") while the other two important factors concerned the processes within the alliance ("deriving alliance objectives from business strategy", "speedy implementation and fast results"). An interesting finding was that several of the most critical, and by unsuccessful alliances most underestimated, factors are concentrated in the early stages of alliance formation. This indicates that favourable conditions, systematic preparation and thorough assessment of the fit of alliance partners should be central to any long-term collaborative effort.

Because of the close proximity (as discussed by Knoblen and Oerlemans, 2006) of the WXDG companies in multiple dimensions it is unlikely that an extensive contract would be needed to embark upon a joint project of the kind investigated in this thesis. Furthermore, empirical surveys in the literature indicate that this is not critical to fruitful business relationships between companies. Identifying the level of integration and relationship between the companies in the WXDG will be useful for finding the best format for joint purchasing, if it proves financially beneficial. Insights into how alliances are formed and what make them successful, especially in the context of SMEs, will be helpful in investigating the potential and possibilities in cooperating within the WXDG.

### 2.3.3 Reward Sharing

In many situations it is beneficial for individuals to join forces and work together, be they social, economic or political. Since each individual has their own purpose, the problem arises how costs (or rewards) should be allocated between the participants of a given initiative. This kind of allocation problem can be modelled according to game theory as a game of *characteristic function form*. The problem is given by a set of players and functions specifying the utility (costs or rewards) that can be allocated between them by working together, i.e., by forming *coalitions*. A key characteristic of this kind of game is that this utility in question can be transferred between the players without loss. There are two fundamental questions that need to be answered: 1) Which coalitions can be expected to form? and 2) How will the utility gained be apportioned between them? If this allocation is not done in what is perceived as a fair manner, the grand coalition (the coalition comprising all players) will likely disintegrate into smaller sub-coalitions or fail to materialize altogether (Hadjduová, 2006).

Different methods generate solutions with different properties. These properties describe the feasibility (the likelihood of it being accepted by the players) of the solution. A solution is called *efficient* if all the costs are allocated among the players. It is *rational* if no player pays more in the joint venture than he or she would on their own. *Marginality* requires that no player should pay less than the cost of including him or her in the venture. The *core* comprises all solutions that satisfy both the rationality and the marginality constraint. Solutions found in the core are said to be *stable*. Furthermore, players that neither add nor reduce costs by joining the venture are called dummies, and should hence not be allocated any costs. Finally, *monotonicity* dictates that adding another player to the game can never cause costs to decrease (Tijs and Driessen, 1986; Frisk et al., 2010).

The problem with simplistic methods that allocate utility proportionally based on a common attribute, e.g., volume, population, size etc., is that they fail to take into consideration the fundamental aspect of rationality. They are therefore unable to provide solutions that give players enough incentive to participate. But since better methods require very detailed information about costs, simpler schemes are more likely to be used in practice. Furthermore, the fairness of the solutions generated by more advanced methods is sometimes difficult to convey to the players, which also hampers their adoption (Young, 1994).

There are a number of different methods for sharing utility among groups or individuals that produce more equitable solutions. Young's (1994) survey of seven cost allocation methods includes the Separable Cost-Remaining Benefits (SCRB) method as well as several variations of the Least Core/Nucleolus method. The first method aims to allocate costs according to the players' willingness to pay, while the latter seek a solution that minimizes the maximum unhappiness in the grand coalition. The Shapley Value and Cost Gap are two other methods frequently mentioned in the literature. The Shapley Value apportions costs according to the average marginal cost of including a new player; Cost Gap aims to reduce the difference in the utility allocated between players (SCRB can be seen as a "rough" version of this method). For a detailed description of the Shapley Value and Cost Gap methods see Tijs and Driessen (1986). Frisk et al. (2010) introduced the Equal Profit Method (EPM) as an easily understandable method to distribute profits more evenly between players to help facilitate negotiations; the profits are distributed in a way that minimizes the pair-wise difference in benefit between the players. This new approach to reward sharing was then implemented with good results in a case study where wood suppliers cooperated in the forestry industry to reduce transportation distances. A slight modification of this scheme was used successfully in the Canadian furniture industry to share costs when collaboratively planning the distribution to the United States using truckload transports (Audy and D'Amours, 2008). The EPM is in turn a variation of Constrained Egalitarian Allocation (CEA) (D'Amours and Rönnqvist, 2011; Dutta, Bhaskar, Ray, 1989).

Young (1994) points out that the SCRB-method, commonly used for multipurpose projects, suffer from several disadvantages: non-monotonicity, failure to properly cover marginal costs and inability to satisfy rationality. Of the seven methods in the survey, Proportional Nucleolus is recommended as it fulfils all these requirements and apportions rewards in a manner more consistent with the benefits players reap from participating in the game than other methods. There are reasons though, for applying more than one reward sharing scheme. One drawback with the Proportional Nucleolus method is that it tends to overly emphasize the bargaining power of key members of the coalition, severely discriminating in their favour while still remaining rational (Lemaire, 1984). The result is an allocation that is unlikely to be accepted. Even though not all allocation methods possess all of the attributes listed above, but they might still provide very feasible solutions simply because those solutions are considered more “fair” to the players. It is therefore advisable to use several different methods even though these will need additional time to compute. Commonly used are Proportional Nucleolus, Shapely Value, EPM (or some other method producing relatively equal allocations) and finally some kind of straight proportional allocation based on volume, cost, size etc.

## 2.4 Logistics

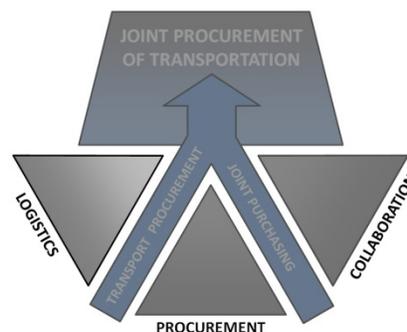


Figure 13 - Underlying theoretical framework: logistics

The idea of effective and efficient transportation of goods between two points is central to the questions that this thesis seeks to answer, see Figure 13; this section thus presents a definition of what logistics is, what it is not and how it differs from supply chain management.

### 2.4.1 Definition

Logistics means different things to different people. The Council of Supply Chain Professionals defines the two closely related concepts of logistics and Supply Chain Management (SCM) as:

**Logistics** is the process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods including services, and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements, including inbound, outbound, internal, and external movements.

**Supply Chain Management** encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third-party service providers, and customers.

These definitions, their scope, activities and relationship to each other are anything but agreed upon, as is made clear in the survey conducted by Larson and Halldorsson (2004). They identify and describe four different perspectives, see Figure 14, on logistics:

- *Traditionalist* – “logistics outside the firm”, considers SCM to be a special type of logistics (external or inter-organisational).
- *Unionist* – argues that logistics is a part of SCM, that logistics is one of the many activities that comprise SCM, i.e., logistics, operations management, purchasing, strategic planning etc.
- *Re-labelling* – proponents of this view consider SCM to be simply the evolution of logistics and that they are but two names of the same thing.
- *Intersectionist* – believes that SCM is a strategy that cuts across many business processes, internally and throughout the supply channels as well, and therefore not just a superset of activities that includes logistics.

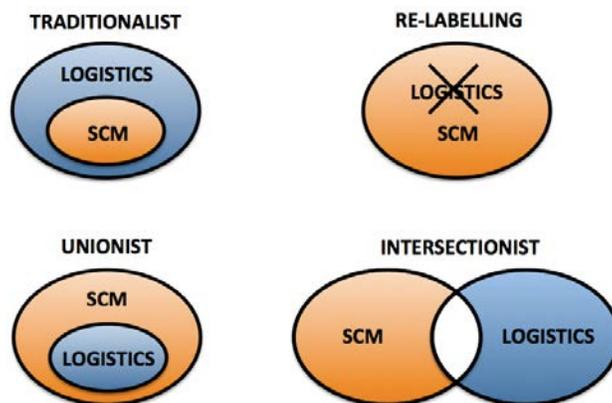


Figure 14 - Views on logistics and supply chain management

Since the definition of logistics and SCM and their relationship is of minor importance to this study, it is noted that opinions on the matter differ and for the purpose of this study the two will be defined as described by the Council of Supply Chain Professionals (arguably unionist).

### 2.4.2 Outsourcing Logistics Activities

The need for manufacturers to be more agile and responsive to customer and market demands has helped propel logistics from a neglected operative function to one of strategic importance. Since logistics has come to involve larger and larger commitments of both capital and resources the need for a proper strategy to handle logistics activities has arisen. Generally, there are three different options available (Razzaque and Chang, 1998):

1. Provide the function in-house by producing the service.
2. Have a subsidiary run logistics through setting up or buying a logistics firm.
3. Outsource the function and then buy the service back from an external firm.

Especially the third option has received a lot of attention lately. Following the rise in popularity of just-in-time production principles and the rising capabilities of third parties, outsourcing of logistics functions and activities has become a way to turn fixed costs into variable costs. This in turn helps increase flexibility and adaptability to changing markets, reduce capital investment while still being able to access experience and expertise. Outsourcing is not without issues though. Losing control of the logistics function, missing out on important information, failing to select or manage providers, unreliable or unrealistic promises from providers, and difficulties changing providers are all common problems that require serious consideration before any outsourcing decisions are made. Razzaque and Chang (1998) present three key questions in their literature survey that should be asked when considering outsourcing a function as important as logistics:

1. Which are the most crucial logistics considerations: Competitive position? Bottom-line cost? Inventory control of finished goods?
2. Is there currently enough manpower available to perform these functions in-house? Do we have the skills and knowledge needed?
3. Has a proper cost-benefit analysis been made for the current setup versus the suggested new one? How do the options align with our general business goals?

Answering these questions should provide enough insight into the current and future needs with regard to logistics. The question is then how to best match these needs with the competencies of available third-party logistics providers.

### 2.4.3 Selection Criteria

Selecting the right provider of logistics services is not a trivial choice. Proper and adequate attention to this problem is necessary for the company to maximize its chances to find the service provider that best matches its needs at the best total cost. First and foremost the outsourcing company must understand what the logistics service providers are selling and that means understanding their characteristics and capabilities. There are many factors that need to

be considered and the unstructured nature of the problem calls for constant performance measurements to ensure that the service purchased is indeed effective (Razzaque and Chang, 1998). Common criteria when choosing among third-party providers are on time performance, superior error rates, financial stability, creative management, ability to deliver as promised, top management availability, and responsiveness to unforeseen occurrences (Menon et al., 1998).

#### 2.4.4 Success Factors

The process of creating and maintaining a business relationship is not an easy feat, especially so when it comes to such an important function as logistics. Bowersox (1990) identifies the single most important factor common to successful logistics partnerships, vis. the recognition that logistics, as a business activity, is an important part of an organization's overall marketing strategy. Traditionally quality, promotion and price have been the foundation of a product's competitiveness while timeliness and location of delivery have largely been neglected. The ability of partnerships to capitalize upon these logistics capabilities has been found to be critical to success. Apart from this success factor, Bowersox also identifies the following five prerequisites to ensuring a fruitful partnership:

- *Role specification* – participants from both parts of the relationship must know their role in the value-adding process and understand the strategic character of the relationship.
- *Partner selection* – successful relationships are those that were built on mutual opportunities to realise economies of scale and at the same time spreading the risk in a fair manner between the parties involved.
- *Information sharing* – it is imperative that all parties involved realise that the benefits of cooperating can only be achieved through long-term commitment and that information needed for the partnership to function is shared without reservation.
- *Rules and goals* – trust between independent organizations is built by all parts adhering to unambiguous rules mutually agreed upon beforehand and by working towards the same goals, which is enabled through rigorous performance measurements.
- *Exit provisions* – it would be naïve not to acknowledge that the relationship will eventually be terminated, for one reason or another, and it is therefore prudent to decide upon how the partnership should be ended at an early stage of the partnership.

Tate (1996) expands upon these success factors by adding two more: flexibility and fairness. Flexibility, she claims, is essential to dealing with unforeseen events during the course of everyday operations, e.g., handling demand peaks, backorder situations or end-of-the-month promotions. A successful long-term relationship requires that benefits and burdens be shared fairly between partners. This means working together to improve operational excellence and remove inefficiencies from the system, but not at the expense of either partner. One example would be adjusting the rates paid for services if real demand differs significantly from projected demand.

### 2.4.5 Pitfalls

Outsourcing logistics and creating alliances and partnerships often requires a leap of faith from both parties involved. Traditionally, there are checks and balances to ensure that the buyer is getting the performance it is paying for when buying services. But in many cases these have to be substituted by trust when entering into a partnership. Not only when enlisting the services of new logistics providers but also when expanding on an existing relationship. This brings about problems such as how to build trust when there is no track record or business has previously only been handled on an arms-length basis. Even though it might be tempting to use the alliance to relentlessly pressure suppliers into offering lower prices, it is often found to be an unsustainable strategy. It is a quick way to improve profits short-term, but runs the risk of higher costs and damaged buyer-supplier relationships in the long-term (Anderson and Katz, 1998).

Bowersox (1990) stresses the importance of building trust early in the relationship. The reason is that there often exist imbalances between the parties regarding power and the stakes involved, which easily result in an uneven commitment to the partnership. Mutual trust is what bridges these gaps and imbalances, and is therefore critical to the long-term success of this kind of intimate business arrangement. A second area identified as problematic is the operationalization of the agreement, ensuring compliance by making sure that line managers and the organization commits to the provisions of the agreement. This is a common problem when deals are made at high levels of management without involving the middle managers that are then tasked with realizing the deal.

## 2.5 Transport Procurement

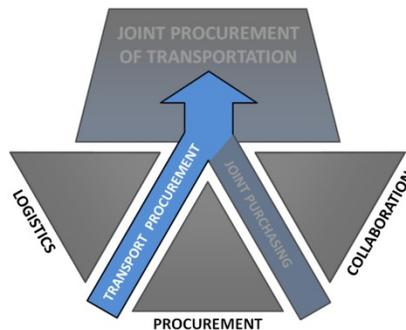


Figure 15 - Underlying theoretical framework: transport sourcing

In this section the reader will be introduced to the intersection of the fields of logistics and procurement, see Figure 15. Transportation puts some very specific requirements on the purchasing process and these will be accounted for here along with ways to handle these special demands.

### 2.5.1 Definition

There has been a clear trend the last two decades towards a focus on core activities while outsourcing those activities that 1) do not provide access to markets, 2) contribute significantly to customer value or 3) are easily imitated by competitors. Logistics activities, such as distribution and warehousing, are by many organizations considered not central to their competitiveness and is thus outsourced to companies specialized in the execution of these functions. This business strategy is both simple and logical (Sink and Langley, 1997). Many companies are increasingly outsourcing their logistics activities to external providers, even though the distribution aspect of a product is becoming more and more important for creating a compelling product offering (Bowersox, 1990; Sink and Langley, 1997). For the purpose of this thesis, the process of procuring transportation as described by Andersson and Norrman (2002) will be used, see Figure 16. The reasons are threefold: 1) it aligns closely with the general framework described by van Weele (2005) while being adapted to fit the context of logistics; 2) it acknowledges that different kinds of logistics services require different approaches; and 3) steps one to six closely reflect the scope of this thesis, van Weele's *determining specification and selecting supplier*.



Figure 16 - Process for transportation purchasing. Adapted from Andersson and Norrman (2002)

Andersson and Norrman (2002) discuss basic transportation services in the form of spot buying on freight exchanges, whereas this study focuses on joint procurement of road transportation. Since this is a problem of companies collaborating when buying transportation with modest requirements on integration from a third party, as opposed to a company closely collaborating with an external party to purchase a complex logistics solution, the scope falls somewhere between “freight exchange” and “advanced outsourcing”.

#### 1. Define/Specify the Service

Procurement of basic services is often transactional in nature with few conditions (e.g., lead-time), a one-time buy of the transportation of goods from one point to another. Specification is not necessarily difficult, but requires time. Advanced services such as third-party logistics are much more difficult to define, as they are more complex and tailored, oftentimes new to both shipper and carrier and abstract (e.g., “develop and deliver best-in-class service to our customers by using a cost-competitive solution”).

## **2. Understand Current Buy**

A thorough understanding of the need (lanes, volumes, etc.) is essential to executing an effective tendering process. Without knowledge of the current situation carriers will be unable to develop accurate proposals and the shipper will not be able to properly evaluate them. For advanced services this is doubly so, as outsourcing logistics activities to a third-party is likely to change the logistics structure, changing locations of nodes, roles and responsibilities etc. In the case of this study this means gathering and analysing data from the three different companies; all of them using different methods and systems for storing data and statistics.

## **3. Simplify/Standardize**

There is fundamental difference in how basic and advanced logistics services are purchased. The goal when purchasing basic transportation is often to realize benefits by leveraging size, reducing the supplier base or streamlining operations by buying a more standardised service. While buying advanced services on the other hand, the purpose is to increase efficiency by buying a function tailored by the carrier to the shipper's needs. During the procurement of a solution akin to the one proposed in this thesis, the emphasis from the buyer's perspective would be on the opportunity offered to the carrier to increase consolidation and fill-rates of goods on lanes originating from or passing through the region.

## **4. Market Survey**

When achieving the lowest possible cost is the main goal of a purchasing event, developing a big supplier base is a sensible strategy as it enables a broader comparison of prices. The problem with buying advanced logistics services is that oftentimes there are only a few, if any, providers with the necessary capabilities and experience. The focus of the market survey is therefore to identify if there are any potential providers, and if not, whether incumbent or new providers can be developed to provide the service needed.

## **5, 6. Request for Information and Request for Proposal**

It is common to issue a request for information (RFI) as an initial way of screening candidates, reducing the amount of carriers whom to include in the bidding process. Those carriers who qualify are then sent a request for proposal (RFP), specifying the service, departure and arrival points of lanes and forecast volumes on each lane. To facilitate comparison between bids, the carriers are often required to use a predefined response format, filling in prices and data in a standardized way. This would be a practical and prudent way of designing a RFP for use in this study, since it does not involve defining complex integrated services. Buying third-party logistics solutions requires solution-oriented RFPs for developing a blueprint of the service; the price for the suggested solutions are then negotiated with the candidates.

## **7, 8. Negotiations and Contracting**

Negotiations when purchasing basic transportation are often very short, resulting in many cases in a standard contract, if any contract at all. Advanced services on the other hand involve lengthy and detailed contracts because of the uncertainty and complexity.

### **2.5.2 Characteristics of Transportation**

The literature on the procurement of third-party logistics services is plentiful (see e.g., Razzaque and Cheng (1998) or Selviaridis and Spring (2007) for a review). The procurement of transportation shares the same problems and characteristics common to all products that are “services”. Compared to regular “products”, services are intangible and inseparable, meaning that they cannot be stored, cannot be demonstrated and are consumed as they are produced (Zeithaml et al. 1985). It is therefore of particular importance that the service to be produced/purchased is properly specified and that these requirements are unambiguously communicated with the supplier (Bagchi and Virum, 1998). Transportation differs from many other kinds of services in that both the buyer and the buyer’s customer are critical stakeholders that will be hurt by poor service. Furthermore, the challenges facing buyers of transportation vary greatly with the scope of the service to be bought. Andersson and Norrman (2002) therefore call for a differentiated approach towards the purchasing of logistics services, distinguishing between basic and advanced services. The authors’ framework focuses on the part of the purchasing process that van Weele (2005) denominates “tactical purchasing”, placing extra emphasis on what they identify as the critical part of the purchasing process: service definition. Similar frameworks have been presented by other authors as well (i.e., Sink and Langley, 1997; Menon et al. 1998; Bagchi and Virum, 1998; Caplice and Sheffi, 2003), although they all emphasise different aspects of the purchasing process. Sink and Langley (1997) give extra consideration to practical problems such as the formation of buying teams and the transition phase when the services of new supplier are implemented. Menon et al. (1998) on the other hand, focus more on the first phases, on service specification and choosing partners. Bagchi and Virum (1998) envision the process of forming logistics alliances as continuous, with evaluation and goal refinement driving each iteration towards greater performance. Caplice and Sheffi (2003) discuss the importance of drawing up specifications and using with quality information during the bidding process for truckload transports.

### 2.5.3 Transport Carrier Economics

The costs for running a shipping business can be divided into two kinds: direct and indirect costs. The direct costs make up the majority of the costs and are comprised of personnel costs (salaries, taxes, benefits etc.), fleet fixed costs (depreciation, taxes, insurance etc.) and fleet variable costs (fuel, maintenance, tires etc.), see Table 1. Indirect costs arise from administrating the business, such as transport planning, invoicing, marketing etc. These are costs that represent one aspect of the way carriers set transport prices (Sveriges Åkeriföretag, 2011).

Table 1- Transportation cost composition, Sveriges Åkeriföretag (2011)

Fleet Fixed Costs	Fleet Variable Costs	Personnel Costs
Depreciation	Maintenance	Driver Salaries
Vehicle Tax	Tires	Other Benefits
Vehicle Insurance	Fuel	
Interest Costs	Road Tolls	
	Fines	
	Repairs	

The other aspect relates to the utilization of the network that the carrier operates. By leveraging economies of scale (the amount of goods passed through the network, i.e., vehicle utilization) and economies of scope (synergies between different lanes served, e.g., backhauling) it is possible for a carrier to reduce cost and offer more competitive prices (Sveriges Åkeriföretag, 2011; Sveriges Åkeriföretag, 2004). With perfect information about shipping volumes, time requirements and destinations this would be a simple resource allocation problem. Unfortunately, the information provided by customers often contains considerable uncertainty (estimations and forecasts) forcing carriers to hedge by raising prices. Improving the quality of information and including carriers in the creation of transport solutions allow carriers to maximize utilization in their networks, raising the possibility finding synergies (Caplice and Sheffi, 2003).

Based on the literature, a minimum requirement on information for effective and efficient procurement can be identified: time of departure, destination, origin, goods volume, weight and type. This set of variables was used in the study of collaboration in logistics within the forest industry by Frisk et al. 2010. Caplice and Sheffi (2003) emphasise the importance of non-uniform or seasonal distribution of annual demand, noting that failure to take this aspect into consideration can result in lower than anticipated performance.

## 2.6 Joint Purchasing

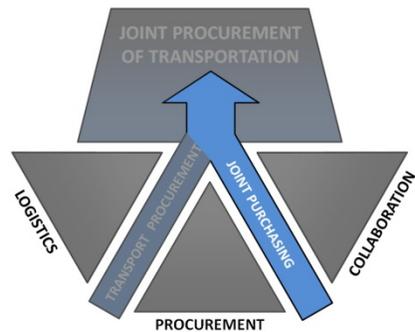


Figure 17 - Underlying theoretical framework: joint purchasing

This section will present the reader to the theory and literature available on the intersection between the fields of procurement and collaboration that is commonly referred to as *joint purchasing*, Figure 17.

### 2.6.1 Definition

The concept of companies joining together in performing purchasing activities in order to gain benefits is an old concept. Despite its long history, no consistent terminology has yet emerged in the literature, referred to as horizontal cooperative purchasing, group purchasing, collaborative purchasing, collective purchasing, joint purchasing, consortium purchasing, shared purchasing or bundled purchasing. Two important concepts that these commonly refer to are: purchasing consortiums and purchasing groups. They are similar in aim but differ organizationally. A purchasing consortium is the “horizontal cooperation between independent organizations that pool their purchases in order to achieve various benefits” (Tella and Virolainen, 2005) and a purchasing group is “a formal or virtual structure that facilitates the consolidation of purchases for many organisations” (Beaulieu and Nollet, 2005). The key difference between the two is that the former is an initiative organized and carried out by the members, while the latter is orchestrated by a third party acting on behalf of its members. Schotanus and Telgen (2008) define joint purchasing in general as:

*The cooperation between two or more organizations in a purchasing group in one or more steps of the purchasing process by sharing and/or bundling their purchasing volumes, information, and/or resources.*

This definition incorporates both purchasing consortia and purchasing groups. Essig (2000) expands upon the concept by talking about “symbiotic consortium sourcing” where the strategic and mutually beneficial nature of successful purchasing groups is emphasised.

## 2.6.2 Motivators and Potential

The overarching motive for engaging in joint purchasing is the opportunity to lower costs, by increasing negotiating power (Tella and Virolainen, 2005). It is not the only motive, but without the prospect either saving or making money one way or another this kind of activities would unlikely gain much traction among upper management. Other possible benefits from cooperation on purchasing activities are lower management costs and reduced transaction costs along the purchasing process. Research has found (Schotanus, 2007, pp 98) that the main motives for companies to join with other organizations to purchase goods and services are:

- *Bundling of purchasing volumes:*
  1. Better quality on purchased products and/or services;
  2. Financial gains (e.g., lower purchase prices);
- *Information Sharing:*
  3. Learn from other organizations (e.g., share (price) information);
- *Shared resources or processes:*
  4. Better quality of the purchasing process (e.g., share expertise);
  5. Reduce tender process throughput time (e.g., by piggy-backing);
  6. Reduced transaction costs (e.g., reduced duplication of efforts and activities).

Just as there may be one or more compelling reasons to join a purchasing group, several motives have been identified among companies for avoiding this kind of initiatives altogether. Fears of increased administrative complexity and reduced efficiency as well as a lack of trust are common issues for prospective members. Schotanus (2007, pp 98-99) summarize the most relevant negative motives:

- *No improvements expected:*
  1. High coordination costs expected;
  2. Increased chance of supplier resistance;
  3. Increased tender process throughput time (e.g., due to reaching consensus);
  4. Loss of control;
- *Lack of trust or support of other organizations:*
  5. Increased chance of disclosure of sensitive information;
  6. Increased chance of free-riding organizations;
- *Lack of priority or cooperation opportunities:*
  7. Lack of cooperation opportunity;
  8. Lack of cooperation priority.

There are examples of successful cooperation between small firms in the literature (e.g., see Hanna and Walsh, 2008), the focus of the networks have been to increase competitiveness generally by providing access to skills and products normally unobtainable to the members alone. The literature specifically researching the potential of establishing purchasing consortiums among small and medium enterprises is scarce, focusing mainly on collaboration between competitors (Quayle, 2002). It has been found that horizontal cooperation in this regard is considered as having considerable potential but also being difficult to implement and maintain. Purchasing consortiums have the theoretical potential to strengthen member companies' bargaining position against suppliers, and thus providing more beneficial terms. The two greatest economic effects of purchasing consortia are lower transaction costs and economies of scale. Business and buying transactions are reduced thanks to the introduction of consortia through which all communication is handled. When the number of members in the consortia and the number of suppliers enlisted grow, purchasing consortia have the potential to considerably reduce the amount of transactions, see Figure 18. Economies of scale in consortia are realized by standardizing requirements between members and pooling purchasing power when negotiating. Besides obtaining lower unit prices, the efficiency and use of each member's purchasing personnel can be increased as well through reducing redundancy in the purchasing process (Essig, 1999).

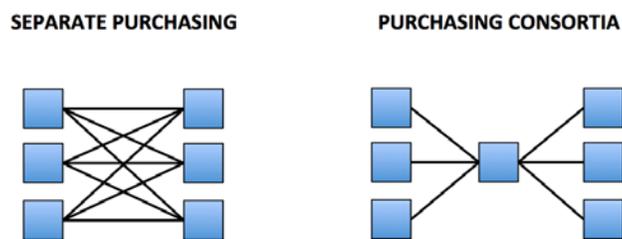


Figure 18 - Business transaction reduction through joint purchasing

While many small firms recognize this potential and believe that consortiums are likely to grow in importance in the future, companies participating in studies show considerable reservation as to the feasibility of such setups. The reasons are the typical adverse behaviour companies express toward competitors: unwillingness to share sensitive information, lack of trust and fear of opportunism (Quayle, 2002; Morrissey and Pittaway, 2004). Largely mirroring these results, a study of cooperative purchasing including small, medium and large organizations in both the private and public sectors found that the greatest deterrents were supplier resistance, fear of free-riding, cooperation given a lack of priority and the risk of sensitive information being disclosed (Schotanus, 2007, pp 120). Not only have the buyers seen potential issues with consortia purchasing. Ball and Pye's (2000) research into purchasing consortiums in the UK library sector reveals that suppliers of periodicals cite the following concerns with purchasing consortiums: unsustainable discount levels, insufficient standardization among consortiums members'

requirements, consortia agreements overly restrictive for suppliers and not restrictive enough for members, and declining service quality due to reduced margins.

Horizontal collaboration generally “grows from the inside” (Crujssen, Dullaert and Fleuren, 2007), and political policies and incentive programs to get small firms to cooperate have been found to not generate the reliable, long-term results that are often envisioned. This is likely due to many such collaboration incentives being solutions looking for a problem and most examples of successful cooperation have stemmed from a mutual need between partners to solve a common problem (Hanna and Walsh, 2008). An important aspect of collaboration is that it is based on mutual trust and openness with risks and rewards shared in a fair manner; the competitive advantage should benefit all parties, not just one or a few. The most successful partnerships have open contracts with the fewest provisions. Because of the way cooperation often occur naturally, open contracts based on trust are the most suitable form of formalizing horizontal collaboration. A formal juridical contract with excessive attention to detail is more likely to become a burden than a useful tool. Especially since the pursuit of common goals often depends on future conditions which are difficult to capture in contractual agreements (Hajduová, 2006; Crujssen, Dullaert and Fleuren, 2007).

### 2.6.3 Forms of Collaborative Purchasing

Cooperative purchasing can take many forms (see for example Bakker et al., 2008 or McCue and Prier, 2008). Schotanus and Telgen (2007) categorize joint purchasing initiatives as being one of the following:

- *Piggy-backing groups* – essentially a setup where smaller enterprises are allowed to share the benefits of contracts negotiated with suppliers by bigger, more powerful companies. The contract negotiator is ideally compensated for this service.
- *Third-party groups (purchasing groups)* – a third-party is enlisted to perform most of the purchasing activities and creates value by leveraging the volumes of its members to negotiate better rates and prices than its members would have been able to do individually.
- *Lead buying groups* – a commodity is purchased by the member that most suitable to do so on behalf of all members. This setup enables each member to specialize in specific commodities and leverage volumes and expertise to the benefit of all members.
- *Project groups* – an intensive form of cooperative purchasing where a one-time purchasing group for a single shared purchasing project is created. Members bundle their forces and together carry out the purchasing activities.

- *Programme groups (purchasing consortia)* – an intensive cooperative purchasing form that involves management teams of members meeting regularly in a steering committee to discuss cooperative projects. Members have high-involvement relationships with each other and all can influence specifications, supplier selections, etc.

Each of these forms has their specific use and is suitable for different companies in different situations. The intensity of a purchasing collaboration agreement (i.e., the amount of influence each member has on the purchasing activities involved) has a big influence in determining what type of purchasing group or consortium is the most suitable. Piggy-backing and third-party purchasing are for example not the optimal choice for companies that are concerned about being marginalized and lose control of the purchasing function (Schotanus, 2007, pp 233).

## 2.7 Bringing it all together: a process for joint procurement of transportation

Based on the literature presented in this chapter the following six-step process, see Figure 19, is suggested when evaluating whether or not to embark upon a joint purchasing initiative: *define scope of collaboration, understand current buy and needs, market survey and RFQ, analyse potential, find suitable form of cooperation and negotiate*. Upon completing these six steps it should be clear to the investigator if purchasing logistics services in a joint fashion is fruitful or not.

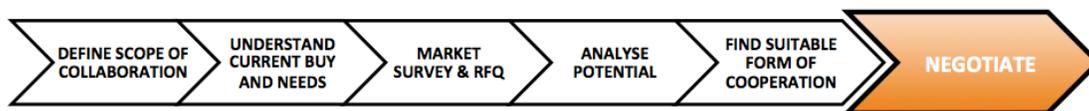


Figure 19 - Process for evaluating the potential for cooperating

### 2.7.1 Define scope of collaboration

In the first step it is decided which parties should be included in the initiative and to what extent. Do all potential participants share similar circumstances with regard to locations, markets, customers, finances and culture? Are there any prerequisites for including any of the participants? What products are practical to include? Is it feasible to include all markets/lanes/destinations/modes of transportation? Will the companies cooperate on purchases of all types of transports, internal and external, or only on some? Is an advanced, integrated solution desired or is the goal consolidating volumes for higher efficiency and fill-rates? The impact of the companies' culture, industries and relationships on collaboration initiatives should not be underestimated. It might be that one or more companies are excluded based on this first analysis due to a mismatch in goals, needs or compatibility. It is also possible be that other potential members of a consortium are identified once the scope has been agreed upon.

### **2.7.2 Understand current buy and needs**

It is crucial to understand the needs of the individual companies that seek to join forces as well as the needs of the consortium they seek form as a whole. Wherefrom, whereto, when and how much are four basic questions that need answering. Furthermore, special requirements with regards to handling, packaging, transportation, storage and lead time need to be taken into consideration as well. This information is then used to identify synergies that can be exploited. Can different types of goods be loaded together? Could lanes be created to serve multiple destinations along a route? Could the mode of transportation be changed to increase volumes on certain lanes? Not only does understanding the total transport demand help increasing the consortium's bargaining power when it comes to negotiating with LSPs, it also makes it easier to find opportunities that would save costs for the LSP as well, which would reasonably translate into lower prices.

Understanding the current buy of the consortium's members also serves to map the logistics spend. This information is necessary for comparing the current scenario with that of increased collaboration between the companies. If their logistics functions have been outsourced already then the information on costs would likely be found in their respective ERP-system or in their accounting department. If logistics is still handled in-house it is however necessary to find and compile all the costs related to this function and activities. Although, it is plausible that most companies running a logistics department already have this information at hand in one form or another.

Regardless of the kind or format of the data it should be organized, simplified and compiled into a format suitable for requesting quotations and facilitates comparison with the quotations received. It is preferable to compile price lists, matrices or indexes for each kind of product/destination/lane, since it is easy to work with during the analysis step.

### **2.7.3 Market survey and RFQ**

Since price is an important factor for most purchasing activities, doubly so for transportation where transactions are often both reoccurring and frequent. It is not unheard of that companies purchase goods and services on routine, using the same suppliers as they always have, without subjecting them to competitive pressure. It would therefore be prudent to perform a market survey of available LSPs to ensure that competitive offers are secured with regard to both price and quality. Incumbent LSP should not be excluded though, as experience and familiarity with one or perhaps several of the members of the consortium is not to be underestimated when it comes to quality of execution.

When a set of suppliers that can fulfil all the needs and requirements has been identified, quotations should be requested based on the data compiled in step two.

#### 2.7.4 Analyse potential

In this step the quotations received from the LSPs are compared to the baseline established in step two. It is desirable to use a spread sheet processor or equivalent software, both for their ability to handle large amounts of data and for their graphics capabilities as well as. It is important to approach the analysis with an open mind as the LSPs might present different solutions than those suggested in the RFQ. It is reasonable to expect an LSP to have better grasp of their network and potential synergies than the shipper, and being flexible when it comes to the logistics setup might open up new possibilities. It is furthermore advisable to take a step back and analyse the impact of the proposed solution as a whole and not just compare prices on a lane-by-lane basis. Accepting a higher cost on some destinations might enable savings on others and higher upfront costs might be offset by increased efficiency in the long run. Should prices on a few destinations reduce the attractiveness of a quote as a whole, the LSP could be approached in an effort to negotiate individual prices or seek solutions as to how these prices could be reduced further.

After, or in parallel with, this qualitative assessment the qualitative factors of collaborating should be analysed as well. Changing responsibilities and processes has the potential to affect work in many ways and often in ways that are difficult to assign a monetary value. Centralizing, collaborating or streamlining ideally leads to less duplication of efforts, less waste, shorter lead times, lower costs and higher efficiency etc. Also, these benefits can ideally be achieved with minimal administrative friction, obstacles and conflicts, but that is seldom the case. Furthermore, even projects with the most promising prospects can be thwarted if the organizations are not yet ready to cooperate. Analysis of these “soft” factors and challenges should therefore be included as well, preferably by looking at quantitative data where possible and in combination with interviews of concerned persons. Naturally, all parties involved should get the opportunity to voice their opinions and the more accounts on the issue available the better, but whom to ask is key. Questions on joint purchasing projects are strategic in nature lend themselves to be answered by persons higher up in the organization. Questions regarding more operational aspects such as processes and the efficiency of specific activities might be better directed towards line managers.

If joint purchasing turns out to have the potential to result in non-insignificant benefits cost-wise, quality-wise or service-wise, the initiative proceeds to the fifth step.

### **2.7.5 Find suitable form of cooperation**

Several factors influence how the purchasing initiative is best organized. The composition of the members of the consortium, their respective sizes, their power relative to the other members, their mutual relationships, how much they stand to gain from cooperating, the industry they operate in, and the purpose of the initiative (purchasing for a single project or long-term collaboration) are all factors that need to be considered. If the goal is to purchase low-cost, high-volume indirect material at the lowest possible price, then forming or joining a third-party purchasing group could be an attractive option. If one of the members has significantly larger purchasing power than the others, a piggybacking arrangement might be a more suitable solution.

### **2.7.6 Negotiate**

In the final step the members come together to discuss and negotiate how the gains resulting from the initiative should be shared among its members. Intuitive methods for sharing rewards, e.g., proportional allocation based on a common attribute such as volume, often fail to provide a truly fair solution, as they are overly simplistic. Any initiative spanning multiple organizations is bound to be inherently more complex than those executed strictly within the walls of a single enterprise. The true cost and value of many transactions are difficult to establish when processes from multiple companies interact and create synergies. As a result, the likelihood of finding a reward-sharing scheme that is acceptable to all participants and ensures the longevity of the purchasing initiative increases if methods based on game theory are applied. Such methods consider a multitude of factors and are often complex and require more information and detailed data to apply, but in return produce solutions that more accurately reflect imbalances in incentive and power among the members.

When a setup has been found that satisfies the interests of all parties to a degree such that it is decided to proceed with the initiative, formal negotiations and bidding with the selected LSPs should commence. This is outside the scope of this process, which focuses on assessing the potential and feasibility of joint purchasing activities and not their implementation.

### 3 Methodology

*This chapter will give the reader an introduction to the approach chosen for this study and the methods used to arrive at the conclusions made. The study that this thesis describes can be classified as quantitative analysis followed by a qualitative discussion. After presenting an overview of common methodological concepts, a more detailed description of the concepts relevant to this study is given.*

#### 3.1 Research Approach

Methodology describes the rules and procedures for how a scientific study should be conducted. There are many different kinds of studies, all with separate aims, but common to them all is that at the core there is a problem; a problem identified by the researcher that needs investigating and this problem then guides the study forward. Arbner and Bjerke (2009, 4) categorize studies, or approaches, as *explorative*, *explanatory* or *descriptive*, while Höst, Regnell and Runeson (2006) add a fourth one: *problem solving*, or *normative* studies (Routio, 2007). A brief introduction to these four approaches follows below:

- *Explorative* – strives to increase understanding by more precisely defining the problem.
- *Descriptive* – primarily concerned with gathering knowledge, trying to find out how a thing, phenomenon or characteristic works.
- *Explanatory / Hypothesis testing* – aims to explain the inner workings of the object of study, finding the relationships between causes and effects.
- *Normative* – tries to define the ideal state of the object of study, finding a solution to an identified problem.

#### Normative Studies

Since the study will first assess the current situation at the three focus companies and then try to improve this situation by highlighting the potential of increased collaboration, the normative approach was the most fitting. Studies following the normative point of view strive not only to gather data and analyse facts about the object of study, but aim to improve upon it in one or more aspects as well. This stands in contrast to the descriptive point of view, which is concerned with describing the actual state of the object of study at a specific time of inspection. There are two dimensions to normative research: *intensive* and *extensive*. They describe how many objects that the researcher aims to improve, e.g., the scope of the study. Intensive studies focus on one or at most a few objects, while extensive studies strive to improve upon a whole class of objects (Routio, 2007, 144). Figure 20 illustrates relationship between research approach and study scope.

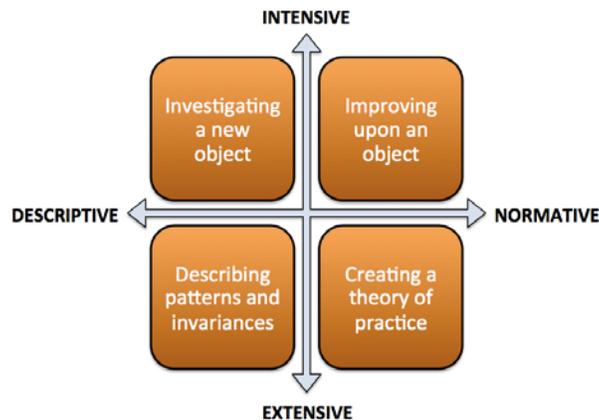


Figure 20 - Research methods. Adapted from Routio (2007)

There are two fundamentally different approaches to intensive normative research. In *participatory* studies the end benefactors or users of the improvement project are allowed to take part in the improvement process personally; they become part of the improvement process. *Professional* studies on the other hand are led by the researcher, who gathers and analyses the interests of those concerned, but without their direct participation. The professional approach is suitable when the researchers can easily identify the pertinent interest groups, or when it is not feasible for practical reasons to include in the project those who are affected. Routio (2007, 144) describes professional normative research as a linear series of seven steps:

1. Define the target.
2. Define which contextual factors can be modified.
3. Plan how to reach the target.
4. Select the best alternative.
5. Make a detailed plan of action.
6. Submit the practical proposals for evaluation.
7. Implement the suggested improvements.

This study is intensive in nature, as the scope of the attempted improvements is narrow, concerning only three objects (companies) of study. And because the study was conducted without changing the object of study (no direct participation), it falls into the category of normative professional studies. A modified version of the seven-step approach served as a foundation on which the theoretical framework and research method was developed. Some major changes were made though: the output of step six was changed and step seven will not be carried out. The results will be presented to the people concerned at the focus companies (step 6), but not in the format or for the purpose as described by the author. Instead of presenting the stakeholders, i.e., the WXDG, with a proposal for evaluation, the findings of the study will be summarized and bundled with suggested courses of action in step 5, serving as the

thesis' final deliverable. The actual implementation of this solution (step 7), if proved beneficial and feasible, is outside the scope of this thesis. This modified version is essentially the same as the *plan-do-study-act* method described by Höst, Regnell and Runeson (2006), see *Research methods – action research* below, but with the *act*-step excluded. When choosing between the two, the former was chosen due to its steps being more finely grained as well as having a process with less emphasis on iterative execution.

### **Define the target**

The target of the study is to investigate the potential reduction in distribution costs by jointly purchasing this service from a third party.

### **Define which contextual factors can be modified**

The factors that can be manipulated in the setting of a group of companies are the logistics provider, the type and amount of goods that the joint purchasing scheme shall cover, and the way potential rewards should be shared among the companies.

### **Plan how to reach the target**

The first step involves mapping the current distribution spend of the three focus companies, common destinations as well as goods types, weights, sizes. The cost of operating the fleet of trucks at LWSEW (driver enumeration, fuel etc.), the carriers used by the group and any special requirements/limitations will also be taken into consideration. In the second step, this information is compiled into a format suitable for requesting pricelists or quotations from potential carriers.

### **Select the best alternative**

During the third step the price information obtained from the selected carriers is used to analyse the cost savings potential. If it is found that the distribution costs can be lowered, the fourth step entails calculating a reward sharing-scheme that all parties find acceptable.

### **Make a detailed plan of action**

In the fifth and final step the results of the analysis will be paired with a qualitative discussion on how the specific conditions of the WXDG affect the feasibility of implementing joint purchasing of logistics services. This step will be complemented by short, open interviews with top management at the three focus companies to provide valuable input from those who would be responsible for implementing any changes based on the results of this study.

### 3.2 Research Method

There are two overarching paradigms in research, two fundamentally different ways of viewing the world: the positivist paradigm and the phenomenological paradigm. The first regards the world as external and objective, where the observer is independent and science is void of subjective values. Proponents of this view focus on facts in the search for cause and effect relationships to reduce phenomena to their simplest form. Formulating hypotheses and testing those using large samples of data is a common way of conducting research. The latter is in many ways the exact opposite of the former and believes that the world is socially constructed and subjective in nature, meaning that the observer is part of what is observed. Research is thus more focused on meanings and implications and not facts, as the goal is to thoroughly understand a phenomenon. Samples are often small but investigated in-depth over a longer period of time, aiming to look at each problem in its entirety (Mangan, Lalwani and Gardner, 2004).

The method chosen for this study can be described as a quantitative analysis with qualitative elements. Since there is a comparison of costs and reward-sharing analysis at the heart of the study, a quantitative approach is the most fitting. But since handling the cooperation between independent organizations is a non-trivial problem that to a large degree depends on trust, relationships and interaction between people, a qualitative discussion on opportunities, obstacles and different forms of joint purchasing initiatives will be included as well. This study was carried out in the context of a group of companies to investigate how this setting might affect collaboration on purchasing activities and the research method follows the framework presented in the theory as below in Figure 21:

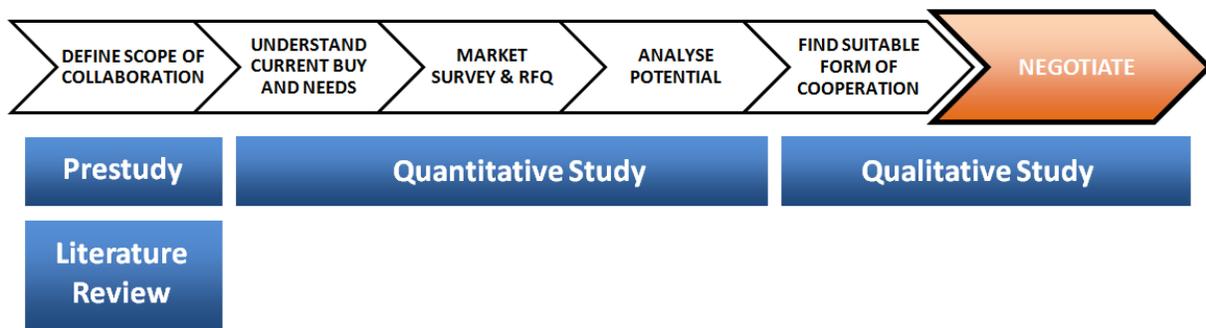


Figure 21 - Connection between theory and methodology

### 3.3 Prestudy

A series of conversational half-structured interviews as described by Höst, Regnell and Runeson (2006) was conducted as a prestudy during this first phase of the study to better understand the focus companies and determine which companies should be included. This approach was chosen, as it would provide flexibility when inquiring into the relatively unknown situations of the focus companies. Logistics managers at LBE, LHE, LWSEW and LHHI were casually interviewed following a set of predetermined questions where the respondents were given the opportunity to provide his or her view on how logistics is handled at the respective companies, such as the volumes shipped, size, weight and volume of products, packaging, most common destinations, modes of transportation used, special requirements, and currently enlisted LSPs. Since Chinese is not the author's mother language the answers were directly recorded and summarized in English for the sake convenience sake. Follow-up inquiries were made where ambiguities arose or questions remained.

Interviews are a useful tool for gathering information that is not documented. One of the strengths of this method of data collection is its flexibility. Interviews are designed to directly target the topic of a study, providing insightful inferences and explanations, especially so when human affairs or behavioural events are at the centre of a study. In such studies interviews are to be regarded as verbal reports only, as they are subject to problems such as bias, poor recall and poor articulation. Corroboration of facts through triangulation is a preferable approach for this kind of study. If the goal is to inquire into the opinions or attitudes of the interviewees then verification of the answers are less relevant. By confirming the results through the opinions of others the interview moves towards a survey-style interview. The importance of the interview as a method for collecting data stems from the format's flexibility; the format can be adapted to fit the circumstances of the study. An interview is more akin to a guided conversation than a structured inquiry or survey. This lack of rigidity allows interviews to fully draw upon the knowledge and experience of the respondent; questions evolving based on the answers given as the interview is carried out (Yin, 2008).

There are different ways to conduct interviews. Höst, Regnell and Runeson (2006) describe three different types of interviews:

- *Structured* – the interview follows, and does not deviate from, a predefined list of questions. Basically an oral survey.
- *Half-structured* – a set of questions is used to guide the interview, but can be adopted to fit the situation and the answers given by the respondent.
- *Open* – the interview is guided by a topic and a framework provided by the interviewer, but the questions are largely up to the interviewee to choose.

The open-style interview was the natural choice for the prestudy.

### 3.4 Literature Review

A literature review was conducted to establishing the methods and theoretical foundation for the study. Processed material was used when conducting and the sources were almost exclusively found in scientific articles published in renowned journals; see *Source Criticism* for details on the exceptions. Google Scholar has been used to search for literature, with the actual material being provided by Lund University's electronic library LibHUB. Google Scholar was used for searching as it indexes and searches the entire contents of articles, while LibHUB only searches abstracts and keywords. The abstracts of results with relevant titles were read to determine if the articles/books/chapters were indeed relevant or not. If so they were read in their entirety. Furthermore, the references were examined to see whether even more relevant sources of information could be found.

Because of the numerous and varying aspects related to cooperation between organizations regarding logistics, several sets of keywords used in order to ensure that the scope of the material would be wide enough to include both old and new research on the topic. Searches were carried out both with the keywords in parentheses included and excluded.

- Optimization, transport, sourcing
- Strategic, procurement, logistics (services)
- Horizontal, collaboration, purchasing (logistics)
- Inter-organizational, (logistics) alliances
- Purchasing, consortium (logistics)
- Collaborative, (transportation) procurement
- Purchasing (sourcing), strategies, (logistics)
- Cost (reward), sharing, (logistics)

### 3.5 Quantitative Study

Besides serving as a foundation for comparing costs between different scenarios, the statistics data was also used when requesting quotations from potential freight forwarders. Two scenarios were created in Excel, one representing annual peak transport demand and one representing a low point demand-wise. For each scenario the data from the respective month was compiled to show in a matrix the total amount of shipments, the total weight shipped and the equivalent in standard pallets for each destination. The logistics managers were consulted when deciding upon average numbers for the dimensions, volume and weight of products that vary considerably in size.

The information obtained from forwarders (quotations/price lists) is a source of primary information as it is collected explicitly for use in this study, a direct observation. The RFQ was distributed under the pretence of the WXDG looking to source a new logistics service provider

to ensure that the RFQ would be taken seriously. Because one of the freight forwarders was inadvertently informed of the fact that the quotations were part of a study, the argument could be made, although with little bearing on this thesis, that this data therefore should be classified as observation with participation.

The goal of the analysis was to answer the questions stated at the centre of this study. To answer the question whether working together on purchasing of transportation can reduce costs or not empirical information collected from the focus companies and freight forwarders was analysed. Compiling the data into statistics in Microsoft Excel and investigating how the choice of forwarder or forwarders affects the total distribution costs will comprise the quantitative part of the analysis. Different scenarios and possible combinations of lanes and products will be investigated to get an indication of the level of upfront savings that can be attained through joining forces when procuring transportation.

Quantitative methods belong to the positivist research paradigm and the qualitative to the phenomenological paradigm. The use of either method, or both, for data collection and analysis depends to a large extent on the object and purpose of the study. Bryman (1988, pp. 94), Figure 22, lists eight areas where the two methods significantly diverge.

	Quantitative	Qualitative
(1) Role of qualitative research	<i>Preparatpry</i>	<i>Means to exploration of actors' interpretations</i>
(2) Relationship between researcher and subject	<i>Distant</i>	<i>Close</i>
(3) Researcher's stance in relation to subject	<i>Outsider</i>	<i>Insider</i>
(4) Relationship between theory/concepts and research	<i>Confirmation</i>	<i>Emergent</i>
(5) Research strategy	<i>Structured</i>	<i>Unstructured</i>
(6) Scope of findings	<i>Nomothetic</i>	<i>Ideographic</i>
(7) Image of social reality	<i>Static and external to actor</i>	<i>Processual and socially constructed by actor</i>
(8) Nature of data	<i>Hard, reliable</i>	<i>Rich, deep</i>

Figure 22 – Comparison between qualitative and quantitative research, Bryman (1988, pp. 94)

The research approach dictates the overarching goals of the study and the principles for how the study should be carried out. The methods are the tools that researchers use to reach these goals. Different goals require different methods, and sometimes more than one method is necessary. Mangan et al. (2004) describe the difference between the two as the former being “top-down, outside-in”, while the latter is “bottom-up, inside-out”.

The natural sciences tend to favour quantitative methods, as they lend themselves to studying objects that are outside of people, the empirically observable and verifiable. The main methods of data collection is through conducting surveys and experiments, collecting large amounts of quantifiable data from a sample deemed representative of a specific population, while having little or no contact with the subject (Bryman, 1988). Studies typically rely on mathematical and statistical analysis, stressing the analysis of casual relationships between variables in terms of quantity, amount, intensity or frequency (Näslund, 2002). In this part of the study the quantitative methods are naturally a good choice as it entails processing and analysing large amounts of data, numbers and statistics.

Data collected for another purpose than that of the study at hand is referred to as *secondary information* and the qualitative analysis was based on such information with but one exception: the quotations received from the freight forwarders. There are four different kinds of secondary information (Höst, Regnell and Runeson, 2006):

- Processed material – data collected and processed in an academic or scientific context, e.g., academic articles and theses.
- Statistics – data that has been collected and processed, but does not include any analysis or conclusions, e.g., census data.
- Registers – data collected for a specific purpose, but made available in an unprocessed format, e.g., a customer register.
- Archival data – data that is not classified as data per se, e.g., protocols, correspondence, documentation etc.

There are two problems inherent to the use of secondary data: *compatibility* and *trustworthiness*. Researchers must keep in mind that information collected or produced by others at another time and with a different purpose, might differ fundamentally from his or her own data. It might be classified differently, use different definitions and scales of measurement, or set out from another point of reference. Consequently, the data might not be, completely or to some degree, compatible with the researcher's own aims and goals. The second problem is that it is often problematic to verify the correctness of data collected and processed by others (Arbnor and Bjerke, 2009, 7), which should lead the researcher to always critically assess the trustworthiness of the data used. Here it is imperative with due diligence with regard to source criticism.

### 3.6 Qualitative Study

Regardless what answer the first part of the analysis provides to the question on the economical sense of collaborating, a second qualitative analysis should be done to assess the feasibility of this kind of initiative along with the potential to realize other benefits than just cost reductions (e.g., improvements in operational efficiency etc.). Another part of the qualitative study is to assess which kind of organizational form would best suit the WXDG for jointly executing procurement activities.

The information needed for this study will partly be gathered from the logistics manager at the respective focus companies through surveys, asking them to provide their thoughts and experience on the operative aspects of working with logistics within their companies, industries and the WXDG. There were several reasons why a survey was used instead of interviews. Not only is it an efficient way to gather information time-wise but the answers are submitted already in written form which speeds up processing. This was also due to language concerns; the replies could without problem be processed by the author while translators would have been needed to transcribe audio logs from interviews. The views and opinions of the WXDG's senior management on the more strategic issues regarding cooperation across companies, the sourcing of logistics services and thoughts regarding the organizational setup needed were also gathered using a survey. Apart from the reasons stated above, a survey was deemed the most convenient way to collect this data as well since input from quite a few people were needed, all of which travel frequently.

Two surveys were designed to address two questions: 1) which, if any, of the benefits that have motivated others to collaborate on logistics purchasing could realistically be realized within the setting of this study, and 2) which form this collaboration would ideally take. The survey was chosen as the method for collecting this information for three reasons: first, because the opinions of several people at different companies on a common issue were needed, a survey would allow for a streamlined and efficient way to gather this information; second, the managers at all companies are busy people, senior managers especially so, and a written reply to a survey could be made whenever it suited them over the course of a few days as opposed to a formal interview; third, because of the formal language used in interviews and the rather advanced terminology related to the topic of this study, a recorded and transcribed interview would require a significantly larger amount of work to reach the same level of accuracy as a written reply. All the surveys were translated by the author together with at least one of the group's translators to ensure that the questions would be correct and properly convey the meaning of the original English version. Said translators were also consulted regarding interpretation of the answers whenever questions arose.

The survey designed to answer the first question was targeted at the logistics managers at the three focus companies since they would be the ones implementing any changes and handle the operative work in cooperation scenario. The questions were centred on the three areas that the theory has identified as having potential to benefit from collaboration: *bundling of purchase volumes*, *information sharing*, and *shared resources collaboration*. This information combined with any general observations would then make up the foundation for this study's qualitative analysis. The second one was designed to assess senior management's views on the matter, which would then serve as material for a final discussion of the issue, in part based on the results of the first survey. The general manager, or other senior manager best suited to answer the questions, at each of the companies was targeted because the opinions of senior management would have the greatest influence on any projects involving all three companies and their attitudes would be crucial to the success of their implementation. Their combined experience, insight into their respective companies, and thoughts on a joint approach towards transportation purchasing would serve as a good foundation for drawing any conclusions as to the best implementation and its overall feasibility.

After it had been revealed that the WXDG had taken the decision to create an internal unit to handle logistics within the group, the planned qualitative part of the analysis was changed in to a qualitative discussion on this topic instead. In the light of this development the respondents felt unable to answer the questions, as they were now completely hypothetical. The first and second surveys were thus both discarded and a new one was created instead. This third survey was also directed towards senior management and aimed to investigate the reasoning behind this decision and its expected effect on each company and the group as a whole. Again, the benefits that research has shown to motivate similar initiatives served as the foundation for the survey and the questions were more direct than those in the other two surveys, dealing with a much more specific issue. The aim was to assess the reasons behind the group adopting this particular approach and how these reasons contrast with those found in the theory. The survey and its 13 questions can be seen in Appendix 2. The survey was given to the general managers at LWSEW and LBE, the chairman of the board of the WXDG, the quality department manager at LHE, and the sales department manager at LHHI. No further triangulation was conducted to corroborate this information.

The results of this survey then served as the foundation for the qualitative analysis and the final discussion. This information was of interest when looking at the scope of a potential initiative; the industries that the companies operate in and their relationship to each other; and when relating and comparing these factors to the theory and previous research on the subject. With this input the possibility for synergies apart from, or in addition to, cost reductions was investigated by comparing and contrasting the gathered empirical data with the theory found in the literature using the framework developed for this study.

Social sciences mainly deal with actions and behaviour that stem from within the human mind, striving to portray a system from the point of view of the system's actors, making it impossible to separate the investigator and the subject. This stands in stark contrast to quantitative research that distances itself from the subject. (Bryman, 1988, pp. 12-13, 16). Researchers engaging in qualitative work are therefore more interpretive and subjective, focusing on processes and meanings (Näslund, 2002). Due to its abstract nature, data of this kind lends itself to methods of analysis that are based on sorting and categorizing. Research of complex phenomena involving people and their interactions with each other and their environment, a combination of both types of data often yields better results than they do in isolation (Höst, Regnell and Runeson, 2006). The qualitative methodology lends itself very well to parts of the research in this study, but is insufficient to handle those aspects that are not easily quantifiable. Here another approach is needed.

A distinction is made between primary and secondary information. *Primary information* comprises any kind of data gathered by the researcher to further the topic of his or her own research. Information of primary kind can generally be collected in three different ways (Arbnor and Bjerke, 2009):

- *Direct observations* – knowledge created by observing the present, and depending on how it is arranged the researcher can either observe or participate, or both.
- *Interviews* – information is gathered by the researcher through asking questions in person and recording the answers or by conducting surveys through distributing questionnaires.
- *Experiments* – knowledge is gained by examining causal relations; the principle is that the researcher arranges two test objects in two identical situations and proceeds to manipulate one of the objects and then measures the effects with the second one as reference.

This thesis draws from all three kinds of material: processed material, statistics, direct observation and interviews. The three sources of primary information collected for this thesis are interviews with the logistics managers, the quotations requested from the freight forwarders, and the survey given to the senior managers. Of these three only the quotations are a direct observation with participation, since it is an observation resulting from the direct use of information in an activity where the observant (the freight forwarder) is aware of his or her participation in the study. That is, the observation could not have been made without the author actively engaging the object of study. The primary information mentioned above is the only information created for the purpose of this study and this study alone; all other sources of information are secondary information.

Regarding methods for the collection of primary information Yin (2008) defines and categorizes interviews in the following three ways:

- *In-depth* – in this type of interview the interviewee takes on the role of an informant, providing not only information and opinions but also suggesting other sources of information as well, e.g., other persons to interview. In-depth interviews may take place over an extended period of time and over several settings.
- *Focused* – an interview following a set of questions but still remaining open-ended and conversational in nature. Focused interviews usually take place over a short period of time (half an hour, an hour) and can for example be used to confirm or verify previously gathered information.
- *Survey* – interviews conducted along the lines of a formal survey with structured questions producing quantitative data. The difference between this type of interview and a regular survey lies in its use. A regular survey would serve as the actual measurement of a certain phenomenon while a survey interview serve as one part of an assessment of the phenomenon.

Due to the constraints and limitations discussed above the survey was the chosen method for this part of the study. Although their usage differs from interviews, the two data collection methods are similar in many ways. It is important to have a firm grasp of the overarching questions that the study seeks to answer. These should be well thought out and articulated and are to be kept strictly separated from the actual interview questions posed to the respondent. The interviewee should not be asked to answer these questions; these questions remind the researcher about what information needs to be collected and why. The questions posed to the interviewees should be designed in a way that allows the interviewer to fully answer the study questions by drawing conclusions from the answers given by the respondents in the interviews. The same goes for surveys and having a set of clearly formulated questions to guide in the creation of the survey helps insure that all the questions asked are relevant and all lead towards gathering the data needed (Yin, 2008).

### **3.7 Source Criticism and Credibility**

When referencing material for information or data, it is important to realise that not all sources are created equally. A piece of research might be biased by the researcher's past experiences; a book might reflect the personal beliefs of the author; an article might be based on someone's personal opinions. Inadvertently or not, material produced by others is likely to contain some degree of bias. It is therefore crucial that the researcher examines the relevance and reliability of a source to ensure the overall quality of the study for which it is to be used. This includes looking at the methodology used by the author, the conclusions drawn from the results, and the relevance/similarities to the researcher's own topic of study. It is furthermore interesting to

look into who sponsored the research, who verified the results and whether or not it has been accepted by the researching community (Höst, Regnell and Runeson, 2006).

Rosengren and Arvidson (cited in Höst, Regnell and Runeson, 2006) describe research as being valid and credible if it succeeds in three aspects: reliability, representativeness and validity. In order for research to be reliable and its results to be trustworthy, the methods used in the study and explanations of how the results were obtained must be presented to the reader. By doing so in a clear and transparent manner the reader is given the opportunity to repeat (or at least follow the authors line of thought) the study and verify that the results are indeed correct. Representativeness describes to which degree the results of the study are generalizable, i.e., to which extent the results can be applied to other problems in other contexts. One factor that influences representativeness is the sample population; e.g., a high response rate in a survey helps to ensure that the sample is representative of the population. Finally, validity describes how well the study achieves what it set out to do. One method of increasing the validity is to apply triangulation, i.e., using different methods to study an object or phenomenon. This reduces the likelihood of critical aspects being missed during data gathering and analysis.

To ensure the validity and representativeness of the theoretical model developed in this thesis a significant amount of time has been devoted to a broad and deep literature study. Multiple aspects and sets of keywords have been used to make sure that the literature study was comprehensive enough to really reflect the obstacles and opportunities inherent to the questions central to this thesis. Also, the reference lists, publisher and academy of all articles were examined to ensure that only reliable and reputable sources were used. Published material was used with only three exceptions: Sweden's Road Carriers' website; *Arteology*, Pentti Routio's online repository of material on research methodology; the Council of Supply Chain Management Professionals (CSCMP) website. A background check was performed and all three sources were deemed credible enough to use. Sweden's Road Carriers is a well-established trade organization representing Swedish carriers' interests; Pentti Routio is a lecturer and researcher at the Helsinki University of Arts and Design; CSCMP is a reputable and professional association in the field of supply chain management. This method is not without limitations as it only considers digital material and heavily favours articles over books, though books are represented among the literature reviewed. Searches using search engines and databases was chosen over the use of a predetermined set of journals since journals are numerous and it would be difficult to decide beforehand on which would be the best fit for this thesis. Furthermore, the multifaceted nature of the problem at the core of this study would benefit from consulting as wide a knowledgebase as possible, which Google Scholar naturally lends itself to.

To make sure that the answers to the research questions would be both valid and reliable, all qualitative information has been gathered from those concerned with the question at hand. This includes the departments for accounting, sales, logistics, product design, and/or their respective managers. Likewise, the quantitative information was collected directly from either accounting or the people tasked with keeping records of dispatched goods. A local forwarder was consulted on the composition of the transportation market to gain an insight into the forwarders available and one of the incumbent forwarders was consulted on the draft for the RFQ to ensure that it would be effective. Furthermore, the logistics managers at LHHI and LWSEW, the two companies with the greatest transport volumes, have been consulted numerous times during the market analysis and the process of developing the RFQ. All contact with freight forwarders during the RFQ was handled either by a logistics manager or secretary to ensure that the academic reason for the request would not affect the quotations given.

In the case of collaboration potentially resulting savings, the way that these savings are allocated between the companies will be calculated using multiple methods. The reason is that different methods put different emphasis on the relative bargaining power of the coalition's members as well as using different definitions of a "fair" allocation. By using more than one method for the calculations and comparing the results side by side the likelihood of finding a reward-sharing scheme that is acceptable to everyone involved increases.

To ensure that the data provided by the surveys is representative of each company and the group as a whole, relevant managers at all focus companies will be asked to contribute by filling out the survey. The translating of the questions, and interpreting the answers if necessary, will be done with the help of one of the WXDG's translators. Also, besides the focus companies, the chairman of the board will be asked to fill out the survey focusing on the strategic issues regarding collaborating, to provide his unique perspective as both an owner and general stakeholder.

## 4 Empirics

Following the six-step method described in the theory section, this section will describe in detail the application of the first three steps of this framework. The first step, define scope of collaboration, introduces the companies included in the study, presents the final choice of focus companies along with the motivation for this choice. The second step, understand current buy and needs, delves into the current situation at each company and their specific needs and requirements regarding the distribution of finished goods. In the third step, market survey and RFQ, the local market for logistics services is presented, the process and creation of short-list of LSPs is described and the thought process behind the design of the RFQ are explained.

### 4.1 Define Scope of Collaboration



Figure 23 - Step one: define scope of collaboration

The first step, see Figure 23, in looking into the potential of increasing collaboration is to identify which companies and products that are most suited for such an endeavour. To get some insight into the four companies of the WXDG and LHHI, the company owned by WXDG's chairman, a series of interviews were conducted. The interviews were of the half-structured kind with the questions designed to inquire about general information, products and packaging, customers and markets, and distribution setup. The questions asked can be found in Appendix 1. The logistics managers at LWSEW, LHHI, LBE and LHE were interviewed and the resulting information is summarized below.

#### 4.1.1 Liaoning Wanxingda Special Enamelled Wire

LWSEW is North-eastern China's biggest manufacturer of enamelled wire with a yearly production capacity of 20,000-30,000 tons (sales currently hover around 10,000 due to the economic climate). Located in Xiaozhaotai Village (小赵台村) just outside Shoushan, Liaoyang County, with around 450 employees. LWSEW uses the ERP-system Jindie K3 (金蝶 K3), a requirement from one of their major customers, Haier Electric.

The main products are enamel-insulated copper and aluminium wire with a diameter ranging from 0.15-3.0mm for aluminium wire and 0.05-2.05mm for copper wire. Finished goods are spun onto rolls weighing between 30kg to 60kg with a height of 30 to 120cm. The rolls are then packed into boxes that are stacked onto pallets. Standard-size pallets measuring 1.2x1x0.25m are used. The weight and height of a loaded pallet varies, but on average 1.5 tonnes of wire are loaded per pallet and the height reach 70, 80 or 100cm. The most common height is 100cm. Pallets are loaded onto trucks using forklifts and can be stacked. It is very rare that deliveries are made in full truckloads.

LWSEW's main market is China but it happens that products go on export to Asian neighbours such as India. Customers are located all over east China but with a clear concentration towards the north-eastern provinces of Shandong, Hebei and Liaoning.

LWSEW oversees and is responsible for the delivery of all finished goods to customers. The sales department handles orders and work together with the logistics manager on planning deliveries. A combination of internal and external trucks is used for distribution. Two freight forwarders specialized in short to medium distance transports are first contacted, if they lack capacity one of LWSEW's three own trucks (with a capacity of 2, 12 and 20 tonnes respectively) is used instead. For all long distance transports a LSP in Shenyang is used. Arranging deliveries with forwarders and planning the use of the trucks are the responsibility of the logistics manager. This also includes finding and developing new forwarders if needed as well as negotiating prices and terms of payment.

Transportation is arranged the same day as the goods are scheduled for dispatching. Prices are negotiated on the spot and there is no agreement with fixed prices in place. All extra charges such as pick-up of goods and fuel charges are included in the price. The copper wire is considered valuable cargo, but it is not insured during transportation. Accounts with the forwarders are settled at the end of each month and any damages or losses incurred during transport are deducted then. Losses resulting from goods damaged during transport are very small and there is no official contract stipulating the provisions or enforcement of this agreement.

To offset the cost of managing a fleet of trucks, the logistics manager works with local transport brokers at each destination on a case-by-case basis to avoid running empty on the way back to Liaoning Province.

Deliveries to the cities of Wendeng, Rongcheng, Zhucheng and Qingdao on the eastern coast of Shandong Province are done by crossing the gulf by roll-on/roll-off ferry from Dalian. It is cheaper than taking the land bound route, but takes longer, 1.5 days compared to 1 day.

#### **4.1.2 Liaoning Hongchang Heavy Industries**

LHHI is a steel-rolling mill located in central Shoushan, Liaoyang County, with an annual capacity of 500,000 tonnes and just over 500 employees. LHHI currently uses the same ERP-system as LWSEW, but since this system has proven to align poorly with LHHI's production and administration needs, LHHI is currently in the process of implementing a new ERP-system called Yongyou (用友). Trial runs are expected to begin in November. LHHI is preparing for an upcoming initial public offering.

The main products are mast rails for forklifts, E-type and 工-type steel sections, and track shoes for excavators and other heavy-duty industrial vehicles. In most cases steel billets are rolled into beams and sections to customers' specifications, which are then cut and further processed by the customers themselves. The longest sections delivered to customers are up to 10m in length.

LHHI produces both for the domestic market and for export, but the domestic market is by a wide margin the biggest one. The eastern and south-eastern provinces of Jiangsu and Zhejiang and the area around Shanghai are home to important customers such as Baosteel and Suzhou Steel. International customers include companies such as American Caterpillar, South Korean Doosan and Japanese Toyota.

Basically, all finished goods are picked up at the factory by LSPs of the customers' choice. The exceptions are goods destined for export or customers in South-eastern China, which are loaded onto heavy-loader trucks (allowed to take up to 100 tonnes) and driven to the port in Yingkou. Since the distance is relatively short and the trucks drive slowly, no special clearance is needed from the Road Administration Department.

#### **4.1.3 Liaoning Boji Electric**

The dry type insulation technology was originally developed for wall bushings by a state-run research academy and then acquired by LBE and adapted to work in transformers. LBE does not have an ERP-system and currently has no plans of implementing one, as LBE is not yet big enough to benefit from the increased integration between business functions that an ERP-system provides. Located in Xiaozhaotai Village just outside Shoushan, Liaoyang County, with just over 100 employees.

LBE produces dry type transformers in the 35-500kV range, dry type wall bushings and composite insulation bus bars. The transformers and wall bushings are packed in wooden crates that can be transported on regular trailers either standing or lying down without risking being damaged. Regardless of type, these products are all considered fragile. They can be transported together with other types of goods, if placed on top or in any another way that ensures that they are well protected. The bus bars are wound in thick rope and then directly loaded onto a trailer. As with all LBE's products, the transformers are designed according to the customer's needs and therefore vary in size. The type of transformer that comprises the majority of sales is a small model that measures 2x1x0.5m when packed and weighs a little over 300kg. The most common model of wall bushings is somewhat smaller, measuring 2x0.5x0.5m and weighs 60-80kg including packaging. The bus bars vary the most in size, but are designed to fit in standard trucks length-wise. In an estimate by the head of the design department, an average bus bar could be said to be 2x0.25x0.25m and weigh in at around 100kg. Deliveries are rarely big enough to fill an entire truck. It is most common that LBE's products are shipped on short

notice that forces the forwarder to arrange for a truck exclusively for this delivery, which nets a higher cost compared to if the forwarder would be given time to coordinate transports.

The main market, generating the majority of sales, is North-eastern China (Liaoning, Inner Mongolia, Jilin, Heilongjiang, Hebei, Henan, Shandong and Shanxi provinces). Exports represent only a small portion of the total sales volume.

Managing orders and deliveries to customers are both the responsibility of the sales department. LBE is responsible for arranging with the distribution of finished goods to all of its customers. Transportation is bought from a single, local LSP, typically two days in advance. The choice of LSP is also belongs to the sales departments, which handle all communication with the current transport supplier as well as the development of a new supplier if needed. Volumes are comparatively small and no fixed price agreement exists. Even though the products are considered fragile, no additional insurance is purchased to cover transportation; losses due to damaged goods are small.

#### **4.1.4 Liaoyang Hongyuan Electron**

LHE is a Sino-Korean joint venture company specializing in electrical components for use in home appliances and consumer electronics. It is a joint venture with South Korean consumer electronics producer Samsung. The monthly production capacity is around 100,000 units of transformers, which are exported to South Korea and then imported back to China due to regulatory requirements. LHE Located in Xiaozhaotai Village just outside Shoushan, Liaoyang County, with around 200 employees.

The main products are small high frequency transformers, micro transformers and degaussing coils. LHE used to produce speaker elements as well, but stopped doing so earlier this year. All products are small in size, packed in cardboard boxes that are then loaded onto pallets and wrapped in plastic. A box is 37x26x24cm and weighs between 13 and 18kg depending on the product in question. A standard pallet is loaded with between 30 and 50 boxes; most commonly with around 40 boxes, stacked in four layers, 11 boxes per full layer.

Since LHE is a joint venture with Samsung all production capacity is devoted to them, the only customer.

LHE is responsible for arranging all deliveries to Samsung. The responsibilities associated with distributing finished goods are shared between to logistics managers: one handles the road-based transport, and the other handles customs and sea transport. LHE currently does not use an ERP-system, statistics and records are instead kept on concerned personnel's computers or on paper. The logistics managers are responsible for finding and developing new LSPs whenever the need arises. Truck transports are typically organized 24 hours before scheduled dispatch. Sea transports are arranged for 48 hours in advance.

Products are sent by truck to the port in Dalian. Passenger boats are most commonly used as they leave for South Korea three times every week. These are preferred over cargo ships, as there are fewer and less predictable departures of cargo ships. Furthermore, cargo ships require that goods be ready for loading at the docks two days before departure. The port of Dalian has imposed new rules this year, requiring all goods destined for passenger ships have to be at the harbour before 09:00/10:00 and trucks can only enter the port carrying goods from one shipper at a time. Due to these demands goods have to be dispatched in the afternoon/evening the day before for overnight transport. Although these strict requirements have given rise to higher transportation costs for LHE as well as sometimes making it difficult to secure capacity, passenger ships are still preferred over cargo ships due to their reliability. LHE is relying exclusively upon a LSP specializing in line-hauls between Liaoyang and Dalian. Goods are shipped in full truckloads, unloaded in Dalian and the truck then proceeds to the port carrying only LHE's goods. LHE had a fixed price agreement with its LSP, but it ended earlier this year due to the added restrictions from the port in Dalian and rising fuel costs. In the event of critical shortages at one of Samsung's Chinese facilities, LHE ships small batches of product directly to the site using a big logistics company.

#### **4.1.5 Chosen Scope and Focus Companies**

After finishing the interviews the results and the scope of the thesis was then discussed with the director of sales at LHHI and the general manager at LBE. It was then decided that the scope should be limited to LHE, LBE and LWSEW only. The reasons are multiple. The conditions for successfully implementing cooperative purchasing appear to be the most favourable for LBE, LHE and LWSEW: they are all located in the same industrial park; their products are all of similar size and share similar shipping requirements; management at LBE and LWSEW share offices, with the management of LHE located just on the opposite side of the road; they share a closer relationship since LBE and LHE buy all their copper from LWSEW. The biggest challenge in coordinating transportation is the short notice with which shipments are planned and arranged at all three companies. One aim of this study is thus to investigate the potential for cost savings assuming that transportations would be scheduled longer in advance, giving forwarders more freedom to increase fill rates. Furthermore, the very specific requirements of LHE reduces the possibility of finding synergies, but since both LBE and LWSEW regularly make deliveries to Dalian it was decided to include LHE to see what, if any, opportunities there might be for collaborating. TANFM was excluded not only due to the distance of Tieling from Liaoyang, but also because TANFM has grown independent of the WXDG in many aspects compared to the companies remaining in Liaoyang County. This reduces its organizational proximity with the WXDG, and therefore reduces the attractiveness of including TANFM in the study. It would furthermore be difficult and impractical to include TANFM because of the distance to Tieling and the limited time available for the execution of this study. LHHI was excluded since the customers themselves manage the distribution. Furthermore, because the products are big,

heavy and often distributed in full truckloads using heavy trailers, synergies would be difficult to realize as this places very different requirements on LSPs that are mainly specialists.

## 4.2 Understand Current Buy and Needs



Figure 24 - Step two: understand current buy and needs

Key to any improvement initiative is to thoroughly understand the situation the group currently faces as well as both present and future needs. Acquiring the data and information needed is the focus of the second step of the framework, see Figure 24.

Large amounts of data are an inherent problem to research projects investigating the activities of multiple companies over an extended period of time. To ensure that collecting, processing and analysing the data would fit within the timeframe of the thesis without sacrificing the accuracy of the information derived from said data, only data from the busiest and the least busy two months were collected. This certainly is not as good a description of how demand fluctuates over the course of a year as a complete time-series analysis of twelve full months worth of data would provide, but performing such an in-depth analysis would take prohibitively long to finish. Instead, by creating two scenarios picturing the low and high points in transport demand allows for the creation of a rough average as well as clearly defining the limits within which the demand varies.

To identify the best choice of these two months the logistics manager, whom are responsible for dispatching goods, at each company was consulted on the issue, after which their views were confirmed by either the general manager or accounting manager. LWSEW’s busiest months are the last month before the spring festival (December-January) and in the spring (April-May). LBE is busiest sales-wise April-May, with relatively little business in December. Deliveries, though, are made relatively evenly through the year, with a concentration towards late summer and early autumn. LHE faces a demand profile rather different from LWSEW, being the busiest in March, September and October with the rest of the year roughly equal in terms of shipments. To capture the maximum spread possible, the busiest month for each company was chosen, i.e., the months of May and September. This choice not only comprises the busiest part of the year but the least busy part as well, since LHE’s and LBE’s peaks coincide with the low for LWSEW.

Data on goods dispatched from the three focus companies was collected from their respective accounting departments. LBE and LWSEW keep electronic records of all deliveries to customers in spreadsheets, while LHE keeps this information on paper only. The logistics manager at LHE was tasked with the digitization of the records to ensure that the transcription would be accurate.

#### 4.2.1 LHE

Apart from using a freight forwarder to ship the bulk of their products to the port in Dalian, LHE also employs couriers to ship samples to Samsung in South Korea and a large 3PL for emergency deliveries to Samsung’s manufacturing sites in China. A summary of all the shipments in May can be seen in Table 2.

Table 2 - LHE summary, May

		May			
	Destination	Tonnage	Goods	Shipments	Cost
Liaoning	Dalian	-	25P, 228B	12	4619
	Shenyang	-	4P, 8B	3	1460
	Total		29P, 236B	15	6079

P = Pallet, B = Box

Even though the amount of shipments does not differ much between the two months investigated, the volume does. The total amount of pallets shipped is just over twice as big and the total cost almost three times as high, see Table 3. The main destination is as expected Dalian with just a few odd deliveries to other cities in the north-east. September saw three return shipments from Dalian to Liaoyang County. For a geographical representation of the shipments made in May see Figure 25, and Figure 26 for the shipments made in September. The yellow dots represent LHE’s shipments.

Table 3 - LHE summary, September

		September			
	Destination	Tonnage	Goods	Shipments	Cost
Liaoning	Dalian	-	71P, 10B	11	13220
	Shenyang	-	1B	1	200
	Shoushan	-	4P	2	1480
	Shoushan	-	1B	1	351
Tianjin	Tianjin	-	5P	3	2100
Total			80P, 12B	18	17351

Return: Dalian

Return: Liaoyang

P = Pallet, B = Box

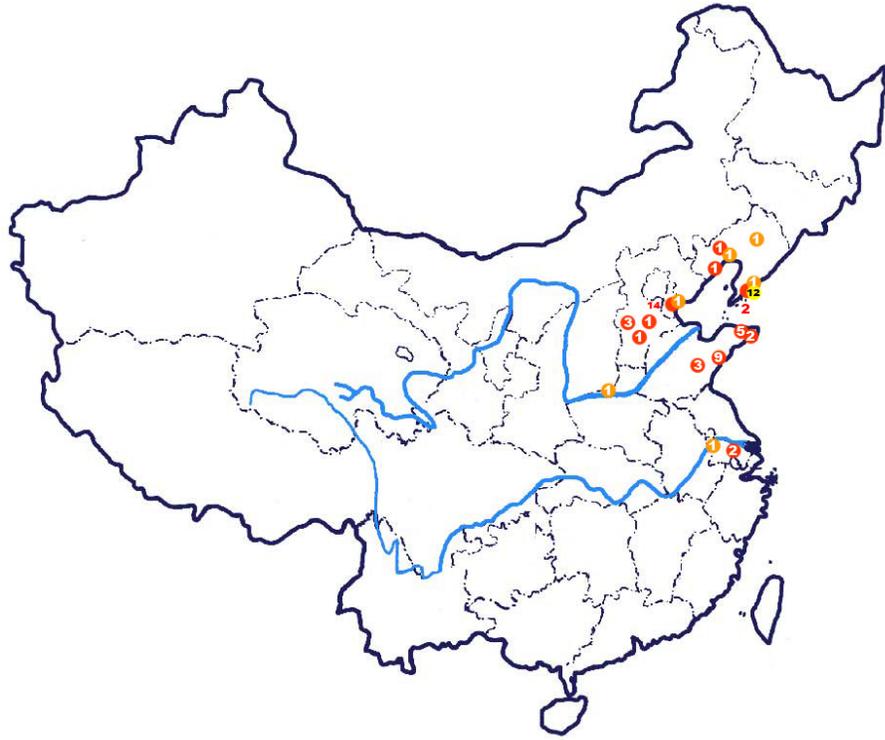


Figure 1 - Destinations and deliveries, May

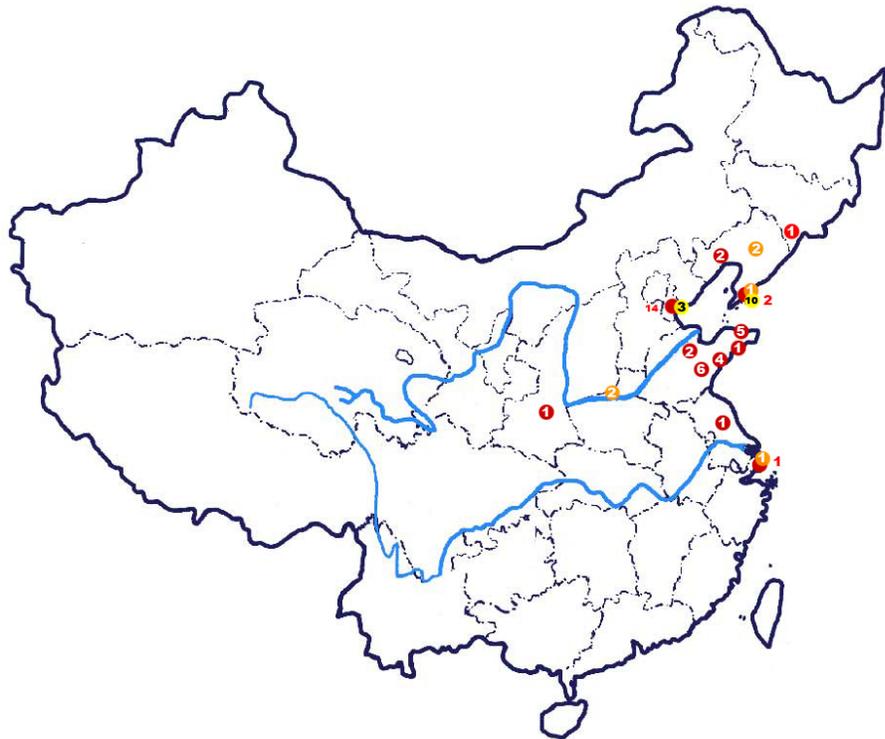


Figure 2 - Destinations and deliveries, September

#### 4.2.2 LBE

The numbers for LBE also show considerably more activity during the autumn month; the amount of shipments is twice as big and so is the spend; see Table 4 and Table 5. The biggest product category, the dry type transformer, saw a big drop in shipments to half the volume in May, but the amount of shipped bus bars and wall bushings quadrupled and tripled respectively. In both months the bulk of the deliveries were made within Liaoning Province with a few shipments going to middle and south-east China. The repeat deliveries were in most cases part deliveries of a bigger order going to one customer.

Table 4 - LBE summary, May

		May			
	Destination	Tonnage	Goods	Shipments	Cost
Jiangsu	Nanjing	0.90	9BB	1	2800
Liaoning	Shenyang	4.50	15T	1	3200
	Liaoyang	0.10	1BB	1	500
	Dalian	0.40	4WB	1	700
	Jinzhou	3.30	6WB, 9T	2	650
Tianjin	Tianjin	0.30	3WB	1	1000
Total		9.50	10BB, 24T 13WB	7	8850

BB = Busbar, T = Transformer  
WB = Wall Bushing

Table 5 - LBE summary, September

		September			
	Destination	Tonnage	Goods	Shipments	Cost
Henan	Jiaozuo	1.50	15BB	2	8400
Shanghai	Shanghai	0.90	9BB	1	1900
Liaoning	Fushun	3.00	12WB, 18BB	5	5200
	Liaoyang	5.00	12T, 10WB	4	380
	Dalian	0.60	6WB	1	500
	Jinzhou	1.50	6WB, 9BB	2	2500
Total		12.50	51BB, 12T 34WB	15	18880

BB = Busbar, T = Transformer  
WB = Wall Bushing

For a geographical representation of the shipment activity in May see Figure 24, and Figure 25 for September. The orange dots represent LBE's shipments.

### 4.2.3 LWSEW

The data collected from LWSEW was more extensive than the samples obtained from LBE and LHE, as LWSEW’s shipping consists of both an external and internal part. The shipments carried out by the two external freight forwarders were sorted according to forwarder, the receiving customer, and then destination. The deliveries made using LWSEW’s own vehicles were sorted by the license number of the truck and then by destination. A summary of the transports made in May and September can be found in Table 6 and Table 7 respectively.

Table 6 - LWSEW summary (external transports), May

		May				
		Destination	Tonnage	Shipments	Cost	
<b>Tianjin</b>	Tianjin		32.20	14	8605	
	Shoushan		0.63	2	400	<i>Return shipment</i>
<b>Shandong</b>	Wendeng		12.68	5	5892	
	Rongcheng		23.00	2	7593	
	Zibo		64.55	6	20572	
	Qingdao		3.08	3	1306	
	Zhucheng		126.60	9	46260	
	Shoushan		3.87	2	1704	<i>Return shipment</i>
	Suzhou		4.71	2	3243	
<b>Hebei</b>	Anping		0.55	1	156	
	Shijiazhuang		36.02	3	10802	
	Hengshui		22.22	1	6223	
	Shoushan		0.31	1	300	<i>Return shipment</i>
<b>Liaoning</b>	Dalian		14.53	2	3013	
	Chaoyang		2.44	1	978	
	Huludao		1.44	1	427	
<b>Total</b>			<b>348.83</b>	<b>55</b>	<b>117474</b>	

May is the busier month with quite the margin. The total tonnage shipped in May was 348.83 tonnes over 55 shipments; the corresponding numbers for September was 253.26 tonnes over 39 trips. The total spend on transportation these two months were 117474 Yuan and 87729 Yuan respectively; the 37% increase in shipped volume resulted in a 34% increase in expenditure. The majority of the deliveries were made to the province of Shandong and deliveries were clearly concentrated to north-eastern China (the provinces of Liaoning, Hebei and Shandong). A few deliveries were made to more remote locations (Shaanxi Province and Zhejiang Province), but they were a clear minority and did not follow any discernible pattern. A geographical representation of the shipments made in May can be found in Figure 24, and the shipments made in September in Figure 25. The red dots represent LWSEW’s shipments.

Table 7 - LWSEW summary (external transports), September

September				
	Destination	Tonnage	Shipments	Cost
<b>Jilin</b>	Tonghua	4.04	1	1213
<b>Tianjin</b>	Tianjin	40.66	14	10903
<b>Shandong</b>	Wendeng	9.52	5	4588
	Zibo	19.39	2	7856
	Zhucheng	70.18	6	22309
	Rongcheng	8.08	1	2959
	Qingdao	52.10	4	17475
	<b>Liaoning</b>	Dalian	9.53	2
Jinzhou		6.73	2	1438
<b>Jiangsu</b>	Taizhou	12.27	1	7119
<b>Shaanxi</b>	Xi'an	20.76	1	9965
	<b>Total</b>	<b>253.26</b>	<b>39</b>	<b>87729</b>

The volume shipped using LWSEW's own vehicles was roughly equal to those shipped using freight forwarders, see Table 6, Table 7 and Table 8. There was a noticeable difference in destinations: apart from a few shipments to Hebei Province and Shandong Province (9 out of 84 or 10.7%), all deliveries were made within Liaoning Province, with the city of Shenyang being the most frequent destination. The cost of making these deliveries comprised both fixed and variable costs. The fixed costs were depreciation and insurance for the three trucks. The variable costs were the drivers' salaries, diesel bought in Shoushan, diesel bought outside Shoushan, compensation to drivers for days spent outside Liaoning Province, road tolls, and finally, miscellaneous costs such accommodation, fines and parking fees. LWSEW has an agreement with a local petrol station, which is why the cost for diesel is divided into these two categories. There were no repairs made to the trucks in the period March-November (statistics for repair costs was requested in November). The income from backhaul deliveries covered a significant part of the costs: 54% in May and 43% in September. These were deliveries arranged for by the logistics manager to cover the cost of running empty on the way back to Liaoning Province.

Table 8 - LWSEW summary (internal transports)

May											
Destination	Tonnage	Shipments	Depreciation	Insurance & Taxes	Salaries	Diesel Home	Diesel Away	Subsistence	Road-Tolls	Other	Backhaul Income
Dalian	30.1	6	4704	2585	4140	29760	6100	1620	14540	750	1565
Shenyang	144.5	24									7075
Yingkou	33.9	4									1970
Haicheng	21.5	3									6092
Tieling	87.2	10									9867
Qingdao	24.5	2									8040
Huludao	2.0	1									0
<b>Total</b>	<b>343.7</b>	<b>50</b>				<b>64199</b>					<b>34609</b>

September											
Destination	Tonnage	Shipments	Depreciation	Insurance & Taxes	Salaries	Diesel Home	Diesel Away	Subsistence	Road-Tolls	Other	Backhaul Income
Shenyang	44.0	12	4704	2585	7690	20070	20700	3100	25155	2260	2462
Haicheng	32.3	6									1330
Tieling	34.4	7									5472
Qingdao	43.5	4									16751
Huludao	2.5	1									0
Hebei	36.8	2									8402
Tianjin	11.0	1									2762
Fushun	2.0	1									0
<b>Total</b>	<b>206.5</b>	<b>34</b>				<b>86264</b>					<b>37179</b>

Utilization for the 12-tonne truck was the highest of the three, as it spent 77.4% and 86.7% of the time on the road in May and September, see Table 9. The 20-tonne and 2-tonne trucks were utilized a lot less during this period of time, standing idle 15 and 8 of 31 days respectively in May and clocking in at just over 50% utilization in September. The relative low utilization is to be expected, since shipments are given to external forwarders first, and if they lack the capacity LWSEW then uses these trucks. Furthermore, the average load was 6.87 and 6.07 tonnes respectively for May and September, which is more than the 2-tonne truck can handle, and at the same time not enough to warrant the use of the 20-tonne truck if not absolutely necessary.

Table 9 - LWSEW truck utilization

May				
Truck	Capacity	Days Busy	Days Idle	% Busy
21207	12	24	7	77.4%
28502	20	16	15	51.6%
27485	2	23	8	74.2%

September				
Truck	Capacity	Days Busy	Days Idle	% Busy
21207	12	26	4	86.7%
28502	20	17	13	56.7%
27485	2	15	15	50.0%

## 4.3 Market Survey and RFQ



Figure 3 - Step three: market survey and RFQ

### 4.3.1 Current Forwarders

In this the third step of the joint procurement of transportation framework, see Figure 27, the market for logistics services is surveyed. The goal is to find a set of suitable logistics service providers, prepare a RFQ and distribute it to them.

The market for transportation in Liaoning Province is characterized by a multitude of single-truck carriers who are coordinated by small broker firms or freight forwarders. These can generally be divided into two kinds, specialists and generalists. Specialists only operate on one or a few lanes between certain cities, often specializing in a specific type of goods or mode of transportation (raw materials, full truckloads, ferries etc.). Generalists on the other hand offer to arrange any shipments to any destination all over China. Companies owning large or even small fleets of cars are rare; most commonly these brokers own a maximum of one or two trucks. The use of big 3PL forwarders is even more uncommon. One reason is the sheer amount of hauliers and forwarders available, which allow them to be very flexible in satisfying different requirements or deliveries on short notice. Also, many are specialists with a very narrow scope, only undertaking transports along lanes between major cities and provincial capitals, which allow them to be competitive on price as well.

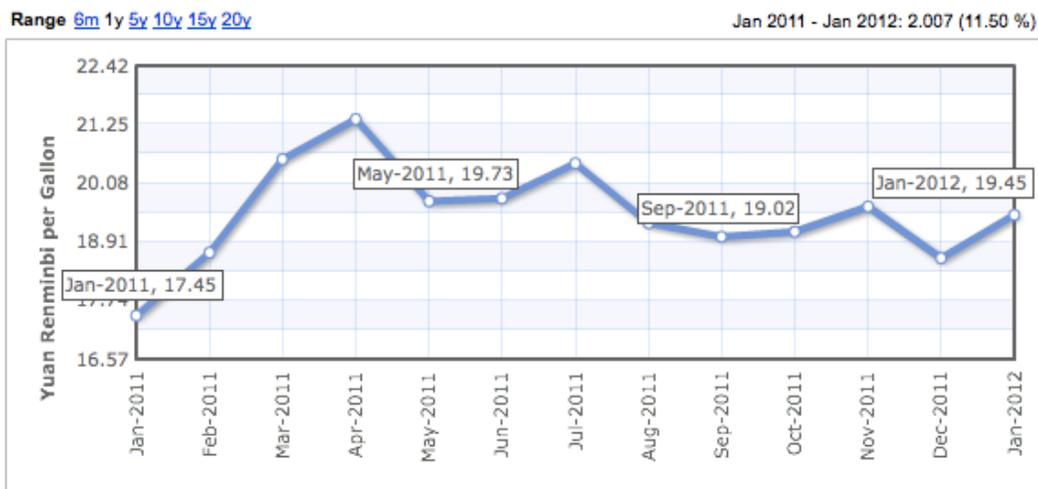
Seven small freight forwarders and one big logistics company are currently enlisted on a regular basis by the WXDG:

- LBE is working with Yishunlong Logistics (益顺隆配货中心).
- LWSEW uses Changda Transportation Centre (辽阳昌达配货中心) and Shunda Logistics (辽阳市顺达空车配货运输中心) for short and medium-distance transports and Shenyang Logistics Group (沈阳运输集团) for long-distance transports.
- LHHI rely mainly on Changda when the customers do not arrange for transportation themselves, but also uses Xingjian Logistics (兴建配货) from time to time.

- LHE has relied exclusively on Liaoyuan Logistics (辽缘配货物流公司) the last year, but a sudden and sharp rise in prices lately has prompted LHE to start looking elsewhere. LHE currently uses both Liaoyuan and their former forwarder Hualong Logistics (华隆配货). LHE also uses a large 3PL logistics company, Deppon (德邦物流), for small, express deliveries within China.

The freight forwarders are all of the broker kind, where one or a few people work from a single office to coordinate hauliers with shippers utilising their personal and professional networks, charging a fee for this service. Deppon is a big logistics company with 1700 outlets in 550 cities and 1800 freight vehicles. Besides truck transport they also offer air, sea and intercity freight along with various value-adding services as online track-and-trace.

The logistics managers at both LHE and LWSEW tell of increasing costs of transportation in the last year. Both companies used to have price lists and price guidelines with their forwarders, which have since been discarded. In their opinion the rise in costs stem from rising fuel costs and a reduction in spare haulier capacity. This is also the reason Liaoyuan cited for not using fixed price agreements. According to the commodities index sites of Zhuochuang Zixun(卓创资讯, index.sci99.com) and Index Mundi (www.indexmundi.com) there was indeed a steep rise in the cost of diesel in Q1 and the beginning of Q2 2011, but it has since stabilized and even fallen a little, see Figure 28 and Figure 29 below.



**Description:** New York Harbor Ultra-Low Sulfur No 2 Diesel Spot Price

**Unit:** Yuan Renminbi per Gallon

Figure 4 - Diesel price during 2011 (RMB per gallon)



Figure 5 - Diesel price index during 2011

### 4.3.2 Potential New Forwarders

Since there is no strong tradition among Chinese small and medium sized logistics companies, carriers and forwarders to make their presence known online in the form of websites, other means were needed to find and get in touch with potential carriers. The organization Logistics People (物流人) publishes an index of active forwarders and carriers in the three northern provinces of Liaoning, Jilin and Heilongjiang, complete with contact information, specialization (LTL, TL, short-haul, long-haul etc.) and lanes (e.g., Shenyang-Beijing). It is an opt-in index where carriers can buy space on a page and as such it is not 100% comprehensive, even though the fee is very low (100 yuan). A copy of this year's issue was obtained from Xinrun Transportation Centre (辽阳县新润配货站), a local transport broker. The manager at Xinrun, who has been in the business for a number of years, acknowledged that not all LSPs are represented in the index, but well enough to run an effective and profitable broking business.

### 4.3.3 Request for Quotation

#### 4.3.3.1 All Products and Destinations

A spreadsheet with an overview of the transportation demand for the two scenarios was created. The destinations were placed along one axis of a matrix and the different products on the other. For each destination and product the total amount of shipments and the average weight and volume per shipment were included. The packaging of the products, the actual dimensions and any special requirements were described in text as well. Furthermore, the preferred mode of transportation was given for each destination; the forwarders were given the choice of transportation mode for the destinations where either truck or ferries from Dalian were possible options. Requesting quotes for average loads for a given amount of shipments was chosen to correctly capture the cost of using Deppon, the 3PL, since they charge for picking goods up at the shipper and delivering to the receiver's door. There are no such surcharges when using freight forwarders, requesting quotes this way would therefore make a comparison convenient.

Not all shipments and data were included in the RFQ. It was designed to facilitate a comparison and be as comprehensive as possible without placing an unrealistic burden on the forwarders when giving quotes. The following data was excluded when designing the RFQ:

- The shipment of samples and the emergency shipments were excluded from LHE's data because of the small volumes, the nature of the shipments and the use of a different kind of LSP for these shipments compared to LBE and LWSEW (couriers do not haul heavy goods and freight forwarders are reluctant to take parcels).
- All shipments of speaker elements were excluded from LHE's data since they are no longer produced.
- Shipments within Shoushan were excluded from LBE's data as they were extremely few and low-cost, representing less than 5% of the total amount of shipments and just over 0.2% of the total spend over these two months (a single delivery to LHHI in September).
- A delivery of tools made to LHHI was excluded as well. Since this type of delivery was found to be non-recurrent in nature and of a different kind than LBE's regular products it was not included.
- The deliveries made using LWSEW's own trucks were excluded. It appeared unrealistic that any form of cooperation or joint purchasing activities would yield the same amount of savings as the profits the backhaul transports currently generate.

- Return deliveries were consistently excluded since they were both small and infrequent and would have added another layer of complexity when preparing the request for quotations for a very tangential benefit in terms of increased validity of the study. Return shipments at LWSEW represented 0.8% of the total tonnage shipped, 5.3% of the shipments and 1.1% of the total cost. LBE had no return shipments during May and September. Return shipments at LHE represented 8% of total expenditure and less than 4% of the total amount of pallets shipped.

With these exclusions made, the cost of the shipments included in the RFQ totalled RMB 247991, or 96.2% of the total cost of RMB 257663. The costs for each company each month can be seen in Table 10, and a summary of the total costs in Table 11.

Table 10 - Cost of shipments (RFQ)

May		September	
LWSEW	115070	LWSEW	87729
LBE	6650	LBE	18700
LHE	4522	LHE	15320
Total	126242	Total	121749

Table 11 - Costs, summary

	Total	%
LWSEW	202799	82%
LBE	25350	10%
LHE	19842	8%
Total	247991	100%

#### 4.3.3.2 Liaoyang - Dalian

Even though shipments from LWSEW and LBE destined for Dalian are neither numerous nor representing a big part of the monthly spend, the lane between Liaoyang and Dalian is the only lane common to all three companies (and is used regularly). A small number of LBE's wall bushings currently go for export to Europe and these are shipped by boat from Dalian and LWSEW has customers in Dalian. Therefore a second RFQ was designed where only the shipments to Dalian were included. The aim being to investigate whether it would make economic sense to pool all shipments destined for Dalian using freight forwarders who specialize in line-hauling between these two cities. Because of the higher regularity and larger volumes the forwarders are handling along the lane, it is reasonable to assume that they would be at least as competitive on price, if not more so, as a generalist.

LHE, LBE and LWSEW's shipments to Dalian during May and September can be seen summarized in Table 12 below.

Table 12 - Shipments to Dalian, summary

May				
Company	Shipped Volume	Tonnes	Trips	Cost
LBE	4 wall bushings	0.28	1	700
LHE	25 pallets	15.84	8	3522
LWSEW	14.53 tonnes	14.53	2	3013
Total		30.65	11	7235

September				
Company	Shipped Volume	Tonnes	Trips	Cost
LBE	6 wall bushings	0.42	1	500
LHE	71 pallets	46	10	13220
LWSEW	9.53 tonnes	9.53	2	1904
Total		55.95	13	15624

#### 4.3.4 Forwarder Selection

This index was browsed together with the logistics manager at LHHI to find potential new forwarders. One suitable forwarder was found in Liaoyang and two in Anshan, all of which were capable of offering transportation all over China. The forwarders in Liaoyang and Anshan were chosen to see whether bids from a big city forwarder would be more or less competitive. These were then complemented with the incumbent forwarder used by LBE, Yishunlong Logistics, and one of the forwarders used by LWSEW, Shunda Logistics. The logistics managers at LHHI and LWSEW both indicated that quotations from known forwarders would possibly be more accurate, i.e., lower, as the established relationships with the WXDG would allow for more honest and open discussions. The inclusion of Yishunlong and Shunda was therefore doubly important as they could provide reference and test for this effect. Deppon only offers delivery by truck within a 3-4 day period, meaning that a shipment is guaranteed to arrive no later than four days, but could arrive well before that. Since Deppon is unable to guarantee that a shipment arrives at a specific time of the day, and LHE currently arranges for transport only 24 hours in advance, it is impossible to enlist Deppon for deliveries to the port in Dalian with its new requirements. Instead, the big 3PL Deppon was given a modified RFQ with the extremely time-sensitive deliveries excluded, to provide a frame of reference for the small, local freight forwarders. Apart from LHE's current forwarder, Liaoyuan Logistics (辽缘配货中心), two more forwarders specializing in transportation between Liaoyang and Dalian, Xingyu Logistics (星宇配货) and Hualong Transportation (华隆物流) were also sent the RFQ. These three companies were sent a RFQ containing only shipments destined for Dalian to see how their prices compared to forwarders offering shipping all over China.

The RFQ was sent to all forwarders under the premise that the WXDG is looking for alternate logistics service providers and would like to reference their prices for consideration.

None of the forwarders were doing business through either website or email, and were all contacted by phone after which the RFQ was sent to them by fax. Shunda Logistics was contacted by the logistics manager at LWSEW and the logistics manager at LHE delivered the RFQ in person to Deppon in Liaoyang. After a series of lengthy delays and reminders, it was clear that only Shunda and Deppon would give quotations; the companies in Liaoyang and Anshan declined citing too volatile prices as the reason why they would not be able to accurately quote the requested transports. Liaoyuan and Xingyu returned the RFQ for the Liaoyang-Dalian lane, Hualong declined. LBE's incumbent forwarder, Yishunlong, declined to give a quote due to a lack of time; no offer of additional time could make them reconsider.

Raising the issue with one of the logistics managers, it was suggested that firms from bigger cities might be uninterested in business in the counties on the countryside. Instead, six local forwarders claiming to undertake transports all over China were contacted instead. Due to several of them lacking fax machines, the RFQ was delivered in person by a secretary at LWSEW. When reminded a week later, all of them declined to leave quotations. It was then suggested that the forwarders on the countryside might be too backwards in their ways and might not have understood the point of dealing with RFQs. Thinking that the forwarders in Liaoyang City might be more accustomed to dealing with customers this way, it was decided that suitable forwarders should be pursued there instead. Liaoyang was chosen over Anshan even though Anshan is much bigger, because Liaoyang is closer to Shoushan and the logistics managers are more familiar with Liaoyang. Another 8 forwarders were contacted and sent the RFQ as well as a reminder after a few days. With none of them willing to give a quotation, another four was visited in person by the secretary, of which two returned quotations after given a reminder. These 12 forwarders were all chosen among the 18 (Shunda Logistics excluded) listed in the index as based in Liaoyang City and arranging less-than-truckload transports all over China. The two quotes were given by Xinyuan Transport and Logistics Centre (新源配货物流中心) and Zhaolin Logistics (兆林配货站).

## 5 Analysis

In this chapter the potential for collaboration among the companies of the WXDG is analysed, the fourth step in the framework, Figure 30. The analysis consists of two parts: one quantitative part based on the quotations received from the LSPs focusing on the monetary incentives for collaborating, which is followed by a qualitative analysis of the areas where collaboration would potentially have an impact.

### 5.1 Analyse Potential

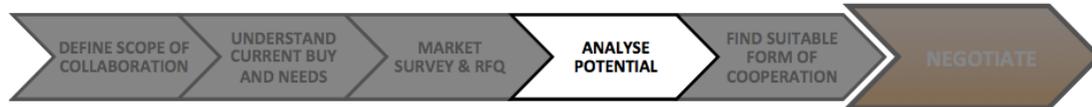


Figure 30 - Step four: analyse potential

Previous research has found that a multitude of potential benefits have motivated organisations to cooperate: *bundling of purchasing volumes, information sharing, and shared resources collaboration* (Schotanus, 2007, pp 98). Some of these benefits are easy to quantify while some are more abstract in nature and it is difficult to assign a value to their effects in terms of currency. The potential for cooperating within the WXDG on joint purchasing of logistics services will therefore comprise of an analysis of both quantitative and qualitative aspects.

Based on the collaborative activities and the benefits they might give rise to as described in the theory, 4.6.2. Literature Review, this chapter will be structured in two sections: quantitative and qualitative.

By bundling purchasing volumes among companies it is possible to create economies of scale, which in turn might allow for lower prices through volume discounts. This possibility of financial gain (motive #2) requires analysis of quantitative costs data and quotations and will be presented in the first section. The possibility of sharing information, resources and processes (motives 1, 3-6) having a positive effect will be analysed in the second section.

## 5.1.1 Quantitative

### 5.1.1.1 All Products and Destinations

Comparing the quotes with the actual costs for the time periods investigated, none of the LSPs managed to match or exceed the baseline, see Table 13. The lowest bid in each category is highlighted in grey.

Table 13 - Quotations comparison, summary

	LWSEW	LBE	LHE	Total
Current	100%	100%	100%	100%
Shunda	104%	72%	123%	103%
Xinyuan	113%	27%	177%	110%
Zhaolin	113%	26%	108%	103%
Deppon	391%	41%	-	352%

The quotes by LWSEW’s incumbent forwarder, Shunda Logistics, and Zhaolin Logistics came in close at 103% of the total cost. Since LWSEW’s volumes represent the lion’s share of the total transports, Shunda’s quote would be the more attractive one, as they offered the best prices for these transports. One reason for this might be that Shunda, as the currently enlisted LSP, is more familiar with the products and LWSEW’s organisation and can therefore offer more accurate (i.e., attractive) prices. Bargaining and relations are big parts of Chinese culture and since the WXDG represents a new and untested customer to the newcomers, it is possible that their quotations include margin for bargaining that was not realized. It cannot be ruled out that the prices in the quotations from Zhaolin and Xinyuan could have been reduced if they were pressured, but lack of time, the approaching Chinese New Year, and the forwarders inexperience (or unwillingness) in doing business by working with quotations made a follow up round of bidding unfeasible. Furthermore, it is possible that the secretary who handled the contact with the forwarders was not high-ranking enough to give credence to the RFQ. The Chinese pay much attention to social and professional positions and it could be that a manager higher up in the hierarchy conducting the same market analysis might have yielded different quotations.

The bids for LBE’s transports are consistently lower than what is paid today. LBE’s products are fragile and need special attention when stowed together with other goods. Due to the short notice on which transports are currently arranged (24-48 hours in advance), shipments are often done using trucks dedicated for the transport in questions and therefore command higher prices than if the forwarder could coordinate the transports with other goods. The total transport volume of LBE is comparatively small next to LWSEW and LHE (20 shipments compared to 84 and 33 respectively), and the margin of error is thus bigger; one overoptimistic bid for one shipment has a greater impact if the total amount of shipments is small. A possible

explanation for the rather big discrepancies between the bids, see Table 14, is that many forwarders are overly focused on weight and time requirements when quoting prices, and might therefore have neglected the volume and fragility of LBE’s goods (even though these requirements were all stated in the RFQ). Shunda’s consistently higher bids for these transports might reflect their overall greater familiarity with the WXDG’s products and their demands, even though they currently only carry LWSEW’s copper wire. The difference between what is currently paid and the prices quoted indicate that there might be a potential for saving money if the reliance on dedicated vehicles is reduced. It bears to mention that this potential represents the ideal situation where it is assumed that all of LBE’s fragile goods can be co-loaded risk-free with other goods and that there are other goods to be co-loaded with, which might not always be the case.

Table 14 - Comparison, presented by scenario

		LWSEW	LBE	LHE	Total
Current	Low	100%	100%	100%	100%
	Shunda	101%	62%	50%	97%
	Xinyuan	111%	34%	190%	109%
	Zhaolin	117%	31%	123%	112%
	Deppon	394%	67%	-	105%
		LWSEW	LBE	LHE	Total
Current	High	100%	100%	100%	100%
	Shunda	108%	76%	144%	108%
	Xinyuan	117%	24%	173%	110%
	Zhaolin	107%	24%	104%	94%
	Deppon	386%	32%	-	324%

Deppon’s quotes are considerably higher than the others. Based on their size and the resources they have at hand, one would expect their prices to be more competitive than this. They do not market themselves as specialists in any specific mode of transportation, such as express deliveries for example, which could indicate that their competitiveness on short and long distance road-based transports would be inferior or this mode being less prioritized than their other services. Even though Deppon’s fleet sports 1800 transportation vehicles, they too rely on local hauliers when they are unable to satisfy requests for transport by themselves. Should it be the case that Deppon has relatively small number of vehicles allocated to the Northeast and that their use of external vehicles is high, a difference in price is to be expected since their overhead costs per shipped ton/kilometre would be much bigger than that of a small freight forwarder. The question is whether a supplement charge this big is justified.

Not all destinations were represented in both the high and the low volume scenarios and furthermore not all of those who were represented were of similar shipment volume, making a direct comparison difficult. Nevertheless, enough comparisons between scenarios were

possible to see that the same rates had been used in both cases in Shunda and Deppon's quotes. The quotations from Zhaolin and Xinyuan did not exhibit this phenomenon. The most probable reason for this is that the combined transport volumes of LWSEW, LBE and LHE were either not big enough or not homogenous enough for the forwarders to realize economies of scale or economies of scope. Another, albeit less likely, reason would be that unprofessionalism and laziness among the forwarders caused them to fill out the RFQ in the manner most convenient. When the RFQ was distributed it was made clear that the two scenarios described in the RFQ represented the high and low points in monthly demand and the demand each month would fall somewhere in between. Overall, the bids from the newcomers were comparatively straggly, perhaps telling of spottiness in the coverage of their networks or showing the effect of the difference in volume between the two scenarios. In the low demand scenario where LWSEW's volumes were big (342 vs. 253 tonnes), Xinyuan's average price per tonne of copper wire was 373, compared to 404 for the high demand scenario. The copper wire is packed on pallets in a way that allow them to be stacked and they are also generally less susceptible to damage than LBE and LHE's products. It could be that Xinyuan's transportation network is better adapted for this type of goods, thus explaining the lower prices in the low demand scenario. Zhaolin on the other hand quoted a higher average price per tonne for the low demand scenario than the high demand scenario (393 vs. 371). This could indicate that the addition of these volumes would add strain to Zhaolin's capacity, forcing them to adjust their prices upwards. The difference in shipping volumes for LBE and LHE between the two scenarios is rather pronounced as well (24 transformers, 9 bus bars, 13 wall bushings vs. 6 transformers, 53 bus bars, 24 wall bushings). Despite LHE's volumes differed quite significantly between the scenarios (28 vs. 76 pallets), the average price for shipping one pallet was virtually identical for both Zhaolin (200 vs. 198) and Xinyuan (333 vs. 329) in both cases. This could be indicative of this additional demand being small compared to the volumes they shipped on the lane to Dalian, and hence providing little benefit in terms of economies of scale. There were too few shipments of the same kind of product to the same destination between the scenarios to make an analysis of the prices in LBE's case.

LWSEW's shipments of copper wire represent by far the biggest share of the total transportation spend (80%), and any bid must therefore be competitive on these shipments in order to be seriously considered. Even though Shunda Logistics offered quotes for LWSEW's shipments of copper wire that are in line with what LWSEW is paying today, they are unable to compete with the forwarders specialized in deliveries along the route from Liaoyang and Dalian. Looking at the price development of diesel during the last year, *ceteris paribus*, one would expect the prices quoted by an incumbent forwarder in January to be similar to those offered in May or September (the price for on gallon of diesel fell 2.85% between May and January and the index fell 1.42%). Since fuel is not the only factor when forwarders and hauliers set their prices, although significant, such an analysis would be overly simplified. Still, with the

development of fuel costs in mind, the 4% increase found in Shunda’s offer might be a reflection of the state of slack capacity in the system. One has best refrain from drawing any general conclusions from such a small sample as this, but since Shunda’s quotes can be expected to contain a smaller margin for bargaining than the quotations from the other companies, as explained above, it is a noteworthy observation.

As it stands, jointly purchasing logistics in the WXDG does not appear to bring any tangible monetary benefits. Something that might well be worth considering, though, is expanding the use of LWSEW’s trucks to include deliveries for the other companies. The utilization for some of the trucks is rather low and could be put to use making delivers for LBE and LHE. Both LBE and LHE’s products are lightweight and shipped in relatively small volumes, which suits the capacity of LWSEW’s trucks. Using internal vehicles also allows for high flexibility, something that comes at a high cost when enlisting logistics companies. Furthermore, the considerable revenues that the backhauling from LWSEWs shipments generate makes expanding on this setup even more interesting. In case the added shipping volumes should be too much for the three trucks, another option could be to acquire more vehicles. The viability and economic feasibility of such schemes are unfortunately outside the scope of this thesis and will not be investigated further.

**5.1.1.2 Liaoyang - Dalian**

On the whole, none of the quotations offered a lower total cost than the current setup where each company manage their own deliveries, as can be seen in Table 15.

**Table 15 - Quotations summary, Liaoyang-Dalian**

	LWSEW	LBE	LHE	Total
Current	100%	100%	100%	100%
Shunda	92%	83%	132%	131%
Xinyuan	138%	50%	185%	168%
Zhaolin	106%	50%	111%	107%
Liaoyuan	90%	83%	127%	116%
Xingyu	77%	71%	116%	105%

If only LHE’s own shipments are considered, the two newcomers Zhaolin and Xingyu have offered lower prices than the incumbent forwarder Liaoyuan currently offers (111% and 116% respectively compared to 127%). This is not that unexpected since LHE has already started looking for alternatives to Liaoyuan due to the recent increase in prices. It is interesting to note that all three of them were able to offer much better prices as LHE’s volumes increased considerably in the high-volume scenario, see Table 16.

Table 16 - Comparison by scenario, Liaoyang-Dalian

		LWSEW	LBE	LHE	Total
Current	Low	100%	100%	100%	100%
Shunda	Low	97%	57%	59%	74%
Xinyuan	Low	133%	43%	227%	170%
Zhaolin	Low	106%	29%	136%	113%
Liaoyuan	Low	90%	57%	204%	142%
Xingyu	Low	75%	50%	182%	124%
		LWSEW	LBE	LHE	Total
Current	High	100%	100%	100%	100%
Shunda	High	84%	120%	151%	157%
Xinyuan	High	147%	60%	174%	167%
Zhaolin	High	105%	80%	105%	104%
Liaoyuan	High	90%	120%	106%	104%
Xingyu	High	80%	100%	98%	96%

Furthermore, Xingyu Logistics offered attractive quotations in all categories in both scenarios, indicating not only that they might be a viable alternative to Liaoyuan for LHE’s shipments to Dalian, but also that it might be worthwhile for LWSEW to use a specialized forwarder for this destination as well. It should be noted, though, that the expenditure for shipments along this route over the investigated time period is very small compared to the total spend (4.73% or RMB1200 for LBE and 2.42% or RMB4917 for LWSEW). Any savings will thus quickly be negated if introducing an extra forwarder would incur extra costs in any way. Due to the volumes in question being very small, it is improbable that the actual pooling of demand would have had any effect on prices.

## 5.2 Qualitative

Originally, one part of the qualitative analysis had the goal of analysing the group’s conditions and potential for cooperating closer on purchasing logistics services, but the decision to centralize logistics proves that this question is already taken very seriously by the management and that they consider their capacity for collaborating and general situation sufficient to go ahead with this kind of initiative. The second part would then focus on forms that this collaboration would ideally take. Due to the WXDG’s decision to create a separate unit to handle logistics internally, the qualitative part of the analysis has changed from investigating feasible forms of collaboration to looking at how this decision contrasts against the solutions found in the theory. The analysis will be based on the answers collected from senior management through a survey.

### 5.2.1 Find Suitable Form of Cooperation



Figure 31 - Step five: find suitable form of cooperation

Since the decision was made to centralize logistics across the group the question regarding what organizational form that would best suit the WXDG, Figure 31, is no longer central to this study. This section will instead be devoted to looking into the form chosen and how it contrasts to the forms in the theory.

Centralizing the logistics function gives the responsibility for performing the actual service to the new unit, the logistics centre, which in practice will be run like a LSP, albeit one that only serves the group itself. This division of responsibility is markedly different from a joint initiative focused purely on service purchasing. As opposed to forging a closer relationship with a current or new LSP and letting it handle all logistics related activities while the group itself purchase this service as a single customer. This way the function (and control) is still kept within the group. This is something that the survey indicated is of great importance because of the fragile and valuable nature of the products combined with special requirements for timeliness of delivery (fixed weekday deliveries, requirements from the port of Dalian). Centralization is one way of dealing with the problem of control, but also one that could alternatively have been solved by working closer with an external service provider, if adequate actors could be found on the current market.

A definite advantage of keeping logistics within the group is that the group's vehicle fleet can be better utilized. At least during the months investigated in this study, LWSEW's three trucks stood idle a significant amount of workdays. Even though the freight capacity of some of the trucks are rather small, they can still make deliveries for LHE and LBE, which in general are voluminous but not heavy. Also, LHE can undoubtedly benefit from gaining more control over their deliveries (very special requirements). Since they have tight deadlines on deliveries and need to ship overnight to the harbour they often find themselves in an unfavourable position when buying transportation. Their requirements increase costs and having difficulties securing transport well in advance of dispatch further aggravates this problem. This new setup is looking to provide better transport planning and added flexibility, which is sure to help operationally if not in cutting costs. Regarding deliveries to Dalian, the (currently not used) forwarder Xingyu offered the most attractive quotes if volumes are big and could thus be an interesting alternative in the future.

Comparing the quotations received, there appears to be room for negotiating prices, although this would likely require a very good relationship with the freight forwarder or a very strong

bargaining position. Although some quotes were similar on the whole, there were still many destinations and lanes where prices differed quite a bit, again emphasizing the somewhat arbitrary fluctuations in price. On the issue of costs there are clear differences between centralizing logistics and jointly purchasing the service. Right now the WXDG is betting on their logistics centre being able to do a better job than an external LSP in securing capacity, given the aggregated transport volumes of the whole group. When cooperating closely with an LSP the problem becomes one of finding a suitable partner and working actively and proactively to reduce costs and improve service continuously. Due to the perceived lack of satisfactory LSPs among the managers, centralization appears to be a valid course of action in realizing this goal.

This kind of centralization is not without problems though. Not only does centralization tend to increase bureaucracy and complexity, it might also lead to discrimination or unequal prioritization, as the member companies are not "real" but internal customers. The answer to these problems was unanimous among senior management: communication and understanding. All four companies are already known and have longstanding relationships among each other, something that will undoubtedly be of great value when cooperating. This mutual insight into the products, needs and markets of the others will go a long way to facilitate working together. This is especially important in situations such as this where several independent organizations are embarking on a whole new venture with little or no previous experience. During the process of establishing and getting the logistics centre up and running there will be issues and friction before all the kinks are ironed out and it is during this period where the participating organizations have to be tolerant and patient. It is difficult to assess how short or long this period will be and what the final cost of learning will be and one of the advantages of working with an existing provider is that, theoretically, these problems can be avoided or at least alleviated. Existing professionals can be expected to have functioning processes in place, networks of hauliers and experience, which in turn should ease the transition when outsourcing these services. One reason why the WXDG decided against trying to work closer with an external provider is a definite lack of trust and belief in their abilities. All managers raise concerns with timeliness of deliveries, arbitrary pricing and service and attitude, all of which combined with their experience of using many different service providers has led them to discard the option of creating closer ties with external providers. They simply do not believe that the necessary level of improvements can be reached that way, and thus centralized the function instead. Furthermore, honesty is also cited as a problem in the current logistics market. Not being as mature as Western markets, the managers feel that there is a prevalent insincerity among LSPs, that very good relationships are required to get even a standard level of service and prices. Another problem that used to be a big concern is scammers posing as legitimate carriers who then misappropriate the goods they have been entrusted to deliver.

Two notable problems discovered during this study were the short amount of time ahead of shipping that the focus companies arrange for transportation and the lack of a formal contract with the freight forwarder for handling damage to transported goods (LWSEW). These problems appear to have been solved with the introduction of the logistics centre. All companies will report weekly their needs to the logistics centre which will then plan for all the necessary transports. This will extend the amount of time available to acquire capacity from one or two days to a full week, something that should help reducing price variability and capacity shortages. Furthermore, all managers are intent on establishing formal contracts in their relationships with the group's new department, and in this process clauses will likely be added to handle damages and delays, effectively solving the second problem. The fact that the business relationships between the group and its companies will be more formal in kind will provide a stable framework for handling any other issues that might arise as well.

A problem common to reorganizing is the risk that the savings from reducing waste in the processes are countered by the cost of running the new logistics unit or by introducing additional complexity and administration into the organization. When the question was raised as to how this problem would be handled the managers reiterated their faith in the group's management (i.e., the chairman) and the need for communication. The chairman himself expressed confidence that such adverse effects can be countered through sound management and adjusting and updating processes as issues are found and handled. This is one of the advantages of outsourcing logistics activities to an existing logistic service provider, as they are experts and already have the needed infrastructure in place. Also, due to their experience and existing network of contacts, working with existing LSPs helps avoid costly mistakes and delays as the new unit learns and adapts.

Apart from centralizing the logistics function under the group's management, there are other solutions that could have been considered. One is to give the responsibility for this function to one of the companies in the group who then represents the others in negotiations and when purchasing. In this setup the company best suited for buying the commodity in question would take on this role. For example, in this case the one with the best network of freight forwarders and the biggest purchase volumes. One concern with drastically increasing the responsibility and workload of a company not specialized in logistics is that their organization might not scale well enough to meet the new requirements. Should this be the case then it might be more convenient to outsource as logistics professionals are likely to be able to better handle the scope of the operations. Since none of the companies in the group had any particularly strong LSP connections, contracts or partnerships that could have been drawn upon for this kind of cooperation, this setup was not considered as they saw no reason why one company should shoulder this responsibility instead of just shifting responsibility to the group directly. If a number of completely independent organizations are to cooperate on purchasing this model

could be of interest because of the small investments requirements to get going and where no central organization is already in place. Also, naturally, this kind of setup might lead to issues regarding impartiality in service commitment as the other members might become regarded as an outcropping of the host organization, an unnecessary burden. Another but similar solution would be for the member with the most beneficial contract to simply share it with the others, i.e., the smaller ones would "piggy-back" on the bigger one. The advantage with these two setups is that they require very little investment to get started and might be therefore be preferable in some cases. The biggest challenge for this approach would be supplier resistance as it would without doubt be more profitable to handle these customers individually. Again, considering the current state of the logistics market this approach would appear unlikely to succeed unless the WXDG was on exceptionally good terms with a LSP.

The survey of senior management's views on this initiative revealed that the differences that exist between the companies (culturally and product-wise) are regarded as one of the biggest challenges with the collaboration. The respondents all showed a general understanding of this challenge and recognized that unconditional communication and patience would be the key to tackling it. Concern was also raised regarding how to implement the centralization initiative in practice and how to ensure that it yields the expected results (lower costs, better/quicker/safer service). Particularly notable, but not all that surprising, was that none of the respondents considered typical problems and adverse behaviour such as unwillingness to share information, lack of trust and opportunism as major concerns going into this new phase. Also, neither the risk of free-riding nor sensitive information going astray were of any major concern. This can most likely be explained by their common ownership and longstanding relationships, something that independent companies, competitors or not, lack. Another advantage with centralized or common management/ownership is that it is easier to ensure that collaboration is prioritized and to drum up enthusiasm. At least in the case of the WXDG there is a homogeneously positive attitude towards centralizing logistics and senior management at all companies are likewise enthusiastic about the perceived potential and expected benefits that it will bring. All in all, most of the problems listed in the theory as having discouraged others from collaborating appear to non-issues at the WXDG. The issues that do remain all relate to the efficiency and effectiveness of the new setup, issues that management acknowledge as potential problems but appear very optimistic about solving given time.

In summary, of the potential benefits that collaborative sourcing of logistics services, the WXDG expects their centralization initiative to yield the following:

- *Better quality on purchased products/services:*
  1. Better access to capacity (trucks);
  2. Reduced risk (delays, capacity shortages);
  3. Reduced price variation/fluctuation;
- *Reduced transaction costs:*
  4. Reduction of waste and duplication of efforts across the group;
- *Financial gain:*
  5. Volume discounts / increased leverage through bigger volumes;
- *Better quality of the purchasing process:*
  6. Jointly search for and develop new suppliers;
  7. Increased process efficiency.

Some key differences aside, this aligns well with theory on joint purchasing. Although, it is notable that information sharing and learning from the other companies in the group were not considered major motivators for cooperating. Instead, increased efficiency was expected to result mainly from operational improvements. This is typical of the thought process in private enterprises; focus is in many cases exclusively on costs and practical aspects of improvement projects, which is understandable. Also, none of the focus companies were the owner of any particularly attractive contract or customer to any specific supplier that motivated the move towards a centralized setup.

- *Learn from other organizations:*
  1. Information about prices and costs of other companies;
  2. Information about new suppliers;
- *Reduce tender process throughput time:*
  3. Access to favourable contracts through other companies.

In the other side of the spectrum, the WXDG's initiative to create a logistics centre has the potential to avoid many of the most common problems associated with collaborating as well, namely:

- No improvements expected
  1. Increased chance of supplier resistance;
  2. Increased tender process throughput time (e.g., due to reaching consensus);
  3. Loss of control;
- Lack of trust or support of other organizations
  4. Increased chance of disclosure of sensitive information;
  5. Increased chance of free-riding organizations;
- Lack of priority or cooperation opportunities
  6. Lack of cooperation opportunity;
  7. Lack of cooperation priority.

The problems of supplier resistance is effectively rendered moot through centralization (could have been an issue with piggybacking or lead buying), and fears of increased tender process throughput time due to divergent needs and reaching consensus on problems are small thanks to a strong belief in the group's management and communication. The one issue that did raise some concern was the cost of running the new department and the added managerial layer. This is also the main concern with centralizing business functions, and thus of particular interest in this case.

- *No improvements expected:*
  1. High coordination costs expected.

The logistics market in the Northeast and its players appear to not be developed, mature and willing enough to support more advanced forms of collaboration. Against this background a centralized setup would appear very appropriate for the Wanxingda Group, drawing on the unique strengths and relationships that being part of a group offers. The crux to successfully implementing this setup is to plan early for problems that centralized management tend to bring and have a strategy in place for how to handle them. Also, management needs to be patient and give the new unit the time and resources it needs to develop and gain experience. Rolling back the changes produced by this project in the short term due to dissatisfactory performance might be overly rash, as some time will be definitely going to be needed for the centralization to reach its potential.

### 5.3 Negotiate



Figure 32 - Step six: negotiate

Negotiate, the final step of this framework designed to approach the issue of collaborative purchasing, Figure 32. Even though the question of reward sharing is not relevant in the sense that this study set out to investigate, it is not completely irrelevant when centralizing a function among two or more organizations. The question was raised among senior management how the monetary benefits of the group's initiative would be shared among their companies. Several very divergent answers were given; some were unaware of any reward-sharing scheme being in place while others suggested that it should be shared according to shipped volume or total spend. The most common view was that the reduced logistics costs of each individual company through cooperating were the main reward in itself. That thoughts on this issue differ can likely be attributed to the infant stage of the initiative. The chairman indicated that there will be a scheme in place for portioning the benefit of collaborating among the companies, but that it is currently not finalized. The overarching idea though, is that 20% will be given to the logistics department as a bonus/incentive, while the remaining share will be split among the companies in some fashion. There is no clear-cut answer to how costs and rewards are best shared. The allocation methods described in the theory are all rather sophisticated and require very good insight into the operations and expenses of the participants in order to be correct and effective. The scheme described falls under the common proportional allocation methods where the allotment is based on the relative size, cost or volume of, for example, each company. It might well be good enough; it is simple, easy to communicate and it takes the logistics unit into consideration as well. As long as its effects are followed up and adjustments are made it is as good a start as any. Naturally, it is prudent to assume that independent organizations without or with limited business relationships or competitors are going to face a much different negotiation situation than the WXDG. The common background and management combined with close geographical proximity give the WXDG companies an advantage as their relationship allows them more leeway in finding solutions acceptable to all parties. Financial concerns have a tendency to take precedence over other issues when it comes to doing business, something that makes finding acceptable solutions among unrelated and independent companies. Senior management at the WXDG companies on the other hand showed greater concern for the implementation and operational efficiency as the project gets underway.

## 6 Conclusions

*In this chapter the research questions of this study will be answered along with the findings of this thesis. Based on these findings a recommendation is given and a discussion on how to best proceed from here is made as well.*

### 6.1 Findings

The goal of this study was to answer the following two questions:

- *Is it possible to reduce distribution costs at the Wanxingda Group by working jointly on transportation procurement activities? If so, what level of reduction in costs would be possible?*
- *How would any benefit derived from cooperating best be shared among the collaborators?*

The answer to the first question is: yes, but. The quotations received from LSPs during this study showed that collaborating on purchasing activities alone is not enough; the best case scenario would result in a cost level similar to the current one. On the other hand, the WXDG has already taken the decision to centralize the logistics function and expects to see improvements of several service factors apart from cost alone. It is expected that jointly planning and executing this function will lead to better availability of trucks, less price fluctuations and higher efficiency. Having the new logistics unit act as an interface between freight companies and the companies in the group, many day-today administrative activities in planning, finding and coordinating transportation for deliveries will become more streamlined. They also believe that with the WXDG as the exclusive customer (the logistics unit will for all intents and purposes function as a freight forwarder) they will receive better service and safer transportation. All of the above mentioned benefits have been major motivators for collaborating on logistics according to contemporary research. Two benefits identified in the theory that the WXDG does not expect to receive from this project are knowledge exchange between companies and reduced tender process throughput time. This divergence might be due to the relatively basic approach towards logistics within the WXDG and the absence of any particularly strong partnerships or contracts that could provide shortcuts when procuring transportation. The lack of LSPs interested in responding to the RFQ and the level of the prices in the quotations received could possibly be explained by the logistics market in Northeast China not yet being mature enough to accommodate the kind of advanced partnerships that this setup requires. Not only is there a lack of progressive attitude towards logistics, but the way of doing business and the communication lack in modernity and effectiveness as well (a very large number of LSPs had to be contacted to get any quotations at all). Also, the WXDG has faced difficulties in finding suitable logistics partners. Smaller freight forwarders are too slow and service is not good enough; medium sized forwarders lack in attitude and service, failing to

provide for the WXDG's special needs; big forwarders and logistics companies are simply too expensive, as the difference between Deppon's quotes and those from the other forwarders shows. The group's decision to completely bypass the third parties shows that there is indeed a potential in collaborating that is worth acting upon, and, that the problem lies with said providers. By executing the logistics function in-house the WXDG effectively avoids many of the inefficiencies in using their current logistics providers, namely high price variability, speed and flexibility and high costs. Furthermore this ensures that they get the priority and service that they expect and currently feel that external LSPs cannot deliver. Both managers and logistics managers indicate that very good relationships with suppliers are needed in order to get the service and prices expected from a partner. If not on good terms, the relationship will remain of the pure buyer-seller kind with few opportunities of developing new services or improving upon existing ones. A logistics unit under the group's own regime would ensure both good service and adequate price development. It is still too early to say more specifically how big of a cost reduction this initiative will bring, but WXDG upper management is convinced the savings will be substantial. Cost was only one of many considerations though. The group expects much more structure and flexibility of jointly planning their shipments. Going from four separate units to a common one provides a more standardized way of working and also allowing for other improvements to be incorporated (e.g., timelier capacity planning and procurement). Having a specialist function handling all the logistics, using their own fleet of trucks and not having to go through an external party also help to increase control and flexibility. These qualities are very important to the WXDG, because customers (many of which are located outside of China) expect deliveries to be made on-time and in full. This is especially important in those cases where the customer is using the products in their own production. No single service quality is more important than cost, but they are all crucial in delivering good service to the customer.

As for question number two, the issue of sharing financial gain among those entitled to it is not an easy question and it has been indicated that only a rudimentary reward-sharing scheme will be implemented as the collaboration matures. Preliminary 80% will be shared among the companies with the remaining 20% used to encourage and motivate the logistics centre. At most the savings will be split according to shipment volume or transportation spend of each company. It might not be the fairest way of solving the problem, but it is easily understandable. The literature indicates that this is common; simplistic but understandable methods are given preference over more advanced and potentially better allocation schemes due to their complexity and data requirements. Not only is very specific and quantitative data on costs and profitability needed, something that is not always readily available, but the more sophisticated methods also lack in transparency which presents a challenge during negotiations when a certain allocation needs to be motivated. The Equal Profit Method represents an effort to generate solutions with more evenly distributed gains to provide a first suggestion as a starting point. Still, the inner workings of this scheme are not as easily understood as proportional

methods. Another thing that speaks in the favour of implementing a simpler method in the beginning when the effects of the centralization are still unknown is the unique relationship that these companies share. All the theory on reward sharing found in the literature survey assume that the players are individual, selfish entities, and while this is true in the case of groups of companies as well they share a stronger incentive to work towards solutions contributing to the greater good of the group as a whole. Due to this fact a simple but perhaps not 100% fair method is more likely to be accepted by all parties than in scenarios where competitors or companies connected only through common business interests are involved. That is not to say that this is trivial problem in the context of the WXDG or other groups, but there is reason to believe that it will be easier to come to agreements and that problems other than monetary considerations will take precedence, as reflected by senior management at the WXDG. Much more concern was expressed over practicalities and operational efficiency rather than the money, trust issues and information privacy concerns that are often mentioned in collaboration literature. It is acknowledged in the literature that inter-organizational cooperation has the potential to be of particularly big help to smaller companies due to resource and investment limitations. Unfortunately the focus is mainly on the creation and cooperation within clusters of independent companies with the context of groups left unexplored. An interesting thing that can be learned from that research is that the most common reasons for cooperation not taking off or ending in clusters are lack of trust, fear of free-riding and leaking of sensitive information. Again, the survey undertaken by this study shows that those issues were of no concern to the management at the WXDG. This also speaks of a slight advantage when it comes to sharing costs and rewards and all players are part of the same group. A common form of cooperative purchasing is the pooling of purchase volumes across member organizations in purchasing groups. Negotiations are held centrally and the “rewards” are then shared through a discount given to the members of the group. In such a setup the reward sharing is done very efficiently through set discounts, which is needed as the amount of members tend to be large. Purchasing groups tend to flourish in industries where big amounts of articles are purchased on a regular basis (e.g., the health care industry), and unfortunately none were available in this case. Other ways of collaborating on purchasing activities are piggybacking and lead purchasing groups, both of which could theoretically fit the WXDG. Since none of the companies involved was neither particularly satisfied with their current LSP nor possessing any contracts worth sharing, there was no real reason for considering these options over a centralized model. The WXDG has chosen to initially go ahead with a simple way of spreading the benefits of the centralization initiative while it matures. It might well be good enough at this stage; it is simple, easy to communicate and it also takes the logistics unit into consideration as well. As long as top management stand ready to correct and adjust how the allocation is made as the effects become clear it is as good a start as any. When the effects of the collaboration are better known it might be interesting to re-evaluate this

aspect of the cooperation to better reflect the costs and contributions of each of the companies. It has been shown that reward sharing can be implemented successfully in the furniture, logistics and forestry industries and that advanced methods can be tailored on a case-by-case basis. Especially the EMP-method stands out as a good alternative to get negotiations started.

## **6.2 Recommendations**

In the light of the condition of the current logistics market, taking steps to increase integration and centralization within the group appears to be a sound decision. Having taken this step the group would do well in at least considering expanding upon this setup to include other areas as well. There might not be that many opportunities to jointly source direct material as the focus companies' products differ quite a lot, but indirect material and consumables such as office material is another story. Furthermore, since all companies provide their workers with housing and food, this is yet another area that might benefit from centralized management.

## **6.3 Steps Forward**

There are issues with centralization and establishing a whole new kind of operations at the group, and many of these are issues that are not always apparent at first look and not easily dealt with. Bureaucracy slowly increasing in complexity, inexperience of the new organization, balancing the need of multiple diverse entities, allocating the savings in a fair way. Management need to be aware of these issues, and they appear to be just that, and deal with them when and if they appear and do so in a lenient manner. Most of all, patience is crucial to avoiding changes being implemented halfway and then reversed, incurring further costs and lower efficiency.

Even though the logistics department will consist only of new employees it is likely that their work will be based on the existing work processes and culture, as all companies concerned feed their experience into the new organization. At this stage it is important that this new part of the group is empowered and encouraged to approach their work and challenges in new ways if cooperating is to be as successful as it can be. For example, how can logistics work be improved with/without further investments (vehicles, employees etc.)? If, for example, the logistics centre keep using the same freight forwarders as before out of organizational habit the costs cannot be expected to decrease much. In that case cooperating would only serve to create another layer in the organization with few tangible benefits and might even end up becoming a burden that only serves to somewhat increase flexibility at high administrative costs.

As the collaboration matures one interesting opportunity could be to include other companies or freight forwarders in this endeavour. This could be one way to ensure greater capacity in the vehicle fleet or to raise utilization of existing resources. It could also be a way to increase volumes to create even bigger economies of scale. There are numerous aspects that need to be considered before bringing an external company into this kind of collaboration (e.g., cultural

and organizational fit), but it might be an interesting option further down the road. Seeing as to how many factories and industries that are located in and around Shouhan, it seems plausible that many others are facing a similar situation as the WXDG.

#### **6.4 Contribution of this Study**

The literature on collaborative purchasing is scarce and mainly focuses on the economics of huge third-party purchasing groups in industries purchasing large amounts of consumables, e.g., the healthcare industry. There have been research on how independent organizations can cooperate on different business activities; even collaboration between competitors has been given some attention lately. But research on collaboration within groups of companies is next to, if not, non-existent. This study casts a small light on the logistics situation of many small and medium enterprises and what can be done within a group in the way of logistics and distribution to strengthen their competitiveness. The results of this study are far from generalizable as it only looks at one group, in one country, dealing only in specific high engineering markets. Nonetheless, some insight can be had from how the focus companies have approached the problem and their attitudes. In this example many of the factors that have deterred others from cooperating (trust issues, sensitive information and fear of free-riding) do not appear to be big if any concern at all in this group of companies. The WXDG's strong central leadership likely plays a big role in the ease and enthusiasm with which the centralization initiative was received. This implies that groups do indeed enjoy an advantage compared wholly independent companies when it comes to cooperating cross-organizationally. From this conclusion it is not farfetched to assume that cooperating more closely on other activities and functions would be possible as well. Apart from logistics, the procurement of indirect material, express deliveries and accommodations for visiting customers all come to mind.

Worth noting is that LHHI was included in the initiative as well, even though their products are of a different kind and require quite different transportation solutions. When the scope was set for this study it was decided against including LHHI and instead focusing the somewhat more homogenous companies. Significantly different products, needs and markets have apparently not deterred the WXDG. Only time will tell whether this was the right decision or not, but it indicates that it might be of interest to go broad when searching for synergies between companies.

## **6.5 Possible Further Research**

Seeing as how the centralization is a new and unproven concept within the WXDG, a follow-up study or Master's thesis on the results of this collaboration is a natural next step to take. As mentioned above, another interesting topic is the economics and feasibility of extending the scope of collaboration beyond just the WXDG. Since LHHI was also included in the initiative, somewhat surprisingly, it is perhaps possible to successfully collaborate across industries, markets and product types; something that might merit further research. One last area that deserves more attention at the WXDG is route planning. With the creation of one big fleet of vehicles it is likely necessary to review how they are used and how their usage is best planned.

## **6.6 Reliability**

In addition to being based on what is generally accepted to be sound and common research methodology, every measure have been taken along the way to ensure the quality along the way. First a rigorous literature review was conducted using almost exclusively content from well established journals, then a thorough prestudy to ensure that the scope of the study was correctly defined. The information collected has been corroborated by asking more than one person qualified to answer and data on transports and costs was taken directly from the computer systems used at the group. Regarding the RFQ, more than one LSP was consulted prior to and during the design of the RFQ and then no less than 18 LSP were asked for quotations, which were selected using a professional index of local providers. All contact with external companies were handled through a secretary and the interview/survey questions were translated into Chinese by the author and then double checked by two of the group's translators. All assumptions made and processing of the data material have been disclosed and explained. It is the author's firm belief that the study was made in such a way that its results can reliably reproduced to similar results.

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## 8 Appendix 1

Questions used to guide the initial orientation interviews.

1. What is your principal market?  
贵公司主要市场和客户在哪里？
2. What is your annual production capacity?  
贵公司一年的生产能力有多少？
3. What was your revenue the last fiscal year?  
贵公司最近一年的销售有多少？
4. Where do you make the bulk of your deliveries?  
贵公司把产品的主要一部分都运输到哪里？
5. Who is responsible for arranging transportation? Your company or the customer?  
是贵公司负责发货的还是客户自己来厂取货或者安排运输？
6. How are your products packaged? Are there any special requirements on packaging?  
准备发货时，贵公司的产品是如何包装起来的？有没有特殊需求？
7. Which freight forwarders or logistics service providers do you currently use?  
贵公司最多是用哪些物流服务商或者配货站？
8. How do you keep data on deliveries and costs? Does your company have an ERP system?  
贵公司有没有企业资源规划系统？

## 9 Appendix 2

The questionnaire designed for senior management at each company.

### **Respondent information**

#### **受访者信息**

1. Name:  
姓名:
2. Job title:  
职业:
3. Main responsibilities:  
主要职责:
4. Years at position:  
在职年限:
5. Years with company:  
工作年限:

### **Survey questions**

#### **问卷问题**

6. Who took the initiative in creating a separate company to handle the group's logistics?  
The group or one of its companies?  
是谁提议建立集团物流中心？是集团还是某一子公司？
7. What were the reasons behind this move? Cost savings? Increased efficiency when buying transportation? Less duplication of efforts at the group members? Reduced transport lead-times? Better service?  
采取这个措施的主要目的是什么？降低物流成本？提高物流效率？减少采购物流的重复劳动？缩短物流周期？提高物流服务质量？
8. Why was it decided to create a whole new company instead of giving this responsibility to one of the companies in the group?  
集团为什么选择成立物流中心负责物流工作而不把这个责任交给集团的一个子公司？
9. What was the reason for not working closer with one of the incumbent logistics companies?  
集团为什么选择建立一个物流中心而不与集团现用的某一配货站建立更密切的合作关系？
10. What is in your opinion the biggest problem with the logistics market and in working with LSPs today? Lack of capacity? Rising costs? Special requirements?

您认为与外部物流公司合作最大的障碍与挑战是什么？您认为目前的物流服务市场最大的问题是什么？配货能力不足？价格的上涨？难以满足集团与其子公司的特殊运输要求？

11. What are the biggest advantages of keeping logistics within the group?

对于物流工作来说，由集团物流中心统一管理最大的优势是什么？

12. What do you consider to be the biggest challenge with this setup? How do you plan on handling it?

您认为采取这一措施最大的挑战是什么？您打算如何应对？

13. Common problems that centralization initiatives give rise to are increased administration, lowered flexibility and responsiveness, and the risk of unequal priority of its members. How will you ensure that these issues do not appear?

统一管理带来的典型问题是行政上的复杂化，各子公司工作灵活性及其适应力的降低，各子公司得到的对待和服务不同。您打算如何避免以上问题的发生呢？

14. Have you considered working together with other companies than those in the group?

Perhaps closely located companies face similar challenges and problems?

集团是否考虑过不仅为集团内部各公司提供物流服务，也包括集团以外的公司？或许集团附近也有面对同样问题与挑战的公司？

15. Apart from lower cost, what other benefits do you expect that this new setup will bring?

除了更低的物流成本之外，您预料这一措施还会带来什么其他的好处？

16. How will this move affect your process for working with logistics at your company and how will it affect staffing? Will there be any difference in how the companies in the group work with logistics?

这一措施对贵公司的物流工作有什么样的影响？未来的操作流程与目前的会有何不同？

17. How will the benefits of this setup be shared among the companies in the group?

这一措施带来的经济效益，在各个子公司之间应如何分配？

18. How will the relationship with this new company be managed? Using contracts or relying on good relations?

新成立的物流中心与各子公司的合作模式？相互之间建立正式合同或依据相互之间友好关系？