Towards Efficient Road Transport in Logistics Operations
A Case Study of IKEA China

Master’s thesis within International Logistics and Supply Chain Management
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Jönköping June. 2010
Acknowledgments

A very special note of thanks and appreciation is due to our tutor and supervisor, Dr. Helgi Valur Fridriksson and Ph.D. Candidate Hamid Jafari of Jönköping International Business School, both of them have provided support and encouragement to allow us to complete this task, this thesis cannot be done without their invaluable insights and guidelines throughout the whole process.

We extend our appreciation to the interviewees, who are the chief managers located in Shanghai office of IKEA China, and they had contributed their time to provide meaningful input for our thesis.

Special thanks to our classmates in Master programme of International Logistics and Supply Chain Management (2008) for their useful advice and appropriate criticism of our ideas during the seminars.

Last but not least we would like to express our gratitude to our parents and friends for their support and patience, which have made our lives meaningful.

Jönköping, June 2010

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__________________                                    ________________
Abbreviations:

STO—Store
DC—Distribution Center
CP—Consolidation Point
TSO—Trading Service Office
DSAP—Distribution Service Asia Pacific
ESP—External Service Provider
CBM—Cubic Meter
SOP—Standard Operation Procedure
TP—Transport Planner
SP—Service Provider
CY—Container Yard
CNS—Cargo Network System (IKEA internal system)
LCL—Less Container Loading
FCL—Full Container Loading
DD—Direct Delivery
Abstract

Purpose - The purpose of this research is to explore the role of road transport in logistics operations, and to investigate and analyze how IKEA China does operate on road transport in logistics operations.

Design/methodology/approach - A single case study has been conducted at IKEA China, including semi-structured interviews and review of internal documents. Along with the case study, literature reviews have been conducted within the areas of efficient road transport in logistics operations.

Findings - The IKEA China case suggests that the logistics operations should have strong link to the efficient road transport in a manner optimized logistics operations can provide efficient road transport with less cost.

Research limitations/implications - This thesis is limited to one representative company, and the authors just focus on a study of efficient road transport in logistics operations for narrowing down the thesis. So the solutions and proposals about efficient road transport might not be adopted by other companies or be applied to other parts of the supply chain. Additionally, a study of efficient road transport can be discussed, analyzed and studied from a lot of different perspectives, even much better in a holistic viewpoint. Here, the authors just choose a few primary perspectives as research objectives to support this study, which concerns the data and information collected from IKEA China. Finally, because of the limitation of time and personal knowledge, the data collected from IKEA China may neither abundant enough nor deep enough in a manner without exploiting and expanding into all the issues and challenges refers to efficient road transport in logistics operations.

Practical implication - This research provides suitable solutions for a company towards efficient road transport in logistics operations. Consequently, it will facilitate companies to achieve the purpose of efficient road transport by optimizing their logistics operations in a manner improve the outcomes of insourcing/outsourcing, merge-in-transit, consolidation point and packaging.

Originality/value - This research combines five theoretical fields in terms of sourcing strategy, merge-in-transit, consolidation point, packaging as well as economics scale of trucking cost to contribute proposals to efficient road transport in logistics operations.

Keywords Efficient road transport, Logistics operations, Cost
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# Introduction

In this chapter, by recognizing the importance of efficient road transport in logistics operations, the strategic importance of this study is emphasized. Following the development of the research problems, the purpose of this study is described as well as how the authors delimit it due to a few factors.

## 1.1 Background

With a Based upon Retail in China (2009) magazine’s calculations of a realistic retail market size in China should be, between 2001 and 2008, China’s total retail market grew 197.63% in current terms over the review period to RMB6.18trn – representing an annual average growth rate of 16.91% (Retail in China). China’s retail market is expected to grow by about 43% between 2009 and 2013, to reach a total value of over RMB9.82trn. The truth is that over the past few years, China’s retail market has continued to develop rapidly. But meanwhile, China’s marketplace today is tremendously competitive, and the advantages foreign companies are often narrowed by the inefficiency of their supply chain. Hence, it is crucial whether a multinational retail company can successful achieve the management of retail supply chain on both effective and efficient way.

There are various definitions about supply chain in the past decades, as Christopher (1992) stated that a supply chain is the network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services delivered to the ultimate consumer. And Coyle et al. (2003) pointed out that a supply chain is an extended enterprise that crosses over the boundaries of individual firms to span the logistical related activities of all the companies involved in the supply chain. In their study, the key factors which are deserved to be special considered have been described, including cost, inventory, information, customer service and collaborative relationships. Talking about cost, carrying cost, transportation cost and administrative costs are considered as three major annual logistics costs (Coyle et al., 2003). All these costs could be reduced in certain level, which leads to the importance of efficient operating.

Organizations today are looking for opportunities to improve operational efficiencies and reduce cost without having a negative effect on customer service levels (Vinod, 2009). The truth is that transport costs represent a significant share of the final price in furniture industry. Both Christopher (1998), Riggs & Robbins (1998) pointed out three key drivers for performance in the supply chain:

- Better quality/service
- Lower transport costs
- Faster transport time

Here, lower transport costs mean cost efficient solutions, which could be reduced costs through larger volumes, lower use of fuel, lower demand for labor force etc and lower external costs (Unrecovered costs in the market are technically known as “external” costs (or “externality”), since they represent a cost to society which is not recovered through conventional market mechanisms (GRIAN, 2010)). Faster transport and higher transport quality: Higher frequency, door-to-door transport and/or faster transports, flexibility (volume, departure time etc.) and perfect order achievement and ability to deliver (Larsen, 2003). All
these three factors are talking about efficient transport in logistics operations. And the increased performance might occur by achieving these factors.

According to Jeroen (2010), the various modes of transport (road, waterways, rail, air and sea) have responded to increasing demand in different ways, and road transport has grown the fastest. As Baseline Report (2004) explained that often where goods are moved by rail, water or air the road network forms an immediate extra link in the supply chain, besides, road is the only transport infrastructure that links virtually all possible points of collection or delivery of goods. So to say, efficient road transport plays an essential role in logistics operations.

By the research of Vinod (2009), IKEA, the Swedish home products retailer, is known for its good-quality, inexpensive products, which are typically sold at prices 30–50% below those of its competitors. While the price of products from other companies continues to rise over time, IKEA claims that its retail prices have been reduced by a total of 20% over the last four years (Vinod, 2009). Virtually, IKEA’s less obvious cost-saving strategies include numerous keys, like recycling, waste reduction, transportation, in-house design, minimal packaging and economies of scale for the sake of example. And certainly, these cost-saving strategies more or less concern efficient road transport in logistics operations, in a manner they could be executed by achieving efficient road transport.

1.2 Topic Choice and Objective

Based upon the research of AF & PA (2004), IKEA, a global Swedish furniture company, entered the Chinese market in 1998 when it opened a store in Beijing with a floor area of 15,400; a second Chinese store was established in Shanghai in 2003, with a floor area of 32,000. IKEA realized $713 million in sales to China in 2003, 24 percent more than in 2002. By 2010, the company plans to establish 10 standard stores and 5 national distribution centers in China (China’s furniture industry today, 2004). Obviously, the road transport network is getting more and more complicated and redundant in a manner hard to operate efficiently following the rapid network development. This is a real challenge for IKEA China to operate more efficient with less road transport costs by handling the issues and challenges occurred through logistic operations.

IKEA China’s growth has been tremendous and sales are still growing, which leads the supply chain to be more and more complicated, and makes supply chain planning a real challenge (Patrik et al., 2008). Cost-saving strategy is always considered as one of the most important supply chain strategy, and IKEAs is very successful on this strategy. As cost-orientation achievement can be resulted from efficient transport by optimizing logistics operations. Therefore, the authors chose the topic about efficient transport in logistics operations.

Science the authors realized that logistics costs are made up of a lot of different ingredients, for instance carrying cost, transportation, purchasing cost and logistics administration etc (See Appendix I), so it is not easy to decide which perspective or perspectives should be chosen as a topic for the authors at the beginning. Fortunately, one of the authors is working in IKEA China, and he knows IKEA China is paying more and more attention on road transport cost reduction, since the reduction of purchasing cost has already been minimized in a manner it cannot be decreased anymore, and the proportion of transport cost is increasing rapidly than ever in the low-margin furniture product industry.
Besides, general speaking transportation cost is composed of motor carriers (road transport) and other carriers (railroads, water, oil pipeline and air), and road transport made the biggest leap in the past years (See Appendix II). And for IKEA China, this is a fact, road transport accounts for the major part of the land transport.

Combine these reasons, the final topic have been chosen by the authors, which is: towards efficient road transport in logistics operations based on a case study of IKEA China. The authors hope this study can provide valuable and useful knowledge for companies who want to be succeeded towards efficient road transport by investigating and analyzing how IKEA China can achieve the purpose of efficient road transport by optimizing logistics operations.

1.3 Problem Discussion

Valerie (2004) emphasized the important role of transport cost in logistical organizations, which clearly takes part in several kinds of trade-offs that involve production and distribution costs at different levels of the system. In his research, he believes that road transport costs and rates are directly in question in the recent logistical evolutions, and this is why an analysis of the impacts of transport costs and road pricing on the logistical systems appears to be crucial.

In his further illustration, the logistical organization implies decisions in which transport costs can intervene, and leads to determining (Valerie, 2004):

- The number and location of production sites;
- The degree of specialization of production sites;
- The degree of centralization of the distribution networks, with the number of levels in the structure;
- The number, the geographical location and the role assigned to the distribution centers (platforms only for transshipments, warehouses or depots with stocks);
- Size and frequency of shipments.

According to Chinese government figures, demand for road freight transport grew by 6.1% a year between 1992 and 2002, reaching 678 billion tkm annually and the volume of road freight transport increased at a faster rate than the growth of China's total freight market during this period, with the road transport share of total freight transport rising from 12.9% to 13.4% over the decade up to 2002. Additionally, under this circumstance, in future, the government expects that increasing freight movement will be by road throughout many parts of the country, due to the greater flexibility and responsiveness of road transport to overall transport needs in a market economy compared with other transport modes (David, 2005).

All of these mentioned reasons lead to the first research question:

What is the role of road transport in logistics operations and its importance for IKEA China?

The investigation of this thesis is based upon the practice and research in IKEA China. And since efficient road transport in logistics operations plays an essential role in the cost-saving strategies of IKEA China, so it is important and necessary for the authors finding out how IKEA China can achieve the purpose of efficient road transport in logistics operations. Meanwhile, there is a strong link between efficient road transport and less cost.
Furthermore, there are various methods for a company fulfilling efficient road transport, not to mention the challenges faced by a company during the processes.

So, the next two research questions will be:

*Whether IKEA China can operate efficiently on road transport in logistics operations or not and how?*

*What kinds of challenges exist to achieve the purpose of efficient road transport?*

Finally, how IKEA China can solve these problems and how to make significant improvements need to be paid attention, then the last research question comes out:

*What kinds of solutions could be found and how could IKEA China utilize and improve them?*

### 1.4 Study Purpose

The purpose of this research is to explore the role of road transport in logistics operations, and to investigate and analyze how IKEA China does operate on road transport in logistics operations.

### 1.5 Delimitation

This is a single case study of a single company, and the authors just focus on a study of efficient road transport in logistics operations for narrowing down the thesis. So the solutions and proposals about efficient road transport might not be imitated by other companies or be applied to other parts of the supply chain, just as reference. Moreover, there are other theories can be used to study on efficient road transport besides the theories used in this thesis, which are selected and applied from the authors point of view.

### 1.6 Disposition of the Paper

How the study was carried out will be illustrated in this section, and the overviews would be described following the structure of this study (See Figure 1-1).
Chapter 1 in this chapter, by recognizing the importance of efficient road transport in logistics operations, the strategic importance of this study is emphasized. Following the development of the research problems, the purpose of this study is described as well as how the authors delimit it due to a few factors.

Chapter 2 in this chapter, a lot of previous theoretical knowledge about the role of road transport in logistics operations and different road transport modes will be described. Besides, how efficient road transport in logistics operations with less cost can be various affected by these different modes will be explained.

Chapter 3 in this chapter, the research tactics is stated. And after the definitions of research strategy, method and approach were being explained and discussed, the methodology of this thesis would be presented as well as the trustworthiness measurement of data is provided. This chapter helps the authors to ensure the thesis of a quality.

Chapter 4 in this chapter, the authors will describe their empirical findings of efficient road transport in investigation with detail, including the presentation of the company and data collected from the company.
Chapter 5 in this chapter, the authors will analyze the data collected about efficient road transport in logistics operations from IKEA China on the foundation of the knowledge learned from literature review. As a result of the analysis, the author will present suggestions and solutions upon the issues identified.

Chapter 6 in this chapter, the conclusions of this study will be drawn by the authors on the basis of which have been discussed and analyzed in the previous chapter. And the research purpose will be emphasized as well as the research questions will be answered.

Chapter 7 in this chapter, the authors will look back relative knowledge learned before and will give much more suggestions for further research, and proposals towards efficient road transport in logistics operations will be explored.
2 Theoretical Framework

In this chapter, a lot of previous theoretical knowledge about the role of road transport in logistics operations and different road transport modes will be described. Besides, how efficient road transport in logistics operations with less cost can be various affected by these different modes will be explained.

2.1 Road Transport in Logistics Operations

Alan (2006) says road transport has a near monopoly in the distribution of finished products at the lower levels of the supply chain, particularly in the delivery of retail supplies. In his study, it is distribution at this level which would be most severely disrupted by the absence of trucks and which would have the greatest impact on consumers. There is a dominating opinion that the implementation of a cost reduction strategy will necessarily result in lower sale prices of goods and services (Aurimas and Boris, 2009). The truth is that the below-the-market prices can be afforded by low-cost producers and service providers, which could be definitely caused by efficient road transport in logistics operations.

As pointed out by Alan (2006), attention will focus on sectors (include retail industry) with the following characteristics:

- Distribution is exclusively or predominantly by road
- Delivery by road is highly time-sensitive
- Limited inventory is held in the supply chain
- Order lead times are short
- They exert strong influence on the level of economic activity/quality of life

Distribution is exclusively or predominantly by road:
An increasingly higher share of freight transport has been earned by road transport because of its own advantages compare to other transport modes, including easy accessibility, flexibility of operations, door-to-door service and reliability (Alan, 2006).

Delivery by road is highly time-sensitive
As Tersine et al. (1995) pointed out time-based competition is an evolving business strategy that redefines the significance of organizational activities. Time-sensitive delivery is also could be called “timely delivers”, which means delivery the right goods at right place and right time.

Limited inventory is held in the supply chain:
The speed and flexibility of road transport has enabled companies to synchronize freight deliveries with their production and distribution operations. By driving down inventory levels, however, companies have made their operations much more dependent on rapid and reliable delivery by road (Alan, 2006).

Order lead times are short:
Making order lead times shorter is essential for any high-performing business and particularly in an industry where the type and volume of orders connects crucial links in the supply
Based upon the mentioned advantages of road transport, this purpose could be achieved by adopting road transport mode.

**They exert strong influence on the level of economic activity/quality of life**

Today, customer demand is ever-changing as well as business environment, which lead organizations, retailers and their suppliers to become fast and more flexible in the activities of logistical operations to nimbly diversify into different products/markets and to flexibly re-configure themselves (Robert, 2002).

The motor carrier is very much a part of any firm’s logistics supply chain; almost every logistics operation utilizes the motor truck, form the smallest pickup truck to the largest tractor-semitrailer combination, in some capacity, and not to mention the average truck revenue per ton-mile is higher than that of rail and water (Coyle et al., 2003). Besides, road transport plays a key role to perform the link service in assuming that a company provides the value-added services by creating time and place utility. Today, the spatial gap between the sellers and buyers is increasing rapidly, and leading to the greater transportation costs. So to say, logistical improvements aiming at improving transport efficiency are therefore of paramount importance to the road transport sector (Jeroen, 2010).

### 2.2 Insights of Strategic Outsourcing

Logistics outsourcing has become a rapidly expanding source of competitive advantage and logistics cost savings (Tian et al., 2008). For now, many organizations are struggling with strategic outsourcing related to the outsourcing of goods and services, like how, where they should outsource and whom they should outsource from. As Minahan (2008) defined, Strategic sourcing essentially is the process of identifying, evaluating, negotiating and configuring the optimal mix of products, suppliers and services to support supply chain and other business objectives at the lowest total cost. Furthermore, it was pointed out early in the theoretical discussion that the decision about outsourcing also includes the possibility of insourcing (Walker and Weber, 1984; Picot, 1991). According to Gretzinger (2008), outsourcing refers to the external as well as internal outsourcing of various economic activities to an external organization with its own independent legal status. By contrast, insourcing means the “insourcing” of activities once done outside the company, and resourcing is used as a general term.

There are three outsourcing approaches were explained by Gretzinger (2008), which are:

- The transaction cost approach (TCA)
- The resource based view of the firm (RBV)
- The resource dependence approach (RDA)

One argument about the criticism of TCA is that it is solely interested in the minimization of transaction costs, but is not concerned with the maximization of profits (Mellewigt, 2003). And he also stated that the central concepts of RBV remain unfocused, and this involves difficulties when it comes to operationalization. Due to its emphasis on corporate resources the resource based view neglects market forces (Freiling, 2001). As Gretzinger (2008) described, by way of storage or the substitution of supply sources, dependency and uncertainty are reduced, accordingly, resourcing is thus a means for changing organizational dependency.
These mentioned considerations are summed up in figure 2-1. In terms of dependence and uncertainty, which are described as the resource situation of the organization, has on the one hand an influence on the choice of business strategies and influences directly and by way of the strategic option of organizational measures of insourcing or outsourcing (Gretzinger, 2008)? Thus, organizations can make a decision solely on the basis of the price for make or buy with minimal dependency and uncertainty. Otherwise, they will attempt to avoid dependences and opt against outsourcing or for the resourcing of a service once provided by an outside provider (Gretzinger, 2008).

![Figure 2-1 Model: Strategic Sourcing](source: Gretzinger (2008))

So far, since organizations and companies are paying more and more attention on strategic sourcing, researchers have given different interpretations and suggestions according and depending on their perspective and standpoint. As a result of this, other researchers have explained and carried out different proposals and solutions. Authors like Tomi (2006) suggested that five decision categories must be analyzed to find the optimal sourcing strategy and understand the consequences of different sourcing options, they are: sourcing interface, organizational decision-making, the scope of service package, the geographical area of sourcing and relationship type. Additionally, the other three approaches to strategic sourcing have been illustrated by Minahan (2008), which are select the combination of products, services and suppliers that offers the lowest total cost solution; ensure sourcing decisions support supply chain and business objectives; enhance and institutionalize knowledge and proven sourcing methodologies across the enterprise.

On summary, it is necessary for organizations to better manage assets by reducing supply chain risk and lowering attendant cost, which are reducing transport content, using transportation more efficiently and the last, most extremely method, re-examining outsourcing strategy.

### 2.2.1 Outsourcing Benefits

The diverse sets of outsourcing benefits include lower cost, more investment on core competencies, flexibility, reduction assets and complementary capabilities (Harland et al., 2005; Hansen et al., 2008). Senior Research Analyst Michael (2010) notes that outsourcers offer a multitude of benefits to their client base, including eliminating capital expenses, flexibility, access to qualified labor, reduced costs, advanced management techniques, and the opportunity to gain access to state-of-the-art technology without massive financial outlays. Companies should always consider their total supply chain picture when making sourcing decisions. Instead of looking at transportation and labor costs alone, they should consider their total distribution costs, including the costs of products, insurance, freight, warehousing and all other factors involved in getting their products to their customers (Mitchell, 2009).
So, there are a number of various benefits of outsourcing have been found and analyzed by different people or organizations. Based on their arguments, it can be concluded that logistics services outsourcing can enable a company to focus on its core business, develop better products, increase flexibility and achieve other strategic goals. Moreover, a firm can also simplify its logistics process, reduce paperwork, damage costs, re-deliveries, inventory, lead-time and risks, learn from other enterprises, improve customer satisfaction and overcome seasonal peaks (Vissak, 2008). And sometimes, the buyer would not need transportation equipment, warehouses and some of its logistics personnel, any more. Logistics services outsourcing can also lead to improved information availability and security, reduced coordination and communication needs, faster transit times and, ultimately, an increased value-added, income and competitive position (Vissak, 2008).

As executives get more experience with outsourcing, they are learning the tool’s potential and beginning to wield it for more strategic purposes (Linder, 2004). By combining the tool’s execution effectiveness with their own growing skills in partnering, leaders who display those characteristics will have a practical and realistic road map at their disposal for building strategic flexibility (Linder, 2004). One thing need to be recognized is that the main driver for outsourcing is cost reduction, although there are other drivers exist.

2.2.2 Outsourcing Risks and Issues

On the basis of Supplier Selection & Management Report (2005), there are a lot of different outsourcing risks, including outsourcing strategy risks, outsourcing selection risks, outsourcing implementation risks and outsourcing management risks. And evaluation of logistics outsourcing risk has been emphasized by decision makers from organizations (kersten et al., 2005). Furthermore, Kotabe et al. (2008) stated that outsourcing risks involve disruptions of internal activities, loss of competitive base, opportunistic behaviors, rising transaction and coordination costs, limited learning and innovation and higher procurement costs in relation to the fluctuating currency exchange rates.

Darren (2009) indicated four of the most common complaints from outsourcing vendors are:

- Not enough trust: for instance, some business owners want to know everything an outsourcer does without paying for the extra time and effort used in documenting those details.
- Too many bosses: for instance, if no one is empowered to make a singular decision, then conflicting directions can be resulted.
- Unrealistic expectations: for instance, unrealistic timelines and budgets are often asked by entrepreneurs approaching vendors.
- Neglecting the project: for instance, some entrepreneurs don’t make the time to stay in contact with outsourcers, which leads them to building useless things.

Based upon the research of Tsai et al. (2008), the more logistical functions outsourced, the higher the outsourcing risk the retail chains will perceive. Also in his study shows risks related to transaction costs and strategic resources were both significant for logistics outsourcing. When engaging in a single transportation outsourcing, which was conventionally
regarded as non-core, routine-based or asset-based, the outsourcers perceived asset risk to be more important than competence risk.

As mentioned, unexpected cost, extended lead times, poor quality or other negative performance variables can be resulted in a lack of a systematic analysis technique to assess risk. And by taking the time to identify risks, align objectives, and prioritize goals, organizations can find success in outsourcing and minimize the inherent risks associated with the action (Paula, 2008).

2.2.3 **Flexibility of Outsourcing Strategy**

After describing the benefits and risks of outsourcing strategy, it becomes obvious to us to understand its own real attribute. As Wartzman (2010) points out the overriding question for companies is: "Where do activities belong?" Inside the company's walls? Or outside its doors? Or should they be reorganized as part of a joint venture or some other type of alliance? The answer isn't always so obvious. According to the latest Bain Survey, 77 percent of their research sample companies have outsourcing policy and yet more half of the companies do not achieve the expected benefits from outsourcing. Figure 2-2 illustrates the logistics outsourcing decision. In quadrant #1, logistics activities critical to a firm’s success and for which competence exists in-house increase the likelihood of generating profitability, while increasing the firm’s ability and efficiency in carrying out these activities (Conner, 1991). Prahalad and Hamel (1990) view these activities (i.e. ‘core competence’) as critical to a firm’s success in creating a set of core products and/or services, and as such should not be contracted out.

In quadrant #2, there are situations where the firm determines that logistics is not a critical success factor in the decision calculus, especially in situations where its perceived value to the focal business strategy is low; here the choice to spin off the logistics function is logical (Bolumole et al., 2007). As an example, many of today’s top-performing 3PL firms are spin-offs from one or more long-established, asset-based transportation company. (Bolumole et al., 2007)

In quadrant #3 where the capabilities and resources for developing logistics core competence is not available within the firm. If logistics is not a critical success factor in the decision calculus, and the firm’s in-house operational performance of logistics service is low, then the choice to fully outsource the function to a capable third party is logical (Bolumole et al., 2007). This is a ‘commodity’ transaction with little to no value-added and primarily cost-based.

If the logistics process is considered critical to a firm’s success, a ‘hybrid’ form of outsourcing may be most logical (Earl, 1996 & Spear, 1997). In this situation, illustrated in quadrant #4, in-house activities (i.e., the ‘processes’) combine with external resources and capabilities (i.e., the ‘functions’). For example, there is a trend towards smart sourcing of those services that provide substantial business value but for which internal operational performance and competence is weak (Earl, 1996).
Obviously, the purpose of outsourcing is often simple: companies can realize significant savings by shedding labor, assets, and infrastructure costs. But meanwhile, the companies need to realize that these sourcing decisions do not end up eroding their core competencies, instead the long view of sourcing need to be taken as a strategic approach (Frank et al., 2004). General speaking, make or buy investigations are triggered by a firm’s desire to improve the efficiency of the supply chain and to offer better products and services to its customers (Laios and Moschuris, 1999).

Based upon the research of Frans et al. (2007), as a conclusion, companies show a strong tendency to decrease the costs of non-value adding activities, such as basic distribution. Moreover, the increasing number of mergers and acquisitions provide the required momentum for companies to rethink and rebuild their logistics processes (Eye for Transport, 2003). Nowadays however, the potential of internal reorganization of these processes has been almost completely exploited, and attention has shifted from optimizing internal logistics processes to better managing external relations in the supply chain (Skjoett-Larsen, 2000). As a result, one of the most fundamental choices that companies face in redesigning their logistics processes is whether they (Gruijssen et al., 2007):

- Keep the execution in-house;
- Outsource the logistics activities; or
- Seek partnerships with sister companies to exploit synergies (Groothedde, 2005).

Combinations of these three possibilities may also prove a valid option, which could help a company to make right decision on outsourcing strategy – outsource or insource.

### 2.3 Consolidation point

Consolidation point (CP) is a network concept. It is a function to group LCL (Less Container Load) volume into FCL (Full Container Load). It could be a cross-docking point, warehouse or distribution center, etc (Dave, 2004). From the point of view of multi-depot hub-location, a depot is a consolidation center that bundles the quantities of parcels of certain demand points to achieve economies of scale for less-than-truckload (LTL) transports.
All demand points belonging to a depot form the service area of the depot. Key issues for the LTL industry include location of depots, assignment of loads to trucks, and scheduling and routing of pickups and deliveries. A hub is a consolidation center that bundles quantities between depots to achieve economies of scale for depot-to-depot transports. (Michael and Gunther, 2003)

While individual volumes may be low, the aggregate volume and related transportation cost is often significant. Take natural resources as an example (Dave, 2004) there are a number of reasons for the lack of control and resulting high cost of transportation for natural resources, including:

- The wide diversity of the items and their original supply sources may result in decentralized purchasing responsibility.
- The limited volume of many items, as well as individual shipments results in expensive ITI, freight costs.
- The remote facility location results in long transportation distances from major metropolitan centers and often limited transportation choices.
- Terms of sale and resulting responsibility for payment of freight varies greatly or may not be well defined. This makes measuring the true cost complicated.
- A numbers of the items are sold on a prepaid basis for which the true freight cost is hidden.

To overcome these issues, one alternative is to adopt an inbound freight consolidation program in which all of these items are routed to a cross-docking location in the major metropolitan centre closest to the facility, where they are consolidated into a single shipment and shipped on a master manifest to the destination.

The most significant transportation savings can be achieved if LTL shipments are consolidated into a full truckload, which finally lead to efficient road transport. But some issues should be concerned like CP location, the balance between in-transit consistency and freight savings (Dove, 2004). Following is a figure about the principle structure of the developed solution method to define the CP network (See Figure 2-3).
First the number of depots and then the depot locations are determined. Next, on the basis of the established depot locations, an optimal line haul structure of the system must be determined. This occurs in three steps: Depot assignment (Da), determines line haul structure (Dlhfs), and determines depot costs (Ddc). Because the quality of the solution of Dlhfs depends on Da, through feedback 1 we attempt to change Da so as to achieve continuous reductions of line haul costs. Next the pickup and delivery transports are determined in the step “Determine pickup/delivery”. Because costs of pickup and delivery depend significantly on the depot assignments, we can expect a sub-optimal solution of the overall problem if there is no feedback from “Determine pickup/delivery” to “Da”. This is the purpose of feedback 2.

After the first iteration the costs are computed for the current overall solution in the step “Determine overall costs”, whereby the solution serves as the starting point for further iterations. Further iterations result from feedback 3 and feedback 4. Through feedback 3 we attempt to improve the overall solution by changing depot locations; in feedback 4 we attempt such improvement by changing the number of depots. (Michael and Gunther, 2003)

As for setup of CP, it actually is a network plan. CP location, the balance between in-transit consistency and freight savings, etc. have to be considered under a whole picture.
2.4 Merge-in-Transit

Merge-in-transit is the centralized co-ordination of customer orders where goods delivered from several dispatch units are consolidated into single customer deliveries at merge points, free of inventory (Norelius, 2002).

Compare to other normal alternatives of physical distribution - Delivery before stock-keeping and DD (Direct deliveries), merge-in-transit is an efficient means for reducing both the need for warehousing and the number of customer receipts (Kärkkäinen et al., 1999). Traditionally, distributors and wholesalers have taken care of both the order and material flow (Richard and Helen, 1999). The means that they purchase products from suppliers, store in their own warehouses, and then sell them to their own customers. When there are a wide variety of products on offer, the number of stock-keeping units becomes too big to be economically warehoused by the distributor (Bowersox et al., 1996). A good alternative to solve the warehousing problem is to have all individual suppliers ship their products directly to the customers, without intermediate storing at the distributor. But direct deliveries (DD) also will lead to another problem which increases the costs of reception activities (Kärkkäinen et al., 2003). For above two points of concern merge-in-transit will be an expected approach to save the stock-keeping cost and meanwhile combine the several customer receipts into one piece delivery.

But in reality, the supply chain manager will be more care about whether such approach could help him save logistic cost or not. Expected general cost and service effects of merge-in-transit are presented in a study prepared by Jan and Laura (Bradley et al., 1998). The expected effects consist of reduced inventory and warehousing costs in the chain, increased or reduced transportation costs, reduced receiving costs at the customers, increased supply chain visibility, reduced cycle times from customer order receipt to delivery, and improved customer service. Merge-in-transit could save the inventory costs and receiving costs but it’s hard to say it could reduce transportation costs. So an evaluation procedure will be necessary to assess the applicability of merge-in-transit operations for a particular distribution situation. Such approach like activity-based costing model (Timo et al., 2003) will help evaluate which kind of distribution situation could achieve cost-saving by implementing merge-in-transit. Following, a flowchart (See Figure 2-4) for the evaluation process will be presented to analyze benefits of merge-in-transit (Kärkkäinen et al., 1999).
Figure 2-4 Evaluation Process
Source: Kärkkäinen et al. (1999, p.139)

In this process, three distinct parts are included, each ending with an assessment of whether to continue the evaluation procedure or not.

**Part 1: Selection of initial merge-in-transit partners**

This section is focused on two steps.

**Step 1.1. Identify potential products for merge-in-transit:**

There are three different alternatives for arranging distribution: customer deliveries from a central warehouse, direct deliveries from individual manufacturing units or suppliers, and consolidated deliveries achieved with cross-docking or merge-in-transit (Simchi-Levi et al., 2000). And each product has its own appropriate alternative depending on its characteristics. As for merge-in-transit, it can be considered as an alternative for products with the following features (Timo et al., 2003):
- Products of high value, as they incur high inventory carrying costs and their cycle time in the chain should be minimized.

- Products with substantial depreciation or obsolescence related costs, e.g. a large number of variants or short life-cycles, since these kinds of products should be stored as centralized and as upstream as possible to minimize the amount of inventory.

- Bulky products that a space consuming and hard to handle, as they incur high warehousing costs and should visit as few warehouses as possible.

Step 1.2. Model the distribution alternatives

In order to model the distribution alternatives, firstly the capabilities of suppliers and logistics service providers for merge-in-transit should be indentified and then the delivery chain for current material flows will be modeled based on identification of the suppliers’ geographical locations and sales volumes, as well as the geographical distribution of customers and an estimation of their order volumes (Timo et al., 2003). The resulting delivery chain models should include all the activities performed in the material flow such as shipping, transporting, warehousing, consolidating and receipt of the deliveries for instance (Kärkkäinen et al., 1999).

Part 2: Evaluation of merge-in-transit operations

In this section the feasibility of merge-in-transit operations is evaluated. First, the distribution operations and their costs in the current chain and the merge-in-transit scenario are identified. Second, the costs of the operations in the alternative channels are compared. Finally, the feasibility of the merge-in-transit scenario is assessed (Timo, et al., 2003).

Step 2.1. Identify operation costs

Identify operation costs in different distribution activities. The picking activities at each supplier and the receiving activities at the customer are common to all distribution channels, but their costs depend on the structure of the handled order (Timo et al., 2003). Warehousing operations include these two activities, and also activities related to stockkeeping. The consolidation activity is associated with merge-in-transit deliveries. Transportation activities are dependent on the channel structure (Timo, et al., 2003).

Step 2.2. Assess costs of distribution alternatives

A costing model is used based on distribution activities to assess costs of different distribution alternatives.

Step 2.3. Evaluate merge-in-transit profitability

Evaluate each alternative profitability by comparison the potential cost savings when switching between different distribution alternatives.

Part 3: Implementation of merge-in-transit

When analyzing the feasibility of merge-in-transit implementation, attention has to be paid to the information system requirements controlling the merging operations (Timo et al., 2003). Since the logistics service provider needs to be able to correctly identify shipments
belonging to the same customer order, independent of their source, this information needs to be made available to the service provider in an efficient way (Timo et al., 2003).

**Step 3.1. Review information system requirements**

Information system must be available from the whole distribution chain, especially to the logistics service provider performing the consolidation (Timo et al., 2003).

**Step 3.2. Evaluate the feasibility of merge-in-transit implementation**

The final evaluation step includes assessment of the implementation costs and their payback time taking into consideration the operational cost benefits and customer service benefits attainable with merge-in-transit distribution (Timo et al., 2003).

The evaluation procedure helps to assess the applicability of merge-in-transit operations for a particular distribution situation (Timo et al., 2003). By an activity-based costing model, a comparison of logistics costs between merge-in-transit and other distribution alternatives is made and then to provider better decision support for supply chain managers considering merge-in-transit.

### 2.5 Packaging in Logistics Operations

Packaging, as a part of logistics, is no longer being thought of as just filling. Things are changing in the world of boxes as shippers and carriers alike realize that effective packaging can reduce costs, decrease inventory and streamline the supply chain (Israelsen, 2005). As Jon (2009) suggests that companies could see additional savings by optimizing space within a truck, which are both financially and environmentally. He says: "Plastic containers and pallets can be securely stacked higher than expendable ones and nest or collapse to take up less floor space, making inventory management and material handling easier, as well as minimizing reverse logistics costs". Virtually, Receiving and inspection of deliveries are also faster and easier with standardized packaging and consistent unit sizes (ORBIS, 2004).

Logistical packaging is one of the most “systemic” of all logistical activities, which is a unique activity that facilitates productivity throughout the logistical system, spanning the boundary of the organization that designs the package, flowing out into the distribution centers, retail outlets, and vehicles of many separate organizational units (Diana, 1992).

According to Cervera (1998), three levels or different hierarchies are to be established: the primary packaging (to protect the product and, in many cases, in contact with it; also known as the “consumer packaging”), the secondary packaging (designed to contain and group together several primary packages; known as “transport packaging”) and the tertiary packaging (involving several primary or secondary packages grouped together on a pallet or load unit).

The others like continual innovation, which is also the secret to success for Packaging Logistics, a manufacturer of corrugated packaging, including displays and boxes. The company thrives on engineering unique packaging solutions corresponding to each customer’s specific needs (Packaging Logistics, 2010). This strategy avoids the "one size fits all" approach, which can lead to a commodity business of diminishing margins and little room for survival or growth (Packaging Logistics, 2010). Nowadays, the product is complemented with packaging i.e. another product, to fulfill the demand of the later phase of the prod-
uct life cycle (Kerstun et al., 2005), we can consider the case study of IKEA by Klevås (2004), in her study she shows that the integration of packaging in both the product development team and in the logistic function can be more successful because of the input of the supply chain overview.

2.5.1 Packaging as an Information Resource

The role of the package as an information resource is closely related to the fact that packages facilitate the containment of goods (Per, 2007). According to his research, goods have been described as identified and registered into an information system, not considering that in many cases these goods are packed. Therefore, the package needs to be concerned, since it is one of the elements in the identification of goods. Actually, as soon as goods are packaged, how logistics activities are carried out will be influenced and, therefore, also the information needed to carry out these activities. In addition, when goods are packed, this influences, the information provided and used concerning goods (Per, 2007). As mentioned in former researchers, in a supply chain, it is the package and not the product that may be regarded as the most important physical resource in a supply chain (Ballou, 1987).

2.5.2 Packaging in Physical Distribution

Paine (1981) first words in his handbook on packaging state that: “Efficient packaging is a vital necessity for virtually every product.” Features of a package should ensure a safe delivery of the product in an economical manner to the end user. Fundamentally, the package has a logistics objective and its most obvious function is to carry goods.

When Ballou (1987) states that it is mainly the package and not the product that must be handled in a supply chain. This statement may be interpreted as packages representing a key resource in achieving efficiency regarding logistics activities. Packages may therefore also be regarded as a resource that plays a role in the coordination of variations in supply and demand with supply chain capacities. Packages are, however, primarily facilities for carrying goods, and also used to handle and inform about goods. How packages are used, depends on how well adapted the different functions of packaging are and in relation to different logistics and other purposes of the package in a supply chain. The importance of packaging varies between industries. Some products such as petroleum for cars and raw materials are not contained in packaging. When goods are distributed through retailers, packaging gains importance.

An obvious aspect of this importance is to facilitate product sales in the predominant self-service type of retail environment. According to Paine (1981), “…packaging is an economic activity which plays an important part in the production and distribution chain of the majority of goods.” Also, he said, “…the functions of any packaging will be dependent on the item to be contained and the method by which it is to be transported from the manufacturer to the consumer”. The two vital physical interfaces of the package are the goods contained in the package and the facilities that contain or handle the package. Facilities where the package is used to store and handle goods include storage rooms, material handling equipment, and information system equipment such as computers, printers and scanners. Packaging standards help increase the degree of match between combinations of packages, goods, and facilities. How packages, goods, and information are combined and used in relation to human resources varies and also influences the efficiency of logistics activities.

According to Lambert et al. (1998) packages mainly have a marketing purpose and a logistics purpose. An aspect of the marketing purpose of packages is according to Paine (1981)
that a “good” package promotes the product thereby increasing its sales, while poor packages provide the end-user with damaged products. The physical features of packages vary.

Therefore, at present, an economic activity, involving the design, selection and use of the package in which the impact of logistics and marketing goals into the goods involved in business efficiency. As Per (2007) claimed that packages both facilitate the transformation of goods in accordance with customer needs and also promote a product through their form and information on the package. Packages are, since they facilitate physical distribution and marketing products, an important part of the core entity in the flow of goods (Arlbjørn & Halldorsson, 2002). Packages also have an important marketing aspect since they are vital in providing a delivery of goods in accordance with customer expectations and also that packages themselves may be used in the marketing of products (Per, 2007).

The package may accordingly be viewed as a central feature regarding how marketing and logistics are interrelated (Per, 2007).

### 2.5.3 Packaging interdependence with successful logistics

The damage rate of products is one way of describing the supply chain performance in different markets and the packaging materials and designs that are needed will be influenced by consumer/customer demands and handling, storage and transport conditions (Jönson, 2005). On the other side, packaging design and handling methods as well as products could certainly influence the hazards and loads in logistics operations. The truth is that efficient road transport can be influenced by the product as well as the type of package chosen and the handling and storage, even concerns to the efficiency and effectiveness of the entire supply chain and subsequently the company profit. As Jönson (2005) said that there was interdependency between packaging design and supply chain design, and it was our conviction that a packaging designer needs logistics knowledge and a logistician needs packaging knowledge.

Today more and more companies have already been recognizing the importance of the consumer/customer views in a competitive market place. They knows that they need to meet customer need and expectations at the same time as they create customer values, which is critical for companies having the goal of making their organizations consumer/customer oriented to ensure that their businesses will be successful (Jönson, 2005). Just take Wall Mart and IKEA as examples. Some of their logistics changes have been driven by legal requirements on safe handling as well as the producer’s responsibility for used materials; others have been influenced by new views on food products and their health aspects, and still other changes depend on volatile consumer/customer demands and requirements; new products are also developed by both manufacturers and retailers, thus the retailers are very sensitive to consumer/customer demands and make sure they have supply chains that can handle changes smoothly and easily (Gustafsson et al., 2006).

Many companies are starting to realize that packaging and logistics are interconnected, since companies seek new opportunities to reduce costs, decrease cycle times and become more responsive (Page, 2004). Virtually, the significant reductions in supply chain costs and cycle times can be resulted from the merging of packaging and logistics, and thus finally lead to efficient road transport in logistics operations.

To become successful we believe it is necessary for product developers, manufacturers as well as distributors to pay attention to both the packaging needs, designs as well as supply chain design – to continuously improve the details to meet the different requirements in different steps (Jönson, 2005). Just as Arca and Carlos (2008) explained the reply to the
question of why pay attention to packaging in the context of logistics, which comes because packaging reproduces all the complex relationships, views and needs arising in each company and between departments (within the company) but on a small scale.

2.6 Economics Scale of Trucking Cost

From the perspective of microeconomics, due to expansion, economics scale is the cost advantage that a business obtains. It is the factor that causes a producer's average cost per unit to fall as scale is increased, and it is a long run concept and refer to reductions in unit cost as the size of a facility, or scale, increases (Sullivan and Steven, 2003). Economies of scale may be utilized by any size firm expanding its scale of operation. The common ones are purchasing (bulk buying of materials through long-term contracts), managerial (increasing the specialization of managers), financial (obtaining lower-interest charges when borrowing from banks and having access to a greater range of financial instruments), and marketing (spreading the cost of advertising over a greater range of output in media markets) (Joaquim, 1987).

In the explanation of Ballantyne (2004), trucking cost can be affected by following factors on the perspective of economics scale, which are:

- Transportation management system
- Centralize transportation processes
- Optimize and consolidate transport operations
- Most of the infrastructure used by trucks is supplied by governments; capacity constraints will require direct government investment and action
- The driver shortage, recruitment and training (difficult working conditions and relatively low pay)
- Tight supply in trucking capacity and rising fuel costs are leading to price increases

Other factors, like the authors indicated, for instance, merge-in-transit, consolidation, strategic sourcing and packaging in logistics operations. As some researchers are saying that reduction in transport costs promote specialization, extend markets and thereby enable exploitation of the economies of scale.

2.7 Summary

This theoretical framework is made up of a few different elements, which can affect the efficiency of road transport in one way or another. After describing the important role of road transport in logistics operations as well as its significant characteristics, the inevitability and importance of efficient road transport in logistics has been pointed out. The efficient road transport can not only meet a company's cost-saving strategy but also provide additional value-added service, like time and place utility e.g. For a company with a broad and complicated transport network, towards efficient road transport in logistics operations has the critical importance of providing high customer service level.

As we known, although a lot of companies outsource their noncore logistics activities to their partners or third party logistics providers for focusing on their core businesses and improving their competences, not each of them can be successful and profitable. The truth
is that sometimes it is much better to be done in-house than out-house. The reasons can be you are familiar with your own business; you can control the entire process; you know what you need and how to get it et cetera. For companies to insource their activities once done outside the company, they may rethink and rebuild their logistics processes, so to say it is necessary for a company recognizing the importance of strategic sourcing. Talking about efficient road transport, it might be decided by making suitable sourcing strategy or not.

For most companies, efficient road transport is a strategic asset in today’s dynamic and highly competitive marketplace. The daily activities of road transport are comprised of scheduling and routing of pickups and deliveries. The volume and attribute of items are always diversity instead of unique, which cause the aggregate volume and related transportation cost is often significant when individual volumes are low, for instance. Based upon mentioned, road transport can be significant reduced by adopting an inbound/outbound freight consolidation program in a manner all of items are transported to a consolidation point where they are consolidated into a single container with a master manifest to the destination. By achieving the function of consolidation point, efficient road transport can be provided through reducing road transport cost. Moreover, this process can quickly take advantage of market opportunities or respond to competitive threats, and not to mention higher service level on the perspectives from both customer and supplier.

Road transport is always about physical distribution, and the inventory management cannot be overlooked when we are talking about this. A company would ideally want to have enough inventories to satisfy the demands of its customers for its products – no lost sales due to inventory stockouts, however, the company does not want to have too much inventory supply on hand because of the cost of carrying inventory (Coyle, 2003). Virtually, it is quite difficult for a company to get this purpose by keeping suitable inventory level. Fortunately, merge-in-transit can help a company solve this tough problem appropriately in certain way. By combining the several customer receipts into one piece delivery, the inventory cost and receiving cost can be saved, even increased supply chain visibility, reduced cycle times from customer order receipt to delivery, transport costs and improved service. Obviously, one of the advantages of adopting merge-in-transit in road transport is improving its efficiency in logistics operations.

The last fact in this chapter which can lead a company to efficient road transport is packaging in logistics operations. Like the authors said that effective logistical packaging had various benefits for a company, for instance:

- Reduce costs
- Decrease inventory
- Streamline the supply chain
- Optimize space utilization
- Accelerate the speed of receiving and inspection of deliveries
- Transport items easily

There are more advantages of effective logistical packaging can be found both in practice and academic area. For this thesis, it is quite obvious that efficient road transport can be resulted from the benefits of effective logistical packaging. As a company who wants to achieve efficient road transport, it has to keep in mind that the packaging industry is continual innovation, so to logistical packaging area.
From the perspective of economics scale, road transport cost can be reduced by achieving these objectives, including suitable sourcing strategy, utilization of consolidation point, adoption of merge-in-transit and effective logistical packaging. Following the successful operation in these areas, efficient road transport can be provided for a company.


3 Methodology

In this chapter, the research tactics are stated. And after the definitions of research strategy, method and approach were being explained and discussed, the methodology of this thesis would be presented as well as the trustworthiness measurement of data is provided. This chapter helps the authors to ensure the thesis of a quality.

3.1 Work Plan

For this paper could be carried out on schedule, the authors think it should be necessary to have a planned work plan. As Phil (2009) said that a work plan is a necessary tool for planning, executing, implementation and monitoring any projects or any ordered set of activities, a project or a programme.

Besides, the work plan (See Figure 3-1 Work Plan) can be reviewed for detailed actions. And a suitable time-working plan can show a planning of the study activities; from moment now till the final thesis presentation and marking. When are the authors going to do what? What are important presentation dates? And what should be ready then? How long do certain phases of the project last, or how long would the authors like to spend time on certain phases? It gives the authors the possibility to set priorities (Remon, 2008).

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<td>Observation &amp; Data Collecting</td>
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<td>Discussion &amp; Data Analysis</td>
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<td>Draw Conclusions based upon Analysis</td>
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<td>Proposals for Further Studies</td>
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<td>Finish writing &amp; Prepare Debate</td>
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In order to implement a feasible research, the authors realize that the suitable research methods should be chosen and optimized. And in the authors’ opinions, to achieve this purpose and complete this study of a quality, it could be started from preparing a genuine work plan. By implementing this work plan well, the authors hope the research purpose of this study -- a specific case study of IKEA China on road transport cost in logistics opera-
tions could be reached by clearly explaining research problems, which can be studied through combining theoretical framework with case study findings.

### 3.2 Research Strategy

Mark et al. (2009) stated that there are many different research strategies could be used for exploratory, descriptive and explanatory research, and some of these clearly belong to the deductive approach, others to the inductive approach. At present, the business environment in logistics and supply chain phenomena is becoming increasingly complex, in order to accurately describe and in-depth explain and analyze these complex phenomena such as out-sourcing, business-to-business relationship and strategic sourcing etc., in addition to quantitative research strategy, qualitative research strategy should also be included.(Golicic et al., 2005). Consequently, what is most important is not the label that is attached to a particular research question(s) and meet your objectives, in a manner the choice of your research strategy will be guided by your research question(s) and objectives, the extent of existing knowledge, the amount of time and other resources you have available, as well as your own philosophical underpinnings (Mark et al., 2009).

This section is written as an introductory part to provide the reader with a guide to the research process and with the necessary theories and skills to undertake a piece of research from thinking of a research topic to writing this master thesis. Therefore, the authors of this paper discussed the various knowledge about methods, which includes interviews and data collection as well as both quantitative (statistical) and qualitative (no statistical) analysis techniques and, as you have properly found from the title, is the focus of this chapter.

#### 3.2.1 Induction and Deduction

Obviously, this research project involves the use of theory. That theory may or may not be made explicit in the design of the research, although it will usually be made explicit in the presentation of the findings and conclusions. The extent to which you are clear about the theory at the beginning of your research raises an important question concerning the design of your research project. This is whether your research should use the deductive approach, in which you develop a theory and hypothesis (or hypotheses) and design a research strategy to test the hypothesis, or the inductive approach, in which you would collect data and develop theory as a result of your data analysis (Mark et al., 2007).

According to Mark et al. (2007), for some research projects you will use the literature to help you to identify theories and ideas that you will test using data. This is known as a deductive approach, in which you develop a theoretical or conceptual framework, which you subsequently test using data.

Relatively, based upon his definition, for other research projects you will be planning to explore your data and to develop theories from them that you will subsequently relate to the literature, this is known as an inductive approach.

In fact, however, both of them have their own special meanings. The difference between these two terms can be showed as the following flowchart (See Figure 3-2 Research Approaches).
In this study, the inductive way is chosen as the research approach of this thesis. Although this research area has been explored by many former investigators, various viewpoints have been described; it is still no last word about a study of road transport costs in logistics operations. Too many uncertain possibilities exist during this study, for example, how organizations could operate more efficient with less road transport cost; what kinds of issues and challenges exist during the optimization of road transport; what kinds of solutions could be utilized to improve this operation.

Furthermore, theoretical framework about road transport costs in logistics operations will be discussed and expounded according to the reference books and materials. A lot of empirical data which are collected by literature review and interview will be explained and analyzed. Finally, the conclusion is obtained based upon the combination of secondary data and empirical findings.

Within the field of research methodology there are two general views on data collection. These are quantitative and qualitative methods (Gill & Johnson, 1997).

### 3.2.2 Qualitative and Quantitative

Bryman and Bell (2007) define that quantitative research is a distinctive research strategy that emphasizes quantification in the collection and analysis of data. In quantitative research, as the term suggests, data are collected and analyzed in numeric form, which tends to emphasize relatively large-scale and representative sets of data, and is often, falsely in our view, presented or perceived as being about the gathering of facts (Blaxter et al., 2002).

Qualitative research will enable people to understand the meaning of what is going on since it primarily focuses on the kind of evidence, and it also offers an increased possibility of developing empirically-support new theories which would increase relevance and interest to
practitioners (Näslund, 2002). According to Mark et al. (2007), qualitative data refers to all non-numeric data or data that have not been quantified and can be a product of all research strategies. It can range from a short list of responses to open-ended questions in an online questionnaire to more complex data such as transcripts of in-depth interviews or entire policy documents (Mark et al., 2009). To be useful these data need to be analyzed and the meanings understood.

Dey (1993), gives distinctions between quantitative and qualitative data (See table 3-1 Distinctions between quantitative and qualitative data).

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<thead>
<tr>
<th>Quantitative data</th>
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<tr>
<td>■ Based on meanings derived from numbers</td>
<td>■ Based on meanings expressed through words</td>
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<tr>
<td>■ Collection results in numerical and standardized data</td>
<td>■ Collection results in non-standardized data requiring classification into categories</td>
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<td>■ Analysis conducted through the use of diagrams and statistics</td>
<td>■ Analysis conducted through the use of conceptualization</td>
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Table 3-1 Distinctions between quantitative and qualitative data
Source: Dey (1993)

Both of quantitative and qualitative data collection techniques and analysis procedures have their own strengths and weakness. The data collection techniques which you choose decide which kind of results you obtain. Because of this, some questions that may occur to your research project, like ‘How do I know which data collection techniques and analysis procedures to use in which situation’ there is always no simple answer. However, above all, it is vital for the researcher to know these basic concepts, the next following examples is helpful to make these a little bit clearly.

Examples of methods associated with quantitative data research (Mark et al., 2007):
- questionnaire or survey technique
- structured observation (predetermined schedule)
- content analysis (predetermined categories)

Examples of methods associated with qualitative data research (Mark et al., 2007):
- interview/oral history
- observation (participant/non participant)
- documentary analysis

In this research report, secondary data provided by the literature review and together with primary data, which is collected through qualitative research methods such as in-depth interviews are applied by the interviewers and observation (one author’s complete participant).

3.2.3 Strategy in this Study

Golicic et al., (2005) bring up an effective ways of choosing research methods. They clarify when the phenomenon is new, complex or variables are difficultly identified and are not
easily to find theories to explain the phenomenon. In order to deeply understand the objective of this thesis, the major research approach is subjective and aims at explore and describe the possibility of operating efficiently with less road transport costs in logistics operations. As the qualitative research is chosen, the major data collection of this report is not done in the form of numbers but in descriptive words.

The research of this thesis is on the focus of a study of road transport costs in logistics operations. This research is new and complex, as different modes of road transport will lead to different effects on road transport costs in logistics operations. In other words, the uncertainty about whether an organization can transport goods more efficiently or not with less cost does exist. Therefore, this research is matched for qualitative method aiming at carrying out the research questions in depth way. Moreover, qualitative method is associated with inductive approach. Thus, the inductive approach is also employed in this thesis. Additionally, the qualitative method has been applied in the process of data collection.

The study in the following chapters is mainly process-oriented rather than outcome-oriented, which starts from the research strategy of case study. And then, the data collection section presents the methods, which are chosen and adopted in this thesis right before the presentation of the construction of interview guide. Finally, the trustworthiness of collected data will be illustrated after describing the parts of case study and data analysis.

3.3 Case Study

Roboson (2002) defines case study as ‘a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence’. As Yin has famously said, case studies are a preferred approach when ‘how’ or ‘why’ questions are to be answered, when the researcher has little control over events and when the focus is on a current phenomenon in a real-life context (Yin, 1994). And moreover, if you want to gain a rich understanding of the context of the research and the processes being enacted, the case study strategy will be of particular interest to you (Mark et al., 2007).

Based up the research of Ghauri (2004), case study is made up of four different steps, which are:

- Deciding to use a case study
- Selecting cases
- Conducting a case study
- Analysing case studies

Deciding to use a case study

Here, the authors chose a single case study as the research strategy in this research report. As Mark et al. (2007), explained that “A single case is often used where it represents a critical case or, alternatively, an extreme or unique case”.
Besides, the primary reason for the authors to choose this research strategy is because the authors are sure that this chosen case could provide me enough opportunity to investigate, demonstrate, analyse and answer my research questions of a study of road transport costs in logistics operations. Just like Mark et al. (2007) claimed that “The case study strategy also has considerable ability to generate answers to the question ‘why?’ as well as the ‘what?’ and ‘how?’ questions, al-
though ‘what?’ and ‘how?’ questions tend to be more the concern of the survey strategy”. Actually, whatever explanatory research or exploratory research often uses case study strategy mostly.

**Selecting cases**

Ghauri (2004) emphasized that cases selection should be based on criteria that are consistent with the research problem, and the cases should correspond to our theoretical framework and the variables we are studying. When a particular case is used, which meets all the conditions necessary to confirm, challenge or extend, then we use single cases to explain or question an established theory (Pervez and Rebecca, 2009). Moreover, single case study is always adopted in the situation of an inductive approach and specific explanations, just exactly as this thesis.

A sample of cases often is built up according to different criteria (Voss et al., 2002). The organization size, industry and inter-organizational effects should be concerned with the choice of case studies. Thereby, the case study research is incredibly costly and time consuming process. Thus, easy-to-access is an essential factor and should be taken into account (Stuart et al., 2002).

Firstly, to meet this study, case company should have abundant road transport activities with a mature road transport network. As known, IKEA entered China in 1998 when it opened its first store which is operated as joint venture in Shanghai and expanded gradually. IKEA has two large distribution center (DC) in Shanghai, and Shanghai will become IKEA's largest distribution center in Asia Pacific Region and have the largest foreign-funded warehouse in Mainland China. Obviously, IKEA China has mature, broad and complicated road transport network, also as mentioned, they are focusing road transport costs reduction as a primary cost-saving strategy. Secondly, the feasibility of access to key decision-makers is a significant factor for the authors to collect data through interview. One of the authors is working in IKEA China, so the authors can access the data timely and adequately. So to say, IKEA China is the typical case because of its suitability to this study.

**Conducting a case study**

In the case study method, it is particularly important as we need to check and validate the information we receive from various sources and examine it from different angles (Ghauri and Gronhaug, 2002). As Ghauri (2004) defined triangulation was one of the defining features of a case study, for instance, we can check the performance of a firm or a project, claimed by the interviewee, from annual accounts, archives or by interviewing another manager or company representative. In his further study, he suggested researchers collected data from multiple viewpoints.

In this thesis, as one of the authors is employee of IKEA China in Shanghai, the accuracy of the collected data can be ensured, and the authors prefer meeting people face to face instead of conducting a series of telephone interviews or corresponding via E-mail. And data collection based upon multiple viewpoints will be indicated in the following sections.

**Analysing case studies**

Interpreting and analysing qualitative data is perhaps the most difficult task while doing case study research, as pointed out by Miles (1979, p.232):
'The most serious and central difficulty in the use of qualitative data is that the method of data analysis is not well formulated... the analyst faced with a bank of data has very few guidelines for protection against self-delusion, let alone the presentation of unreliable or invalid conclusion to scientific or policy-making decisions. How can we be sure that an 'earthy', 'undeniable', 'serendipitous' finding is not, in fact, wrong?'

One of the suitable answers for this question can be making sure that data analysis and collection are closely interconnected during the life cycle of the case study research (Ghauri, 2004). Others like Miles and Huberman (1994) said, interweaving data collection and data analysis right from the first case/interview is the best policy in case study research. More details about data analysis in this thesis will be described in section 3.6.

**Action Research**

Strongly related to the case study approach is action research, as defined by Nick and Ian (2008), action research is basically the idea that the researcher actually acts as an agent for change in a particular situation (e.g. a company, or a school), which means the researcher is clearly part of the research itself, not standing apart from it.

Considering one of the authors is the formal employee in IKEA China, so action research is perfectly suitable for the case study of this research. His position in the company ensure the authors to access the data freely as well as his work experience can make the data be analyzed deeply, not to mention both the validity and reliability can be provided. Talking about the validity and reliability, more details will be explored in the later sections.

**3.4 Data Collection**

The case study is most often used in explanatory and exploratory research. And there are maybe various data collection techniques and are likely used in combinations, perhaps including, for example, interviews, observation, documentary analysis and questionnaires (Mark et al., 2007). Defined as a qualitative research, it is necessary for a well-rounded researcher to understand how to collect qualitative data. As Nick and Ian (2008) said in their study, without high-quality data, none of your conclusions are trustworthy, and assuring readers of this is one of your most important tasks as a researcher.

According to Blaxter et al (2002), the following themes and issues are usually involved in data collection:

- Access and ethical issues: The negotiation of access to people and organizations and data collection in the process of designing your research.
- Sampling and selection: Collecting data in an efficient way.
- Applying techniques to data collection: Suitable methods of data collection are adopted in your research.
- Documents: Providing a theoretical foundation for your research.
- Interviews: Gathering valid and reliable data for your research questions and objectives.
- Observations: The researcher participates in the activities of subjects for collecting data.
- Recording your progress: Keeping a close check on the process of your research.
Access and ethical issues: In this thesis, the manager of operations in IKEA China offered fully cooperation to the authors, and the authors gained much help from them. All the data collected by the authors is under the supervision of the chief manager from IKEA China, and the authors have the liability to use and secure the data if needed.

Sampling and selection: Non-probability sampling (or non-random sampling) provides a range of alternative techniques to select samples based on your subjective judgment, and this sample would provide the research with an information-rich case study in which the research explore his/her research questions and gain theoretical insights (Mark et al., 2009). Obviously, this method is definitely suitable for this thesis, the authors chose the people who can offer available data as representatives. The reason is that in order to collect data in a both time and cost saving with the guarantee of reliability, valuable and validity.

Documents: The documentations used in this thesis include all electronic articles/literatures and paper materials (textbooks e.g.), which may be useful for the authors carrying out this research.

Interviews: All the interviews the authors are taken are face-to-face interviews combine with prepared interview questions. More details of the interview guide see section 3.5.

Observations: There are two different definitions based on the study of Mark et al. (2009), one is participant observation, which is qualitative and emphasizes on discovering the meanings that people attach to their actions; the other is structured observation, which is quantitative and is more concerned with the frequency of those actions. Considering the essence of this thesis, the authors prefer participant observation. The first reason for this is because one of the authors is working in Shanghai office of IKEA China as a full employee. His job title is Transport Business Developer, the purpose of this job position is to develop the transport business with a number of service providers to secure customer availability; to strive for the best supply set up in the creation/changing of supply solutions with the aim to secure high availability at lowest possible cost landed sales price; to demand performance of the service providers. Although this might risk affecting the level of objectivity, the experience difference between a “researcher” and a “practitioner” has been greatly reduced. As Delbridge and Kirkpatrick (1994) state: ‘in the social sciences we cannot hope to adequately explain the behaviour of social actors unless we at least try to understand their meanings’, in a manner the data collected by the authors have a comparatively high reliability.

By the way, most research questions are answered using some combination of secondary and primary data. These two concepts will be explained in the next sections.

3.4.1 Primary Data

The process of observing or directly collecting data from first-hand experiences has been defined as primary data collection. In other words, new (primary) data are collected in terms of answering special research questions or meeting special objectives. Various methods of collecting primary data can be used by the research, including observation, interview and questionnaire, and the use of interviews can help you to gather valid and reliable data that are relevant to your research question(s) and objectives (Mark et al., 2009).

In thesis, the methods of participant observation and semi-structured interviews (e.g. via face to face, telephone and email) are utilized to collect primary data. The interview guide
can be found in Appendix III. Participant observation is defined as ‘the researcher attempts to participate fully in the lives and activities of subjects and thus becomes a member of their group, organization or community, which enables researchers to share their experiences by not merely observing what is happening but also feeling it’ (Gill and Johnson, 2002). The further information about interview will be described in detail in Section 3.5.

### 3.4.2 Secondary Data

Secondary data are known as the data have already been collected for some other purpose, and which can offer the researchers the possibility of reanalysing them for their own purpose (Mark et al., 2009). Secondary data can be both raw data and published summaries. Besides, the key point of secondary data is that it should be relevant, accurate and available (Fay, 1997).

Secondary data include both quantitative and qualitative data, and they are used principally in both descriptive and explanatory (Mark et al., 2009). As Thietart et al. (2001) defined the process of collecting secondary data, which are made up of gathering internal secondary data and external secondary data. In this thesis, primary internal secondary data are collected from IKEA China, like annual reports, company website and other internal documents, especially from the department of Transportation Department. On the other hand, external secondary data have been collected by reading related articles and textbooks as well as Internet website. And the reference of frame is build up in the end of the thesis by the authors based on the resources of external secondary data.

Additionally, the method of literature review has been carried out by the authors on the basis of articles, textbooks and other scientific reports. The literature review can provide insights into this study through studying existing work in related field. Here, it can enable the authors to better understand and gain knowledge about road transport costs in logistics operations and to describe the purpose of the thesis as well as its delimitations. However, considering the objectivity and validity of this thesis, the authors have used the accepted and scientific databases e.g. ABI/Inform, Emerald, Ebsco Science Direct, Google Scholar and Jönköping University Library database etc. To find available information in a both time and cost saving way, the authors used key words to search information in these scientific research databases as well as Internet website, which were road transport costs, transportation and supply chains, outsourcing and insourcing, merge-in-transit, consolidation point, economics scale and trucking cost, packaging and combination of them. Except searching useful articles from these free electrical scientific databases, textbooks and other paper materials related to the topic of this thesis have been studied by the authors.

Summarily, there are two main objectives can be resulted from literature review, helping the authors to understand the current theoretical framework in the fields of interest much better and providing more insights for the further studies. Furthermore, the research questions can be defined rightly and the foundation of the primary data collection can be built up because of this function.

### 3.5 Interview Guide

The importance of an interview guide is to ensure a successful interview. Unstructured interviewing often employs the brief list of prompts of all topics to be covered as an interview guide. A more structured list of questions to be asked is employed in semi-structured interviewing (Bryman and Bell, 2007).
This interview guide is designed to enable the authors collect the primary data. After analyzing these empirical findings, combine with the secondary data and based on the studying of theoretical framework on logistics operations affected efficient road transport, then the possibilities of the road transport costs reduction will be external discussed.

Moreover, it is used to interview the manager or the supervisor of the company’s related department and which covers: the brief information of IKEA China, IKEA China land transport strategy, transportation network development and others related to efficient road transport by optimized logistics operations. This therefore means the interview guide designed purely for academic purpose, the data is only used in this thesis.

**Interview design in this thesis**

According to previous discussion, making decisions about whether to interview individuals or groups, and face to face (e.g. in person) or by telephone are affected on factors like cost, time, re-search skill and distances to respondents and the willingness of their companies to collaborate as well as the predetermined questions (Hannabuss, 1996).

The authors made four interviews with four different departments. These interviewees are Daniel Lu, transport manager for IKEA Asia-Pacific. He is top level person who take responsibility for transport strategy in IKEA Asia-pacific area. Daisy Li is the Business Development manager for IKEA China. She is key person for land transport service purchasing in China including trucking, barge and railway in domestic of China. Jason Jiang, who is the transport operation coordinator of IKEA CP in China, is responsible for operation management for total 7 CPs. Allen Shen is the business development manager for IKEA Trading China. He is the key person for IKEA home furnishing purchasing and the expertise for packaging issues. All the four persons are located in Shanghai office, IKEA China.

Because one of the authors was the previous employee in IKEA China, he found Daisy Li, who was his previous colleague, for help to contact the key persons in IKEA internally. With the help of Daisy Li, the authors had successfully contacted with Daniel Lu, Jason Jiang and Allen Shen.

All interviews were conducted at a quiet and private space and followed the processes and guide-lines. Thus, writing and calling a prime contact was the first step. A letter that outlines what the research is about, what it is for, why they have been selected for interview, what are the benefits for them, how the interview is conducted, when of the interview and what specific resources required was sent to the key ‘informant’ in advance. The interview guide was sent to all the respondents ahead of schedule. Therefore, they could be well informed and prepared. Moreover, the risk of respondents’ withdrawal was lower. In order to correct the natural limitations of the authors’ memories and the intuitive glosses and take a thorough examination of what people have said, all interviews were tap-recorded and then transcribed.

### 3.6 Data Analysis

The differences between qualitative and quantitative data has already been described in the former sections, which are useful for the research understanding what is necessary in order
to be able to analyse meaningfully. Considering the nature of this thesis is qualitative, so the authors will focus on explaining the concepts of analysing qualitative data.

Mark et al. (2009) thought qualitative analysis generally involved one or more of: summarising data, categorising data and structuring data using narrative to recognise relationships, develop and test propositions and produce well-grounded conclusions, meanwhile, he thought the processes of data analysis and data collection were necessarily interactive. Also Nick and Ian (2008) said, as qualitative data for most intents and purposes is that which was or could be transformed into words, the qualitative analysis process was generally that of reducing the vast amount of data to themes, ideas and concepts. Moreover, he emphasized that most qualitative analysts should not ignore considerations of reliability and validity, although there are a number of different perspectives on these ideas. These two elements will be discussed in the next section.

Here, after presenting the collected empirical data from IKEA China in Chapter 4, the following chapter (Chapter 5) will carry out a case analysis on the basis of Chapter 4 combines with theoretical framework (Chapter 2). And the conclusion based on the answers of research questions will be come out after that, finally, the further studies in related field will be proposed in the last chapter.

### 3.7 Trustworthiness

As a rule, if the credibility of data and methods being used cannot be guaranteed, then the research conclusion which is drawn from data collection and research methods will be useless. Thereby, the authors were always trying to find out these certain rules and follow them during the entire process of this research.

As soon as we talk about qualitative research methodology, reliability and validity always come out in our mind. Simple speaking, trustworthiness, rigor and quality can be resulted from achieving these two necessary factors. On the other side, the truthfulness of describing research question(s) and objectives can be increased without bias.

Therefore, in relation to the use of semi-structured and in-depth interviews from a perspective of qualitative research methodology, reliability and validity are necessary and important to be relevant research concepts. As the authors mentioned, this thesis is built upon qualitative research with semi-structured interviews. In the following parts, these two important concepts will be defined and explained for reflecting the multiple ways of establishing truth.

#### 3.7.1 Reliability

Reliability refers to the extent to which your data collection techniques or analysis procedures will yield consistent findings (Mark et al., 2007). As Marshall and Rossman (1999) said, one response to the issue of reliability is that the findings derived from using non-standardised research methods are not necessary intended to be repeatable since they reflect reality at the time they were collected, in a situation which may be subject to change.

Like all research methods, the key to a successful interview is careful preparation, Mark et al. (2009) suggested the five Ps as a useful mantra, they were prior planning prevents poor performance when using non-structured interviews. Virtually, the reliability of a measure is
an indication of the stability and consistency with which the instrument measures the concept and helps to assess the “goodness” of a measure.

To provide a high reliability of this thesis, the semi-structured interview is adopted by the authors, in a manner the authors will direct the interview and the interviewee responds to the questions of the research. Moreover, the authors will prepared interview questions in advance. Consequently, the reliability of this thesis can be improved because of using prepared questions during the interview.

3.7.2 Validity

Validity is concerned with whether the findings are really about what they appear to be about (Mark et al., 2007). Also in conformity to Babbie (1990), validity refers to the extent to which an empirical measure adequately reflects real meaning of the concept under consideration. For guaranteeing the validity of this study, all the concepts and theories which are used here are referred to relative literatures and certain authoritative documents in this correlative area.

Since both of the authors have been studying in the field of international logistics and supply chain management for one more years, so they have enough related education background. And before conducting this thesis, one of the authors has already worked in the transportation department of IKEA China for some times. He was a participant in FCA SUP project, so the validity of collected data has been guaranteed. And he is still working in there but in a new position - Transport Business Developer. Therefore, the authors are very familiar with the topic of this thesis. The data, collected by the authors, are empirical and applied because of being deep understanding on the relative concepts and abundant working experience.

Additionally, the research objective was already decided and investigated in some broad ways during experience before seeking for more methods to support and applying further investigation.

In this way, the authors keep this study always on the right track towards the termini. Furthermore, since this study belongs to causal study, the validity can also be come true through testing the results of analyzing case study findings.

3.8 Summary

Overall speaking, this thesis is conducted on the basis of inductive approach combine with qualitative research. The data which concern of theoretical framework are collected from literature review, case study and interview. Talking about literature review, a lot of previous scientific articles have been studied during the entire thesis’s process, and these related knowledge have been in-depth described and explained around the thesis’s topic. To develop this thesis much better, the authors used a case study as research strategy which involves an empirical investigation, and the method of interview has been adopted for collecting primary data not just secondary data.

There is one thing has to be mentioned is that one of the authors is an employee of IKEA China, who is working in the transportation department as a business developer. So to say, the authors can free access the data source of IKEA China, they are completely willing to share their data with them. Since one of them is working in the company, so the authors
know exactly where and which data they can collect from the company as soon as the topic has been decided. Considering the interview, the questions listed on the interview guide have been prepared very well, which refers to the brief information of IKEA China, land strategy, sourcing strategy, CP, merge-in-transit, packaging and related to efficient road transport. As mentioned, the valuable data have been timely collected by the authors based upon the authors’ abundant background of academic knowledge and working experience. Furthermore, the reliability and validity can be ensured because of an action research approach has been used in the case study. In other words, one of the authors actually acts in the company as an employee.

In the following chapter, the data collected from IKEA China will be presented on the foundation of theoretical framework.
4 Case Study Findings

In this chapter, the authors will describe their empirical findings of efficient road transport in investigation with detail, including the presentation of the company and data collected from the company.

4.1 General information of IKEA China

4.1.1 Facts in China

Land area of China covers 9.6 Million square km, which is the 3rd largest country in the world next to Russia and Canada (U.S. 9.1 Million square km). The land boundary reaches 22,800 km and mainland coastline is 18,000. The distance from north to south is 5,500 km and from east to west is 5,200 km. The population is 1.3 Billion (end to 2009), which shares the one-fifth of the world total population. The density of population is 135 people / sq km or 4 times greater than that of the U.S. Some important data of highway, railway and ports, which is related to logistics industry, is shown following (IKEA Website, 2010):

Highways:
- 1.9 Mil. km (end 2004) including 34,300 km of Expressways, ranking 2nd of the world
- Density is at 19.5 km/100 sq km

Railways:
- 74,200 km (end 2004) including 24,100 km of multiple track and 18,900 km of Electrified railways.
- One of world largest by volume, having 6% of the world’s operating railways, and carrying 25% of the world’s total railway workload

Ports:
- At the end of 2004, China’s coastal ports had over 2,500 berths of medium size or above, of which 650 were 10,000-ton-class berths; their handling capacity was 61.5 million standard containers for the year, ranking first in the world
- Freight volumes handled by some large ports exceed 100 million tons a year; and the Shanghai, Shenzhen, Qingdao, Tianjin, Guangzhou, Xiamen, Ningbo and Dalian have been listed among the world’s top 50 container ports

4.1.2 IKEA in China

IKEA entered China in 1998 when it opened its first store which is operated as joint venture in Shanghai and expanded gradually. At present there are 7 stores (STO), which are located in Beijing, Shanghai, Guangzhou, Shenzhen, Chengdu, Nanjing and Wuhan respectively. And the sales in China rises around 40% every year. On the other hand, China has become the most important country for IKEA in terms of purchasing. The Chinese suppliers rank No.1 with over 20% purchase volume. There are three trading service office in China---Qingdao office for north China, Shanghai office for central China and Shekou office for south China. Except that, there are two large distribution center (DC) in Shanghai and 7 consolidation points (CP) in different cities. As for two DCs, one is located in Songjiang district, and another is in Fengxian district. The totally building area reaches about 350,000 square. Then Shanghai will become IKEA’s largest distribution center in
Asia Pacific Region and have the largest foreign-funded warehouse in Mainland China. The two DCs support both inbound and outbound logistics of IKEA commodities. 7 CPs are located in Harbin, Dalian, Tianjin, Qingdao, Shanghai, Xiamen and Shekou. Please see Figure 4-1.

4.1.3 IKEA logistics development in China

The whole picture of annuals of IKEA logistics development in China is shown in Chart 4-1:

<table>
<thead>
<tr>
<th>Phase</th>
<th>Volume</th>
<th>Store</th>
<th>Logistics operation</th>
<th>Outsource /in-source</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration Phase</td>
<td>Low</td>
<td>N/A</td>
<td>Simple</td>
<td>Out-source totally</td>
<td></td>
</tr>
<tr>
<td>Expanding Phase</td>
<td>10%</td>
<td>2</td>
<td>Complex &amp; Overall</td>
<td>Partially</td>
<td>1998/Shanghai</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1999/Beijing</td>
</tr>
<tr>
<td>Consolidation Phase</td>
<td>&gt;20%</td>
<td>7</td>
<td>Consolidated &amp; Improved</td>
<td>In-source smart</td>
<td>2 DCs in Shanghai</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7 CPs in China</td>
</tr>
</tbody>
</table>

Table 4-1 IKEA Logistics Development in China

In 1995, it could be said as the exploration phase that IKEA sited first trading office in
China to purchasing some raw materials and limited ranged of articles but there were not any stores in mainland and no any sales to local customers. Although the logistics part of IKEA in China was quite simple, it was still confronted with big challenges not only by IKEA’s requirement for logistics quality in many respects like transparency, cost, flexibility, competency, quality-control etc, but also Chinese policy and regulation on foreign investment business before entering into WTO. So IKEA outsourced its whole logistics operation to its old partner-Maersk logistics.

Later on, with its first store opened in Shanghai in 1998 and second in Beijing in 1999, IKEA accelerated expansion in mainland China and its strategic center of gravity in Asia-Pacific began to shift to China. In following years, sales in China rose around 40% per year continuously and 10% of global purchasing was from China. With the increasing of suppliers and expanding of sales territory, IKEA required high quality logistics support for its growing purchasing and services networks from all aspects like inbound and outbound of materials, products, inland transport, storage, warehousing, and distribution and so on. Apparently, it required the service providers to offer an integrated planning for the whole supply chain and it’s hard for just one Logistics Company to handle everything. Then more service providers were involved into IKEA logistics operation.

From 2005, IKEA entered into its consolidation phase. With IKEA’s DSAP (distribution service Asia-Pacific) moved from Singapore to Shanghai, IKEA began to take back major function of supply chain management from its service providers gradually and switched from outsource to insource. And meanwhile the share of IKEA global purchasing in China grew to over 20%. With the head quarter of DSAP moved to Shanghai, the logistics function in mainland China became more comprehensive. In DSAP, there are four departments named Supply Chain, Transport, DC, and Custom. Supply Chain department takes responsible for supply chain management and designs and provides the solution for logistics connection between stores, DCs and suppliers in Asia-Pacific area. Transport department provides transport solution including shipping, trucking, barging, even air, signs contracts with carriers directly and CPs management. DC department manages the two large distribution centers in Shanghai and takes care about the warehousing, stock control and distribution. Custom department solves the custom issues about the outbound shipments exported from mainland China (IKEA Internal Document, 2010).

Talking about land transport strategy in IKEA China, the authors have been told that for now there are totally three different land transportation modes, including truck, barge and railway with their respective percentages are 86%, 13% and 1%.

4.1.4 IKEA Transport Department

IKEA Transport Department is to plan, purchase, operate and control transport globally in order to fulfill the service level demands. Transport task is to deliver IKEA product under good conditions with high and reliable delivery performance at the lowest total supply cost at point of sales or to customers’ homes.

In whole IKEA core processes, in order to fulfill customer need and achieve customer success, IKEA Trading will create the home furnishing offer and purchasing the products from suppliers; IKEA Retail will communicate with customers and sell the products finally; IKEA Transport will be a connection and deliver goods between different functions. Please see figure 4-2.
When being asked what the strategy of IKEA Transport China is, Daniel Lu, transport manager for IKEA Asia-Pacific said the main direction of IKEA Transport China is to generate a professional, motivated and sustainable organization and well balance between the possible lowest cost and the best service (Daniel Lu, personal communication, 2010-03-18). In order to achieve these, they would organize themselves in the below 5 priorities (IKEA Internal Document, 2010):

- Reach the lowest possible cost and the best service through Purchasing Development Process
- Secure a strong carrier pool and operational performance through Carrier Management
- Aim to long term and total supply chain efficiency through Network Development
- Develop CPs and CP ESPs (External Service Providers) with needed functionalities and capability
- Organize for Excellence in Operations

**Purchasing Development Process** – outsource the land transport to external service providers (ESPs) but control and manage the performance internally.

**Carrier Management** – manage carrier and divide them into different classification as Prioritised, Potential Prioritised, Basic and Critical for instance. Take different strategy for different carrier that grow together with Prioritised and Potential Prioritised carriers, develop basic to Prioritised and Potential Prioritised carriers and reduce critical ones.

**Network Development** – cluster suppliers in relative small area and do merge-in-transit or co-loading.

**CPs Development** – relocates CPs and adjusts the number of CPs, even CP service providers and meanwhile increases IKEA CP competence.

**Excellence in Operations** – one of these is how to improve the operations by optimize
packaging including increasing filling rate.

In order to achieve the 5 priorities, IKEA China carried out several projects and IKEA FCA SUP was the typical one with purpose to overall achieve transport strategy.

4.2 Case study about IKEA FCA SUP Project

From 2005, with the labor cost increasing in China and material cost increasing in global area, IKEA trading finds it’s more and more difficult to achieve its cost-orientation strategy to keep purchasing price decrease continuously among Chinese suppliers. So IKEA try to change its trade term from FCA Port to FCA SUP. Original IKEA signs sales contract with Chinese suppliers by FCA Port. According to the INCOTERMS-FCA—Free Carrier (named place):

The seller hands over the goods, cleared for export, into the custody of the first carrier (named by the buyer) at the named place. This term is suitable for all modes of transport, including carriage by air, rail, road, and containerized / multi-modal transport.

Suppliers hand over the goods at port or a consolidation point to IKEA, at that moment, supplier finishes the delivery and right of the goods is switched to IKEA, finally IKEA take the delivery to destination. In transport cost perspective, suppliers take the land-carriage from factory to port, pay for the transport cost and finally this part of cost is charged to IKEA in purchasing price. But now IKEA begins to sign the sales contract by FCA SUP which means IKEA will take over the land-carriage from suppliers. See Figure 4-3:
So, under FCA SUP, supplier hands the right of goods over to IKEA at the gate of factory. And then, IKEA takes responsibility of land-carriage from factory to port or consolidation point.

In transport perspective, the major routines handed by IKEA are between DC to STO, CP to STO and some long distance transport about Shaoxing SUP to Beijing and Guangzhou STO. And the major modes of transport are truck and barge (just one routine by rail & barge). But after FCA SUP, the routine become more complex, because IKEA have to hand the all routines between suppliers and DC, CP, STO, Port respectively. How to manage the new huge network of transport, control the cost and efficiency is a big challenge for IKEA.

FCA Sup to FCA Port is just a word changed but makes big sense. Because, under FCA SUP, IKEA trading could peel off the land transport cost from factory to port or CP from purchasing price. The purpose is to decrease the purchasing price and collect the land transport volume from every different supplier. The benefits from this change are shown following (IKEA Internal Document, 2010):

- Saving on inland transportation by consolidating all IKEA volume (reduction of logistic cost)
- Reduce the PUA price and increase competitiveness by converting transport savings into purchase price
- To reduce the impact on environment by better control of inland transportation
- To reduce/eliminate the consolidation cost by creating the possibility of co-load arrangements
- To have better transportation network before IKEA set up a formal transport organization in Greater China region
- Enable to compare production cost and lead time

4.2.1 **Outsource road transport to external service provider under FCA SUP**

IKEA outsources its road transport to external service provider (Trucking Company). Now IKEA have 35 external trucking companies separated around China from North to South. IKEA Purchase Process today is mainly Tender activities. Doing tenders where, based on market knowledge and seeing a potential for price development or operational improvement. The process is mainly driven by locally initiated tenders. The steps for the tenders are (IKEA Internal Document, 2010):

- Decide where there is a potential
- Gather relevant information such as volumes, routes, existing price levels, existing carrier base, which carrier to invite etc
- What are our goals with the tender? Cost development, number of carriers etc
- Invite for quotation
- Evaluate the offers
- Re-negotiate for lower prices, better service or more capacities
- Agree and sign
Up to now, IKEA mainly have considered and invited local carriers. No carriers with more coverage in their networks than for the requested area. This has led to several contracts with same carriers instead of one covering Asia Pacific (AP) or China area. Mainly for the AP business is offered a 12 month contract or UFN Agreement (Until Further Notice Agreement). These have been the preferred agreement terms from Transport Global since some years. In AP IKEA do have some exceptions to these 2 agreement terms and that is connect with significant investments for the carriers to set up IKEA wished transport network. Examples are short sea solution in Japan with OOCL and Long haul transports in Australia with MKD. IKEA are offering the IKEA standard Agreement Package when it comes to General Conditions, SOP, Transport Requirement and minimum demands. Additional to tender activities IKEA are also using directed price negotiations with an offer to extend existing business where it is beneficial for IKEA. Transport Global is at all times involved in our tenders in such way that they are Tender Event Managers and are in all cases, e.g. fuel, tolls, salary, in a transport is to be included in our “all-in-rates” and are regulated in our General Conditions if any need for re-negotiations. IKEA are using a +/-5% clause for a possible re-negotiation for either part.

Originally under FCA Port, suppliers took land-carriage from supplier to port by themselves and they had to negotiate with land carriers by their limited volume of CBM (cubic meter). And as for the low volume of every single supplier, it was really hard for them to have the initiative in negotiation for a good price and services and they also had no choice to find high-quality carriers which meet the IKEA standard. Now under FCA Sup, IKEA collects the whole volume of land carriage from each supplier, which achieves economies of scale, so IKEA could negotiate with high-quality carrier like OOCL Logistics with good price and services. So far, IKEA reduces the total transport cost and final reduces the PUA price (land price) to achieve the strategy of cost-saving.

So what’s the challenge of outsource or purchasing? Daisy Li, the Business Development manager for IKEA China, said as following (Daisy Li, personal communication, 2010-03-23):

- Transport China has not been fully been able to identify new potential carriers that can cover a larger geographical scope.
- From a carrier management point of view it is desirable to reduce the carrier base, however there a limited options to work with national carriers.
- Carriers covering China nationally exist; however for various reasons do not always have natural fit with IKEA business objectives.
- We have not been able to integrate carrier development and purchase development.
- We have not actively created pre-conditions for existing carrier base to extend its network with IKEA.
- Not been able to fully grasp to what degree our contract terms prevent (duration) carriers to invest for IKEA business.
- IKEA lacks economy of scale advantages in most areas. Opposite to ocean business, IKEA China land is considered a small party.
- Fuel strategy.

So what’s the strategy IKEA Transport will take to meet the challenge? Daisy Li answered that (Daisy Li, personal communication, 2010-03-23):
- Pro-actively link purchasing needs to the carrier development / feedback-input loops.
- In order to reduce carrier base IKEA TP needs to identify and develop.
- 2-3 carriers with national coverage
- focus on growing a limited number of regional carriers business with IKEA
- merge small/specific/specialized routes under the umbrella of existing bigger carriers in the carrier base (even though a small premium needs to be paid)
- Focus on China supplier base (not linked to other Asian markets due to little overlap/economies of scale w/other markets)
- Secure longer term contracts (2-3 yrs) on key routes allowing investments, time for optimization within carriers etc.
- Fuel strategy: fix a price in a period from xxxx to yyyy.
- Leverage our strength in tendering while seek for long term business partnership according to market situation.

4.2.2 Merge-in-transit (Co-load) under FCA SUP
IKEA calls Merge-in-transit as Co-load internally. Under FCA SUP, IKEA could divide the whole supplier pool to several clusters. In each cluster, suppliers are relative close to each other so that IKEA could do co-load in relative short distance to control the transport cost.

4.2.2.1 Co-load plan
Generally, maximum of 3 pick-up addresses should be involved in each co-load. If any Exception, IKEA will handle. And the supplier should be in same area.

The Supplier sends the CP cargo report with goods volume(less than one full truck), weight and planned delivery date to IKEA Transport Planner (TP) 10 days before planned dispatch date. IKEA TP will inform suppliers about the co-loading plan and loading instruction within 2 working days. Co-loading plan mentions which suppliers’ cargos will be co-loaded together with picking up sequence. Loading instruction tells supplier where the cargos should be loaded in the containers. If suppliers disagrees on Loading Instruction, they can discuss with IKEA and decide on a new one agreed by both parties.

Supplier should confirm loading date and time to IKEA transport planner within 24 hours after receiving the co-loading pan and loading instruction. If there is any special requirement from the Supplier (easy broken articles or special size of palletized cargo) to trucking company when they arrange pick up route, it should be commented in the booking sheet.

IKEA TP may ask the supplier to increase or decrease the goods quantity or change the delivery time for better filling rate with copy to Service Planner (SP).

The final co-loading plan includes confirmed loading date/time, volume from each supplier, loading sequence and cargo flow: Co-load from suppliers to CY or Co-load from suppliers to CP.

Based on the final plan, Suppliers will send the booking via ECIS or a manual booking for non-ECIS to IKEA TP 5 working days prior to dispatch date. IKEA transport planner will send book to the trucking company and ocean carrier.
In case the suppliers want to change IKEA proposed date or time for pickup, they must contact IKEA TP. IKEA TP will update the pickup date/time in CNS for this shipment based on the confirmation between supplier and TP.

Meantime, IKEA will send co-loading plan and Loading Instruction to land carrier who will bring these two documents to the suppliers when collecting cargoes from suppliers (IKEA Internal Document, 2010).

4.2.2.2 Cargo Collection Procedure

The ground rules of Cargo Collection Procedure is when creating the co-load plan and actual cargoes loading the following should be considered to avoid possible damages and empty space during the loading (IKEA Internal Document, 2010):

- Heavy articles to be stored in the first layer in the truck/container
- Fragile articles to be stored in the second layer or possibly be used as fillers in the truck/container
- The type of material used in the products should be considered when creating the co-load plan.
- Only weight under 40KGs (one carton) can be used as fillers in the truck/container.
- For special cargo, such as heavy and fragile cargo, IKEA will handle specially.

Trucking company undertakes to arrive on time at the loading place. Trucking company has to inform the supplier as soon as a delay is foreseeable by the driver. Suppliers shall also start loading at the confirmed pickup time. The waiting time for both suppliers and truck shall not be exceeding 1 hour after confirmed pick-up time. Suppliers shall load cargoes into the container within the maximum loading time allowed which is set based on cargo volume (m³) as follows (Chart 4-2):

<table>
<thead>
<tr>
<th>Cargo Volume</th>
<th>Maximum Loading Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤10 cbm</td>
<td>1 hour</td>
</tr>
<tr>
<td>11-20 cbm</td>
<td>1.5 hours</td>
</tr>
<tr>
<td>21-30 cbm</td>
<td>2 hours</td>
</tr>
<tr>
<td>31-40 cbm</td>
<td>2.5 hours</td>
</tr>
<tr>
<td>≥41 cbm</td>
<td>3 hours</td>
</tr>
</tbody>
</table>

Table 4-2 Volume and Time

Regarding Co-loading to CY shipment, trucking company need to notify every involved supplier the seal number of ocean container when the truck arrives at supplier to load cargoes. It’s also important the load is done evenly to avoid pallets or cartons falling down during the transportation. (Both height and width)
4.2.2.3 Cargo Collection Procedure

One day before cargo collection, trucking company will call each supplier for re-confirmation of the collection arrangement.

The suppliers must ensure that the cargo is ready 1 day prior to dispatch date. All cargo must be in good packaging condition at the time of loading. No loading should take place if the packaging or quality is not good. This will only cause additional costs and further damages.

In any case if the truck can’t arrive on time at one supplier, trucking company must inform the next suppliers in advance for the delay so that the suppliers can make arrangement accordingly.

Trucking company drivers will bring Co-loading Plan, Loading & Unloading Advice and Loading Instruction when collecting cargos. Suppliers shall load according to IKEA loading instructions in order to meet the filling rate and cargo securing requirement by IKEA.

Any damage during loading or failure of a co-loading shipment or failure to meet the filling rate due to supplier not following IKEA loading instruction will be on the responsible supplier’s account.

In principle, during the loading, the Supplier should not move cargos which already have been loaded by the previous Suppliers to avoid damages & liability issues. However for the purpose of increasing the filling rate or even the weight, the supplier shall help to move the cargo under trucking company driver’s supervision according to Loading Instruction.

The suppliers must leave enough space to the cargo from the next co-load supplier. If the next co-load supplier cannot load their confirmed cargo due to the bad loading of the first supplier, IKEA suggests the second supplier helps to remove the cargo to make the co-load more efficient. The next supplier takes photos and issues a letter to the first supplier to confirm.

In order to divide duty and control risk, net and seal play important roles in co-loading.

Net:
After finishing loading by each supplier, the supplier shall also put up net provided by the trucker in the container whenever practical to secure the cargoes from falling down during transportation. There are hooks positioning inside the container at the point of 1.96M, 1.4M, 1.12M, 1.84M for 40 feet & 45 feet container from the bottom that can be used to put up net. The last supplier for CY containers should seal the seal from the ocean carrier and give the net to the truck driver if the container goes to port. Suppliers shall also take digital photos for reference before closing the container door. The nets shall be provided by IKEA.

The supplier should take photos of cargo situations in container or trucks when they finish loading.

Seal:
Each supplier shall seal the container or ton truck after he or she finishes loading his or her cargoes and write down the seal number on the Loading and Unloading advice and double
check / sign by driver. Before opening the container or ton truck door, the next supplier shall check if the seal is intact and record the seal number on the Loading and Unloading advice. Pictures shall also be taken when the 2nd or 3rd supplier just opens the container door before loading his cargoes into it. If the 2nd or 3rd Supplier discovers damages of the 1st Supplier consignment, digital photo images should be taken and sent to the first Supplier, with copy to IKEA immediately for necessary actions.

For co-load shipment, the seal should be used at each stop. Firstly, when the truck arrives each stop, the supplier shall check the seal number locked by the former supplier together with the driver. After the driver and the supplier sign together for the confirmation of the good seal, they can cut the seal and continue to on-load (discharge). Supplier shall seal the container. The loss of the goods shall be responsible by trucking company.

After the last load has been finalized, the load needs to be secured. The cargo at door end must be palletized without any top fillings. The net should be moved by the last loading supplier if container is delivered to CY.

4.2.3 IKEA CP under FCA SUP

CP is the consolidation point whose purpose is to group LCL (Less Container Load) volume into FCL (Full Container Load). The benefits achieved by CP are transport cost saving, less CO2 mission, repair and modification, value-added service and etc. In the perspective of CP operation function, it is the combination of warehouse, transport, custom declaration and documentation handling. Usually, a qualified CP operator is necessary with right license and good customer service mindset.

IKEA CP development always follows the IKEA purchasing and retail development. There are some important data about CPs shown as following:

8 CPs in China
There are 72 IKEA CPs globally and 8 in China. 8 CPs are located in Harbin, Dalian, Tianjin, Qingdao, Shanghai, Xiamen, Yantian and Taipei respectively. Different CP is located in different trading area. Usually CP is set for those relative small suppliers with LTL volume. Actually, the smaller IKEA suppliers are gather in north China mostly, so there are 4 CPs located in north China (Harbin, Dalian, Tianjin and Qingdao).

21.8% CP share
CP share means the percentage of CP volume under total IKEA volume of goods flow in China. Following Figure 4-4 shows the whole picture of IKEA goods flow.
There is only one line of CP inbound just from suppliers (Line No.3) and 2 lines of outbound to Distribution Center (Line No.8) and Port (Line No.5).

The total volume operated by CPs in China is 1502366 CBM in FY09 (from Aug, 2008 to Sep, 2009), which shares 21.8% of total volume of IKEA goods flow in China. And IKEA spends 6195324 Euro on CPs in FY09. The total shipments operated by CPs reach 24871.

**Filling rate: 78.5% (Gross) and 70.7 % (Net)**
The filling rate is an important KPI, which means the percentage of cargo volume under total water volume of 40’ dry vendor. Gross filling rate is calculated include package but net filling rate is not. Because IKEA always pays for the whole container delivery, an economical and healthy filling rate is quite important for IKEA to control the transport cost. And always higher filling rate means lower transport cost.

**Lead-time: 5.6 days in China**
Lead-time is another KPI that measure the efficiency of CP operation. CP lean time means the time to consolidate LTL volume into FCL in CPs. This lead time is calculated from LTL shipments reach the CP till FCL shipments leave. The shorter lead time means the more efficient CP operation.

As for CP operation, IKEA usually outsource this section to qualified CP service providers. In China, there are 4 CP service providers to handle IKEA CP in different points. MCS handles 4 CPs located in Shanghai, Dalian, Qingdao and Tianjin respectively. Damco handles 2 located Xiamen and Harbin. OOCL.L handles one in Taipei and V-grow handles Yantian CP. The whole Figure 4-5 is shown as following.
Different CP is operated by different service provider in same way. Here Shanghai CP is cited following as an example. IKEA CP in Shanghai is operated by MCS. MCS-MOL consolidation is an affiliate company invested by MOL head quarter in Tokyo MOL Group is the largest transportation related company in Japan, with annual turnover exceeding USD 13 billion. MOL consolidation provides end to end logistics solution mainly handle, export consolidation to European countries as well as North America. The network covers more than 30 countries in Asia/Mid-East/Africa and China as the largest origin had contributed to the major cargo share of the whole system. MOL consolidation set up operation in China since 2003, and now it had been expanded to 7 covering all major sea ports.

The square of warehouse of Shanghai CP is 1,100 square meter with 24 docks and 5 electrical forklifts. It's the biggest IKEA CP in China. The total volume operated by Shanghai CP in FY09 reached 426,773 CBM (export 343,675 CBM) and IKEA spent 1,759,889 euro on it, which occupied 28% in total CP volume. Chart 4-1 shows here.
Now Shanghai CP serves 87 suppliers in China and 54 receivers around the world. MCS outsource the CP operation to its subcontractor—Nice Talent (NT). The CP service time is 7 days/week, 24 hours/day. There are 36 Nice Talent employees working on Shanghai CP.

The working scope of Shanghai CP is shown as Chart 4-2:

![Chart 4-2 the Working Scope of Shanghai CP](source: IKEA (2010))

IKEA transport department manages CP performance and support MCS to achieve its KPI. MCS manages CP operation including inbound unloading, outbound loading, consolidation, shipping booking, customs declaration, claim follow-up and relative documentation issues and NT does the warehouse operation.

Now under FCA SUP, CP becomes another option for IKEA LTL cargo from suppliers’ side except for merge-in-transit. CP could help collect the LTL cargo which is not covered in cluster; consolidate it and then delivery to DC or STO, even export.

The current challenge for CP told by Jason Jiang, who is the transport operation coordinator of IKEA CP in China, that (Jason Jiang, personal communication, 2010-03-30):

- Internal CP professional competence.
- IKEA CP service needs will change in years ahead. More advanced services are required:
  - Pull goods into CP (instead of supplier push) enabling cross dock.
  - Increase number of receivers due to combined supply or direct delivery (DD) implementation.
  - Revised / increased demands in customs process due to combined supply/DD implementation.
  - Potential extended role for CP in Retail China domestic service needs.
- Further, it is expected that CP volumes in China will double / triple over the reference period
- When there are potentially more CP’s in China, we have to focus our resources on common KPI and working method, while current setup can be potential barrier.
- Further cost development pressure demands more synergy from economy sourcing, but current structure cannot well support this purpose.

So what’s the strategy will be taken for these challenges, Jason Jiang also shared with us that (Jason Jiang, personal communication, 2010-03-30):

- Move from a non coordinated CP tender process in Asia to a coordinated approach.
- As the business context of CP operator will be more complex in future, need to
move and more towards price / service development through the carrier development process than through tender process.

- Coordinated CP sourcing process in Asia to a coordinated approach:
  - Limit the CP ESP base in Asia to 4 core players and 1-2 contenders. Through coordinated tenders shift the business among core players and once in a while a contender.
  - (Re) Tender 1/3 of the CP points per year spread over the various countries at one time per year
  - Shift operations between I-way approved carriers (as much as possible)
- Emphasize on strengthening CP carrier development process through standardized KPI's, operations development (pull vs. push, cross dock, increased receivers, filling rate, 3rd layer logic and packaging specifications). The IKEA CP representative will follow-up all CP's up on monthly basis and be physical present in each CP min. 3 times per year.
- Secure dedicated CP expertise to do follow-up. The CP competence needs to be distributed within the organization.
- Implement pre-conditions for combined supply / DD growth from China sender
- Achieve the lowest CP rate by leveraging the economic scale in country and/or region level;
- Proactively understand business needs and trends of Trading in order to provide creative and suitable CP solutions

4.2.4 Packaging under FCA SUP

Packaging is quite important in transportation. For IKEA, the general roles of packaging are shown in following aspects (Allen Shen, personal communication, 2010-04-05).

Product protection

Protective properties of packaging
The ability of the packaging is to protect the product in different environments from mechanical, climate-related, chemical and electro technical stresses. Mechanical stresses are for example large during handling and when storing.

No overhang
Within the outer boundaries of the pallet or load carrier, the products are quite safe, but if there is overhang in any direction the products are exposed to a greater risk of damages occurring.

Minimize empty space in packaging / Fixation of product within packaging
Empty space within the packaging gives the product room to move around, whereby the risk of product and packaging damages increases. If the centre of gravity shifts, the packaging is subjected to increased stresses that the packaging may not withstand.

Minimize empty space in means of transportation
When there is empty space between the goods in a transportation vehicle, e.g. when underhang exists, the goods are not supported by other goods. This makes it possible for the goods to shift during transportation, which in turn may have the effect that packaging brakes and the entire pallet, or stack of pallets, collapses.

Packaging stability
A stable packaging system could minimize the risk of damage occurring during transportation. Packaging stability influences stackability and increases the ability of the packaging to withstand the strains put on it during transportation.
Volume efficiency

Minimize empty space in means of transportation
To achieve the best possible cube utilization, and thereby lower transportation costs, it is important to minimize empty space during transportation.

Minimize empty space in packaging
The less empty space transported in packaging, the more products there are room for in total during transport. Thus, minimizing empty space in packaging can enable more products to be transported.

Stackability
In order to achieve good cube utilization during transportation, it is beneficial to be able to stack unit loads on top of each other. If pallets cannot be stacked, it would be possible to transport only one layer of pallets.

Right amount and size

Packaging adapted to means of transport
The packaging system is to be adapted to meet the quantity demands throughout the supply chain. For example, the size and quantity of the packaging system should ease and make handling and distribution efficient by e.g. being unitized and by enabling a high coefficient of fullness in the means of transport.

Handleability

Stackability
In order for loading to be efficient, stackability can be beneficial from a handleability perspective. For example, two pallets can be handled at once if they are stackable.

Packaging stability
A stable packaging system requires less effort to be handled in a safe manner and stability also minimizes the risk of handling related damages to product and packaging.

Economical demands
Packages that are handled manually should be adapted to economical demands in order to enable good efficiency and at the same time minimize the risk of work related injury. This is important to consider when for example top loading.

Minimize handling
All handling requires resources but adds no value to the customer and should therefore be minimized. Considering transport, this applies mainly during loading.

Under FCA PORT, the right of cargo is transferred at the port of loading to IKEA. So it’s really hard for IKEA to check whether packaging is qualified and reasonable or not in transport process. But under FCA SUP, the right of cargo is transferred at the gate of supplier’s factory, so IKEA’s carrier could check the packaging in advance. For example, a supplier located in Fuzhou area products glass with wooden frame. There are 5 pieces in pallet with size as 2M (L) x0.8M (W) x0.7M (H). But according to the size of 40dv (12Mx2.35Mx2.35M), the pallet is too wide to arrange 3 pallets on a line and the packaging is too weak to pile three layers, so the filling rate of loading is always around 40%, which lead to transport cost increasing. Then after FCA SUP, IKEA Transport realizes this situation and takes action to contact with packaging team for this issue. Finally, the width of pallet is changed from 0.8M to 0.7M (remove on piece of glass) and the packaging is strengthened to afford three new layers. And then the filling rate is increased from 40% to 80% (IKEA Internal Document, 2010).
5 Discussion and Analysis

In this chapter, the authors will analyze the data collected about efficient road transport in logistics operations from IKEA China on the foundation of the knowledge learned from literature review. As a result of the analysis, the author will present suggestions and solutions upon the issues identified.

5.1 Road Transport in Logistics Operations

The motor carrier is very much a part of any firm’s logistics supply chain; almost every logistics operation utilizes the motor truck, from the smallest pickup truck to the largest tractor-semitrailer combination, in some capacity (Coyle et al., 2003). In other words, Road transport always plays an essential role in logistics operations, and especially important for IKEA China, since China has 2nd longest highways of the world. Virtually, in IKEA China, road transport accounts for 86% of the total percentage of land transport currently.

As we already known, IKEA China is rapidly expanding since entering China in 1998. Now IKEA China has not only 7 stores but also two large distribution center and 7 consolidation points in China, and Shanghai will become IKEA’s largest distribution center in Asia Pacific Region. The growth of the volumes during this developing period is so remarkable. Meanwhile, the transportation network is becoming more and more enlarged and complicated. Because of this situation, road transport has been put on a pivotal position.

As one of the core logistics activities in IKEA China, transport helps the company to deliver goods to its customers as well as purchase materials from its suppliers. And among the transport, road transport occupies the dominant position – be a connection and deliver goods between different functions.

As pointed out by David (2005) that in future, the Chinese government expects that movement of freight and passengers increasingly will be by road throughout many parts of the country, due to the greater flexibility and responsiveness of road transport to overall transport needs in a market economy compared with other transport modes. Although it will be the trend for IKEA China paying more attention on road transport, certain challenges cannot be overlooked. Daniel Lu, transport manager for IKEA China raised five priorities of IKEA transportation strategy, and they can be simply summarized as the followings (Daniel Lu, personal communication, 2010-03-18):

- Purchasing development process
- Good carrier management
- Long term and efficient supply chain network
- Better development of CPs and CP ESPs
- Excellent operations

Obviously, all of these five priorities are related to efficient road transport in somehow. In other words, all of them can lead IKEA China to achieve efficient road transport in logistics operations. Anyway, there is no doubt that road transport is very important, and not to mention the benefits can be obtained from efficient road transport.
But things are not always so simple, the geographical dispersion of the general commodity shipping public has increased motor carrier pick-up and delivery costs from both a time and distance standpoint, others like rising labor cost, freight handling and increased wages (Baker, 1968). So it is very vital for a company having good carrier management or not, especially when the company like IKEA China has multi-carriers. IKEA China needs to know how to choose right carrier as well as manage them well.

Moreover, other challenges like how to make right sourcing strategy; how to achieve the functions of merge-in-transit; how to develop CPs; and how to operate efficiently by using optimized packaging will be analyzed in the following sections along with how these various elements lead IKEA China to efficient road transport in logistics operations.

### 5.2 In-sourcing VS Out-sourcing

For supply managers who want to reveal and exploit every competency within the links of the supply chain, they need to make right decision on a frequently asked question – to make or to buy (Laios and Moschuris, 1999). The term outsourcing relates to the delegation of non-core tasks, processes, and resources to external organizations or consultants (Usher, 2004; Walker et al., 2008). European Director of Real Estate and Facilities for the global corporation Honeywell claims that advantages of outsourcing can include, but are not limited, like the reduction in cost, the reduction in complexity, the reduction of the concentration of risk and it gives the buying organization the space to focus on core competencies. But in practice, a company always trades off their strategy between in-sourcing and out-sourcing for tasks and resources.

And insourcing is different to out-sourcing with respect to a number of important features. Encon and Tsang (2004, p.87) state that:

*The traditional approach to staying lean is through out-sourcing, whereby a whole package of support functions is off-loaded to an external service provider. This contrasts with in-sourcing, which is defined as the management process of performing a service by in-house staff.*

With insourcing, firms make the decision to keep tasks, processes and key resources within the firm by contracting with an external entity to work within the organization as a “member of the team” but subject to agreement on tasks to be undertaken (Kimberlin, 2006).

Study from the current concepts about outsourcing and insourcing, we could find the key point of the choice between outsourcing and insourcing is whether it’s the core tasks, processes and resources or not. Following the authors will try to analyze the IKEA’s strategy of outsourcing or insourcing based on Bolumole’s Logistics Outsourcing Matrix (See Figure 2-2).

In IKEA, let’s go back to the paragraph about IKEA logistics development in China, in 1995, when IKEA began to enter into mainland China, its requirements about logistics performance is relative low. IKEA China call it’s an exploration phase. In this phase, because of the number and kind of shipments purchased were limited, the logistics support for this was simple that means logistics is not a critical success factor in the decision calculus. Furthermore, at that moment, for lack of the knowledge and experience about Chinese logistics industries, IKEA’s in-house operational performance of logistics service was low. So, according to Bolumole’s logistics outsourcing matrix, IKEA chose the strategy to outsourc-
ing its logistics function to Maersk Logistics was logic like quadrant #3.

Later on, with its strategic center of gravity in Asia-Pacific began to shift to China from 1998; IKEA went into the expanding phase. With the number and kind of shipments not only outbound to stores overseas but inbound to DCs for domestic market increased dramatically, the distribution system became very complicated which needs much support from logistics to keep the whole system efficient and effective. In other words, IKEA China need change its outsourcing strategy to meet the requirement of efficient road transport.

In IKEA Fuzhou Project, the authors learned from the internal comments that it’s to have better transportation networking before IKEA set up a formal transport organization in Greater China region. On the other hand, as we already known, the most basic strategy of IKEA is price as well as cost-saving strategy. After IKEA moved to the low-cost country like China several years later, they found it was not easy to reduce the purchasing-price again and again, furthermore, go into 2006, the raw material price all over the world increased rapidly, which, to some extent, put pressure on IKEA’s strategy on cost-orientation. And the land price equals to purchasing cost plus logistics cost. So they started to shift their focus on the logistics cost and made tradeoff between purchasing cost and logistics cost like the internal comments from IKE that the project will reduce the PUA price and increase competitiveness by converting transport savings into purchase price. And then logistics activities which are critical to a firm’s success and for which competence exists in-house increase the likelihood of generating profitability. And the benefits for such change are obvious, which have already been described in the last chapter. Benefits are including increase competitiveness, better control transportation, better transportation network, enable to compare production cost and lead time, and logistics cost reduction, all of these benefits help IKEA China toward efficient road transport.

From 1998, DSAP took over the logistics operation from its service provider gradually and sourced in door. But IKEA insourcing strategy is more like the smart source as said in quadrant #4. IKEA kept some core competence inside like DC operation, warehousing, booking with carrier directly, supply chain management etc, while outsourced trucking, CP operation to service providers. They tried to outsource functions but maintain in-house and control the process. By doing this, the goals of efficient road transport can be achieved by IKEA China. For an example, the FCA Fuzhou project, IKEA designed and maintained the whole project in-house and outsource the land carriage to OOCL Logistics and CP operation to Maersk Logistics, furthermore IKEA TP controlled the whole process at higher level. And IKEA China defined this current phase as a consolidation phase.

Even in the consolidation phase, IKEA China still faces a great number of the challenges. The company outsources its road transport to 35 external service provider (trucking company). And Daisy Li, the business development manager of IKEA China, pointed out these challenges, including (Daisy Li, personal communication, 2010-03-23):

- Unable to identify new potential carriers that can cover a larger geographical
- Need to reduce the carrier base
- Hard to find carriers with covering China nationally that fit with IKEA business objectives
- The cooperation between IKEA and carriers need to be improved
- Fuel strategy

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Response to these challenges, IKEA offers targeted solutions, for instance: improve carrier management, reduce carrier base, find 2-3 carriers with national coverage, merge small/specific/specialized routes under the umbrella of existing bigger carriers in the carrier base, improve fuel strategy, secure longer term contracts (2-3) years on key routes allowing investments and leverage its strength with partners.

Basically, the change process of IKEA China’s sourcing strategy can be presented as Figure 5-1, which is based upon Bolumole’s Logistics Outsourcing Matrix and IKEA logistics development in China:

![Outsourcing Matrix of IKEA China’s Logistics Development](image)

Figure 5-1 Outsourcing Matrix of IKEA China’s Logistics Development
Source: Own Prepared based upon Bolumole et al. (2007)

According to mentioned, there is no doubt that the sourcing strategy of IKEA China is ever-changing depending on the time. Whatever decided to buy or to sell, the purpose of achieving efficient road transport is always be considered and succeeded finally by making right sourcing strategy. Additionally, the significant cost reduction can be resulted from efficient road transport. However, the challenges cannot be neglected when a company tries to make a right sourcing strategy. As Eric and Ahmet (2000) suggested five factors needed to be incorporated into the outsourcing framework developed, they are:

- Competitive advantage
- Demand flexibility
- Process capability
- Process maturity
- Strategic risk

In other words, a company needs know the answers for the following questions before making outsourcing strategy, which might be what does your company really need; what kind of benefit can you obtain from such activity; and what kind of risk will you face e.g. Otherwise, a company maybe make a wrong outsourcing strategy instead of the right one, and the road toward efficient road transport will be ended.
5.3 Consolidation Point Delivery and Co-loading (Merge-in-transit)

In IKEA, Direct delivery, CP delivery and Co-loading are three alternatives for transportation under FCA SUP. But the three ways of transport are implemented for different shipments in different transport structure. Following, a transport model evaluation procedure will be carried out to analysis how the different transport model, especially CP delivery and Co-loading to make road transport more efficient.

The Transport Model Evaluation Procedure

The transport model evaluation procedure is based on Kärkkäinen, Mikko’s and Timo Alarisku’s (Figure 2-4) merge-in-transit evaluation procedure. Some modifications are made and some steps are moved. The purpose is to analysis how Co-loading and CP delivery under FCA SUP make road transport more efficient and a cost model will be carried out for evaluating the Co-loading and CP delivery profitability.

This model presents the procedure for assessing the applicability of Co-loading and CP delivery in a particular distribution network. A flow chart for the evaluation process is presented in Figure 5-2. The process includes three distinct parts.

In the first part of the procedure, current distribution operation are reviewed and select IKEA products for which Co-loading and CP delivery could potentially be the best available distribution model. Then potential suppliers and logistics service providers for Co-loading and CP delivery are identified. In the second part, the distribution models are analyzed from the viewpoint of logistics costs. In the third part, the feasibility and profitability of the Co-loading and CP delivery scenario is assessed.

<table>
<thead>
<tr>
<th>Step 1: Selection of Initial Co-loading and CP delivery Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify Potential Products for Co-loading and CP delivery</td>
</tr>
<tr>
<td>Indentify qualified carriers</td>
</tr>
</tbody>
</table>

↓

<table>
<thead>
<tr>
<th>Step 2: Evaluation of Co-loading and CP Delivery Operations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify the Activity Cost in Distribution Operations</td>
</tr>
<tr>
<td>Assess Costs of Distribution Alternatives</td>
</tr>
</tbody>
</table>

↓

| Step 3: Evaluate Co-loading and CP delivery Profitability   |

Figure 5-2 Evaluation Process  
Source: Own Prepared (2010)

Step 1: Selection of Initial Co-loading and CP delivery Partners

In this section potential products for Co-loading and CP delivery distribution are selected and initial partner companies are identified. The operation under FCA PORT and Co-loading and CP delivery operation under FCA SUP are modeled for subsequent comparison.
Identify Potential Products for Co-loading and CP delivery. Under FCA SUP, there are three different alternatives for arranging export are direct deliveries from individual manufacturing units or suppliers, co-load delivery from suppliers in cluster and transit delivery from Consolidation Point. And an extra alternative is a combination of Co-loading and CP deliver as an optimum delivery strategy depends on products characteristics.

Direct deliveries are the most cost-effective solution for products that are ordered in amounts of large enough to form a full or near full truckload from a single supplier. In IKEA, some products are called level-1 articles, which are sold very well in store or the products on the category. Such those products can never be shortage. So IKEA Transport should provide the highest service quality for the large volume of such kind of products and keep the shortest lead-time. In this situation, direct delivery will be the prioritized alternative.

Co-loading is for the LTL cargoes, which have the same destination, to co-load together for export. But co-loading is just happened in the cluster. In IKEA network strategy, some suppliers who are relatively close to each other will be set in a cluster. Some small clusters are based on the city level like Beijing cluster or Tianjin cluster. And some bigger clusters are based on the province level like Shandong cluster in Shandong province. IKEA sets such kind of cluster to help collect LTL volume from the suppliers more systematically. For example, originally if there are two or three suppliers have LTL delivery to same destination like Hamburg, these shipments have to be delivered to DCs to wait for consolidation export. But two DCs are both sited in Shanghai, which are far away for most of suppliers. So the long haul transport cost and high DC operation fee will be the main concern. Comparatively, under FCA SUP, IKEA’s carrier could co-load these LTL into FCL for export directly to avoid extra cost via DCs and shorter lead time.

Consolidation point is for the LTL cargoes, which have the different destination, to consolidate for export. IKEA have 7 CPs at 7 main ports in China separately. And main IKEA suppliers are located along the coastal area, so LTL cargoes from the suppliers, which are near to relative ports, will be sent to local CPs. And then the LTL cargoes will wait for 1 to 7 days to consolidate with other LTL with same destination. Compared to LTL sent to DCs, the advantages of CPs delivery are relative short transport distance, lower CP operation cost and shorter lead time in CPs.

There is a combination for LTL cargoes with different export destination in cluster. Co-loading will be done in the cluster to collect LTL cargoes with different export destination and then deliver to CPs to consolidate with other LTL cargoes with same export destination.

Here, under FCA SUP, IKEA takes different road transport mode for different deliveries from suppliers to achieve optimization of road transport efficiency. Following is a table shows the comparison among different road transport alternatives (Table 5-1).
Identify qualified carriers. After identification of potential products for Co-loading and CP delivery, selection of qualified carriers is quite important to support IKEA road transportation. The first consideration is that the logistics company can provide co-loading service and be familiar with IKEA supplier setup and then they can optimize the co-loading routes among different suppliers. Second, the service provider needs to have high-quality delivery management ability (knowledge, experience or system) for coordinating the complex information and material flows.

**Step 2: Evaluation of Co-loading and CP Delivery Operations**

In this section the feasibility and profitability of Co-loading and CP delivery operation is evaluated. First, the distribution operations and their costs in the previous alternative and Co-loading and CP delivery scenario are identified. Second, the costs of the operations in the alternative channels are compared.

Identify the Activity Cost in Distribution Operations. This section presents the cost of the five activity groups. The activity groups are illustrated in Figure 5-3 along with the basic delivery chain structures for direct deliveries, Co-loading deliveries, and CP deliveries.

<table>
<thead>
<tr>
<th>SUP</th>
<th>Alternative</th>
<th>Order Volume</th>
<th>Destination</th>
<th>Transport Cost</th>
<th>Lead Time</th>
<th>Cluster</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single SUP</td>
<td>DD</td>
<td>FCL</td>
<td></td>
<td>Lowest</td>
<td>Shortest</td>
<td></td>
</tr>
<tr>
<td>Several SUPs</td>
<td>DC</td>
<td>LTL</td>
<td>Same or different</td>
<td>High</td>
<td>Long</td>
<td></td>
</tr>
<tr>
<td>Several SUPs</td>
<td>Co-loading</td>
<td>LTL</td>
<td>Same</td>
<td>Low</td>
<td>Short</td>
<td>Not in cluster</td>
</tr>
<tr>
<td>Several SUPs</td>
<td>CP</td>
<td>LTL</td>
<td>Different</td>
<td>Low</td>
<td>Short</td>
<td>Not in cluster</td>
</tr>
<tr>
<td>Several SUPs</td>
<td>Co-loading + CP</td>
<td>LTL</td>
<td>Different</td>
<td>low</td>
<td>Short</td>
<td>In cluster</td>
</tr>
</tbody>
</table>

Table 5-1 Different Road Transport Mode
Source: Own Prepared (2010)
The picking activities at each supplier and the receiving activities at the customer are common to all distribution channels, but their costs depend on the structure of the handled order. In our case, picking cost is excluded from IKEA logistics cost under FCA SUP because the cost is calculated once carrier pickup the shipments at the gate of supplier’s factory. As for the receiving cost, because we just discuss the transport cost of the part from supplier to port of loading which is relative to domestic road transport, it will not be considered in this evaluation. So here we’ll fix them. DC operations include these two activities, and also activities related to stock-keeping. So the cost will be mixed into total cost. The consolidation activity is associated with CP delivery. Transportation activities are dependent on the channel structure.

Assess Costs of Distribution Alternatives. Next, the costs of the constructed Co-loading and CP delivery scenario are compared with direct delivery and DC delivery separately. To illustrate the use of the costing model based on distribution activities, a comparison of direct deliveries, DC deliveries, Co-loading deliveries and CP deliveries is presented using the basic delivery chain structures in Figure 5-3.

For instance, a route that supplier exports via Shanghai port, which could be as a real case to demonstrate the cost evaluation.
The delivery costs are fairly straightforward to evaluate for a direct delivery. They are the sum of all the individual outbound, transportation, and inbound costs needed to fulfill the customer order. Here we assume the cost of outbound and inbound is 2 RMB/CBM. Normally the order volume for a 40dv is 50CBM. Transport cost is 2700 RMB/40DV from suppliers to Shanghai port (See Table 5-2).

<table>
<thead>
<tr>
<th>FCL</th>
<th>Order Volume</th>
<th>Outbound at Supplier</th>
<th>Transportation</th>
<th>Inbound at Customer</th>
<th>Lead time (SUP to Port)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier</td>
<td>50CBM</td>
<td>100RMB</td>
<td>2700RMB</td>
<td>100RMB</td>
<td>1-2days</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2900RMB</td>
</tr>
</tbody>
</table>

Table 5-2 Direct Delivery Costs
Source: Own Prepared (2010)

The cost of DC delivery should add a DC operation fee, which is 14RMB/CBM. The fee is combined by inbound, outbound and consolidation cost. And the lead time for consignments kept in DC is 10 to 14days (See Table 5-3).

<table>
<thead>
<tr>
<th>LTL</th>
<th>Order volume</th>
<th>Outbound at Supplier</th>
<th>Transportation</th>
<th>DC Operation</th>
<th>Transportation</th>
<th>Inbound at Customer</th>
<th>Lead Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUP1</td>
<td>15 CBM</td>
<td>30RMB</td>
<td>700RMB</td>
<td>700 RMB</td>
<td>800 RMB</td>
<td>100RMB</td>
<td>12-16 days</td>
</tr>
<tr>
<td>SUP2</td>
<td>10 CBM</td>
<td>20RMB</td>
<td>600RMB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUP3</td>
<td>25 CBM</td>
<td>50RMB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4000RMB</td>
</tr>
</tbody>
</table>

Table 5-3 DC Delivery Costs
Source: Own Prepared (2010)

The cost of Co-loading delivery is similar to that of direct delivery. But there is a Co-loading fee when do co-load in cluster. Here the cluster is located in Zhejiang province, which is close to Shanghai port. The fee is 200RMB per co-loading (See Table 5-4).

<table>
<thead>
<tr>
<th>LTL</th>
<th>Order volume</th>
<th>Outbound at Supplier</th>
<th>Co-load fee</th>
<th>Transportation</th>
<th>Inbound at Customer</th>
<th>Lead Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUP1</td>
<td>15CBM</td>
<td>30RMB</td>
<td>200RMB</td>
<td>2700RMB</td>
<td>100RMB</td>
<td>2-3days</td>
</tr>
<tr>
<td>SUP2</td>
<td>10CBM</td>
<td>20RMB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUP3</td>
<td>25CBM</td>
<td>50RMB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3100RMB</td>
</tr>
</tbody>
</table>
The CP delivery will add a CP operation fee, which is 7RMB/CBM. The fee is combined by inbound, outbound and consolidation cost. The lead time is 2-7 days that consignments could be stayed in CP (See Table 5-5).

<table>
<thead>
<tr>
<th>LTL</th>
<th>Order volume</th>
<th>Outbound at Supplier</th>
<th>Transportation</th>
<th>CP Operation</th>
<th>Transportation</th>
<th>Inbound at Customer</th>
<th>Lead Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUP1</td>
<td>15 CBM</td>
<td>30RMB</td>
<td>700RMB</td>
<td>350RMB</td>
<td>800RMB</td>
<td>100RMB</td>
<td>3-9 days</td>
</tr>
<tr>
<td>SUP2</td>
<td>10 CBM</td>
<td>20RMB</td>
<td>600RMB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUP3</td>
<td>25 CBM</td>
<td>50RMB</td>
<td>1000RMB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3650RMB</td>
</tr>
</tbody>
</table>

Table 5-5 CP Delivery Costs
Source: Own Prepared (2010)

**Step 3: Evaluate Co-loading and CP delivery Profitability.**
From above comparison, it’s quite clear that direct delivery is the fastest and cheapest alternative. But the realism is that supplier can’t receive FCL order every time, so quite a few volumes have to be sent by LTL. Originally, before FCA SUP, suppliers delivered LTL shipments to DCs. But, for some suppliers, which are far from DCs, the transport cost from suppliers to DCs is really high. Meanwhile, the transit time in DCs is around 10 to 14 days, which makes significant influence on lead time. And also the operation fee in DCs is higher than that in CPs. So as for LTL cargo, Co-loading in cluster and CP delivery for those shipments with different destination are suitable alternative to cut down the cost and improve efficiency compared to original DC delivery. And from lead time perspective, Co-loading and CP could effectively reduce lead time compared DC delivery, because these two alternatives could cut mid-links or decrease transit time.

The primary challenges of Co-loading for IKEA China are how to avoid possible damages and how to minimize empty space. Additionally, as the transport operation coordination of IKEA CO in China, Jason Jiang states that there are various challenges of CP currently, including internal CP professional competence, higher CP services, more volume, existing potential barrier and demands more synergy from economy sourcing.

For handling these challenges well, IKEA China has made the targeted strategy, which is shared by Jason Jiang, and can be shown as the followings (Jason Jiang, personal communication, 2010-03-30):

- Adopt a coordinated approach
- towards price / service development through the carrier development process
- Coordinated CP sourcing process in Asia to a coordinated approach
- Strength and standardize CP carrier management
- Implement pre-conditions
- Achieve the lowest CP rate
- Secure dedicated CP expertise to do follow-up

5.4 Packaging in Logistics Operations

Many efforts have been made in acknowledging the role of packaging in improving the operation of a company, although normally they fail as they do not consider its influence outside the traditional view on packaging (Jesus and Jose, 2008). According to IKEA China, they have been focusing on the following aspects of packaging for improving efficient road transport, such as (Allen Shen, personal communication, 2010-04-05):

- Production protection
- Volume efficiency
- Right amount and size
- Handle ability

Production protection
Packaging is usually viewed either as a marketing tool or as a logistics facility, for example in terms of protecting the product during distribution and facilitating handling operations (Jenny, 2005). As Mary (2009) pointed out that if product is damaged in transport, it is harder to use the excuse that the product was not adequately protected. For keeping the products safety, IKEA China figured out some solutions, for instance: protective properties of packaging, no overhang, minimize empty space both in packaging and transportation, and keep packaging stability.

Volume efficiency
Full use of truck space to transport products, transport time with transportation costs can be reduced, so as to achieve the purpose of efficient road transport. IKEA China not only full uses the capacity of truck but also minimizes empty space both in terms of transportation and packaging.

Right amount and size
In this regard, efficient road transport has been achieved by making handling and distribution efficient, since the requirement of a high coefficient of fullness has been met in the means of transport.

Handle ability
Bowersox et al. (1999) argues that effective distribution and materials handling require a proper packaging solution, since almost all logistics operations are affected by packaging utilities. This is the reason why IKEA China asks for stack ability and packaging stability during the process of loading and unloading, and the requirement of economical demands have been touched. On the other hand, all handlings are required to be minimized, as Lee and Lye (2003) stated that ICA, a large grocery retail chain in Sweden, has discovered that most of the handling time, or approximately 75 percent, occurs in the stores, and that it mostly involves packaging handling (Lee and Lye, 2003).
Beside the mentioned, there are other methods of packaging during the transportation have been adopted by IKEA China, and they are presented as the followings:

- **Net utilized**: After finishing loading by each supplier, the supplier shall also put up net provided by the trucker in the container whenever practical to secure the cargoes from falling down during transportation.
- **Seal utilized**: Each supplier shall seal the container or ton truck after he or she finishes loading his or her cargoes and write down the seal number on the Loading and Unloading advice and double check / sign by driver.

These two points can be considered as the supplement of the above mentioned packaging strategy in IKEA China. Moreover, after outsourcing road transport to external service providers under FCA SUP, IKEA are offering the IKEA standard Agreement Package when it comes to General Conditions, SOP, Transport Requirement and minimum demands. So to say, all these elements related to packaging logistics lead IKEA China to the development of efficient road transport.

Although the authors did not ask challenges of packaging logistics during the interview with IKEA China, in the authors’ opinion, they are quite obvious. Since most of the time during transport (include loading/unloading) are mechanized operation (like using forklift e.g.), so package can easily be ruined by carelessness or accident. And the transport distance is often so great that the time required to receive a reordered product may cause the buyer and seller extremely high stockout costs, which can justify more protective packaging (increased packaging cost). Furthermore, the package size should always be suitable to the truck capacity as well as conform to the customer’s instructions. There but not the last one that product design, packaging and logistics are highly interdependent, and together they have a great impact on supply chain activities (Jenny, 2005), this point should be recognized by a retail company.

### 5.5 Economics Scale of Trucking Cost

The authors found that, originally under FCA Port, suppliers took the land-carriage from supplier to port by themselves and they had to negotiate with land carriers by their limited volume of CBM (cubic meter). And as for the low volume of every single supplier, it was really hard for them to have the initiative in negotiation for a good price and services and they also had no choice to find a high-quality carrier which meets the IKEA standard. Now under FCA SUP, IKEA collects the whole volume of land carriage from each supplier, which achieves economies of scale, so IKEA could negotiate with high-quality carrier like OOCL Logistics with good price and services. So far, IKEA reduces the total transport cost and final reduces the PUA price (land price) to achieve the strategy of cost-saving. Moreover, Daisy Li, who is the Business Development manager for IKEA China, said IKEA lacks economy of scale advantages in most areas. Opposite to ocean business, IKEA China land is considered a small party.

By adopting the method of merge-in-transit, IKEA China could do co-load in relative short distance to control the transport cost. Besides, the possible damages and empty space during the loading can be avoided by following the ground rules of Cargo Collection Procedure.

One of the benefits of using consolidation point is transport cost saving. For controlling
the transport cost, IKEA China always pays attention to an economical and healthy filling rate, since higher filling rate means lower transport cost. Not to mention the implementation of consolidation point lean time lead IKEA China to the efficiency of CP operation. Under the circumstance of efficient road transport, the strategies of packaging logistics in IKEA China not only focus on production protection but also handle ability. Durable packaging nowadays is not seen as a necessary investment or as cost driver, but as a tool to reduce overall piece price of components and of transport costs (Mulken, 2007).
6 Conclusions

In this chapter, the conclusions of this study will be drawn by the authors on the basis of which have been discussed and analyzed in the previous chapter. And the research purpose will be emphasized as well as the research questions will be answered.

As the authors emphasized at the beginning, one of the purposes of this research is to explore the role of road transport in logistics operations. The study shows the primary activities of logistics operations are made up of materials flow and goods delivery, and due to road transport accounts for the major part in the distribution of products, so to say road transport plays an essential role in logistics operations. So obviously the road transport is important enough to need to be concerned for the companies in logistics operations. Particularly in the delivery of IKEA China, owing to road transport has a near monopoly in its land transport.

After explaining the importance of road transport, lots of literature review on four different logistics operations have been studied and analyzed, in terms of outsourcing strategy, merge-in-transit, consolidation point and packaging. The studies of them have shown the fact that companies can operate efficiently on road transport by optimizing these logistics operations, which finally leads them to enable exploitation of the economies of scale.

This paper has investigated and analyzed how IKEA China does operate on road transport in logistics operations, and the conclusion has been drawn that IKEA China can achieve the purpose of efficient road transport in logistics operations through optimizing mentioned four different logistics operations, which finally caused the cost reduction of IKEA China from the perspective of economies of scale.

First and foremost, there is a need for understanding the flexibility of sourcing strategy. The truth is that the sourcing strategy of IKEA China is to change over time and certainly not static. Initially, IKEA China outsourced its logistics function to third party logistic provider totally because of lower in-house operational performance. Currently, IKEA China kept some core competence inside but outsourced trucking and CP operation to service providers, which help them control the process better and maintain in-house even for the outsource functions. By making the right outsourcing strategy based upon identifying the challenges of flexibility, the purpose of efficient road transport can be achieved.

Second, the profitability of adopting Co-loading and CP delivery is clear, which is that the cost both on operation fee and lead time can be significant reduced. And the efficient road transport in logistics operation can be exactly caused by the achievement of such cost reduction. Furthermore, the challenges of them have not only been recognized but also been settle quite well by IKEA China.

Third, packaging has a significant role in logistics operations, and logistical packaging is considered as one of the most “systemic” of all logistical activities, particularly in road transport. IKEA China’s packaging strategies focus on production protection, volume efficiency and handle ability. IKEA China takes advantage of these packaging strategies to help them be toward efficient road transport. Obviously, the challenges of logistical packaging cannot be overlooked, such as easily damaged, increased packaging cost, suitable size and highly interdependent with product design and logistics.
Finally, the cost can be reduced by IKEA China from the perspective of economics scale, which can be caused by the achievement of successful outsourcing strategy, merge-in-transit, consolidation point and logistical packaging. In other words, IKEA China can achieve the purpose of efficient road transport with less cost by the outcomes of optimizing these logistics operations.
7 Proposals for Further Studies

In this chapter, the authors will look back relative knowledge learned before and will give much more suggestions for further research, and proposals towards efficient road transport in logistics operations will be explored.

Due to the limitations of time and other factors, which have been mentioned by the authors, there are some other theories have not been carried out yet. However, if it is possible, the authors want to do more in-depth research from other perspectives about efficient road transport in logistics operations. On the basis of literature reviews, these other proposals will be given such as the followings.

7.1 The Communicative Functions of a Package

The functions of packaging are all concerned with how packages are mainly used for logistics and marketing objectives. The protection and utility functions are concerned with the physical handling of the package. The communicative function is associated with supporting the transformation of goods and providing information about goods that are used for other purposes, such as for promoting products. The two main logistical and communicative functions of a package may be described as (Johansson et al. 1997):

An information carrier: information attached to the package itself, label, tag or other document forms that are attached to the package.

As an information source: information concerning the package registered in other media forms than the package, through documents either in an electronic or paper form.

The function of the package as an information carrier is based on the physical presence of information on the package and this information is physically present when transforming goods. The function of the package as an information source is based on identifying the package or goods and is registered in an information system. This is information about goods that includes time, location, and product form. The communicative function thus shows how the package is a link between the transformation of goods and an information system in the supply chain. In this way, packages can be delivered more effectively during the transportation, like enter/out warehouse/distribution center and loading/unloading, and this can lead IKEA China to efficient road transport.

7.2 IT-enabled Information Sharing in Logistics Operations

The emergence of new, dynamic customer requirements has been responsible for the emergence of innovative, contemporary networks (Coyle et al., 2003). Inside these supply chain networks, the utilization of contemporary logistics information systems provide a lot of useful functions with information sharing, which could be accurate product delivery, efficient transactions, material movement optimization, customer demand and logistic process visibility e.g. By sharing these valuable information with its partners, IKEA China
can improve the efficiency of road transport. After all, IKEA China has so many different
partners, and such ability of information sharing can provide higher efficiency and more
transparent cooperation.

7.3  Relationship Development

There is no doubt that IKEA China has a great number of various transport partners,
which makes it very important whether they can cooperate and coordinator well enough or
not. Soosay et al. (2008) emphasizes in order for companies to develop a more competitive
approach on a globalization-driven competitive environment, collaboration with other
firms becomes evident, forcing firms to search beyond the firm’s boundaries for resources
and skills necessary for such achievements in terms on innovation. Moreover, Swink (2006)
states that “the organization’s ability to innovate is key to success”. Therefore, the authors
believe that a win-win strategy needs IKEA China to develop a better partnership as well as
customer relationship (CRM), and this finally can lead the company to be toward efficient
road transport in logistics, not to mention with less cost.

7.4  Training Program

To ensure employees can carry out their tasks efficiently and effectively, this program will
be very helpful and useful. As we known, road transport is not just simple transport goods
from A to B, and actually, it is a complex process. A lot of people are involved in this
process, who works in different departments and in different positions, like drivers, ware-
house/distribution staff, office staff and coordinators etc. In the authors’ opinion, the
achievement of efficient road transport can be provided if all of the employees can be qual-
ified in carrying out tasks in every different operational section as expected. For example,
one of the IKEA China’s challenges is fuel strategy, a good driver can drive faster with less
time and less fuel, which is especially important in the rising price of oil today.

7.5  RFID Benefits

The benefits of RFID are many and varied, like Stacy (2006) illustrated that the most ob-
vious advantages by using RFID are heightened visibility, improved supply chain respons-
siveness, greater efficiencies, stock out prevention, better inventory control and accuracy,
and less manpower in retail operations – many of the same pluses that any company across
any industry will experience. Regardless of category, the investment is all about creating
quicker, more agile, more visible supply chains that work more effectively and efficiently,
ultimately impacting both your company and your customers’ satisfaction. The main func-
tion is using RFID technology to read to receive, manifest, load and palletise merchandise
in a distribution centre environment. Obviously, the adoption of such advanced technology
can highly improve the efficiency of road transport in logistics operations, especially for the
retail companies like IKEA. Unfortunately, the development and using RFID is quite ex-
pensive as a new technology. So this item is more like a common suggestion from the au-
thors, which might not be adopted by IKEA China right now.
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Appendix

Appendix 1 Average Logistics Cost as a Percentage of Sales

Table 1. Average Logistics Cost as a Percentage of Sales

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2007</th>
<th>2006</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>4.68%</td>
<td>4.40%</td>
<td>4.43%</td>
<td>3.36%</td>
</tr>
<tr>
<td>Warehousing</td>
<td>1.90</td>
<td>1.99</td>
<td>1.52</td>
<td>1.65</td>
</tr>
<tr>
<td>Order entry/customer service</td>
<td>0.62</td>
<td>1.10</td>
<td>0.69</td>
<td>0.48</td>
</tr>
<tr>
<td>Administration</td>
<td>0.28</td>
<td>0.39</td>
<td>0.24</td>
<td>0.25</td>
</tr>
<tr>
<td>Inventory carrying</td>
<td>1.80</td>
<td>1.95</td>
<td>1.92</td>
<td>1.76</td>
</tr>
<tr>
<td>Total logistics costs</td>
<td>9.28</td>
<td>9.74</td>
<td>8.79</td>
<td>7.51</td>
</tr>
</tbody>
</table>

(Source: Establish Inc.)

Source: Logistics Savings (2008)
Appendix 2 A Snapshot of the U.S. Logistics Market

Source: James A. Cooke (2006)
Appendix 3 The Interview Guide

The Interview Questions for IKEA China (Data: between 16th March to 9th April)

This interview guide is designed to enable the authors collect the primary data. After analyzing these empirical findings, combine with the secondary data and based on the studying of theoretical framework on logistics operations affected efficient road transport, then the possibilities of the road transport costs reduction will be external discussed.

Moreover, it is used to interview the manager or the supervisor of the company's related department and which covers: the brief information of IKEA China, IKEA China land transport strategy, transportation network development and others related to efficient road transport by optimized logistics operations. This therefore means the interview guide designed purely for academic purpose, the data is only used in this thesis.

The interview is going to follow a list of questions but it can be more flexible.

**Basic Information about Interviewee:**
Name:
Date:
Position:
How long have you been in IKEA China?

**Brief information about company:**
The developments of IKEA China and its transportation network

**Questions about efficient road transport in logistics operations:**
What is your land strategy?
What is the role of road transport in your land transport?
What do you think of the importance of efficient road transport?
How could your company towards efficient road transport with less cost?
What is the role of efficient road transport in cost-saving strategy of your company?
Could you describe current situation and challenges of IKEA China land transport strategy?
What is your strategy of efficient road transport in logistics operations?

What kinds of logistics operations affect efficient road transport and how do you manage them? Especially from the following different perspectives:
Sourcing strategy, Merge-in-transit, Consolidation point, packaging logistics and economics scale of trucking cost.
Appendix

**In sourcing strategy:**
What is the sourcing strategy of your company?
What’s the challenge of outsourcing/insourcing?
What’s the strategy IKEA will take to meet such challenge?

**In merge-in-transit:**
How do you execute merge-in-transit in your company?
What are the challenges for achieving merge-in-transit?
How do you manage these challenges?

**In consolidation point:**
What about the current situation about CP?
What are the challenges for CP?
What are the strategies for your company meeting these challenges?
What the other facts may affect road transport costs and how?

**In packaging logistics:**
How could packaging logistics affect efficient road transport?
What are the strategies for your company to achieve efficient road transport?
Why do you make such packaging strategies?

**In economics scale of trucking cost:**
What is the role of efficient road transport in economics scale of trucking cost?
Why is it so important for efficient road transport reducing trucking cost?

**General questions:**
What kind challenges exist of achieving road transport with less cost in logistics operations?
Has IKEA China managed these problems well and how?
What will be your future directions considering the balance between the possible lowest cost and the best service?