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Logistics consequences of manufacturing outsourcing in China for Nordic enterprises

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Abstract

With the replacement of traditional manufacturing by global manufacturing outsourcing and the centralization of manufacturing outsourcing to China, a lot of Nordic enterprises have moved their manufacturing activities through launching own local factories or purchasing final products from certified Chinese suppliers for the purpose of both cost reduction and easier entry into local market.

But for the final target of achieving sustainable competitive advantage, what will the logistic consequences be for these Nordic companies during their outsourcing procedure in China? Our main purpose is to delineate the relevant logistics problems and how they affect the global supply chains of those Nordic organizations.

Based on qualitative and quantitative observations from case studies in different industries, we try to make analysis on both the internal decisions inside Nordic organizations and the external environment in China. Then the thesis conducts a line of arguments concerning indications of whether a successful logistics strategy has been implemented by these Nordic companies. After integrating theories and experts' experiences, our own ideas will be given to explain and improve the performance of logistics operations in the process of manufacturing outsourcing in the Chinese market.

Key Words: manufacturing outsourcing, logistics consequences, Nordic enterprises, global supply chain management, economy of scale, logistics cost, Electronics Manufacturing Service (EMS), Original Design Manufacturer (ODM)

Acknowledgement

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Xin Wang & Yiwen Yan

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ABBREVIATIONS

3PL *Third Party Logistics*
4PL *Fourth Party Logistics*
A4D *Application for Distribution*
BDA *Business Economic and Technological Development Area*
BMC *Beijing Sony-Ericsson Putian Mobile Communications Co. Ltd*
BPO *Business Process Outsourcing*
CEM *Contract Equipment Manufacturer*
CFR *Cost and Freight*
CIF *Cost, Insurance and Freight*
CSMS *Central Service Management System*
DC *Distribution Centre*
EOQ *Economic Order Quantities*
EMS *Electronics Manufacturing Service*
FOB *Free on Board*
FCL *Full Container Load*
GPS *Global Positioning System*
JIT *Just in Time*
LCL *Less than Container Load*
MNC *Multinational Cooperation*
ODM *Original Design Manufacturer*
OEM *Original Equipment Manufacturer*
POQ *Periodic Order Quantity*
SCM *Supply Chain Management*
SRM *Supplier Relationship Management*
P&P *Packing and Package*
R&D *Research and Design Centre*
RFID *Radio Frequency Identification*
SKU *Stock-keeping Unit*
VAT *Value-added Tax*
VMI *Vendor Managed Inventory*
WTO *World Trade Organization*

PART ONE

This thesis is divided into two parts. The first part consists of introduction, theory framework, problem analysis and methodology. The purpose of part one is to introduction basic information of problem concerned, provide necessary theory and methodology support and design whole research model.

1 INTRODUCTION

The chapter of introduction briefly states an overall picture of our thesis work, presenting general information and object of our study. More specifically, the chapter consists of three sections. Firstly, definition, background and some other basic information about global manufacturing outsourcing are introduced. With a clear statement of the situation concerned, the second section is the outline of our thesis, and finally, we present main purpose and certain delimitations in order to make our research process concentrate on certain specific scopes.

1.1 Background of Global Manufacturing Outsourcing

Outsourcing, especially manufacturing outsourcing, has been highly developed during the past ten years. Every enterprise expecting to achieve the equilibrium between cost effectiveness and competitive advantage needs to seek for new sources to lower the cost and explore potential markets. This section explains rough definition, groups different types and introduces main goal, development history of this strategy.

1.1.1 Definition and Grouping

Generally, outsourcing is defined as the delegation of specific business from internal production of an organization to the external entity or subcontractors that are specialized in that business operation. Thus the definition of 'manufacturing outsourcing' could be prescribed as the procurement of products or manufacturing process from original manufacturer to independent outside organizations. However, manufacturing outsourcing doesn't equal to the total loss of manufacturing ability, because outsourcers could still keep part of their production capacity. From this perspective, we could group manufacturing outsourcing as:

- Part manufacturing outsourcing: In this way, manufacturing outsourcers still have their own manufacturing facilities for production.
- Total manufacturing outsourcing: Under this circumstance, manufacturing outsourcers totally give up their manufacturing ability and directly buy all the final products from outsourcing providers.

On the other hand, manufacturing outsourcing could also be grouped according to different phases during the manufacturing procedure:

- Components manufacturing outsourcing
- Semi- product manufacturing outsourcing
- Final product manufacturing outsourcing

1.1.2 Ultimate Goal

With the shift of power from producers of goods and services to end customers, the time to charge higher price has been shortened sharply while companies still need to keep a satisfying profitability. At the same time, as another important part of increased shareholder's value,

growth is also required to be achieved accompany with the acquisition of profit. Vertical integration is no long the panacea for enterprises to survive and further develop in today's rapidly changing business environment although it once was 20 years ago. In 1990, outsourcing first appeared in US and a new revolution all over the world was incited. The development of information science also helps to break through the geographic limitation.

Accompanying with the development of raw materials, components as well as labor outsourcing, manufacturing outsourcing plays a vital part as the joint of all these outsourcing activities. By the end of 2004, global outsourcing has reached a volume of US$ 6 trillion and about 50% of the spending is in manufacturing[1]. Asia, with its attractive cost advantage and experienced work force, has now become the center of global manufacturing outsourcing. Although the purposes of manufacturing outsourcing may be different, all of them can be summarized as the way of "achieving sustainable competitive advantage", which is the ultimate goal of modern enterprises.

1.1.3 Development History

With the replacement of standard mode of manufacturing industry by contract manufacturing, manufacturing outsourcing is widely adopted by global original equipment manufacturers (**OEMs**). Most enterprises move selected manufacturing operation to specific partners while adjusting their internal investments in other areas, such as Research and Design centre with competitive advantages. During the recent ten years, former Contract Equipment Manufacturers (**CEMs**) have further developed in many different industries. For instance, in electronic industry, concept of Electronics Manufacturing Services (**EMSs**) has emerged. And furthermore, Original Design Manufacturers (**ODMs**) are responsible for more tasks, including design part. Figure 1.1 sets out this development process clearly.

- Standard products by Original equipment manufacturers (OEM) – 15 years ago
- Contract equipment manufacturing (CEM) – 10 years ago
- Electronic manufacturing service (EMS) & Original design manufacturing (ODM) – Nowadays

[1] Michael F. Corbett, (2004), "*Outsourcing Revolution: Why It Makes Sense and How to Do It Right"*, Dearborn Trade Publishing

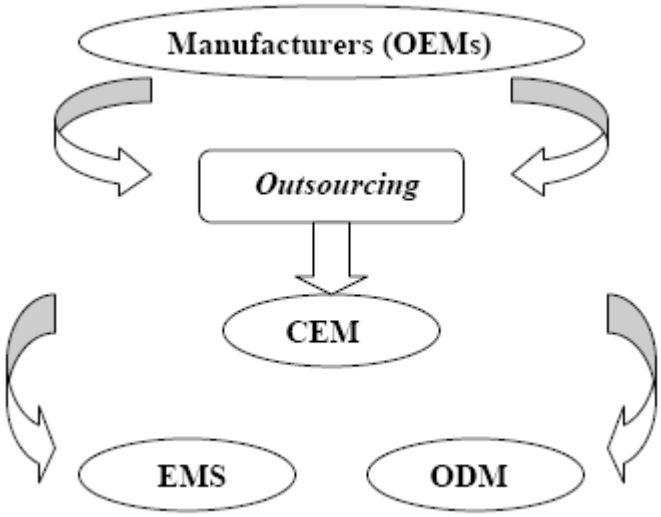


Figure 1.1: Development of Global Manufacturing Outsourcing Strategy
Source: Own

The emergence of EMS also announces a new era of global. Big OEMs also recognize that the transformation from the old transactional CEM to this new collaborative partnership of EMS makes them more flexible in the rapidly changing business environment. Therefore, with more and more compressed product life cycle and the intense globalization process, EMS has developed rapidly in these 15 years, especially for multinational manufacturers who has shifted the focus from peripheral manufacturing activity to the inside core competence to achieve sustainable competitive advantage. With the cooperation of EMS, enterprises will accordingly decrease cost of raw materials, components, labor, logistics and even cost for the whole supply chain with the advantage of economy of scale provided. Just shown in Figure 1.2, from 2002 to 2008 (estimated), total contract manufacturing revenue will still have dramatic increase.

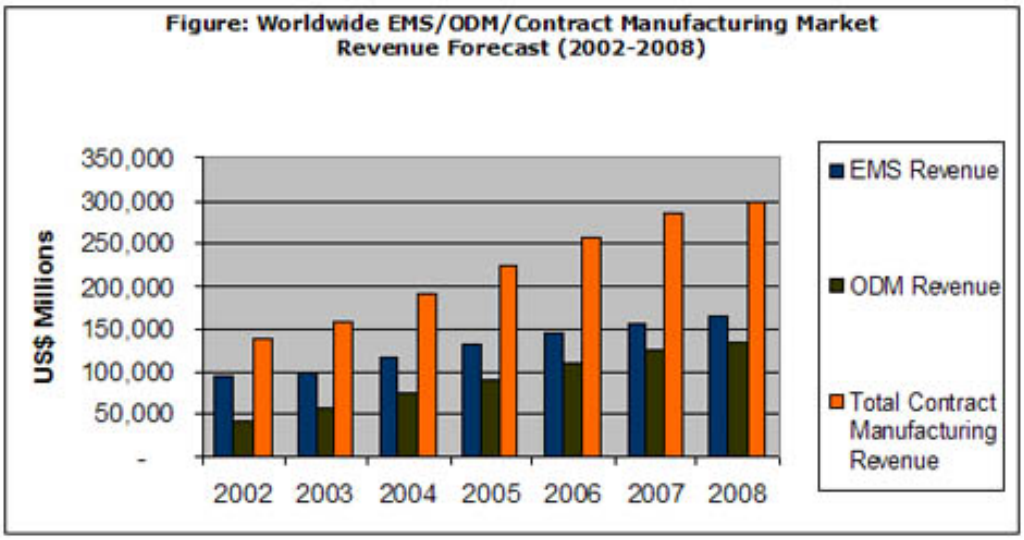


Figure 1.2: Worldwide EMS/ODM/Contract Manufacturing Market Revenue Forecast (2002-2008)
Source: "CSR Issues in the ICT Hardware Manufacturing Sector"

1.1.4 New Tendency of Service Scope

As Figure 1.3 shows, all the EMS providers cater logistic services through their network by providing global assembling and delivery. The rapid growth rate of EMS implies the inclination of combination of OEM & EMS globally. For instance, the biggest EMS provider Flextronics has cooperated with communication electronics giants like Sony-Ericsson, which is its biggest customer with 12% of Flextronics's total products, for several years not only by its own established plants, but also through manufacturing outsourcing to other countries like China.
In recent years, EMS providers have further minimized the difference between EMS & ODM by launching own designing as well as engineering services. Moreover, reverse logistic service for global maintenance is also developed to fulfill the global supply chain network.

On the other hand, ODM providers play another important role in global manufacturing outsourcing with design and engineering services. Represented by Taiwanese ODMs, the original design manufacturing service providers enlarged their traditional designing and manufacturing services to global assembling, delivery and maintenance for better meeting their customers' needs and striving for global market share with EMSs, especially on IT hardware productions. For example, Arima Communication, one of the top three ODMs in the world, has 73.27% of production for Sony-Ericsson and even 7.57% for its competitor, Flextronics, the biggest EMS provider in the world.

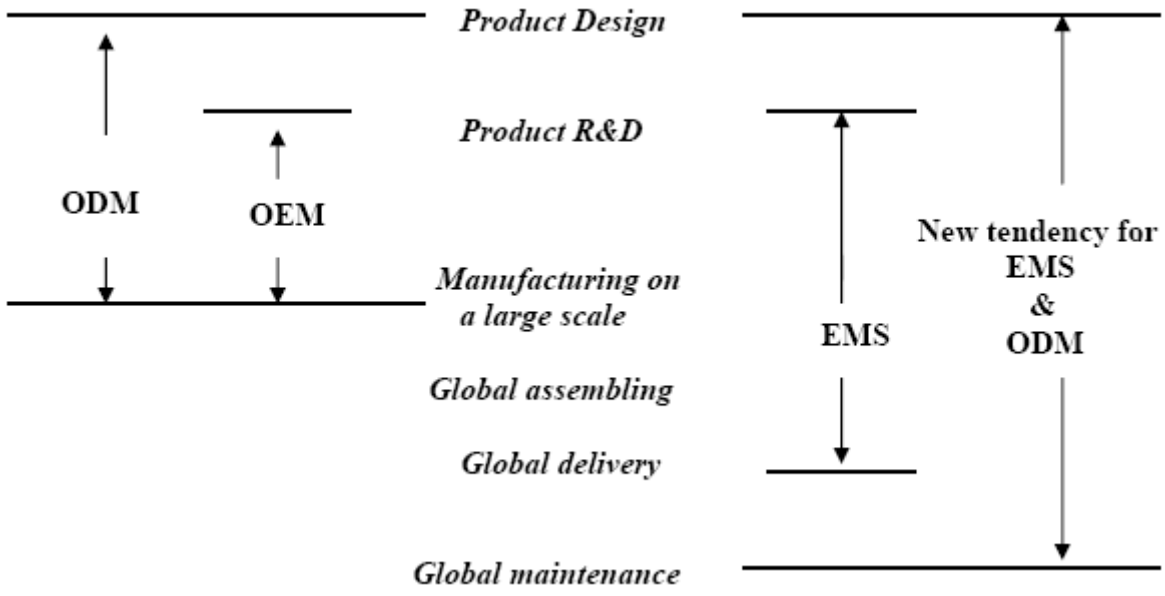


Figure 1.3: New Tendency of Service Scopes
Source: "Fox & Tiger", the Story of Guo Chuanming, the Founder of Foxconn

1.2 Outline of the Thesis

The thesis consists of eight chapters. Figure 1.4 demonstrates the outline of the thesis and interrelationship of different chapters.

After introduction statement, theory and methodology framework provide foundation for research structure establishment and further analyses. Then, chapter four about research purpose and sub-problems establishes whole structure design to make research direction clear. Afterwards, we present general situation and specific cases studies. Analyses and comparison are made according on different companies or industries. Consequently, some conclusions are generated and we also try to give certain suggestions based on our report and result.

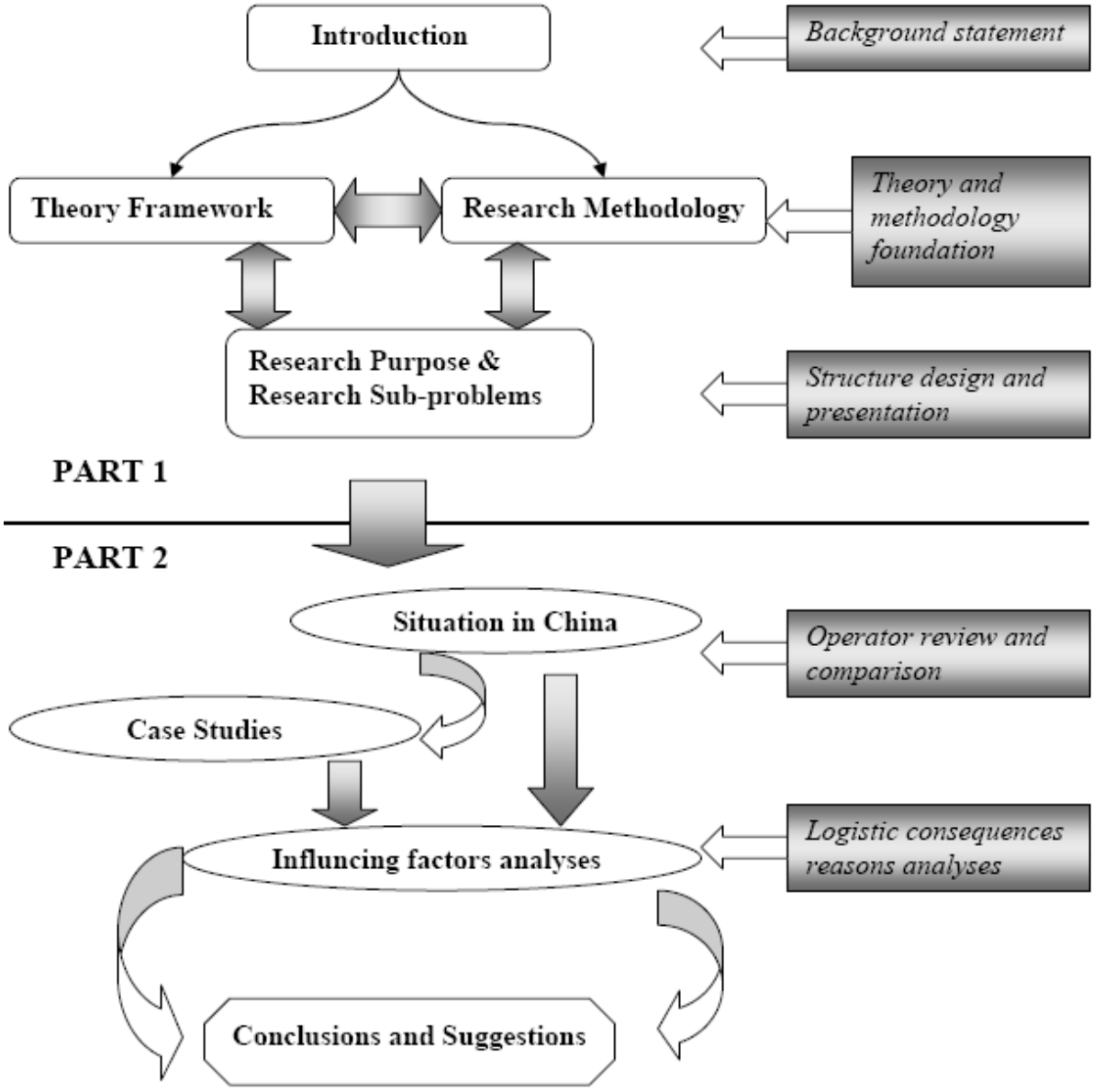


Figure 1.4: Thesis Outline
Source: Own

1.3 Purpose and Delimitation

The purpose of this thesis is to ***find out the logistic consequences of manufacturing outsourcing to China for Nordic enterprises*.**

Thus, other consequences of manufacturing outsourcing to China, e.g. the overall financial effect and relevant administrative effects produced are excluded from our research program. Besides, other types of the off-shore outsourcing modes, such as human resource outsourcing, IT outsourcing won't be discussed in our thesis.

From the angle of geographic location, only enterprises founded in Nordic countries with manufacturing business in China are chosen as our candidates of interview. From the perspective of history, culture as well as geography, the word 'Nordic countries' primarily means countries located in Scandinavia and a few surrounded ones, which include: Denmark, Sweden, Finland, Norway and sometimes, Iceland. While in our case research, we mainly concentrate on the manufacturing outsourcing of Sweden, Denmark and Finland due to the availability of information. Therefore, the thesis is based on information received from the own experience of manufacturing outsourcers from these three countries and of course also the opinions addressed by some international organization and associates assumed to be objective.

2 THEORY FRAMEWORK

The intention of this chapter is to provide general picture of theoretical knowledge for analyzing the research process on logistic consequences after manufacturing outsourcing to China. First of all, some theories about manufacturing outsourcing will be given, including definition development and purposes. During the decision-making process, outsourcers need to consider strategic value and economic value improvement. Other criteria are also applied to assess location selection. Afterwards, we discuss influencing factors during process of supply chain operation, and these factors are discussed through two main aspects according to final logistic consequences – customer service and cost efficiency. In addition, some consequences, challenges when managing international pipeline will be presented. Finally, summary section illustrates how these theories connect together for historic review of our study.

2.1 Manufacturing Outsourcing

In this section, we introduce some general theory foundation. Definition of manufacturing outsourcing has developed from Business Process Outsourcing, and some purposes can be found among this popular trend throughout the world. Outsourcers need to notice basic principle during decision-making process. At the same time, country selection criteria helps to explain reasons about arise of China, this manufacturing outsourcing hot spot and PEST model contributes to assess overall environmental conditions.

2.1.1 Definition Development

Firstly, we can have a look at the definition of **Business Process Outsourcing** (BPO). BPO is defined as "the movement of business processes from inside the organization to external service providers[2]".

With the global communication electronics service and infrastructure well established and reliable, now BPO initiatives often include shifting work to international providers, highest-skill/lowest-cost providers. Then one important type of BPO has emerged, called **Offshore Business Process Outsourcing**. Presently, there are five BPO international hot spots globally:

- India, Engineering and Technical
- ***China, Manufacturing and Technical***
- Mexico, Manufacturing
- United States, Analysis and Creative
- Philippines, Administrative

Manufacturing Outsourcing is the main strategy selected by developed countries to outsource to China. It is very hard to find specific definition for this concept. In general, we try to define **"Manufacturing Outsourcing" as the situation that companies outsource manufacturing related jobs as well as set up manufacturing outlets and factories in**

[2] Rick L.Click, Thomas N. Duening, (2004), "*Business Process Outsourcing: the Competitive Advantage*", John Wiley & Sons, Inc.

developing countries such as Mexico, China and South Africa. Despite the criticism existing, most people believe that the advantages of doing so outweigh the disadvantages much. More and more enterprises are applying this strategy to look for more competitive advantages.

2.1.2 Purposes

Some general purposes for selecting manufacturing outsourcing are shown in Figure 2.1 to support this strategy.

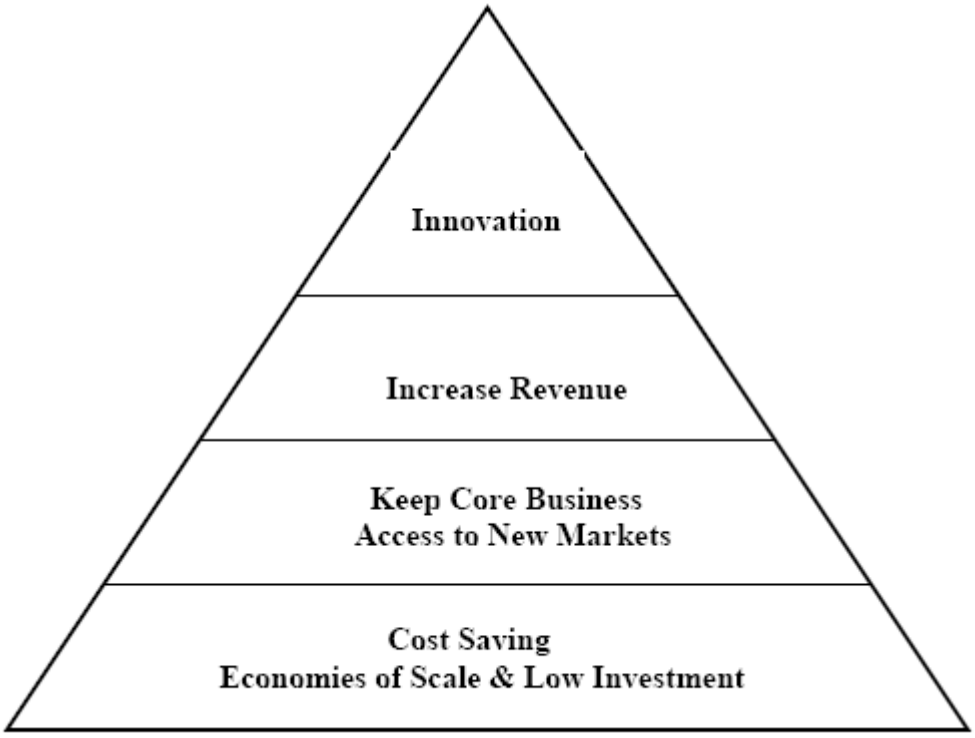


Figure 2.1: Driver Factors and Purpose for Manufacturing Outsourcing
Source: Own

Apparently, cost saving brought by economies of scale and low investment are the most important reason for selecting manufacturing outsourcing strategy. The pyramid figure also shows different levels of purposes. Keep core business, increase revenue are the other two factors in sequence. And reaching innovation will be the further objective to manufacturing outsourcing to win more competitive ability.

In China, low resource and labour costs make great opportunities to achievement of cost savings, and large market provides potential development space to enterprises. Increasing education level ensures human resource foundation to potential innovation phase.

2.1.3 Principle of Decision Making

Sometimes, companies need to know when and if it should make decision of outsource. Luckily, Fine et al[3] (2002) provide a useful framework with strategic value and economic value, which can devote to this question. The strategic value added is derived as a qualitative score in terms of customer importance, speed of technology change, competitive position, supply base and the level of integration. While the economic value added may be followed by standard break-even analysis. The author combined analysis of strategic value added and economic value added, and provided four choices for the manufacturing value-chain design: insource, leverage, outsource and harvest (See Figure 2.2). In our research study, we could use a similar analysis for assessing decision of making manufacturing outsourcing to China.

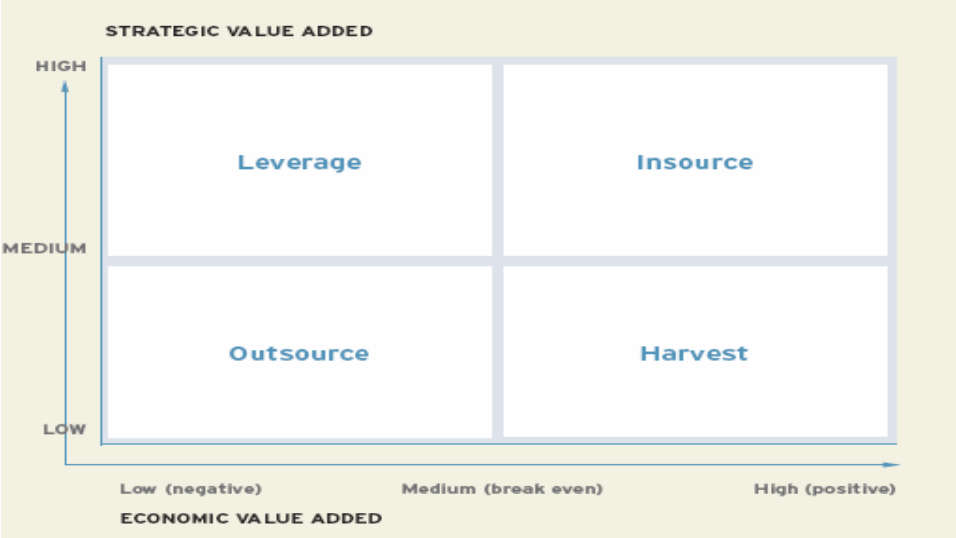


Figure 2.2: Framework for Assessing Strategic Value and Economic Value
Source: "Rapid-Response Capability in Value-chain Design"

2.1.4 Country Selection Criteria

Geopolitics has always been a factor in choosing where to locate the outsourcing work. In selecting a country, companies need to consider: "government support, infrastructure, communications, education system, English proficiency, labour cost advantage, quality initiative, labour pool characteristics, country law, etc[4]."

These complex criteria can be divided into three parts: costs, environment and people.

- Costs
  - ✓ Labour costs
  - ✓ Management and infrastructure costs
  - ✓ Tax

[3] Fine, C. H., R. Pethick and J. El-Hout, (2002), "*Rapid-Response Capability in Value-Chain Design*", MIT Sloan Management Review
[4] Suresh Gupta, (2003), "*Risks, Rewards, and Trade-offs of Offshore Outsourcing*", The Capco Institute Journal #8

  - ✓ Transaction costs
- Environment
  - ✓ Political risks
  - ✓ Financial robustness
  - ✓ Government support
  - ✓ Infrastructure
  - ✓ Cultural differentials
  - ✓ Geographic proximity
- People
  - ✓ Size and quality of labour market
  - ✓ Education level
  - ✓ Language barriers

2.1.5 PEST Model

PEST Model is one normal used external analyze tools, which divide influencing factors into four parts: political/legal conditions, economics conditions, sociological/culture conditions and technological conditions (See Table 2.1). We try to use this model to analyze external influencing factors on final logistic consequences in China.

Table 2.1: Main Macroeconomic Factors

Political/legal conditions	Economic conditions
- Monopoly - Environment protection laws - Tax politics - Foreign trade regulations - Employment law - Government stability	- Business cycles - GNP trends - Interest level - Inflation - Unemployment - Disposable income - Energy access and price
Sociological/cultural conditions	**Technological conditions**
- Population demography - Income distribution - Social mobility - Lifestyle changes - Attitudes to work and leisure - Consumption - Education level	- Government spending on public research - Focus on technology - New discoveries/development - Technology transfer - Rates of obsolescence

Source: http://www.businessballs.com

2.2 Customer Service

Basically, the focus of operation aspect of logistics is to ensure seven rights to its customers: the right amount of the right product at the right time at the right place in the right condition at the right price with the right information, providing time and place utility in the transfer of goods and services between buyer and seller.

Customer service is one of the most powerful elements available to the final assessment of one strategy selection. Under the market-driven situation, the aim of logistic management is to enhance customer satisfaction with acceptable costs. After manufacturing outsourcing, supply chain has been enlarged and business scope has been broadened. Customer service assessment is more important than before.

2.2.1 Service Standards

Customer service level can be assessed from several metrics, such as fill rate, stock levels, delivery frequency and reliability, order cycle time, response time, complete orders, customer complaints and etc, which can give us a clear and objective understanding of the customers' requirements. Apparently, there are so many aspects to indicate standards. And in any particular strategy, some of these elements will be more important than others. So we try to select certain key areas, which are essential to our research study within lengthened global pipeline operation:

- **Lead time**
  Lead time refers to elapsed time from placing order until the shipment is received, inspected and made ready for use. International trade makes lead-time long and difficult to predict.

- **Stock availability**
  Stock availability relates to the percentage of demand for a given line item (stock-keeping unit, or SKU) that can be met from available inventory[5].

- **Order fill rate**
  What proportions of orders are completely filled? Order fill rate equals to number of customer orders divide number of orders delivered complete.

- **On-time delivery**
  On-time delivery refers to percentage of times the customer's delivery requirements are actually met on time.

- **Shipping losses**
  Shipping losses refers to production losses because of damage, stealing or other uncertainty situations.

2.2.2 Interrelationships

Now we determine customer service standards to be examined. Afterwards, we want to know interrelationships among them (See Figure 2.3), which help to make further assessment systematic.

[5] Christopher M. (1998), "*Logistics and Supply Chain Management*", Prentice Hall

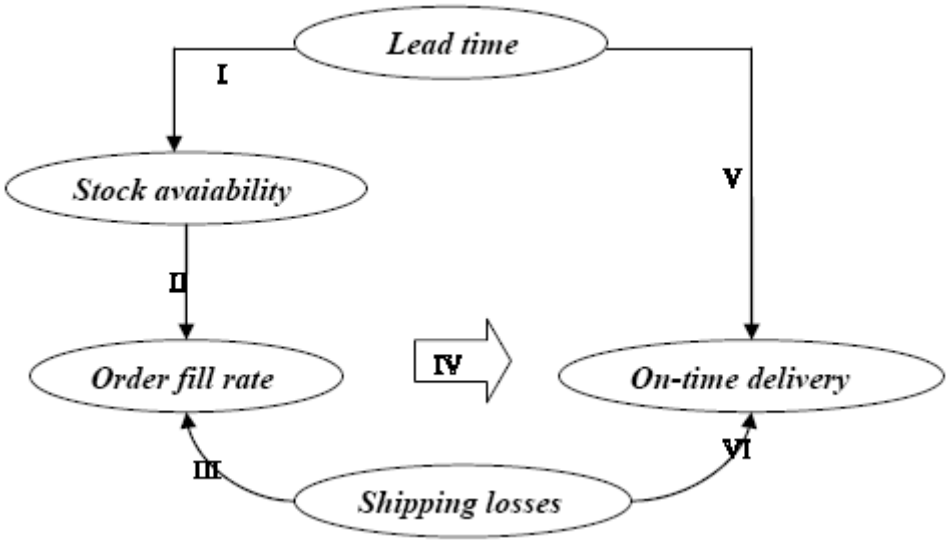


Figure 2.3: Interrelationships among Service Standards
Source: Own

There are six lines drawn in the Figure 2.3 and arrows reflect influencing directions. We try to explain these relationships one by one, based on number Ⅰ – Ⅵ labeled.

Ⅰ. Outsourcers need to face situation of longer lead time within global operation, which leads to increased σ_c, by using Equation (2-1), when other factors remain. If outsourcers remain original safety stock, k goes down (Equation 2-3). According to Equation (2-2), while reorder quantity per order keep constant, stock availability decreases with σ_c and $E_{(k)}$ increases.

- $\sigma_c = \sqrt{\mu_l * \sigma_d^{\,2} + \mu_d^{\,2} * \sigma_l^{\,2}}$ …… (2-1)

σ_c = standard deviation of combined probabilities
μ_l = average lead time
σ_d = standard deviation of daily demand
μ_d = average daily demand
σ_l = standard deviation of lead time

- $v = (1 - \sigma_c * E_{(k)}/Q) * 100$ …… (2-2)

v = stock availability
Q = reorder quantity per order
$E_{(k)}$ is the so called partial expectation of the normal distribution.

- Safety stock = $k * \sigma_c$ …… (2-3)

"k" is safety factor that corresponds with $E_{(k)}$, and their development direction is reverse according to table.

Mainly two delivery modes from manufacturers to customers are used:
Ⅱ. Transport from plants to warehouses or distribution centers and then distributed to final markets. Here, stock availability equals to order fill rate.
Ⅲ. Directly transport from plants to final markets. Under this situation, shipping losses percentage determines order fill rate.

Ⅳ. It is also common for companies to track percentage of back-orders within stated period. A hundred percentage order fill rate does not lead to high customer satisfaction absolutely. For example, if 20 percentage products were completed in 3 days and 40 percentage products in 9 days, there is great inconsistency. Now we need another measure – 'on time delivery' to assess.

Ⅴ. There are two concepts containing within "lead time": average lead time and reliability. The latter one impacts achievement of on-time delivery.

Ⅵ: Shipping losses induce uncertainty of whole pipeline. Increased percentage of shipping losses leads to depressed on-time delivery.

2.3 Cost Efficiency

One objective of manufacturing outsourcing is to reach low manufacturing costs through economies of scale in low resource and labor cost areas. But this strategy may lead to higher logistic costs, varying by company and by industry depending on practical distribution system, logistic operation and market orientation.

When deciding the strategy of manufacturing outsourcing, the executor believes that the manufacture costs will decrease apparently, however, decreasing costs in certain part will lead to increased costs in other parts, for example, after manufacturing outsourcing, transaction costs will increase at the same time. **Total cost management** refers to the process of identifying and developing a strategy for managing the costs associated with initiating and managing a manufacturing outsourcing project. So some break-even analysis is needed and looking for one balance point is the important step to decide whether the strategy is successful. Total cost management can help us consider minimization of total costs.

On the other hand, we have to mention the concept of **dis-economy of scale**, which means costs increased by business broadened. For example, when one company only procures manufactures and sells among small region, this company needs not to consider many problems brought by longer distance operation. However, when range of business extends to larger region, this company should face more problems that will make costs increased.

2.3.1 Total Costs on Logistic Objective

Figure 2.4 illustrates logistic objective of cost trade-offs, given the customer service objective. **Total costs = Transportation costs + Warehousing costs + Order processing and information costs + Lot quantity costs + Inventory carrying costs.**

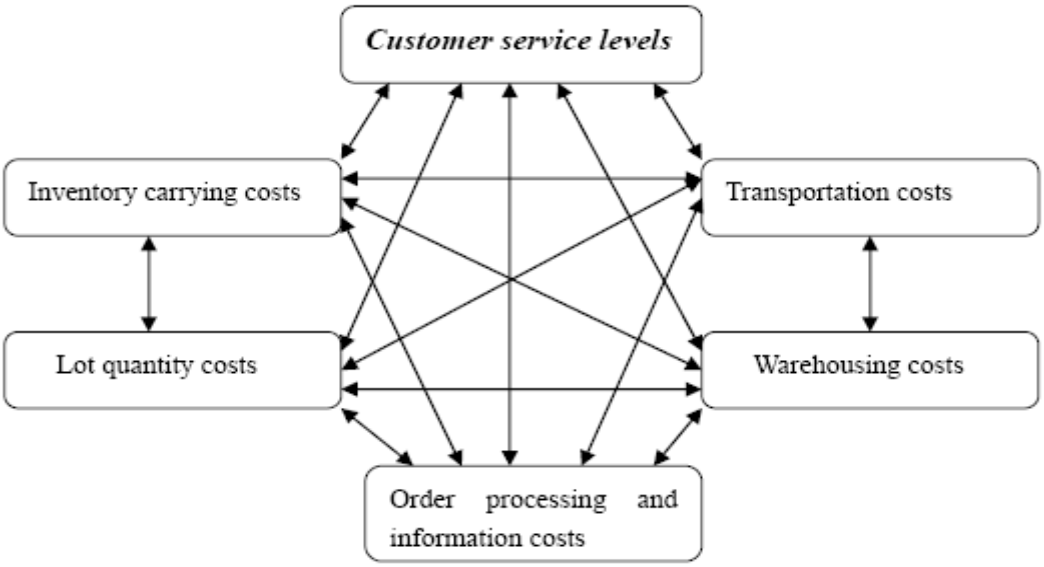


Figure 2.4: Cost Trade-offs on Logistic Objective
Source: James R. Stock et al, 2001, "Strategic Logistics Management"

Strategy of manufacturing outsourcing to China influences each individual cost component and the total cost as well.

- **Transportation costs**

✓ Overall transportation costs increases due to lengthened pipeline.
✓ In order to satisfy needs of demand-based supply chain, numbers of consolidation and break-bulk increase, sometimes inducing economy-of-scale criteria may not be applied occasionally.

- **Warehousing costs**

✓ Normally, warehouse operating costs decreases because major operating cost is the labour cost. However, we have to consider prophase-training cost.
✓ It is hard to estimate capital costs, including materials handling and space costs, because uncertain SKU and warehouse layout after manufacturing outsourcing.
✓ Facility establishment costs increase dramatically if new warehouses are established.

- **Order processing and information costs**

✓ Order processing and information costs increase, as more operators may be involved among whole supply chain, which leads to more information system investment.
✓ Different operators have different information system. System exchange makes much trouble and wastes.
✓ High percentage of uncertainty leads to more times of order placed and prcessed.

- **Lot quantity costs**

✓ Lot quantity costs are not impacted much by distance changing.

- **Inventory carrying costs**

The average inventory carried depends on cycle stock and safety stock (See Figure 2.5).

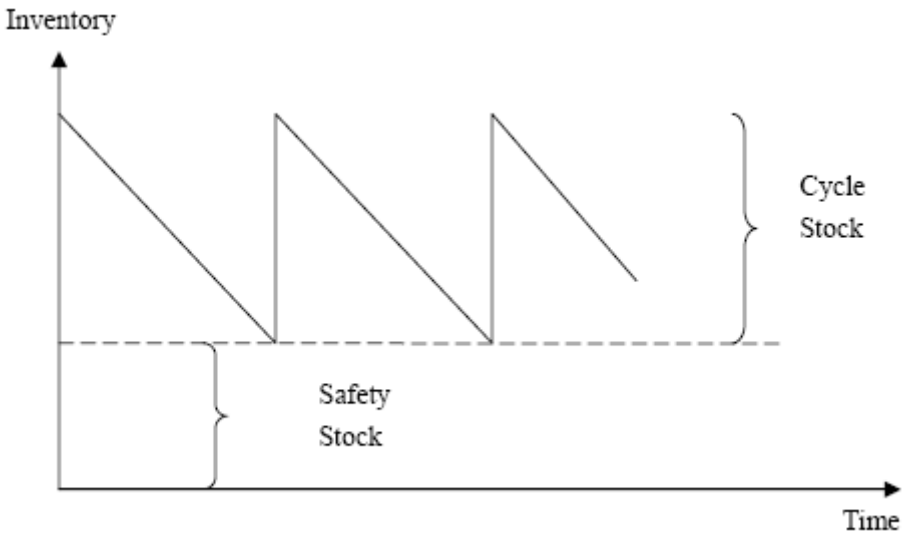


Figure 2.5: Average Inventory Picture
Source: Jensen A., 2004, "Trade Facilitation and International Logistics Performance", Lecture Notes

✓ Holding cost for cycle stock

Holding cost for cycle stock = Q / 2 * I * C …… (2 - 4)
Q = reorder quantity
I = capital rate + insurance rate
C = unit cost

It is difficult to estimate changing trend of holding cost for cycle stock after offshore manufacturing outsourcing. But the Equation 2-4 reflects that cycle stock holding costs depends on geographic location of warehouses or distribution centres. Local low capital rate and insurance rate helps to reduce costs of tied-up capital of warehouses (I) and low operation costs decreases supplier price (C).

✓ Holding cost for safety stock

Holding cost for safety stock = $I * C * k * \sigma_c$ …… (2 - 5)
$E_{(k)} = (Q / \sigma_c) * (1- v)$ …… (2 - 6)

We need to keep stock availability (v) not decrease. With σ_c decreases (discussed in 2.2.2), $E_{(k)}$ falls accordingly (Equation 2-6). Under situation of increased k and σ_c, holding cost for safety stock goes up if there are not any changes on I and C (Equation 2-5).

2.3.2 Other Relevant Costs on Customer Service Objective

There is a danger that some companies may take too narrow a view of cost and only pay their attention on manufacturing cost reduction. In reality, longer pipeline leads to much more customer service problem. The costs to maintain customer service level may outweigh the production cost saving.

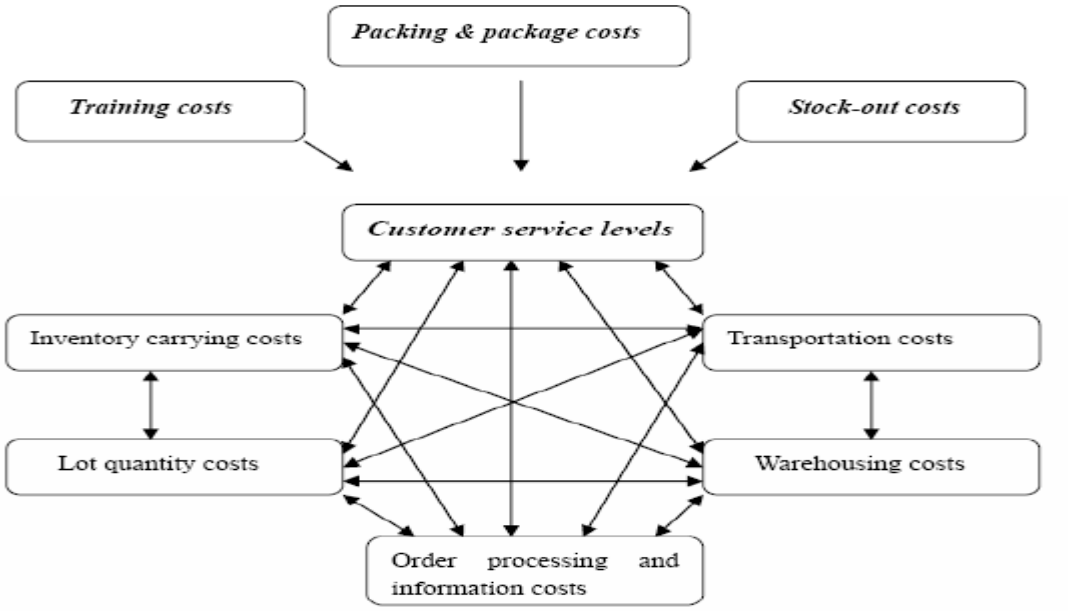


Figure 2.6: Cost Trade-offs on Logistic Objective & Customer Service Objective
Source: James R. Stock et al, 2001, "Strategic Logistics Management" (Modified)

In Figure 2.6, we try to develop Figure 2.4 from the angle of related costs on customer service objective. And some main costs concerned during manufacturing outsourcing operation are stated.

- **Training costs**

Larger supply chain picture consists of more operators than before. Enterprises need to train local vendors and suppliers to ensure products or services quality, and transaction process smooth and efficient. Training costs enlarge dramatically after manufacturing outsourcing.

- **Packing & package costs**

In order to prevent damaging during long distance transportation and sorting, level of packing and package must be improved, and correspond costs go up.

- **Stock-out costs**

Stock-out costs = $D * B * E_{(k)} * \sigma_c / Q$ …… (2-7)
D = total demand per year
B = back order cost

Safety stock = $k * \sigma_c$ …… (2-3)
"k" is safety factor that corresponds with $E_{(k)}$, and their development direction is reverse according to table.

If we suppose total demand per year (D) and reorder quantity (Q) don't change, outsourcers do not increase their safety stock level, decreased k (Equation 2-3) leads to increased $E_{(k)}$ and σ_c (discussed in 2.2.2 & 2.3.1) lead to higher stock-out costs (Equation 2-7). And another point needs to be noticed: back order cost (B) refers to stock-out cost

per unit in regional warehouse, which depends on local labour costs and other operational costs.

In order to avoid possibility of related costs on customer service objective, companies can choose to use some methods, for instance, improve information system exchange, and strengthen quality management level. However, opportunity costs should be considered meanwhile.

Therefore, we may find two groups of trade-offs when assessing performance of whole supply chain after manufacturing outsourcing:

- Trade-off between manufacturing cost and logistic costs
- Trade-off between customer service and other related costs

2.4 Consequences of Managing the Global Pipeline

Each company selecting manufacturing outsourcing seeks cost reduction by not influencing original brand quality, through scale economies on purchasing and production. Some of them also want to develop their business in the new market. However, we have to recognize adopting this strategy also brings certain challenges. The logistic tasks may become complexity, influenced by many factors such as shorter product life cycles, increasing number of supply and demand channels and broadened range of product types.

2.4.1 Logistical Implication

Harrison, A. et al[6] (2002) give some logistical implications for inventory, handling and transport policies after international operation.

Inventory

Centralizing inventories can hold advantages on inventory-holding costs and inventory levels. The aim is to balance minus allocations, reservations, backorders and quantities held for quality problems, satisfying the needs of upstream and downstream operators, although sometimes, centralize inventory leads to unnecessary transport and waste.

Meanwhile, inventory centralization helps to satisfy demands of local market through improving customer service level there (See Figure 2.7).

[6] Harrison, A., Hoek, V., (2002), "*Logistics Management and Strategy*", Prentice Hall

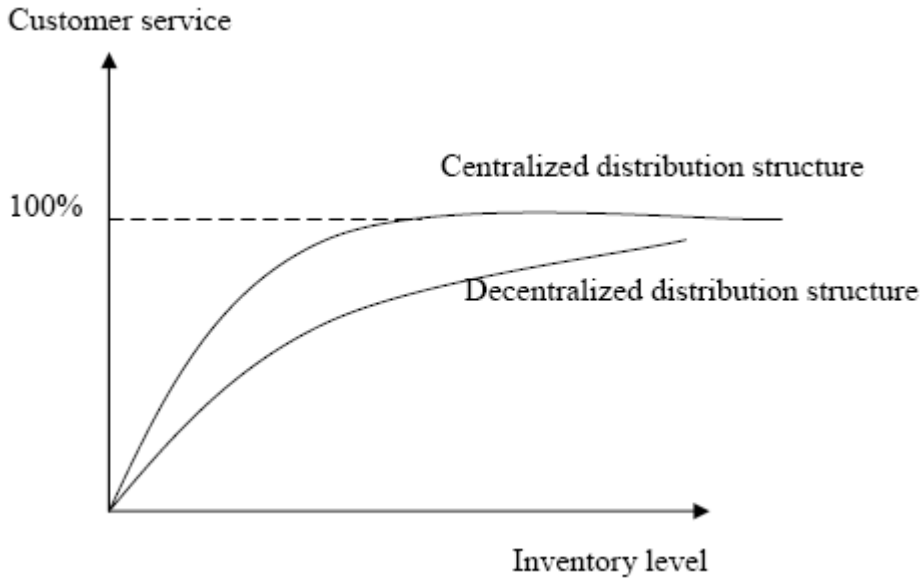


Figure 2.7: Customer Service and Inventory Level
Source: Roger Lindau, 2004, "Managing Logistics Internationally", Lecture Notes

Handling

Different countries have different logistic service practices. And various facilities may have their own implementation regulations. These two aspects influence handling operation during the process of internationalization.

Transport

Time to market is the demand from final market. But extended pipelines lead to international centralisation. There will be summarised in terms of trade-off the benefits from global consolidation (See Figure 2.8) and reaching a timely manner.

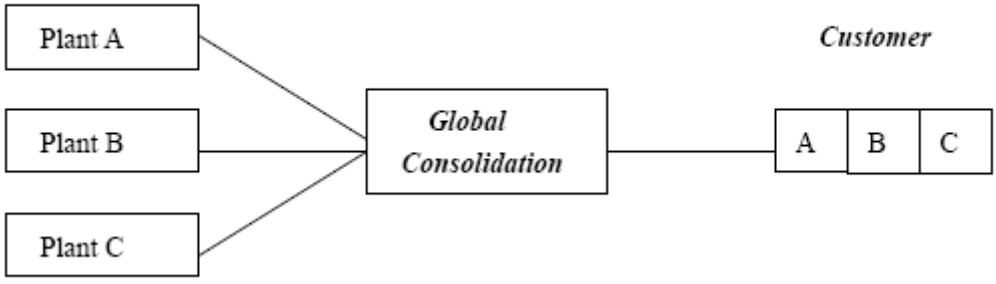


Figure 2.8: Global Consolidation
Source: Bowersox, et al, 2002, "Supply Chain Logistics Management", p.383

2.4.2 Some Challenges

Clearly managing the global supply chain network of material and information flows involves some additional considerations. Some factors can be identified in the planning of

manufacturing outsourcing, creating challenge to logistic management and affecting logistic consequences[7]:

- Extended lead times of supply

Figure 2.9 demonstrates general meaning on concept of lead time. Now, we may face the increased lead time gap after manufacturing outsourcing.

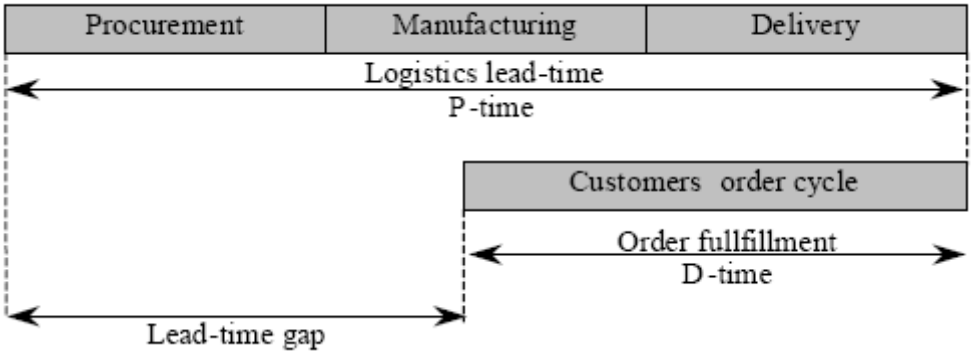


Figure 2.9: P:D ratio
Source: Harrison, A., et al, 2002, "Logistics Management and Strategy", p.119

- Extended and unreliable transit times

Uncertainty of international logistic pipeline induces transit time unreliable, which makes planned and unplanned inventories higher than optimal situation. Uncertainty leads to high safety stocks or costly stock-outs, and higher inflexible costs of production changes or production stops.

- Multiple consolidation and break bulk options

In order to achieve economies of scale and make distribution system easily operated, consolidation is one of the ways used in international pipeline management. The location of consolidation and break-bulk points should consider both geographical factor and tax factor to realize one economic and reasonable assignment.

- Multiple freight mode and cost options

Different freight mode options should be assessed for advantages and disadvantages in terms of cost, speed and availability. There are different assessment standards and methods within different industries, based on product types and geographic locations.

2.4.3 Location Analysis

In the location decision-making process, four general steps are suggested to follow:

- Deciding upon the appropriate level of centralisation and decentralisation
- Selecting relevant location criteria
- Selecting criteria weightings
- Trade-off analysis of structures and relevant locations

[7] Harrison, A., Hoek, V., (2002), "*Logistics Management and Strategy*", Prentice Hall

Applicable locations of factories and other support facilities of different levels of suppliers help to make the whole distribution system effective and efficient.

2.4.4 Tax Issues

Moving production abroad may create both tax opportunities and risks. Cross-border transfers lead to serious customs duty implication. On the other hand, moving to other countries may provide opportunities to shift income to low tax jurisdictions.

2.5 Summary

This chapter is a general guideline for literature review. Figure 2.10 illustrates the structure of this chapter, and also the development process of our historical study. The first section provides some basic knowledge and information on manufacturing outsourcing. The section on how to manage global pipeline presents some challenges among global supply chain operation. And contents of logistic consequences are focused on two aspects: customer service and cost efficiency. Some specific aspects are listed and discussed further during our further research process.

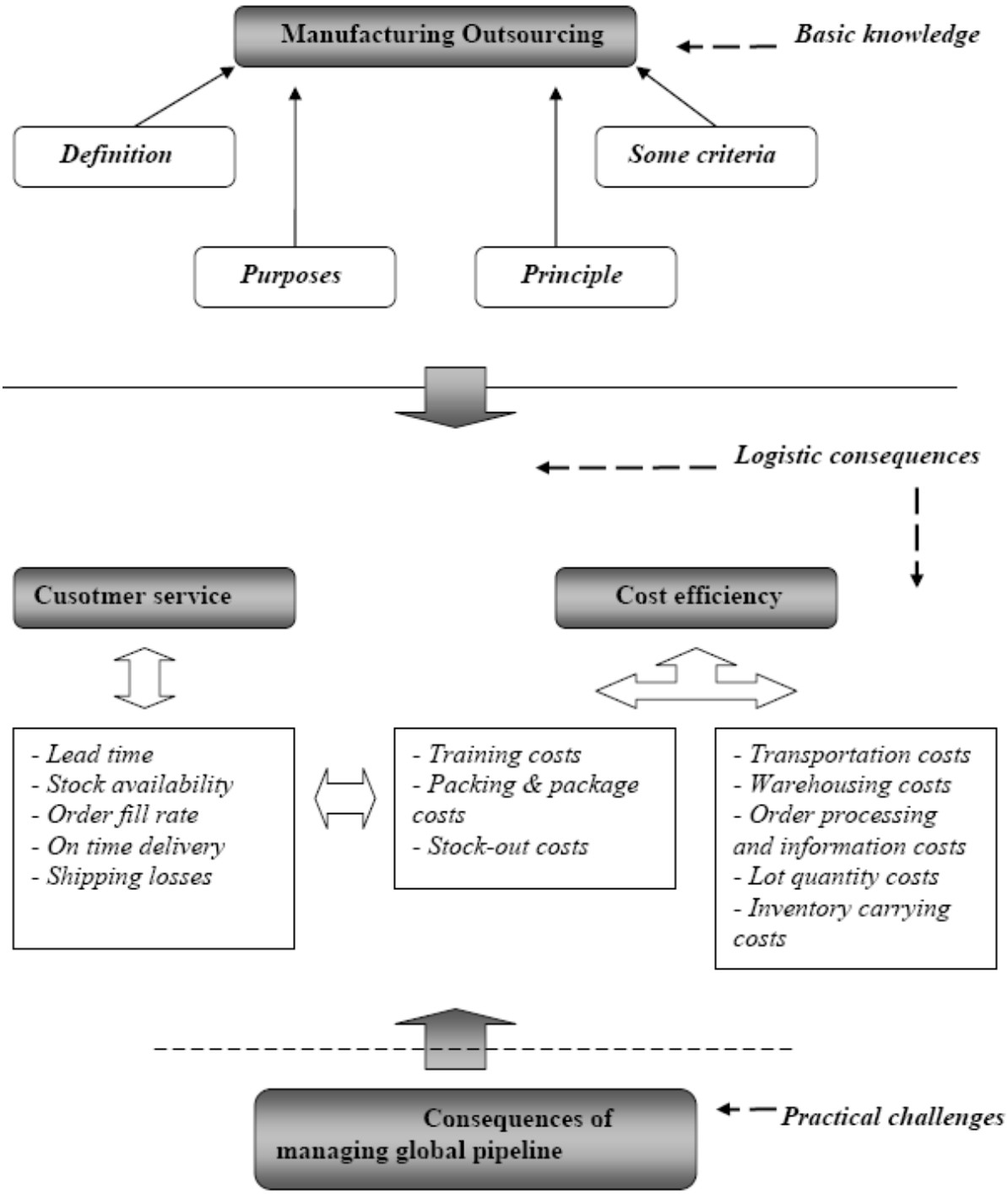


Figure 2.10: Structure of Theory Framework
Source: Own

3 PROBLEM ANALYSIS

Now China is becoming one important manufacturing outsourcing destination for Nordic companies. However, manufacturing outsourcing to other countries not only strengthens companies' competence, but also brings a lot of problems on logistic operation due to the extension of supply chain globally. The main purpose of our thesis, as we mentioned in the first chapter, is to find out the logistic consequences of manufacturing outsourcing to China for Nordic enterprises. Therefore, our research will focus on logistic operation before, during and after manufacturing procedure. Some related consequences will also be discussed from the aspect of logistic process.

3.1 Research Purpose and Research Sub-problems

The main research purpose of our thesis is to find out the **Logistic consequences of manufacturing outsourcing to China for Nordic enterprises.** In order to manage this main research purpose, we are going to divide concerning problems into following two sub-problems:

Sub-problem 1: What is the experience of Nordic companies' manufacturing outsourcing to China? What logistic consequences do they encounter during this procedure? How do these consequences affect the running of global supply chain?

The first question is to show practical situation of manufacturing outsourcing within selected industries from Scandinavian countries and to identify logistic consequences and problems encountered in China. What kind of logistic consequences will be produced by strategy of manufacturing outsourcing to China? And will these consequences eventually affect end customers? On the basis of brief outline of the general situation about Nordic enterprises' manufacturing outsourcing to China, we will make several case studies in more detail. After the descriptive part on the logistic operation of each case, comparison and summary will be made either within the same industry or among different business scopes.

Sub-problem 2: What kind of factors could influence the logistic consequences of manufacturing outsourcing to China for Nordic companies?

Generally we can figure out that logistic operation is highly private for an organization, which means, the logistic consequences of manufacturing outsourcing are primarily decided based on the outsourcing decisions made by companies. And then, specialties of outsourcing process, concerning products and other relevant factors could also lead to different logistic situation. Thus analysis from the perspective of internal decision of Nordic enterprises is necessary.

On the other hand, selecting China as one manufacturing outsourcing location is another key for our analysis. The logistic problems encountered in China maybe various from those faced in other countries. Accordingly, the logistic consequences of manufacturing outsourcing to China differs a lot from that of local production in Nordic countries or manufacturing outsourcing to other developed countries, which enjoy rather high level in logistic service. Even for other developing areas like India or Thailand, the result will be somewhat unlike in terms of different geographic characteristics and cultural backgrounds. Therefore, we also need to make analysis from the perspective of environmental situation in China.

3.2 Assessment on Logistic Consequences

The strategy of manufacturing outsourcing will influence logistic process because of longer geographical supply chain operation and more complex logistic operation. We try to make the "checklist" of these effects to show overall logistics consequences. In order to make it clearer, we outline the logistic consequences from the perspective of cost efficiency and customer service with each items listed as bellows and Figure 3.1 also demonstrates relationship among these consequences:

- Customer service
  - ✓ Lead time
  - ✓ Stock availability
  - ✓ Order fill rate
  - ✓ On-time delivery
  - ✓ Shipping losses
- Logistic costs
  - ✓ Transportation costs
  - ✓ Warehousing costs
  - ✓ Order processing & information costs
  - ✓ Lot quantity costs
  - ✓ Inventory carrying costs
  - ✓ Other relevant logistic costs
    - ♦ Training costs both for suppliers & employees
    - ♦ Packing & package costs
    - ♦ Stock-out costs

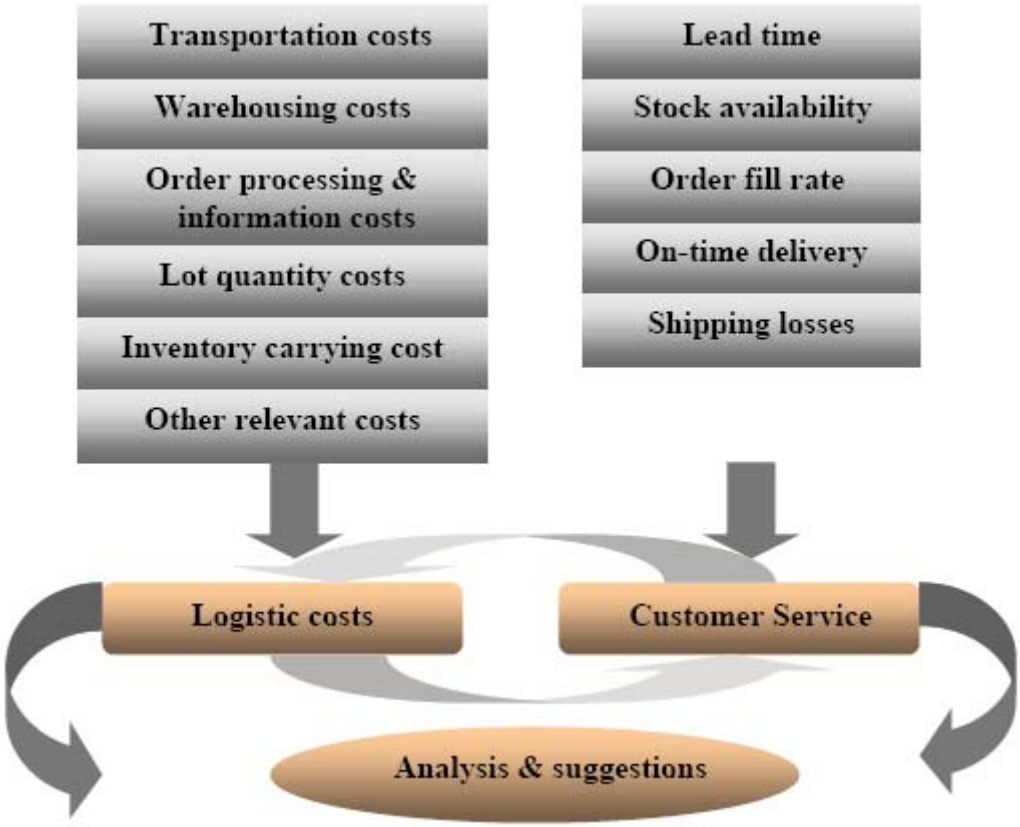


Figure 3.1: Logistics Consequences Discussed in Thesis
Source: Own

However, on considering the availability of detailed data on cost calculation from interviewers is always low, we may concentrate on the general description like:

- Very high
- High
- Medium
- Low
- Very low

3.3 Information Needs

Once the gauge for evaluating logistic consequence is launched, we need relevant information for further research. The information required is roughly divided into three parts to solve sub-problems of this thesis.

- **Brief introduction about Nordic enterprises' manufacturing outsourcing to China:**
  - ✓ Driving factors of manufacturing outsourcing to China
  - ✓ Pros & cons of manufacturing outsourcing to China
  - ✓ Status of manufacturing outsourcing in China for Nordic companies

- Number
- Scope of services
- Location

- **General knowledge about China**
  - ✓ Logistic infrastructure & service level resulted by economic development
  - ✓ Geographic characteristics
  - ✓ Political constraints
  - ✓ Cultural barriers

- **Company information:**
  - ✓ Background
  - ✓ Characteristics of products
  - ✓ Target markets and customers
  - ✓ Situation of import & export
  - ✓ Information on logistic & supply chain operation
    - Mode of transport
    - Location of warehouse & distribution centre
    - Inventory level
    - Information exchange with suppliers & distributors
    - Procurement of raw materials & components
  - ✓ Customer service on logistics & supply chain management
    - Lead time
    - Stock availability
    - Order fill rate
    - On-time delivery
    - Shipping losses
  - ✓ Logistic costs
    - Transportation costs
    - Warehousing costs
    - Order processing & information costs
    - Lot quantity costs
    - Other relevant logistic costs
      a) Training costs both for suppliers & employees
      b) Packing & package costs
      c) Stock-out costs
  - ✓ Future development

3.4 Research Model

Figure 3.2 illustrates general interrelationships among research purpose, sub-problems, information sources and some detailed discussed aspects among each research direction.

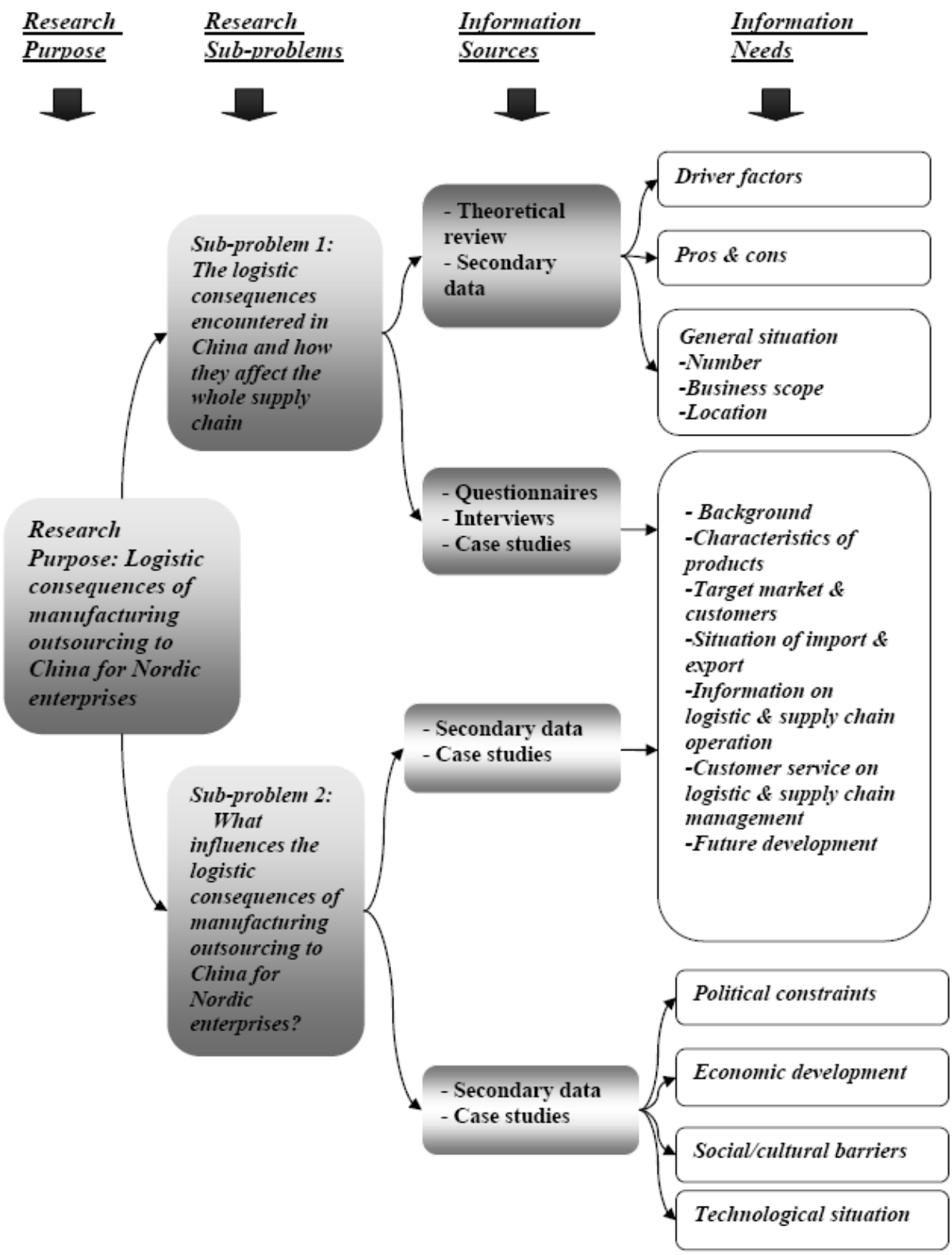


Figure 3.2: Research Model
Source: Own

4 METHODOLOGY

The term methodology refers to the way in which we approach problems and seek answers. It applies to how our research development is conducted. This chapter is the guideline through our work on the thesis. The methods selected during the phrases of preparing, writing and conducting the thesis are assessed and presented.

A well-defined methodology for achieving the results we need is essential to our thesis. With good and suitable methodology, the process of reaching our aim will become easier and more systematic. On the other hand, without methodology, we may be confused when facing the complicated data and large amount of information and deviate from our original target. Now, we can ask ourselves different questions during different phrases and find interrelationships among these subtasks. In other words, we will not wonder problems such as "Where to start?", "Where to finish?", "How to get information needed?" and so on.

4.1 Choices of Methods for the Research

In order to carry out a market research defined by our thesis study, it is necessary to introduce the use of multitude methods, in order to combine their advantages to collect information we need. The choices of methods depend on the objective of research study.

4.1.1 Quantitative and Qualitative

The most common methods used to collect information are quantitative research and qualitative research.

Many writers discuss difference between these two methods. According to Cresswell, J. W.[8] (1998), quantitative research is defined as "an inquiry into social or human problems based on testing a theory composed of variables, measured with numbers, and analyzed with statistical procedures, in order to determine whether the predictive generalizations of the theory hold true." And qualitative research is concerned with developing explanation of social problem, can be defined as "an inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting."

In general, compared with quantitative research, qualitative research is narrative, description "soft" data, and subjective, deriving from social science and emphasizing inductive analysis. Measurements of quantitative research tell us how often and how many people behave in a certain way, but cannot solve the problem of "why", "how" people behave like this. We need qualitative research when we want to solve similar problem.

After revealing textbooks and articles, some comparisons between the nature of quantitative and qualitative research will be listed in Table 4.1:

[8] Cresswell J. W., (1998), "*Qualitative Inquiry and Research Design: Choosing among Five Traditions*", Sage Publication, Inc

Table 4.1: Comparison between Quantitative Research and Qualitative Research

Quantitative research	***Qualitative research***
• Emphasis on testing and verifications • Focus on facts and/or reasons for social events • Logical and critical approach • Controlled measurement • Objective 'outsider view' distant from data • Hypothetical-deductive; focus on hypothesis testing • Result oriented • Particularistic and analytical • Generalization by population membership	• Emphasis on understanding • Focus on understanding from respondent's/informant's point of view • Interpretation and rational approach • Observations and measurements in natural settings • Subjective 'inside view' and closeness to data • Explorative orientation • Process oriented • Holistic perspective • Generalization by comparison of properties and contexts of individual organism

Source: Ghauri, P. et al, 2002, "Research Methods in Business Studies"

4.1.2 Deductive and Inductive

There should be another discussion about whether deductive research or inductive research approach will be used. Gill J. et al[9] (1997) state their definition: deductive research means "the development of a conceptual and theoretical structure prior to its testing through empirical observation". And inductive research "involves moving from the observation of the empirical world to the construction of explanations and theories about what has been observed."

According to Figure 4.1, deduction is on the left side of Kolb's learning cycle, starting with abstract conceptualization, moving on to testing, while induction starts from the right side, "learning by reflecting upon particular past experiences and through the formulation of abstract concepts, theories and generalizations that explain past, and predict future, experience."

[9] Gill, J., Phil, J., (1997), "*Research Methods for Managers*", Paul Chapman Publishing Ltd

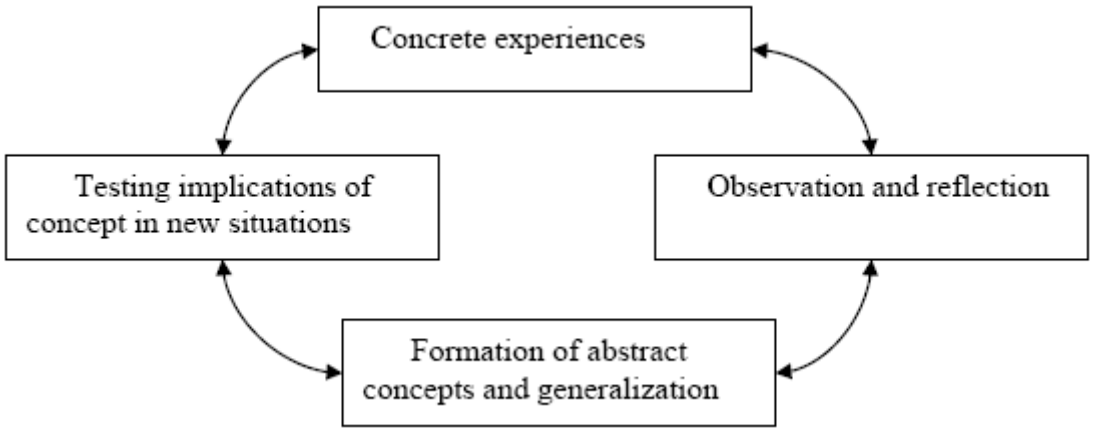


Figure 4.1: Kolb's Experimental Learning Cycle
Source: Kolb, D. A., et al, 1979, "Organizational Psychology: an Experiential Approach"

4.1.3 Primary and Secondary

What are the sources of data collection? Where can we find the right data? There are two groups of data sources, called primary data source and secondary data source.

A first distinction can be made between primary data and secondary data sources. Primary data are original data collected by us for the research problem at hand. Secondary data are information collected by others for purposes that can be different from ours[10].

The main advantage of primary data collection is that they are collected for the project or purpose at hand, so they are more consistent with our research purpose and research questions. The disadvantage is long time and high cost needed to take the data. It is very difficult to access the information we need and we have to be fully dependent on the willingness and ability of respondents.

On the other hand, the foremost advantage of using secondary data is time and money saving. We only need to go to the library to locate the sources, which can promise the process rapid and information reliable. But we also should be careful on the "fit" problem.

4.2 Employed Research Design

During the process of research design, we want to employ and combine different methods. A combination of quantitative research and qualitative research will be used, which is useful and applicable to our study. Some related research methods, such as survey; interview and case study are associated in different research phase.

Meanwhile, we use the inductive research approach to find out appropriate method to describe and evaluate our problem. It starts with general problem, down into observation, hypothesis.

[10]Ghauri, P., Gronhaug, K., (2002), "*Research Methods in Business Studies*", Prentice Hall

Afterwards, a study of theories is used to pick up essential related knowledge to support specific research process.

4.3 Employed Data Collection Methods

There is no best research method and it is unnecessary to distinguish the differences among different methods, we only need to look for the most suitable and effective combination from a large amount of options to carry out our investigation. In order to approach the problems linked to manufacturing outsourcing, several basic study methods are proposed. Some kinds of quantitative methods are used to draw a broad view, and then qualitative research method can help us get deeper view on the problem analyzed.

Our thesis starts from secondary data collection, and then questionnaire, interview and case study are employed in sequence. In Figure 4.2, the included data sources and some data collection methods of our thesis are illustrated:

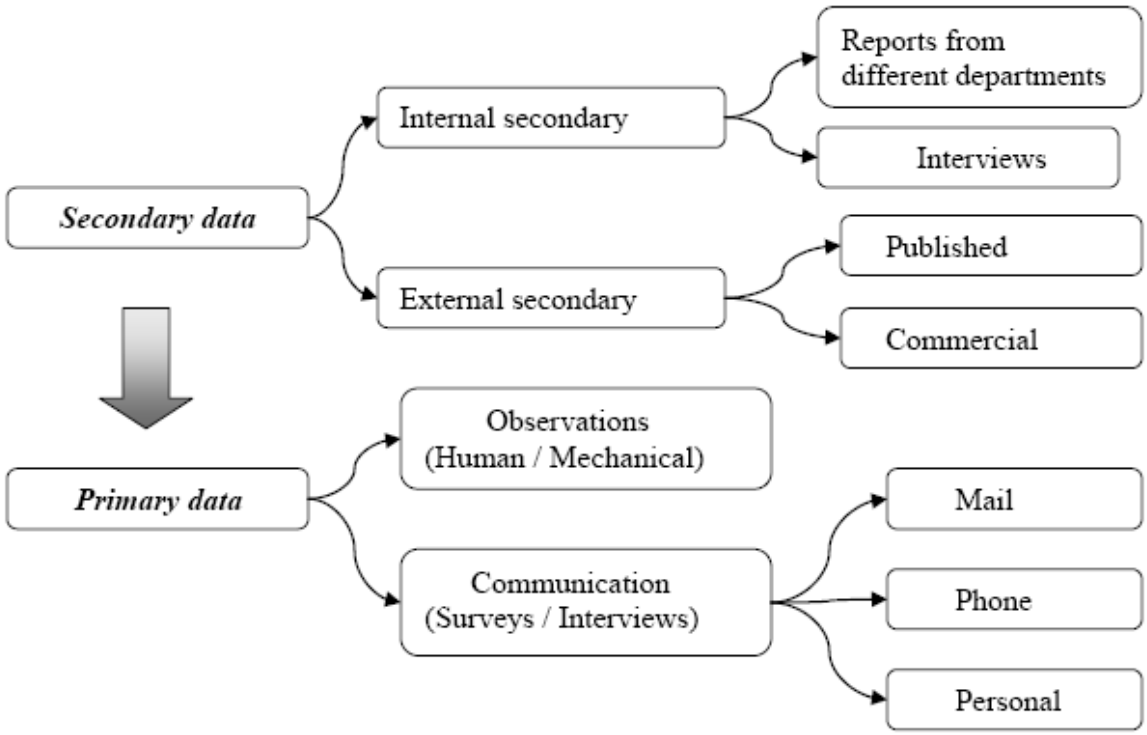


Figure 4.2: Data Sources and Data Collection Methods of Thesis
Source: Own

More specifically, we divide process of data collection into three parts to make it more clear and practicable:

- Firstly, we make use of the secondary data collection method, which is based on existing public database, such as books, journals, Internet, to find enough references to make good description and assessment of manufacturing outsourcing in China.
- Secondly, questionnaires and personal interviews with respondents in selected industries will be made to draw the detail picture of logistics status of Nordic enterprises manufacturing outsourcing to China.

- Finally, a set of case studies are proposed to try to conclude our thesis and propose possible recommendation to logistics consequences existed by reaching some real practical examples.

4.3.1 Questionnaire

Questionnaire is among the most popular data collection methods. And there are two major types of questionnaires: descriptive and analytical. The most important issue is to know what information we want to have, which will direct our questions shown to our respondents. Both descriptive and analytical questionnaire are applied in our research.

During the construction of questionnaire, we have to consider many problems, for instance, degree of importance and relevance of individual questions, how the questions are to be answered, the length, and the precise used words of our questionnaire. All these factors will influence whether we can get information required.

4.3.2 The Interview

The interview is one of the major sources of data collection due to its relative accessibility and low cost. Namely, it is organized through asking and answering questions. There are also some disadvantages about methods. The first one is time consuming and another important disadvantage is that we can't avoid existence of bias of different respondent. Additionally, we also can't predict and prevent different understanding on the problems between respondent and us, as an interview is one joint product of what interviewees and interviewers discuss and how they talk with each other.

To get reliable and valid answers and make efficient comparison, we try to broaden scope of respondent according to some principles. And we select highly structured interview, which means asking the same questions to different people from different companies, at the same time, differences among different companies are not neglected, especially those points affecting logistics operation. Besides these methods, we adopt the method of observation to validate consistency between what respondent said and how they actually behave.

4.3.3 Case Study

Case study is marked by periods of intense use and intense disuse. Case study can be single or multiple cases design. Yin[11] (2003) recommended the use of case-study protocol as part of a carefully designed research project that would include the following sections:

- Overview of the project (project objectives and case study issues)
- Field procedures (credentials and access to sites)
- Questions (specific questions that the investigator must keep in mind during data collection)
- Guide for the report (outline, format for the narrative)

[11] Yin, R., (2003), "*Case Study Research: Design and Methods*", Sage Publications, Inc

In addition, documents, interviews, direct and participant observation are suggested to reach sources of evident in case studies. Of course, it is not the entire and ordered list.

There are some advantages of this method:

- Rich source of information
- Intensive study
- Can focus on rare and extreme cases

Meanwhile, a frequent criticism of case study is that the dependence on one or several unique cases and cannot reach ideal conclusions because observer may be biased and subject is usually aware that they are studied.

So we need to deal with some problems while applying. Firstly, we must consider which case to be selected. And then whether to study a single case or multiple cases should be considered. The more cases we choose, the greater possibilities we can avoid biases, and the greater lack of depth we have to face in our study. The problem of generalization is the most important challenges to us.

Finally, selections of our case studies are focused on several aspects:

- Communication electronics industry
- Textile industry
- Volvo Group
- Ikea Group

Presently, more and more communication electronics enterprises turn to EMS and ODM to manufacture components and final products. Growth in this industry is dramatic, especially in China. As for textile industry, compared with other countries or areas, Chinese manufacturers have enjoyed large price advantage due to low production costs for long time. But problems of trade regulation lead to much barrier within outsourcing process. Volvo Group and Ikea Group are among the most famous Nordic enterprises. Their history of manufacturing outsourcing to China is long and they have reached great performance during recent years. We consider these case studies are representative to our research purpose.

4.4 Research Process

The purpose of these methods employed in our thesis is to look for logistic consequences after manufacturing outsourcing to China. Then our analyses and suggestions are focused on two aspects:

- Evaluate the influencing factors to manufacturing outsourcing to China
- Improve performance of supply chain operation from aspect of logistic process

In general, there are four stages in our research process (See Figure 4.3): problem definition and research planning, information collection, research application and data analysis and conclusions and suggestions.

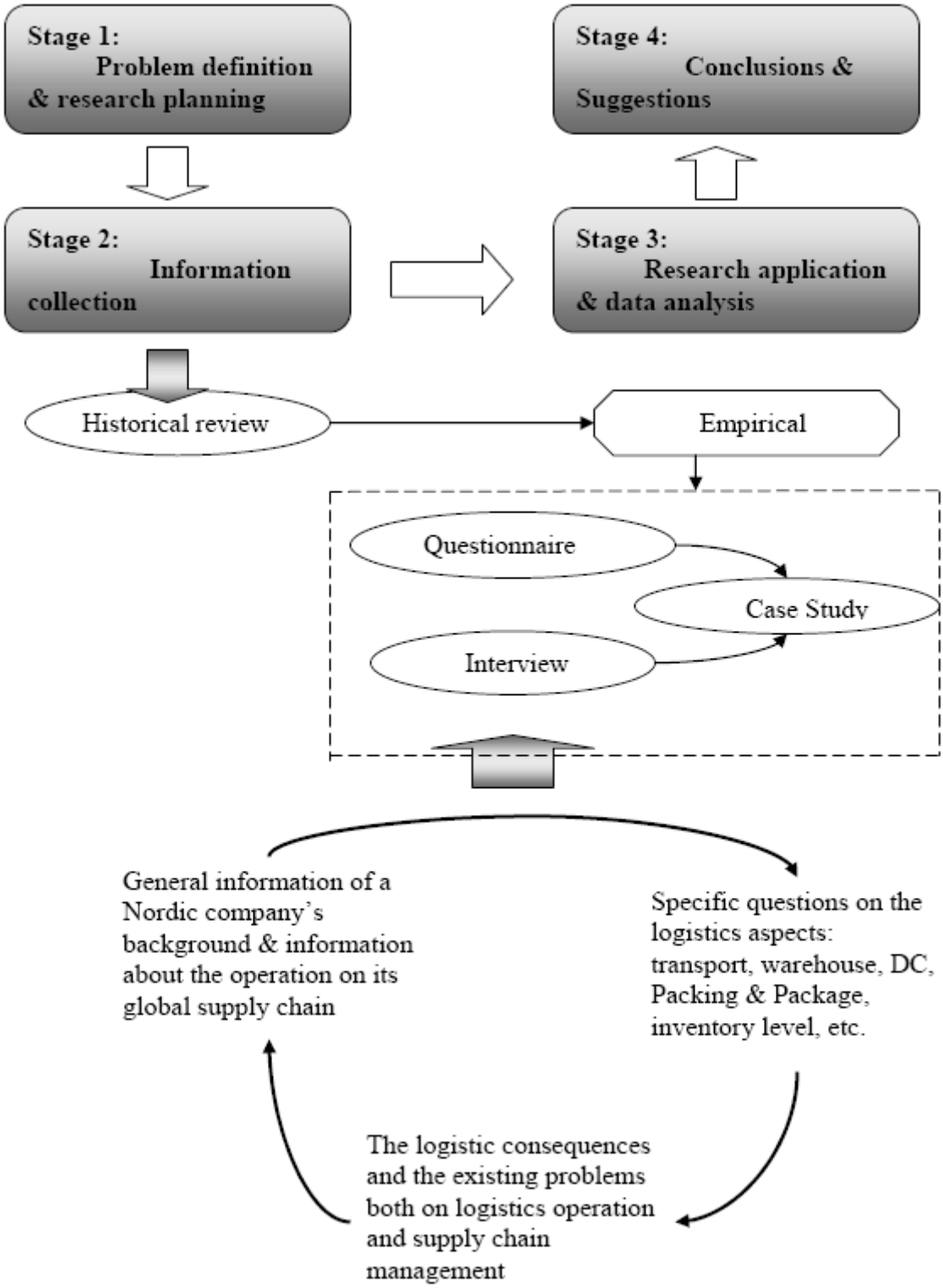


Figure 4.3: Research Process
Source: Own

PART TWO

The second part of the thesis consists of general situation and specific case studies statement, analyses on the factors influencing logistic consequences of manufacturing outsourcing to China, and finally conclusions and suggestions. The research model foundation and structure established in Part One do help to analyze and compare practical problems, conclude logistic consequences and present possible suggestions.

5 GENERAL SITUATION OF NORDIC ENTERPRISES' MANUFACTURING OUTSOURCING TO CHINA

In this chapter, we present general situation of Nordic enterprises, who engage in manufacturing outsourcing to China. Firstly, driver factors are introduced, mainly on cost advantage, market potentiality and quality ensure. Afterwards, we make overall assessment on country selection. Finally, basic backgrounds about business operation of Nordic enterprises are recommended in terms of business sector, procurement, sales distribution and geographic location.

5.1 Driver Factors

Nordic enterprises have learned the importance of maintaining competitive advantage and began to set up their offshore manufacturing business in China. Those Nordic organizations try to keep their core business in-shore and come to look for the off-shore business parts, mainly the manufacturing process in China in order to achieve the sustainable competitive advantage.

5.1.1 Huge and Potential Market

Domestic production and local consumption was once the way of business for Nordic manufacturers. However, with the saturation of Nordic and other European markets as well as the rapid development of Chinese economy, Nordic manufacturers gradually recognize the scale of this potential market and how important it is to extend their own business to this burgeoning country for sustaining the competitive advantage. Large domestic consumer base and increasing consumer purchasing power are enough to make this market appealing to all enterprises.

Furthermore, China is also chosen as the manufacturing base for better supplying the Asian market by some Nordic enterprises regarding its physical proximity with other Asian countries. Normally Asian market could be divided into two categories: highly developed market like Japan, Singapore and rapid developing one, e.g. Vietnam and India. Thus the paralleled move of 'domestic production and local consumption' mode from Scandinavia to Chinese suppliers seems the best way to establish closer and long term relationship to this huge volume of Chinese as well as other Asian customers.

5.1.2 Cost Advantages on Labour, Resource, Lands & Taxes

In addition, due to the obvious local cost advantage, outsourcing strategy focusing on area of China also ensures more affordable product price not only for Chinese customers, but also for other global markets of these Nordic enterprises. Drawn by the principle of extremely low labour rates and low resource costs, Nordic companies are advantageous to move manufacturing offshore, especially to China and other south-eastern Asian countries with extremely low production cost. Hourly wage is an important fraction to drive companies make outsourcing strategy. According to hourly compensation comparison between China and Nordic countries (See Table 5.1), we can find powerful reason of shifting to China, adopted by huge amounts of industry production. Besides the low wage, low costs on land use and

other basic resources for production are also important motivations for manufacturing outsourcing to China.

Table 5.1: Hourly Compensation Comparison

Countries or regions	***Hourly compensation ($)***
China	<1
Sweden	25.18
Denmark	32.19
Norway	31.54
Finland	27.17

Source: "International Comparisons of Hourly Compensation Costs for Production Workers in Manufacturing"

On the other hand, for the purpose of attracting foreign investment, both the central government and the local administrative institutes have established special areas in China during recent years, within which companies could enjoy the advantages of duty free, taxation reduction etc. The main types of these areas are listed as below:

- Economic and technological area
- Free trade zone
- Industrial park
- Bonded area
- Bonded logistic park
- Export processing zone

All the foreign funded companies registered in the above areas can enjoy the preferential policies:

- A reduced income tax rate of 15% for foreign funded companies[12]

- All the imported self-use equipment or instruments less than invest value are exempted from customs duty and import value-added tax and consumption tax except those on the list of Catalog of Imported Products Without Tax Exemption Concerning Foreign-funded Projects[13].

- All the imported raw materials, parts, packing materials, elements, which are needed by processing enterprises, are exempt from customs duty, import value-added tax[14].

- Raw material could also be bought from Chinese market but needed to pay for custom duty, import value-added tax and consumption tax[15].

[12] http://www.bda.gov.cn/, visited on 2005-11-05
[13] http://61.181.251.10/, visited on 2005-11-05
[14] http://61.181.251.10/, visited on 2005-11-05
[15] http://www.nftz.gov.cn/, visited on 2005-11-05

- The export products manufactured by foreign export processing enterprises, except for exercising the management of export passive quotas, shall not exercise the management of import and export quotas, licenses and are exempt from customs duties, value-added taxes and consumption taxes[16].

- The product being sold in the free trade zone is also exempt from productions related value-added taxes[17].

- The products being sold to non-free trade zone shall be levied customs duties, import related value-added taxes and consumption taxes according to the tax rate of the materials and parts purchased overseas for manufacturing[18].

Besides the above mentioned preferential policies, firms also pay different duties on imported parts and components according to where the finished products will be sold out, i.e. to domestic or international markets. The Chinese central government employs a value-added tax (VAT) refunding mechanism to promote exports. Thus Nordic companies could get double privilege via manufacturing outsourcing to China.

5.1.3 Ensured Product Quality

Among advantage factors in China, the productivity of labour force is another important one. Often, not always, once one Chinese plant solved its initial manufacturing problems and moved along its learning curve, the product quality will not be lower than the products manufactured in its original plant in the West. Related high productivity is supported by vast pool of highly educated workforce in China. "Made in China" is now the indicator of both ensured quality and affordable price.

5.2 Pros and Cons of Manufacturing Outsourcing to China

According to Country Selection Criteria, we integrate some advantages and disadvantages of China selected as one manufacturing outsourcing spot. Similarly, costs, environment and people are three main parts discussed, and meanwhile, some other factors such as brand image, control within organization and intellectual property safety are added (See Table 5.2).

Table 5.2: Country Selection Criteria & Brief Status in China

Selection Criteria		**Status in China**		
		Good	***Medium***	***Bad***
Costs	*Labour costs*	X		
	Management and infrastructure costs		X	
	Tax	X		
	Material costs	X		

[16] http://61.181.251.10/, visited on 2005-11-05
[17] http://www.nftz.gov.cn/, visited on 2005-11-05
[18] http://www.nftz.gov.cn/, visited on 2005-11-05

Environment	*Political risks*		X	
	Financial robustness		X	
	Economic development	X		
	Government support	X		
	Potential market	X		
	Infrastructure			X
	Cultural differentials			X
	Efficiency of administrations		X	
	Geographic proximity		X	
People	*Size and quality of labour market*	X		
	Education level		X	
	Language barriers			X
Others	*Brand image*		X	
	Control within organization		X	
	Intellectual property safety			X

Source: Own

5.3 Situation of Manufacturing Outsourcing to China for Nordic Countries

Nowadays, Nordic countries not only represent developed countries with high social welfare, but also rank as the most competitive nations due to their highly developed technology level and sustainable innovation. In this section, basic information on manufacturing outsourcing situation of Nordic enterprises in China will be presented.

5.3.1 Brief Introduction

Being the earliest western countries establishing diplomatic relations with People's Republic of China, Nordic countries also play an important role in China's economic development. As the largest trade partner of Nordic countries in Asia, the booming Chinese market attracts huge investment coming from these countries. It is estimated that the total number of Nordic enterprises investing in China has overreached 1000[19], with specific figure of 268[20], more than 250[21], around 200[22]& around 200[23] from Denmark, Sweden, Finland and Norway

[19] The number of Icelandic companies in China is unavailable now.
[20] Danish Trade Council in China (2005), "*The 2005 Report on Danish Companies in China"*
[21] Swedish Embassy in Beijing, "*China business climate report of 2005*"
[22] http://www.helsinginsanomat.fi/, visited on 2005-09-28
[23] http://www.norway.cn/embassy/embassy.htm, visited on 2005-10-20

respectively (See Figure 5.1). It is estimated that in 2004, Swedish business procured products value at least 6 billion US$ in China for their global operations[24].

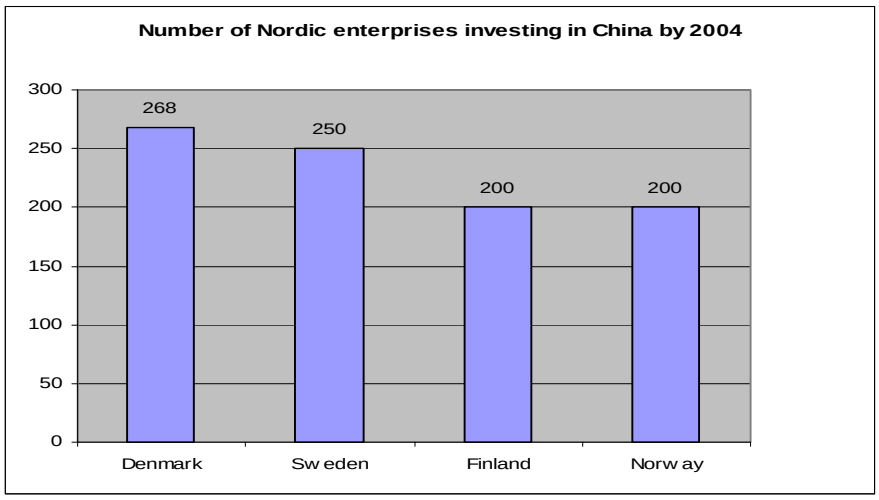


Figure 5.1: Number of Nordic Enterprises Investing in China by 2004
Source: Own

Except for the huge attractive local market, the purposes of investing in China for Nordic companies include: production at own plants located in China, direct procurement of products from Chinese market, services and R&D. According to an investigation from Danish Trade Council, among the 268 Danish companies investing in China nowadays, 32% of them have direct procurement of products from Chinese manufacturers while another 33% of Danish investors in China have their own plants[25] launched. On considering manufacturing outsourcing could be achieved either through direct procurement of products from overseas market or by buying components or semi-products from overseas suppliers and finishing the final assembling in own plants outside mother country, manufacturing outsourcing to China has became one of the main purposes of investing in China. The other main purpose is sales to Chinese market, which accounts for 65% of the investigators in this research from Danish Trade Council[26].

5.3.2 Business sectors

These Nordic enterprises mainly concentrate their manufacturing outsourcing to China on the areas of textiles & shoes, industry goods and other high-tech industries, which consists of information & computer science, communication electronics and environmental friendly projects. Table 5.3 sets out business scopes in detail.

Table 5.3: Business Scopes of Nordic Enterprises with Manufacturing Outsourcing to China

Sectors of operation	Sweden	Denmark	Finland	Norway	Iceland
Industrial equipment & Machinery	x	x	x	x	x

[24] http://www.swedenabroad.com/, visited on 2005-10-21
[25] Danish Trade Council in China (2005), "*The 2005 Report on Danish Companies in China*"
[26] Danish Trade Council in China (2005), "*The 2005 Report on Danish Companies in China*"

Electronics	x	x	x		
Textiles & shoes	x	x			
Information technology & Communication electronics	x		x		x
Building & Construction materials	x	x		x	
Automobile	x				

Source: Website of Embassy in Beijing, China of Each Individual Nordic Country.

5.3.3 Procurement of Raw Materials or Components

As we mentioned before in this chapter, besides the low laboring cost, the low costs for raw materials and components are also driven factors attracting Nordic companies for manufacturing outsourcing to China. Therefore, a lot of Nordic manufacturing outsourcers also enjoy the cost advantage achieved by localization of raw materials or components in China. However, for some key parts or components with high technical request, which are critical for the production in specific areas, e.g. automobile, few qualified Chinese suppliers could be available. Thus, to some manufacturing outsourcers in China, import for critical parts or special raw materials is still indispensable. For instance, according to report from Danish Trade Council[27], when asked how much raw materials and components for manufacturing outsourcing to China comes from their own imports to China, 57% of Danish respondents agree that only the key components are imported and most of raw materials as well as components are outsourced locally in China. Another 40% of Danish participants of this investigation indicate that all the raw materials are locally procured in China in the process of their manufacturing outsourcing to China.

5.3.4 Sales of Final Products

Compared with the reductive cost advantage, the huge potential Chinese market is becoming more attractive to Nordic manufacturing outsourcers in recent years. Some of them even rank China as one of the most important markets on considering the huge customer base and quickly increasing purchasing power. Hence, if the selling price could be lower down, the Nordic manufacturers will consequently increase the sales volume in China and better achieve economies of scale. Undoubtedly manufacturing outsourcing to China is the best way to solve this problem through the combination of quicker response to customer satisfaction and more affordable price. As shown in the investigation from Danish Trade Council[28], only 28% of the Danish manufacturing outsourcers in China have no sales in local Chinese market at all. 34% of Danish companies with manufacturing outsourcing business in China have most of their sales volume in China and the whole percentage for Danish manufacturer both having outsourcing business and sales in China amounts to 72%.

[27] Danish Trade Council in China (2005), "*The 2005 Report on Danish Companies in China*"
[28] Danish Trade Council in China (2005), "*The 2005 Report on Danish Companies in China*"

5.3.5 Location

For the Nordic enterprises with production facilities in China, the bellowing three geographic areas in China indicate their common choices, which can be traced in the following attached maps. As the most developed areas in China, these south-eastern coastal cities are always their choices not only for better manufacturing infrastructure, but also for logistic convenience.

Bohai Economic Rim is the economic area encircling Bohai Sea, covering the southern part of Liaoning, eastern part of Hebei, northern part of Shangdong, Beijing and Tianjin (See Figure 5.2). It is a solid hi-tech industrial development region with a lot of scientific research institutions, education organizations and talented persons. From this perspective, it ranks top of the whole country[29]. Being the traditional industrial base of China, Bohai Sea Rim cities have obvious advantages on manufacturing infrastructure. On the other hand, the geographic proximity both for main Chinese ports such as Tianjin, Dalian & Qingdao and international airport further contributes to the location selection within this area. Consequently, some Nordic enterprises, especially communication electronics industry, are inclined to choose Bohai Economic Rim as their production base (e.g. Nokia & Sony-Ericsson in Beijing). Nordic manufacturers majoring in environmentally friendly package (e.g. Ecolean in Tianjin), industrial equipment (e.g. SKF in Dalian) as well as biological pharmaceuticals (e.g. Novo Nordisc in Tianjin) also launch production facilities in this area.

Figure 5.2: Location of Bohai Economic Rim in China
Source: http://www.cadz.org.cn/

Yangtze Delta Economic Circle is the economic area encircling the delta region at the mouth of Yangtze River, covering Shanghai, the southern part of Jiangsu, northern part of Zhejiang[30] (See Figure 5.3). As the most developed area in China, Yangtze Delta Economic Circle contributes around 20%[31] of China's GDP and mainly concentrates on the industrial sectors of steel, iron, petro-chemical and automobile. Given the preferential strategies on

[29] http://www.cadz.org.cn/, visited on 2005-12-25
[30] http://www.cadz.org.cn/, visited on 2005-12-25
[31] http://www.ft.com/, visited on 2005-12-01

administrative structure, this region is undergoing rapid development. The first[32] and fourth[33] largest Chinese seaport in mainland, Shanghai and Ningbo respectively locates in this region. Huge investment has been devoted into infrastructure construction with highway, rail and seaport to ensure the sustainable development of Yangtze Delta Economic Circle. Nordic manufacturers also set this region as one of the most optimal areas for outsourcing to China (e.g. Volvo Bus in Shanghai, Volvo Penta in Wu'xi and Electrolux in Nanjing). Paper making industry as well as packaging from Nordic countries also concentrates in this area, e.g. Stora Enso investing in Suzhou, Tetra Pak in Kunshan as well as Nefab Packaging in Wuxi.

Figure 5.3: Location of Yangtze Delta Economic Circle in China
Source: http://www.cadz.org.cn/

Pearl Delta Economic Circle is the economic area encircling the delta region at the mouth of Pearl River, covering the southern part of Guangdong, Hong Kong and Macao[34] (See Figure 5.4). It has unique geographical advantage thanks to its adjacency to Hong Kong, which ranks the largest container seaport in the world[35]. Moreover, as the first special economic zone of China, many global manufacturers have extended their outsourcing business to this region for better utilization of transport convenience and preferential strategies. For manufacturing outsourcing in assembling procedure, this area is the best choice for EMS & ODM providers due to its huge volume of skilled workers and labour intensive orientation, especially on communication electronics industry. In recent years, Pearl Delta Economic Circle began to transfer its service scope from simple processing to high-tech industrial sectors and thus attracted Nordic manufacturers like Nokia to establish industrial park. The scheme of building a free trade zone between Pearl Delta Region and Hong Kong is under way which will exert an enormous economic impact on this region once it is passed.

[32] Containerization International Yearbook, 2004
[33] Containerization International Yearbook, 2004
[34] http://www.cadz.org.cn/, visited on 2005-12-25
[35] Containerization International Yearbook, 2004

Figure 5.4: Location of Pearl Delta Economic Circle in China
Source: http://www.cadz.org.cn/

The Middle & Eastern Region and **the Middle & Western Region** are key areas for development and construction of the Chinese government at present and in the long run. They cover altogether 14 provinces (including municipalities and cities directly under the jurisdiction of Center government) Anhui, Hubei, Chongqing, Sichuan, Guizhou, Yunnan, Xizhang, Shanxi, Gansu, Qinghai, Ningxia, Sinkiang, Inner Mongolia and Guangxi (See Figure 5.5 & Figure 5.6). Historically, some cities in these two regions, such as Xi'an & Chongqing, used to be the production bases for heavy industry and therefore became the target for Nordic manufacturers like Volvo and Electrolux (e.g. Volvo bus in Xi'an, Volvo trucks close to Nanjing, and Electrolux in Changsha). Recently, the Chinese government will frame out more policies to increase investment to speed up the pace of further opening up and attract more Nordic manufacturing outsourcers.

Figure 5.5: Location of the Middle & Eastern Region in China
Source: http://www.cadz.org.cn/

Figure 5.6: Location of Middle and Western Region in China
Source: http://www.cadz.org.cn/

6 CASE STUDIES

In this chapter, several cases from Nordic countries will be covered. Specifically, communication electronics industry and textile industry are the first and second sector to be presented, in terms of their in-depth outsourcing scales and especial involved issues. In the next two sectors, we set out status on other two famous Nordic enterprises, Volvo Group and Ikea Group. We want to make overall introduction, analysis and comparison among them. Finally, corresponding logistic consequences are concluded in detail.

6.1 Introduction of Global Communication Electronics Industry

6.1.1 General Situation

According to statistics in February, 2005, Nokia enjoys the largest market share globally, about 32 %. And the market share of another target Nordic enterprise, Sony Ericsson is 7%, just as what is illustrated in Figure 6.1:

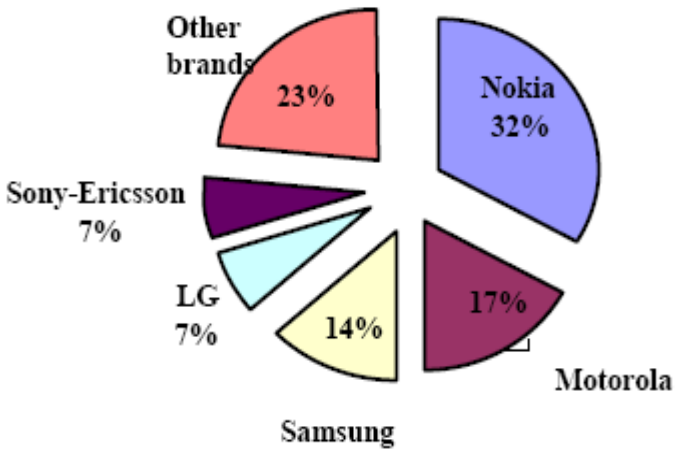


Figure 6.1: Market Share on Mobile Phones (2005.2)
Source: Gartner Dataquest

Communication electronics industry is the primary industry, a strategic and pioneering one in China's national economy. During recent years a rapid development has been witnessed in communication electronics industry in China. The year of 2004, an overall stable increase up to RMB 518.76 billion RMB have been reached in Chinese communication electronics industry. The popularity of cellular phone users came to 335 million and the ADSL users amounted to 24 million[36].

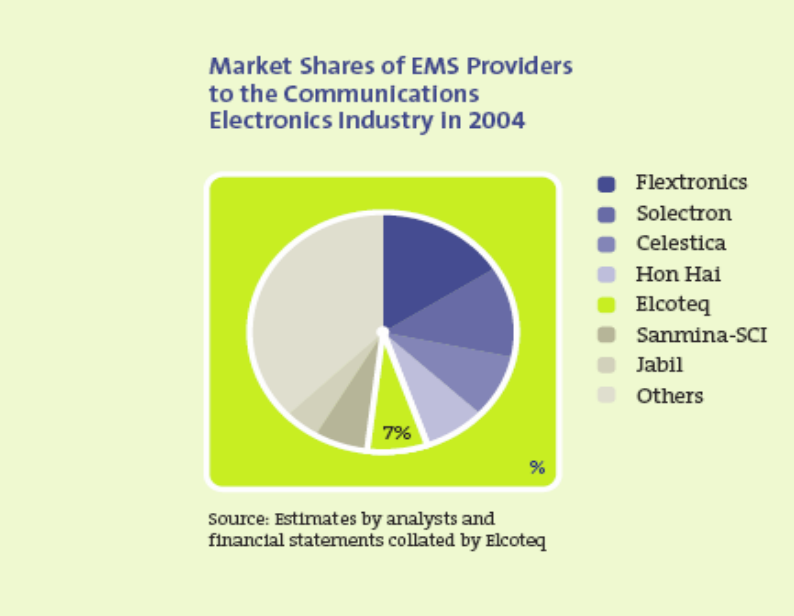
The internationalised technologies, standard network and protocol are gradually melting away the state boundaries and differences within the communication electronics industry. More international enterprises select China as the essential manufacture spot and market, including many Nordic companies, such as Nokia and Sony Ericsson.

[36] www.people.com.cn, visited on 2005-11-20

6.1.2 Some EMS/ODM Providers

Presently, most of communication electronics companies are depending on EMS for manufacturing, sometimes they will also make use of design and logistic ability of EMS & ODM. Figure 6.2 shows market shares of EMS providers to the communications electronics industry in 2004.

Figure 6.2: Market Shares of EMS Providers to the Communication Electronics Industry in 2004



Note: EMS Hon Hai has another name known more widely as 'Foxconn'
Source: Annual Report of Elcoteq SE, 2004

Some of them provide manufacturing outsourcing service to Nokia and Sony Ericsson in area of China:

- **Flextronics** from U.S., the largest EMS provider in the world, also ranks the largest in global communication electronics industry. It caters one-stop shop solution to its customers by providing cross-docking and consolidation services from various locations directly to final distribution channels. The combination of both inbound and outbound supply chain management is facilitated by the instalment of Atlas system. Besides, Flextronics also provide other value-added services, such as reverse logistic service for global maintenance and product upgrades. The new area Flextronics involves in is designing, engineering as well as ODM services, which used to be the unique advantage of ODM providers. Sony-Ericsson now is one of the biggest customers for Flextronics with 12% of annual net sales of Flextronics in 2004[37].

- **Elcoteq** from Finland, the largest European EMS company in the world and the fifth largest EMS provider in global communication technology, is particularly competitive in the area of cell phones, as the world's second largest EMS provider with a market

[37] Annual report of Flextronics, 2004

share of 14%[38]. 73%[39] of the total consolidated net sales of Elcoteq are from Nokia & Ericsson Group. Customers of its terminal products in communication electronics industry mainly include Motorola, Nokia & Sony-Ericsson.

- The Taiwanese based **Arima Communication** is one leading **ODM** supplier of GSM/GPRS terminals to many top-tier brands and is famous for its extraordinary original designing capability on mobile phone. Its customers include Sony- Ericsson and NEC. In 2004, 73.27%[40] of its total sales come for Sony-Ericsson. Interestingly, another 7.57%[41] of 2004 total sales are for one of its competitors, Flextronics.

Many factors propel China as center of global EMSs & ODMs, for instance, advantages of competitive material and labor cost and huge potential Chinese market. It is estimated that more product manufacturing will be transferred to China and global EMSs & ODMs will keep investing to increase their manufacturing capacities, at least by the end of 2008. In parallel, Nokia and Sony Ericsson also have their own manufacturers and other support facilities, such as distribution centre and research & design centre in Chinese Mainland, which integrate the whole physical and information flow from design, procurement to final sales, as shown in Table 6.1:

Table 6.1: Number of Facilities of Communication Electronics Enterprises in Mainland, China

Name of OEM, EMS & ODM in communication electronics industry	Number of facilities in Mainland, China		
	Factories	Industrial park	R & D centre
Nokia (OEM)	4	-	5
Sony-Ericsson (OEM)	1	-	1
Flextronics (EMS)	8	1	3
Elcoteq (EMS)	3	-	1
Arima Communication (ODM)	2	-	2

Source: Own

[38] Annual report of Elcoteq, 2004
[39] Annual report of Elcoteq, 2004
[40] Annual report of Arima Communication, 2004
[41] Annual report of Arima Communication, 2004

6.2 Case of Nokia

The speciality of Nokia's case lies in that this company adheres to self manufacturing for most of its products, which makes its logistic consequences somehow different from those of Sony- Ericsson, although both of them are typical examples of Nordic enterprises with manufacturing outsourcing to China. The mass production and absolute power within the supply chain make Nokia achieve cost-efficiency and control for both inbound and outbound logistics and result in more satisfying customer service level.

6.2.1 Background

In February 2005, Nokia celebrates its 20-year presence in China. This Finnish company has developed from five employees in 1985 to more than 4,700 employees today, focusing on global manufacture and R&D. The export sales reached a record $3.3 billion in 2004, growing 56 percent year on year from 2000[42]. And it is said the local source of components in China has reached 60%[43]. In order to make use of the advantage of manufacturing in China, Nokia established four factories (See Table 6.2) and five research and design centre there. In 2003, just before starting production of CDMA handsets in China, Nokia announced the merge of its four manufacturers to one single joint venture with headquarter in Beijing, two branch offices in Dongguan and Suzhou. It then became both the largest foreign invested enterprises in China and the largest mobile communications manufacturer and exporter in China.

Table 6.2: Basic Information of Nokia's Plants in China

Location	Time of operation
Beijing (Capital Nokia)	1995
Beijing (Nokia Hangxing)	1994
Dongguan	1995
Suzhou	1998

Source: www.nokia.com

On the other hand, Chinese market is now becoming the second largest market to Nokia Group, after the United States. Recently China was separate as an independent national market from Asian due to its huge potential customers. Hence strategically, China is becoming one logistic hub for Nokia, playing an important part in Nokia's global manufacturing base. In 2004, the location of the third global distribution centre of Nokia was established in Suzhou for improving the global logistic operation efficiency.

6.2.2 Mode of Xingwang Industrial Park

- **Industrial cluster**

[42] http://www.southcn.com/, visited on 2005-09-30
[43] www.xinhuanet.com , visited on 2005-08-24

Xingwang Industrial Park, which was driven by Nokia, started construction in 2000 and began operations in 2002, is located in BDA (Beijing Economic & Technological Development Area). As the core leader of this industrial park, Beijing Capital Nokia Mobile Communication Electronics Co., Ltd., the joint venture of Nokia & Capital Group work closely to its world-class suppliers, such as EMS provider Elcoteq, chip provider IBI, battery provider SANYO. As the logistic provider of Nokia, Exel also works in Xingwang Industrial Park with its service scope ranging from design, consulting, freight forwarding, warehousing and distribution to integrated information management and e-commerce support[44].

- **Zero Inventory & Just in Time service**

Excel provides "seamless chain service" to realize the minimum of inventory procedure with help of Central Service Management System (CSMS), which is implemented for information sharing among all upstream suppliers of Nokia and its logistic service provider. The logistic supervising system run by Exel enables Nokia's suppliers to learn about the latest inventory status and make consequent supplement. Components are sent by Nokia's suppliers within the same park on the pallet without any package since the final assembling will be finished within two hours and the final products will be sent to Beijing airport within another hour. From this viewpoint, the logistic system makes Nokia achieve "Zero Inventory" and "Just in time" service in Xingwang Industrial Park, as shown in Figure 6.3:

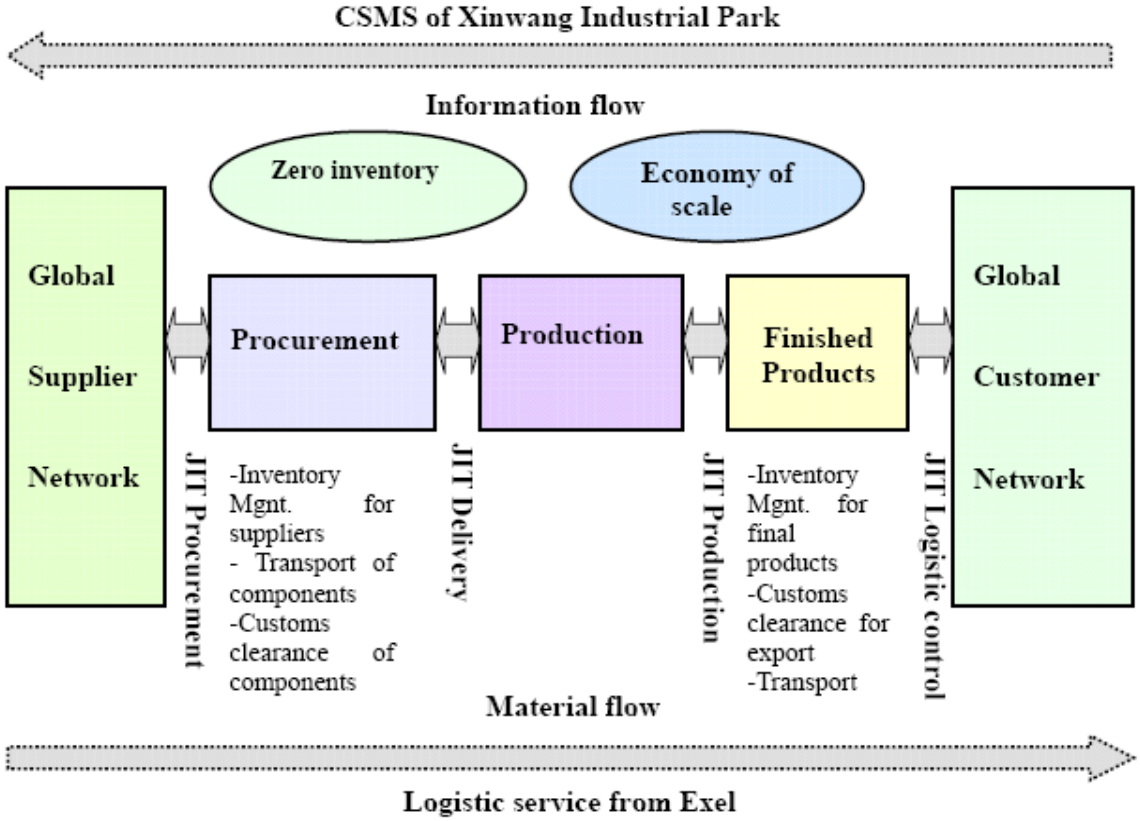
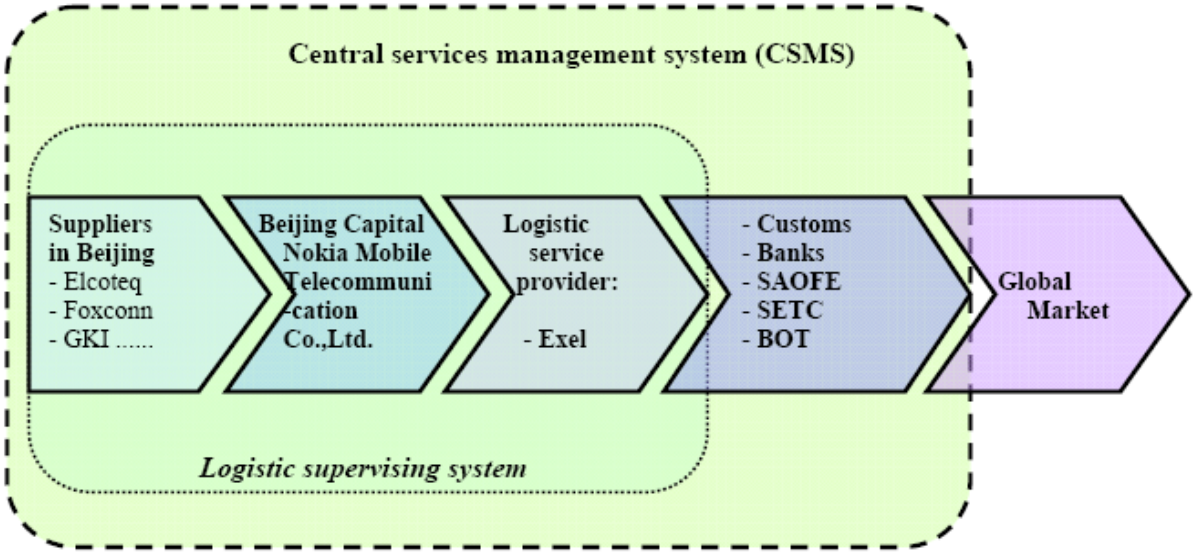


Figure 6.3: The Operation of Xingwang Industrial Park in Beijing, China
Source: Own

[44] www.jxtrans.com.net, visited on 2005-11-03

- **On line administration & customer clearance via CSMS**

However, CSMS not only serves as a logistic supervising system among Nokia, its suppliers and Exel, but also greatly contributes to local administration on Xingwang Industrial Park as a central management platform. As shown in Figure 6.4, local administrative institutes, such as local customs, banks, local Taxation Bureau can also enter this system and learn latest status. Through this electronic supervision, these Chinese administrative institutes reduce their investment and time on supervising companies' activities and thus improve the efficiency for both parts.



Note: SAOFE (State Administration of Foreign Exchange, under the People's Bank of China)
SETC (State Economic & Trade Council)
BOT (Bureau of Taxation)

Figure 6.4: Central services management system (CSMS)
Source: Own

Moreover, for Exel, the logistic service provider for Nokia and its suppliers, this central management system also allow it to make on-line customs clearance, reducing former 11 application procedure to 6 for both import & export, thus strongly support the application of "Zero Inventory" and "Just in time" service in production.

6.2.3 Logistic Consequences

Ten years ago, logistic operation became a serious problem of Nokia's globalization. With the adjustment in this area for a long time, nowadays Nokia is not only famous for its top brand within the communication electronics industry, but also becomes prestigious for its cost efficiency on global supply chain operation. However, this doesn't mean Nokia has no problem on its logistics sector during its manufacturing outsourcing to China. Although Xingwang Industrial Park achieves excellent performance on "Zero Inventory" and "Just in time" service, it is just one among the total four production bases in China.

Customer service within logistic sector generally descends; while on the other hand, total

logistic costs undoubtedly increase following by Nokia's manufacturing outsourcing to China. We made a brief list as bellows, in terms of selected standards in Chapter 2:

- Customer service
  - ✓ High stock availability
  - ✓ Few change on average lead time due to airfreight as main transport mode
  - ✓ High order fill rate
  - ✓ Acceptable "on time delivery" with persistence in self manufacturing for most products except
    - ♦ Delay at Chinese Customs
    - ♦ Uncertainty of on time delivery from EMS/ODM providers in China
  - ✓ Acceptable shipping losses / transport damages
    - ♦ Theft
    - ♦ Improper loading modes

- Logistic costs
  - ✓ Sharply increasing transportation costs by airfreight
  - ✓ Increasing warehousing costs in China due to building of DC in China
  - ✓ Increasing order processing & information costs
  - ✓ Medium inventory carrying costs
  - ✓ Other logistic costs
    - ♦ Increasing training costs for employees
    - ♦ Medium costs for out-of-stock

6.3 Case of Sony Ericsson

The speciality of Sony-Ericsson's case lies in its difference mode of manufacturing outsourcing to China with its competitors, Nokia. Although Sony- Ericsson keeps its own factory in Beijing, the products made by Sony- Ericsson itself are rather limited. Sony Ericsson depends on EMS & ODM providers, in order to make use of their advantages. However, such kind of dependent relationship leads to a relatively weak control on Sony Ericsson's supply chain and thus results in uncertainty on its lead time from China to overseas markets as well as a very high inventory level.

6.3.1 Background

Ericsson from Sweden is one of the most famous mobile technical providers in the world. In 2000, mobile phone market shrunk, which also influenced business of Ericsson. Ericsson adopted two strategies: 1) change self-manufacture to outsource; 2) co-operate with Sony. Launched in October 2001, Sony-Ericsson develops its management based on London. In August 2002, Sony Ericsson started its operation in China. On June 30th, 2004, Sony Ericsson announced that it took control of Beijing Sony-Ericsson Putian Mobile Communications Co. Ltd (BMC) through raising its share holding to 51%[45]. Now BMC is becoming an in-house manufacturing site, shortening ramp-up times, simplifying the company's supply chain, generating cost efficiencies and making its customization process more efficient.

Table 6.3: Stock Share of Putian Mobile Communications Co. Ltd

Beijing SE Putian Mobile Communications Co. Ltd	
Sony Ericsson China Sony Ericsson Mobile Communications AB	26% 25%
	51%
China PUTIAN Co. Ltd	27%
Nanjing Panda Electronics Co. Ltd	20%
Yung Shing	2%

Source: www.sonyericsson.com

Table 6.3 shows outline of BMC ownership interests. BMC is the only Sony Ericsson-invested manufacturer for Sony Ericsson mobile phones within Sony Ericsson group in China.
Now Sony Ericsson is growing fast worldwide, representing a year-on-year sales increase of 29%[46]. With Sony Ericsson's innovative design, attractive imaging, entertainment and other function, its Chinese market has been growing these years. And company also thinks of China as one market with enormous potential and important status for its business. At the same time, large demand of Sony Ericsson mobile phone makes it turn to OEM and ODM companies, as Ericsson did before.

[45] www.sonyericsson.com, visited on 2005-11-23
[46] www.sonyericsson.com, visited on 2005-11-23

6.3.2 Manufacturing and Logistic Process

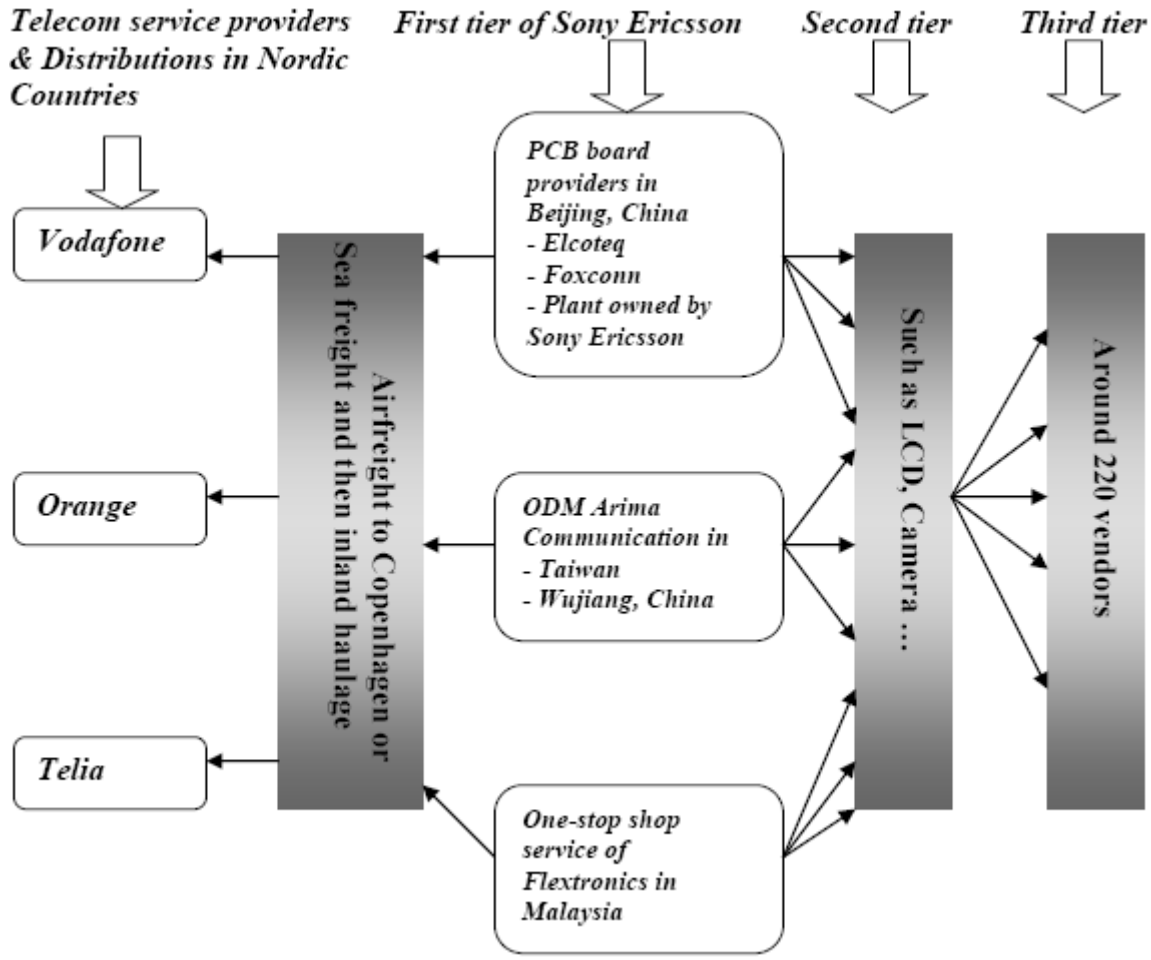


Figure 6.5: Distribution Picture of Sony Ericsson
Source: Sony Ericsson Mobile Communication AB

Just shown in Figure 6.5, there are three main suppliers to produce mobile phone for Sony Ericsson in Asian area: BMC in Beijing, Arima in Taiwan and Flextronics in Malaysia. There are about 220[47] vendors to supply components among this picture. Now, some of components are transported to factories directly. Next year, one operation centre for components will be established in Hong Kong. At that time, all of components will be transferred to Hong Kong and then distributed to each factory to be assembled.

In Chinese Mainland, Sony Ericsson has one large warehouse for finished mobile phone in Beijing. After distributing step there, 55%[48] of the mobile phones produced in Chinese manufacturer are sold in European area. Most of the goods belong to light product are transported by air. SAS provides the service from China to European airport, for instance, Copenhagen airport for Nordic market and Amsterdam airport as well. Some other goods such as battery are so heavy that they will be transported by ocean shipping, and the main European ports to receive these goods are Copenhagen, Amsterdam, Vienna and Frankfurt.

[47] Interview Nathan Kelly
[48] Interview Nathan Kelly

When reaching Europe, goods are distributed to several telecom providers, without warehouse stop for Sony Ericsson.

Because of adoption on air transportation, Sony Ericsson has short order cycle, only a couple of days from China to European market. But they are not satisfied with distribution process from components providers to assembly factories. Establishment of Hong Kong distribution centre may be one method selected to solve this problem, although the interviewee also could not predict the actual effect.

6.3.3 Logistic Consequences

In 2005, around 60%[49] products of Sony Ericsson are outsourced to the EMS or ODM providers. To Sony Ericsson, this strategy of manufacturing outsourcing provides the possibility of focusing on design and marketing. However, there are many problems while operating. The scope of supply chain is becoming more complex than before. Chinese customs is also another problem for manufacturers like Sony Ericsson having frequent import and export business.

After discussion with Mr Nathan Kelly, the Director of Planning/Sourcing of Sony Ericsson AB, we outline some logistic consequences during the process of manufacturing outsourcing from the aspect of Sony Ericsson:

- Customer service
  - ✓ Low stock availability (uncontrollable production from EMD/ODM providers)
  - ✓ Few change on average lead time due to airfreight as main transport mode
  - ✓ Medium order fill rate (uncontrollable production from EMD/ODM providers but very low safety stock)
  - ✓ Bad "on time delivery"
    - ♦ Delay at Chinese Customs
    - ♦ Uncertainty of on time delivery from EMS/ODM providers
  - ✓ Acceptable shipping losses/ transport damages
    - ♦ Theft
    - ♦ Improper loading modes

- Logistic costs
  - ✓ Sharply increasing transportation costs by airfreight
  - ✓ Low warehousing costs due to large scale of manufacturing outsourcing from EMS/ODM providers
  - ✓ Increasing order processing & information costs
  - ✓ Low inventory carrying costs —very low safety stock
  - ✓ Other logistic costs
    - ♦ High training costs for Chinese employees
    - ♦ Very high costs for out of stock
    - ♦ Low P&P costs

[49] Interview Nathan Kelly

6.4 Case of AQ Holmberg Suzhou

The specialty of this case for AQ Holmberg Suzhou firstly comes from its relatively smaller manufacturing scale, which consequently leads to fewer logistic problems encountered in China. Generally AQ Holmberg Suzhou is satisfied with its logistic operation both from the perspective of efficiency and cost. The problems incurred by poor loading modes, high fuel and toll costs for trucking service are caused by poor logistic development in China and difficult to be settled in short term.

On the other hand, AQ Holmberg is special on considering its position of different tiers of supplier for Sony Ericsson & its EMS provider, Flextronics.

6.4.1 Background

AQ Holmberg Suzhou, which majors in design and manufacture mechanical components with 'metal stamping' as the key process, is founded in 1999 by AQ Holmberg AB Sweden[50]. By leasing the factories and importing the manufacturing facilities from Sweden, AQ Holmberg Suzhou offers fully finished and assembled products with assembly, insert/over-molding and surface treatment solutions. 99% of their raw materials are outsourced in China and 85% of components are sold out in local Chinese market[51]. Except manufacturing for its largest customer, the left products are mainly sold to Korea and Japan.

6.4.2 Logistic Operation

The case of AQ Holmberg Suzhou factory is special on considering its role of the second tier supplier for communication electronics OEM Sony-Ericsson and first tier supplier for Sony-Ericsson's main EMS provider, Flextronics. As the largest EMS supplier to Ericsson and Nokia, Flextronics is also the No. 1 customer of AQ Holmberg Suzhou. Therefore, most of products of AQ Holmbergs Suzhou are made according to the orders from Flextronics. At the same time, Holmberg also produces to satisfy other customers' demands (See Figure 6.6). Furthermore, the transport service providers as well as the raw material suppliers are also appointed by Flextronics. Except for the business with Flextronics, AQ Holmberg Suzhou has its own right to choose both the suppliers and 3PL service.

[50] http://www.aqholmbergs.cn, visited on 2005-07-01
[51] Interview Jim Lu

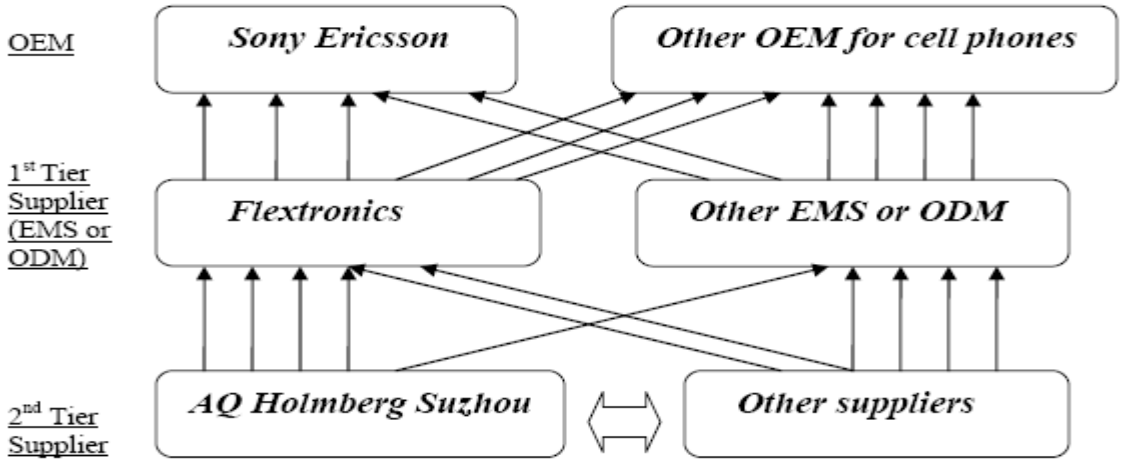


Figure 6.6: Role of Different Tier of Suppliers by AQ Holmberg Suzhou
Source: Own

6.4.3 Logistic Consequences

As AQ Holmberg Suzhou indicates, generally they are satisfied with their logistic status. They have own warehouse close to the factory and manage it only via EXCEL due to their small scale of production. The inventory cost is acceptable. Cost of packing & package is rather low regarding to characteristics of their products. The logistic problems mentioned by AQ Holmberg Suzhou are poor loading modes, high toll and fuel costs for road haulage, which result from the poor logistic infrastructure and service level in China[52].

- Customer service
  - ✓ High stock availability (Most products are produced according to the request of Flextronics)
  - ✓ Decreased lead time (Most products are sold in China)
  - ✓ High order fill rate (Most products are manufactured according to the forecast of Flextronics)
  - ✓ Acceptable "on time delivery"
  - ✓ High shipping losses/ transport damages due to improper loading modes & poor facilities

- Lower logistic costs since most of the products outsourced in China are sold out locally
  - ✓ Transport costs -high toll and fuel cost for trucking service
  - ✓ Medium warehousing costs
  - ✓ Low order processing & information costs
  - ✓ Medium inventory carrying costs
  - ✓ Other logistic costs
    - ♦ Low training cost neither for employees nor suppliers
    - ♦ Low cost for out of stock (most products are produced according to the orders of Flextronics)
    - ♦ Low P&P costs

[52] Interview Jim Lu

6.5 Comparison among Nokia, Sony-Ericsson and AQ Holmberg

In fact, our cases cover two levels of enterprises in communication electronics industry in China:

- OEM (manufacturers), such as Nokia and Sony Ericsson
- Suppliers, such as AQ Holmberg

There are complicated interrelationships between OEMs and their suppliers. But their logistic consequences or problems of manufacturing outsourcing may be various due to their different roles played in the supply chain. On the other hand, the size of a company, or the scale of production also lead to different logistic status, especially on the operation of warehouse, DC and logistic information system, as shown in Table 6.4 below:

Table 6.4: Comparisons among Different Levels of Service Providers in Communication Electronics Industry

Basic information	Nokia	Sony Ericsson	AQ Holmberg
DC or warehouse in China	Both		No
Volume of inventory level	Medium	Low	Low
Import & Export	- Huge volume of export for components and final products - Small volume of import for raw materials and components		- 15% products for export[53] - 1% raw material from import[54]
Main transport mode	- Airfreight from China to overseas market - Sea freight of accessories from china to overseas market		Road haulage within China
Training cost	- High training cost for logistic employees		Low training cost for logistic employees
Supply chain problems in China	- Inventory level uncontrolled - Low delivery reliability - Delay incurred by Chinese Customs - High logistic cost		- High inland haulage cost - Improper loading modes

Source: Own

Even for manufacturers in the supply chain, different players have different outsourcing degrees and thus incurred various logistic consequences. For instance, Nokia & Ericsson all have manufacturing outsourcing business in China, but Nokia sticks to self-production for most of its cellular phone while more than 50%[55] of the cell phones branded "Sony-Ericsson" are outsourced to other EMS/ODM providers operating in China. We can figure out the different controllable capability on global supply chain between Nokia & Sony-Ericsson from Table 6.5:

[53] Interview Jim Lu
[54] Interview Jim Lu
[55] Interview Nathan Kelly

Table 6.5: Comparison on the Supply Chain and Consequences between Nokia and Sony-Ericsson

	Nokia	Sony Ericsson
Geographic location in China with EMS, ODM providers and other suppliers	- Highly concentrated - Famous for 'industrial cluster'	Fragmented
Dependence on EMS & OEM	Medium	Very high
Control on its supply chain	Very powerful	Relatively weak
Lead time	Good	Bad
Turn over on stock	High	Medium
On time delivery	Relatively higher	Low
Inventory level	Medium	Low
Stock availability	High	Low

Source: Own

6.6 Cases within Textile Industry

The specialty of this case study results from the limitation on quota and relevant trade friction, which will be involved in textile industry in the long run. And the direct logistic consequence of the frequent trade argument between EU & China is the delay at customs and the risk of out of stock at overseas markets. On the other hand, the way of manufacturing outsourcing to China within textile industry is always direct purchasing of final garments from Chinese suppliers, through which relevant logistic problems in the manufacturing process will be eliminated. Moreover, the only logistic work involved by these Nordic garment outsourcers in China is the picking up at Chinese main ports and direct marine shipping of the products to overseas. It also leads to few logistic problems encountered in China.

6.6.1 Background of Textile Industry

From the perspective of supply chain management, the limitation on the quantity of textile trade impedes the efficient development of global textile chain. Manufacturing outsourcers of textiles are forced to set up factories or source products from where they can get more quota quantity ensuring the smooth import to final markets instead of where is most competitive in global textile manufacturing.

With the global elimination of quota on textiles from 2005, it is possible for textile outsourcers to enjoy the economy of scale on both manufacturing and logistic costs by cutting down the number of their suppliers worldwide. For example, the export on sweater and men's trousers from China to EU in the first three months of 2005 has sharply increased by 534% and 413% respectively while the unit price was decreased by 30% in general[56]. Some EU members like Spain and Italy, which are famous for its own textile manufacturing, protested the situation and claimed the sharp increasing volume from China as dumping. Then the trade friction on textiles for post quota ear started. Through several rounds of negotiation, limitation on textiles imported from China was re-launched although EU members e.g. Sweden, Denmark and Holland criticized it harmful to free trade.

6.6.2 Background of Bestseller Group

Bestseller is a leading European company headquartered in Denmark by designing, developing and marketing several fashion brands in Europe, Middle East and China. Its brands include: Exit (1986), Vero Moda (1987), Jack & Jones (1990), VILA (1993), Name it (1996), Only (1996), Selected (1997), tdk (1999), PH industries (2003), Pieces accessories (2003), Object Collectors Item (2003), Gosha by Vero Moda (2005) and mama-licious (2005)[57].

However, as a typical example of fashion retailers, Bestseller doesn't have any manufacturing facilities. Around 50% of its products are purchased directly from Asian market and Chinese suppliers contribute for most of the outsourcing volume in Asia[58].

[56] http://news.ctei.gov.cn, visited on 2005-10-14
[57] www.bestseller.com, visited on 2005-10-10
[58] www.bestseller.com, visited on 2005-11-22

Bestseller Group China was established in 1996 as Danish-Chinese based joint adventure. However, the three owners of Bestseller China are all Danes. Together with Dan Frils, Allan Warburg owns 50% of the Bestseller shops in China. The other half is owned by Troels Holch Plovlsen, the founder of Bestseller, through Bestseller United Ltd. in Hong Kong[59]. Now three brands ONLY, Jack & Jones as well as Vero Moda are sold in 550 shops spread in over 100 Chinese cities. Since the first ONLY shop opened in Beijing in 1996, ONLY has expanded very fast and now has over 317 shops in China; Jack & Jones has close to 218; Vero Moda currently opened 243 shops[60].

6.6.3 Background of H&M

H&M was a Swedish fashion retailer established in 1947. Now as the largest retailer in fashion industry within Europe, H&M has expanded substantially in recent years and has more than 1,134 stores spread across 22 countries. H&M has no manufacturing facilities, neither. Its range is manufactured by about 800 suppliers and has a total share of 60% of its purchase in Asia. It is said that H&M has 120 suppliers with 350 factories in China[61]. In 2001, the direct purchasing from China was around 10 billion SEK and accounted for 21.5% of its global outsourcing[62].H&M However, H&M has no stores in Asia either through joint venture or franchising in Asia since all the H&M stores are owned and solely run by H&M.

6.6.4 Logistic Operation

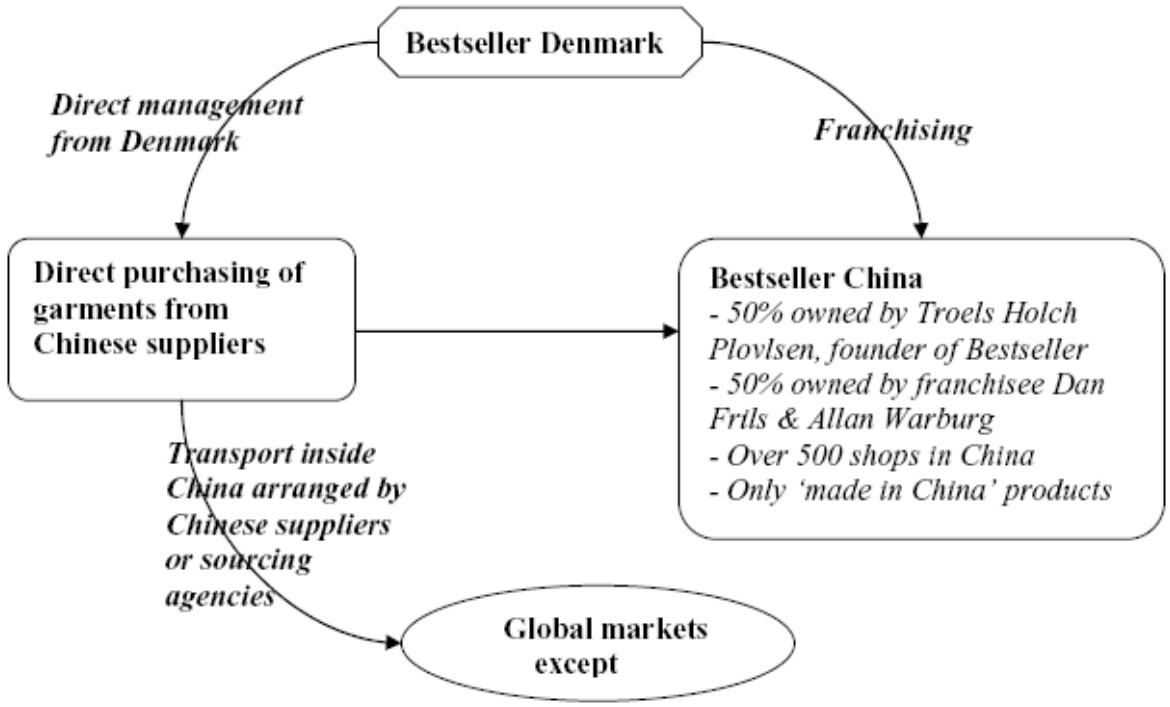


Figure 6.7: the Independent Operation between Bestseller Denmark and Bestseller China
Source: Own

[59] www.bestseller.com, visited on 2005-11-29
[60] www.zhaopin.com, visited on 2005-11-29
[61] www.ahbofcom.gov.cn, visited on 2005-8-17
[62] www.qm365.com, visited on 2005-12-7

As shown in Figure 6.7, Bestseller China is franchised and only has 'Made in China' products sold out in Chinese market, all the relevant logistic work is independently performed by the franchisees as excluded in our discussion.

Bestseller and H&M import garments and other accessories directly from their Chinese suppliers either by sending out their own purchasers to China or through outsourcing agency. These purchasing staffs or the agencies seek for qualified Chinese textile manufacturers and then supervise the manufacturing procedure to ensure the textile quality. Usually all the transport activities in China including the delivery to Chinese main ports are arranged by local Chinese suppliers. And then all the garments are shipped by sea freight from China to global markets as scheduled by these Nordic outsourcers or their outsourcing agency. Thus H&M and Bestseller Group generally incurred simpler logistic consequences than other Nordic manufacturing outsourcers in China who needs to take part in the upstream supply chain management[63].

Stock management is carried out virtually entirely within their own organization. Actually textile outsourcers like H&M and Best Seller need to keep a relatively higher stock in final markets to prevent emergency situation, just like what happened in this summer. All garments, mostly heavy knitted garments were stopped in the EU customs because of the trade friction on textiles between EU & China. These fashion retailers having huge manufacturing outsourcing volume from China complained about out-of-stock. After the delay in European main ports for several weeks, all the garments were finally delivered to the stores after re-establishment of the import restrictions on China.

Through negotiation, limitations have been re-established on imports from China for some types of garments. The re-establishment of the quota regulations from Chinese markets makes the buying process for Best Seller and H&M somehow difficult and may sharply reduce on time delivery, prolong lead time and decrease order fill rate due to delay at European and Chinese customs[64]. Besides, H&M and Best Seller need to keep rather high inventory to prevent the situation of out of stock on considering what happened in this summer. Thus, these purchasers may gradually reduce their outsourcing volume in China to keep away from stock out if the quantitative limitation of EU on Chinese textiles still exists.

- No manufacturing facilities
- Direct purchasing from Chinese suppliers or through outsourcing agency
- All logistic activities within China implemented by Chinese suppliers
- Garments are delivered to Chinese ports by local suppliers and then shipped by ocean freight as scheduled by Bestseller and H&M

6.6.5 Logistic Consequences

The logistic consequences of manufacturing outsourcers within textile industry could be concluded as:

- Customer service
  - ✓ High stock availability (high safety stock in regional distribution centres)
  - ✓ Longer lead time for European markets

[63] Interview Mette Christensen
[64] Interim report of H&M 2005

- ✓ High order fill rate
- ✓ Medium "on time delivery" except
  - ♦ Delay at Customs due to trade friction on textiles
- ✓ Low shipping losses/ transport damages

- Logistic costs
- ✓ Increasing transportation costs - sea fright charge
- ✓ No warehousing cost in China, covered in unit price from Chinese suppliers:
- ✓ Warehousing costs in other markets remains
- ✓ Increasing order processing & information costs
- ✓ High inventory carrying costs — high safety stock in regional distribution centre
- ✓ Other logistic costs
  - ♦ High training cost for Chinese suppliers
  - ♦ Very high costs for out of stock – risk on trade friction for textiles
  - ♦ Low P&P costs

6.7 Case of Volvo

The case of Volvo in China is special for its huge volume of import to China comparing with its limited export for overseas markets, which means most of the products manufactured in China are sold out in local market. Delay caused by Chinese Customs is the most significant logistic problem for Volvo in the process of manufacturing outsourcing to China. However, with the enlargement of both investment and production volume in China, Volvo will definitely face more problems in this area and strive for reduce logistic cost in the long run.

6.7.1 Background

Business in China is an important continuation of Volvo's global manufacturing consolidation. Now Volvo has almost set all its business areas represented in China (See Table 6.6). There are also three steps of the localization of Volvo Greater China and the first two steps have already been accomplished till 2004, now the third one is in process[65]:

- Step 1: Focus on China, which sets Chinese market as the most potential single one in the world.
- Step 2: Triple the business among Europe, American and Asia. In this phase, the headquarter of Volvo in Asia was moved to Beijing, China
- Step 3: Volvo's manufacturing outsourcing on both vehicles and spare parts in china, followed by Volvo 3P's outsourcing to Chinese vehicle suppliers.

Table 6.6: Location and Shares of Volvo China with Different Business Scopes

Scopes	Location in China	Type	Date of operation
Volvo Penta	Wuxi	Joint venture	2000
Volvo Construction Equipment	Shanghai Pudong	Wholly owned by Volvo Group	2002
Volvo Buses	Shanghai Xi'an	Joint venture	Shanghai, 2000 Xi'an, 1994
Volvo Trucks Greater China	Jinan Liuzhou	Joint venture	Jinan, 2003 Liuzhou
Volvo Cars	In plan, either Chongqing or Nanjing	Joint venture	2006

Source: Own

[65] www.auto.sina.com.cn, visited on 2005-10-28

6.7.2 Logistic Information System

In global logistic operation, automobile companies have to face cost burden from large amount exchange of raw material, semi-products, components and final products. The outbound logistic information system explored by Volvo is called **A4D** (Application for Distribution), which is regarded as the most advanced outbound logistic information system for its integration of car manufacturer, components manufacturers, dealers, consignors, consignees, and logistic service providers into one platform. This system starts to operate when a dealer receive an order from customer, then delivery time and lead time will be calculated and sent to each participants within the system on the basis of pre-planned routes. If any delay or advancement happened, the system will automatically update the delivery time[66]. It is a solution keeping close relationship with customers through the whole supply chain operation, improving logistic efficiency. By using this system, some logistic advantages can be reached:

- Ensure accurate information through the whole process
- Reduce lead time from ordering to delivery
- Reduce management, inventory level and operation cost
- Improve logistic layout

Since Volvo Logistics do not have transport facility and must cooperate with other carriers, this advanced information logistic management system undoubtedly provides favorable foundation to relationship establishment with partners.

6.7.3 Logistic Operation

Volvo Logistics and Volvo Parts are responsible for the global spare part distribution within the Volvo Group. The supply chain of Volvo Group is the typical demand-driven one. Critical spare parts are planned and transported to China by sea or by air to finalize the last-step assembling. This phase of business operation is within the charge of Volvo Parts. A huge volume of shipments goes through different cross-docking terminals worldwide and transfers to assembling factories in China to satisfy the orders.

Most frequently used mode of transport of Volvo China is sea freight. Since most of the final products are sold in Chinese market and the import duties for finished cars are quite high, both import and export of finished cars are quite limited for Volvo China. The import and export of spare parts account for most of the international transport cargo volume, which could be transported by global carriers either through Volvo's suppliers or through Volvo Spare Parts itself on the basis of cost efficiency (please note that the logistic service of spare parts in Volvo Group is totally arranged by Volvo Spare Parts, which is independent of Volvo Logistics). Regarding to inland haulage in China, spare parts are also arranged by Volvo Spare Parts itself. As a 4PL service provider, Volvo logistics also needs other 3PL providers to cater essential logistic service for Volvo in China. After assembling process is finished in Chinese factories, local brokers or transport forwarders are chosen by Volvo Logistics on considering for the combination of service level and fare charged.

[66] Interview Leon Liao

There is no DC located in China. Each factory in China has its own warehouse. Inventory level is rather low due to limited sales volume in Chinese market. The service level of inland haulage in China is acceptable to Volvo although the level still needs to be further improved, so do shipping losses. Information cost is rather higher for the implementation of A4D system for outbound logistics[67].

6.7.4 Logistic Consequences

The biggest logistic problem of Volvo in China is the delay caused by custom clearance and commodity inspection. Total logistic cost of Volvo China could to be further reduced, as introduced by Volvo Logistics. On the other hand, due to important position among Volvo global development strategy, China will be the manufacturing centre, design centre and components supplying centre in Asia, especially for Volvo trucks. Main components import and inventory level will be one of essential issues to be faced along with demand increasing in this area.

- Customer service
  - ✓ High stock availability
  - ✓ Better lead time (local manufacturing outsourcing & sales in China)
  - ✓ High order fill rate
  - ✓ High "on time delivery" except
    - ♦ Delay at Chinese Customs of components & accessories
  - ✓ Low shipping losses/ transport damages

- Logistic costs
  - ✓ Lower transportation cost (local)
  - ✓ Low warehousing costs
  - ✓ Increasing order processing & information costs
  - ✓ Low inventory carrying costs
  - ✓ Other logistic costs
    - ♦ High training costs both for Chinese employees & suppliers
    - ♦ Medium costs for out of stock
    - ♦ High packing & package cost (environmentally friendly packages)

[67] Interview Leon Liao

6.8 Case of Ikea

Ikea has both its own furniture factories launched and direct purchasing final products in China. From this point, it's similar to Nokia & Sony-Ericsson. However, the difference among them lies on the product assortment as well as the length of supply chain served. Ikea has an extremely deep assortment on its products, which significantly enhances the complexity on logistic operation. On the other hand, Ikea also need to take part in each phase of the supply chain management, from the right start of procuring raw materials to the eventual delivery to final customer, which means the logistic consequences of manufacturing outsourcing to China more complicated.

6.8.1 Background

As a global furniture giant, Ikea started outsourcing activity to China in 1984 and launched the first store in China in 1998. Nowadays, Ikea has selected around 370 Chinese manufacturers as its global suppliers and products sourced in China have accounted for 18% of total global outsourcing volume in the fiscal year of 2005[68]. Moreover, it is estimated that this percentage will increase to 50% by 2008[69]. However, Ikea also launches its own factory in China, named Qindgdao Yifa Furniture Co., Ltd, established in 1992[70].

Besides the role of global outsourcing centre, China also ranks the most potential market for Ikea. Although current turnover in China only accounts for less than 1% of Ikea's global annual sales income, it keeps increasing by 40-50% year by year. Recently, Ikea opened its third store in China and plan to enlarge this number to ten before 2010 on considering China is estimated to become Ikea's largest market in 10-15 years.

In 1998, when Ikea firstly appeared in Chinese market, its products were regarded as expensive due to limited personal disposable income of Chinese people. In the following years, Ikea strived for making prices more affordable to Chinese customers by increasing local outsourcing volume and the number of Chinese suppliers. As a result, the average price of unit article sold in Ikea Shanghai has decreased by 46% in 2005 contrasted to the figure in 2000. For the newly opened store in Guangzhou, China, the average price is 48% lower than that in 1998, when Ikea firstly entered into China. Definitely, Chinese customers are not the only communities enjoying the outcome of manufacturing outsourcing in China. The price competitiveness of Chinese products helped reduce the average Ikea price by 6% on a yearly basis in 2004[71].

6.8.2 Improving Logistic Efficiency

Retailing chosen plan

The central distribution centre in Asia-Pacific is original located in Malaysia. All the products sold in Chinese stores have to be transported to Malaysia first and then be sent back to China for

[68] Annual report of IKEA, 2005
[69] www.xinhuanet.com, visited on 2005-08-08
[70] http://dbl.swedishtrade.se, visited on 2006-01-06
[71] www.xinhuanet.com, visited on 2005-10-31

the purpose of cutting down total purchasing costs for Ikea and managing whole products flow. Undoubtedly this method will increase logistic costs for Ikea stores in China and eventually influence the final prices in Chinese market.

With the steadily increasing outsourcing volume and market potential in China, Ikea sets up "Retailing chosen plan". By choosing several articles manufactured by Chinese suppliers, Ikea makes direct delivery to Chinese stores and sends other volumes sold globally to DC in Malaysia. Its implementation has been proved to be quite successful. Here we use "Nickel folder chair" as an example of Ikea's "Retailing chosen plan" to illustrate the big change both on logistics and sales (See Table 6.7):

Table 6.7: Comparison on the Price of 'Nickel folder chairs'

Price unit: RMB

Origin of Manufacturing	Thailand	China
Manufacturing cost	34	30
Transport cost to China	32	4
Management cost in China	33	25
Final price sold in Ikea China	99	59
Annual sales volume	Around 10,000	Around 120,000
Net sales	Around 1,000,000	Around 7,200,000

Source: www.chinampaonline.com

Centralized inventories

With the increasing importance of China for its business, Ikea has moved its Asian purchasing centre from Singapore to Shanghai, China and now seven purchasing offices are operated in China. The further plan is a newly built distribution centre around 260,000m^2 in Shanghai for better supporting the booming business in China and Japan. On December 1st, 2005, the first part of construction has been finished, covering 93,000 m^2. This warehouse is charge of distribution and inventory management for sixteen stores in Asia. Central warehouse management system ensures cost efficiency on route planning within Asia. It is hoped that the second part of this distribution centre in Shanghai will be tax-free, in order to provide service for business of newly opened Japanese Ikea.

Supply chain operation system of Ikea

Ikea has launched the portal system for its suppliers, especially new suppliers within Asia, improving communication level and enhancing logistic operation efficiency. The program mainly includes some contents listed in Table 6.8:

Table 6.8: The Logistic Information System of Ikea

Ikea's portal system	Function items
Global common system: one common order generating system worldwide, providing global total need for Ikea merged & sent as orders	• Receiving order • Change, split, move order • Receiving forecast • Sending order confirmation

to suppliers through one system	• Transport booking • Create dispatch information
Quotation management: tool for suppliers to submit quotation in standardized format	• Easy to compare, possible for on-line bidding
Intranet	• Article specifications (drawings, etc) • Transport information • Customs information • Forecast • Ikea information (e.g. openings)
FCL & palletization	• Palletization of goods performed by suppliers • FCL at supplier's premises
Carrier integration project: follow all shipments on-line via EDI with carriers	• Transport bookings and confirmations • Shipping instructions • Seaway bill or B/L information • Increased visibility of goods status

Source: www.ficci.com

Global cooperation with Intertek & Maersk

Being a popular global furniture retailer, Ikea has been cooperated with Intertek and Maersk for a long time. With increasing importance of China in its global business, Ikea also extends the cooperation with Intertek and Maersk in China to reduce logistic cost and smooth the operation of whole global supply chain.

Intertek is famous for its product testing in Europe and is chosen to be the partner of Ikea for testing on quality, safety as well as environmentally friendness of Ikea's products. Since huge volume of outsourcing has been shifted to China, Ikea has to arrange a lot of logistic work on scheduling product testing and quality experiment for products made by Chinese suppliers, especially when the product is newly designed or when those suppliers are still inexperienced facing to Ikea's strictness on products. Usually the test sample was sent from the supplier in China to Almhult, Sweden via Ikea Trading and then transhipped to Intertek in Stockholm. If the result was unsatisfying, the sample will be sent to Ikea Trading again and then delivered back to its original supplier in China. Sometimes the procedure needs to be repeated for several times until the product is tested to be totally qualifying to Ikea's standard. This logistic arrangement lowers the efficiency of Ikea both on product outsourcing and the selection of it suppliers, which further influence the running of Ikea's global supply chain. The problem is completely settled with the launching of Intertek's own offices in China.

The office of Intertek is fully responsible for contacting with local offices of Ikea Trading in China. Thus, better communication reduces the misunderstanding from Chinese suppliers. Geographical proximity also involves the engineers of Intertek into earlier stage in manufacturing. Deficiencies will be found out as soon as possible. Sometimes the knowledge improvement on product manufacturing further helps the design of Ikea's articles.

The same thing happened on the cooperation between Ikea and Maersk Logistics. Ikea has been cooperated with Maersk Logistics in Europe and USA for quite a long time. With the

increasing outsourcing volume and market demand in China, Ikea needs its logistic service provider to cater integrated supply chain service for a wider geographic area. Maersk Logistics took the chance and expanded its business into China by launching offices at where the Ikea purchasing offices locates in China. It works closely with Ikea for its Chinese retailing business and distribution activities between China and other countries.

6.8.3 Logistic Consequences

Road haulage is the most frequently used mode of transport for Ikea, accounting for 60%[72] of Ikea's transport volume (See Figure 6.8). And sea freight only accounts for 20%[73] of Ikea's mode of goods transport.

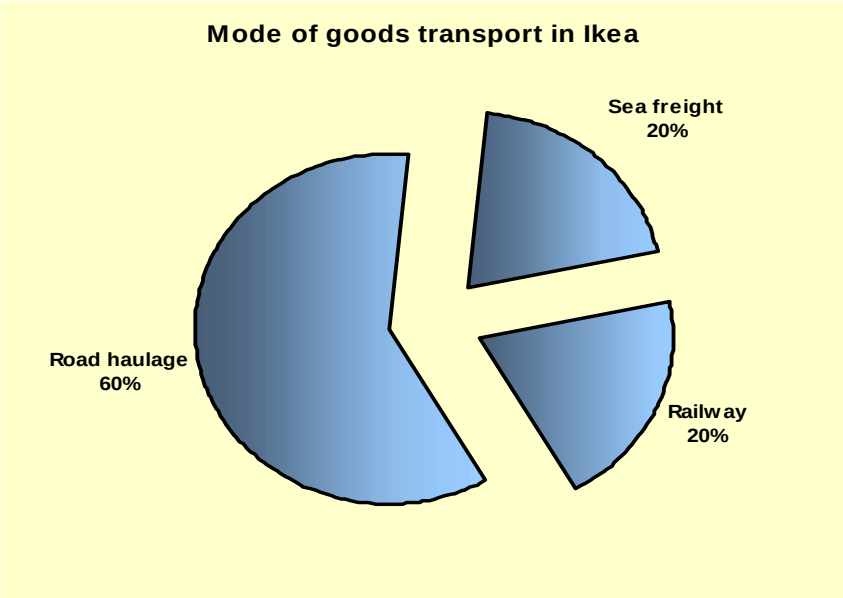


Figure 6.8: Mode of Goods Transport in Ikea
Source: Ikea's annual report of 2004

However, according to Figure 6.9, sea freight enjoys the highest reliability in China. This divergence just implies the biggest problem of Ikea's logistics activities in China, produced by low delivery reliability of road transport[74].

[72] Annual report of Ikea, 2004
[73] Annual report of Ikea, 2004
[74] Interview Julianna Ma

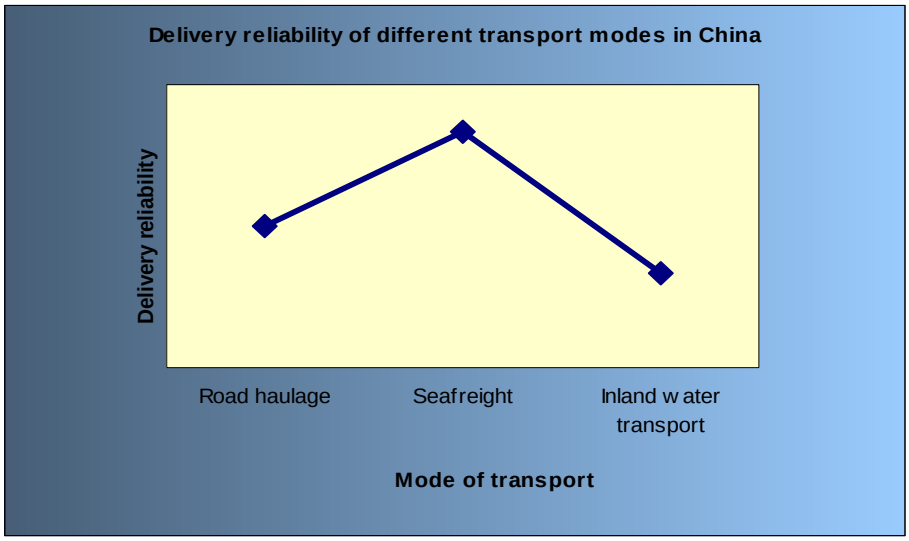


Figure 6.9: Delivery Reliability of Different Transport Modes for Ikea in China
Source: Interview with Julianna Zhu

- **Low delivery reliability of road haulage:** It dues to poor local logistic service level. Improper loading modes lagged behind, leading to delay and shipping losses, which are needed to be improved dramatically by Ikea's Chinese suppliers. Furthermore, unexpected delay and accidents are incurred not only by the poor road condition, but also by the disqualified trailers. Break-off is also incurred by countless toll-houses & toll-bridges established by local administrations (See Figure 6.10):

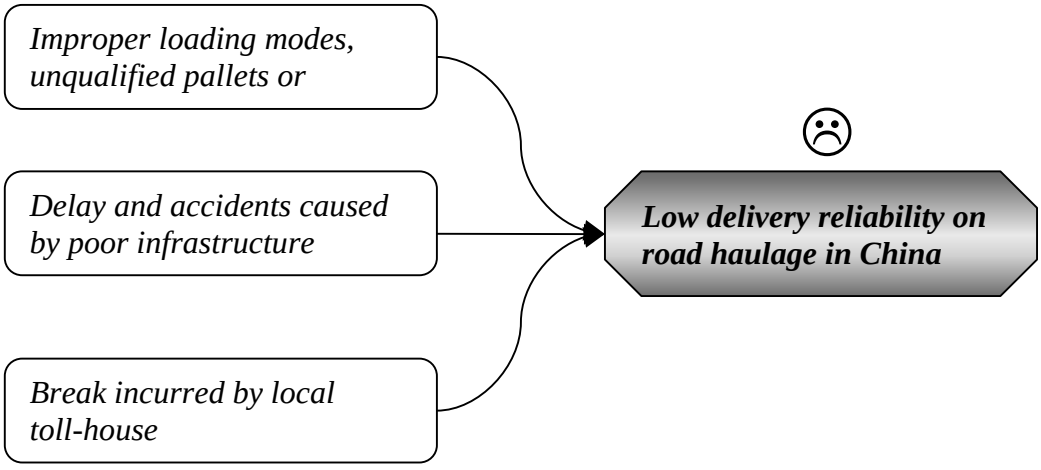


Figure 6.10: Factors Resulting in Low Delivery Reliability on Road Haulage in China
Source: Own

- **Poor delivery service** to Chinese customers: Besides the above-mentioned factors, problems also happen in the last phase of Ikea's local supply chain in China. Logistic service is rather undeveloped in China. And considering the limited disposal capability of Chinese customers on home delivery, Ikea has very few choices in finding their delivery service provider in China. Sometimes, Ikea will receive the complaint of late delivery from its customers in China.

Similarly, customer service and logistic costs are two main aspects to assess. We list certain consequences after Ikea manufacturing outsourcing to China.

- Customer service
  - ✓ High stock availability (high safety stock)
  - ✓ Longer lead time for European markets, shortened lead time for China & Aisa
  - ✓ High order fill rate
  - ✓ Low "on time delivery" caused by Chinese suppliers
  - ✓ High shipping losses/transport damages due to improper loading modes & poor facilities

- Logistic costs
  - ✓ Very high transportation costs (especially for road haulage in China)
  - ✓ High warehousing costs (Building up new DC in China & high handling costs for various products)
  - ✓ High order processing & information costs
  - ✓ High inventory carrying costs for keeping safety stock
  - ✓ Other logistic costs
    - ♦ High training costs both for Chinese employees & suppliers
    - ♦ High costs for out of stock
    - ♦ High packing & package cost (environmentally friendly packages)

6.9 Comparisons among Bestseller, H&M, Volvo and Ikea

H&M, Bestseller, Volvo and Ikea are all famous enterprises from Nordic countries. All of them attach great importance to China as manufacturing centre and essential market. However, because of different types of products and different business strategies, these manufacturer outsourcers have their own characteristics on supply chain operation and logistic consequences faced by them are somehow different (See Table 6.9):

Table 6.9: Basic Information Comparison between Volvo and IKEA's Manufacturing Outsourcing in China

Basic information	Best seller and H&M	Volvo	Ikea
Description on supply chain	Lean for basic garments Agile for fashionable goods	- Pull system - Agile supply Chain	- Push system - Lean supply Chain
Distribution Center in China	No	- DC outside China - No plan to set up DC in China	- Regional DC in Malaysia & Europe - A 260,000m^2 new DC in China before 2010
Warehouse in China	No	Self owned warehouse - Shanghai - Xi'an - Jinan - Wuxi - Chongqing	No, 3PL service - Shanghai - Beijing
Inventory level	No	Low	Very high
3PL or self-own logistic service in China	No	- 3PL logistic service - 4PL provided by Volvo logistics itself	Both
Main Exp/Imp ports	Only export of finished garments from China	- Shanghai - Wuxi - Tianjin - Qingdao	- Shanghai - Xiamen - Qingdao
Logistic information system	Yes, global system, but unavailable for Chinese garment manufacturers	- Only global system in Volvo Logistics Shanghai - No this kind of system in Chinese factories	Yes, Global system
Packing & Package	No	- Environmentally friendly packing - High cost in China	- Global standard - High P&P cost in China
Logistic training cost	No	Low training cost for logistic employees	- High training cost for Chinese suppliers - Low training cost for

			logistic employees
Logistic problems in China	Out of stock & high inventory level in overseas market incurred by customs delays	Delay due to customer clearance & commodity inspection	- Low delivery reliability - Out-of-stock/Over stock - Improper loading modes - High logistic cost both for inland transport & IT

Source: Own

6.10 Summary

In this section, customer service and logistic costs are discussed as separate logistic consequences after manufacturing outsourcing to China, after we review and analyze concerned case studies.

6.10.1 Customer Service

Through several case studies based on interviews, we figure out situation of customer service for manufacturing outsourcing to China is quite complicated. First of all, we have to scope the customer services within 'final products' to 'different tiers of distributors' and 'end customers'. In the following, we also need to divide the target markets into several categories according to their geographic locations so as to differentiate distinct outcomes on specific item of custom services. Generally the customer services level on logistics operation decreases for European customers following the pace of manufacturing outsourcing to China while it is still acceptable on considering the offset on unit price. However, Chinese and Asian customers sometimes achieve higher customer satisfaction on both lead time and stock availability due to reduction on delivery distance as well as exempt of delay at Chinese customs.

Lead time

Before discussing lead time, we need to classify it into two items:

- Average lead time
- Uncertainty of lead time

With the manufacturing outsourcing procedure to China, average lead time has relevant changes according to different final markets if the main transport mode is via international sea transport:

- China, Southeast Asia and Oceania: significantly decreases due to shortened delivery distance
- Europe and Africa: significantly increases due to prolonged delivery distance from China
- Western Asia and American: no obvious change on average lead time

However, if the main transport mode is via airfreight, then the change on average lead time could be ignored.

On the other hand, uncertainty on lead time, which could be represented by standard deviation on lead time, is also important to evaluate customer service level. First of all, the control capability on production would consequently reduce due to the outsourcing decision and further increase uncertainty on lead time. Moreover, other uncertainties on logistic operation, such as delay at Chinese customs could also contribute to it.

Stock availability

In order to make our statement clearer, we use European market as an example. For this market, both average lead time and standard deviation of lead time increase.

- $\sigma_c = \sqrt{\mu_l * \sigma_d^2 + \mu_d^2 * \sigma_l^2}$ …… (2-1)
- $v = (1 - \sigma_c * E_{(k)}/Q) * 100$ …… (2-2)
- Safety stock = $k * \sigma_c$ …… (2-3)

For European markets, both the average lead time (μ_l) and standard deviation of lead time (σ_l) increase. If average daily demands (μ_d) and standard deviation of daily demand (μ_d) in Europe don't have any change, then standard deviation of combined probabilities (σ_c) increases (Equation 2-1). According to Equation 2-3, if safety stock remains at the same level, the safety factor (k) thus decrease and consequently incurs the increase of $E_{(k)}$. The augment of both σ_c and $E_{(k)}$ finally results in the reduction on stock availability (Equation 2-2).

Theoretically the stock availability could be maintained by increasing safety stock, but both warehousing costs and inventory carrying costs will significantly increase. Therefore in practical operation, in order to alleviate the pressure of safety stock and reduce inventory carrying costs, Nordic enterprise may start outsourcing final products instead of self manufacturing in China and sometimes even make its suppliers deliver commodities directly to overseas markets. In other words, they shift inventory pressure to their suppliers and meanwhile, try to keep certain stock availability to satisfy their customers. However, due to loss of control on both production and logistic process, the result may be proved opposite when safety stock in European distribution center is not enough to meet demands.

It is also possible to keep the stock availability while not increasing safety stock during the process of manufacturing outsourcing to China. But firstly the forecast on customer demands should be as accurate as possible to cut down the deviation on daily demands. Then measures like postponement on production, speeding up stock turnover as well as JIT operation need to be implemented to maintain the stock availability during manufacturing outsourcing to China.

Order fill rate

Order fill rate equals to stock availability in most of our cases. Thus high stock availability always means satisfying order fill rate. However, it is not the case for 'Make to order' products because usually this kind of manufacturer starts to work only after receiving orders from their customers, no stock problems in warehouse or distribution centre.

On time delivery

As we mentioned before, uncertainty of lead time, which is calculated by standard deviation, increases after manufacturing outsourcing to China. Then percentage of times when delivery demands are satisfied on time goes down, which means enterprises are hard to ensure on time delivery under this situation.

In our case studies, on time delivery is mostly unsatisfying for Nordic manufacturing outsourcers due to out of control on production as well as other uncertainties in logistic operation, such as frequent delay at Chinese customs. Similarly, keeping high safety stock is one method to solve this problem. Additionally, outsourcers should pay more attention on

cooperation with interrelated operators, in order to reduce delay and other uncertainties could be avoided.

Shipping losses

Shipping losses is another problem worried about by Nordic manufacturing outsourcers. The poor loading modes, backward logistic service level, unqualified packing & packing as well as theft totally results in serious shipping losses during the procedure of manufacturing outsourcing to China. And shipping losses influence accomplishment of satisfying order fill rate dramatically.

6.10.2 Logistic Costs

On the other hand, the consequent logistic costs with manufacturing outsourcing to China is also complicated although total logistic costs generally increases in most of our cases, each item maybe diversifies under specific circumstance. Hereby we need to clarify our conclusion on logistic costs is based on the comparison of manufacturing within Nordic countries and shifting manufacturing process to China.

Transportation costs

Generally total transportation costs of manufacturing outsourcing to China are consisted by three parts:

- Transportation costs within China
- Transportation costs from China to overseas market
- Transportation costs within overseas markets

Thus we need to clarify final market to products manufactured in China, which decides the change on overall transportation cost.

- **Products sold in China, other South Eastern Asia or Oceania:** Total transportation costs reduce since goods don't need to be shipped far from Europe. The delivery distance from China to above markets shrinks a lot.
- **Products sold in EU or Africa:** Total transportation costs increase significantly due to shipping requests from China to Europe.
- **Products sold in America or West Asia:** The change on transportation costs is quite limited since the distance from North Europe or China to above areas doesn't differ a lot.

Therefore, the market orientation for products manufacturing outsourcing to China essentially decides the change on transportation costs. If most of the commodities need to be shipped from China to Europe, transportation costs undoubtedly increase sharply. On the contrary, costs significantly reduce when most of output is locally consumed in China, Southeastern Asia or Oceania.

Warehousing costs

Three individual parts compose warehousing costs. Therefore we will make separate discussion in the following:

- **Labor costs:** This item may decreases due to low laboring cost in China. However, the global layout for warehouses or distribution centers are extremely diversifies, thus make the change on labor cost extremely uncertain.
- **Capital costs:** Capital costs consist of material handling costs and space costs. Changes on these items are also quite complicated since they could be affected by output, labor costs as well as layout and location of warehouses. The consolidation volume may increase due to manufacturing outsourcing while the workload in China is implemented largely by handwork due to the low mechanization level on operation facilities. Handling costs in others areas outside China would be more intricate related with global layout of warehousing facilities.
- **Facility costs:** If there is warehouse or distribution center newly built to meet the logistic needs for manufacturing outsourcing, the facility costs will sharply increase.

For huge volume of manufacturing outsourcing to China, the total warehousing costs generally increases since new warehouse or distribution center is needed to streamline the prolonged supply chain operation, especially during the initial phase. But economic location, reasonable setup and efficient operation may decrease warehouse costs, at least within global scope.

For textile purchasers like H&M and Bestseller, apparently they don't have any warehousing costs incurred in China on considering they have shifted all the pressure onto their Chinese suppliers. We have to notice that relevant warehousing costs will be covered by unit price and shifted from suppliers to customers finally.

Additionally, if output volume outsourced is relatively small, just like the cases of Holmberg Suzhou and Volvo in China, the overall warehousing costs may not vary very much.

Order processing & information costs

Basically order processing and information costs increases due to the implementation of global communication and information exchange. Lead time uncertainty leads to high percentage of backorder, which makes numbers of order placed and managed increased. Related uniform information system and accurate order quantity may help to reduce this part of costs.

And if the company size and production volume is small enough to exempted from the implementation of global information system, the cost maybe remains the same (Holmberg Suzhou).

Lot quantity costs

This item ordinarily remains since there is no big change on lot quantity, even after manufacturing outsourcing to China.

Inventory carrying costs

Actually inventory carrying costs are tightly related with the location of warehouses and distribution centers globally, which is just partially influenced by manufacturing outsourcing to China. Thus the situation is too complicated to reach a uniform conclusion.

- **Holding costs for cycle stock:** As we mentioned before, we estimate order quantity doesn't have any obvious change. But the low labor and raw material costs in China will consequently reduce the unit cost, thus lower the holding cost for cycle stock in China. Furthermore, the preferential policies for foreign investment also makes Nordic manufacturing outsourcers enjoy a decreasing taxation as well as insurance rate in China, thus indirectly reduce the holding cost for cycle stock. However, holding costs for cycle stock outside China is difficult to be judged.

- **Holding costs for safety stock:** Theoretically, outsourcers need to maintain an extremely high stock to prevent the risk of stock out caused by decreasing reliability of lead time and on time delivery. Thus safety stock costs increase accordingly. However, the safety stock could be decrease either through airfreight, which reduces average lead time sharply or implementation of just in time service through the whole supply chain. On the other hand, manufacturing outsourcers like Sony-Ericsson has almost pushed problem of safety stock to its EMS/ODM providers. However, the cost for keeping safety stock will be finally covered by price provided by its EMSs/ODMs.

Other logistic costs

We discuss some other logistic costs on customer service objective, including three items:

- **Training costs:** Because there are few proficient logistic staffs and qualified suppliers in China, this cost generally increases.
- **Packing & Package costs:** If environmental friendly packing is compulsory, this cost may sharply increase due to limited qualified P&P suppliers in China. And if long distance transport needs higher qualified P&P level, packing and package costs go up accordingly. Otherwise the costs will reduce on considering the low material and labor costs in China.
- **Stock out costs:** The risk of stock out sharply increases under circumstance of manufacturing outsourcing. However, it could be alleviated through certain methods, for instance, JIT operation, changing EOQ ordering to POQ ordering, reducing percentage of unnecessary shipping losses and etc. In general, decreasing uncertain situation occurred and forecasting or tracing the customer-oriented market are choices suggested.

7 ANALYSIS ON THE FACTORS INFLUENCING LOGISTIC CONSEQUENCES

In the following part, we will try to scope factors what affects the logistic consequences of manufacturing outsourcing from both internal characteristics of these Nordic enterprises and external environment in China with items listed in Table 7.1:

Table 7.1: Internal Factors and External Factors

Internal Factors	External Factors
- Source of raw materials and components - Characteristics of products - Production volume - Share among target markets on sales volume - Length of supply chain in charge - Power of OEM - Incoterms - Main transport mode - Geographic location - Trade off between logistic cost and service quality	- Political/legal conditions - Economical conditions - Sociological/cultural conditions - Technological conditions

Source: Own

7.1 Internal Factors

During the strategy operation process, Nordic enterprises have various implementation methods. These internal decisions are pivotal, directly leading to the differences on manufacturing outsourcing situation, and then eventually delineate various scopes of logistic consequences.

7.1.1 Source of Raw Materials and Components

Basically there are three ways of procuring materials for manufacturing outsourcers to China:

- Chinese suppliers
- Overseas suppliers
- Both

Dependence on total import of raw materials rarely happens in our research on considering its conflict to the primary motion of manufacturing outsourcing to China, cutting down the cost.

Most of them would like to enjoy the cost advantage on raw materials or components brought by Chinese suppliers. However, some critical parts and materials still need to be imported so as to secure the quality of products outsourced in China, especially for high-end technical products. From this perspective, combination of both localization of raw materials in China

and import of critical parts is ideal for manufacturing outsourcing enterprises dealing in telecommunication, electronics and mechanical engineering.

However, the import of components or materials undoubtedly results in increased logistic cost and longer lead time (if by marine transport). But the most important logistic consequence incurred is the decrease on 'on time delivery' due to frequent delay by Chinese Customs. Import of raw materials, mechanical components and high-tech parts are always extensively inspected by Chinese Customs and importers must provide many compulsory documents to meet the requests from administrative officials. Moreover, customs clearance procedure is always fussy and time consuming, which will directly influence the efficient operation of the global supply chain of these foreign manufacturers. Complaint almost comes from every participant having import activities to China in our research, for instance, Volvo, Sony-Ericsson and Holmberg. Some of them even regard it as the biggest logistic problem of their manufacturing outsourcing to China.

7.1.2 Characteristics of Products

Within manufacturing outsourcing situation, complex characteristics of products induce some results, which need to be noticed:

- Product variety
- Packing & package requirements
- Transport mode
- Make to order or make to request

Firstly, product variety, or the assortment of products affects the diversification of Chinese suppliers, which will then determine the complexity of logistic operation and further influence global supply chain efficiency. This means logistic cost will change in reverse direction. Outsourcers of consumable goods like Ikea have to face more problems incurred by its suppliers producing various products. Moreover, logistic operation, for example, cargo consolidation, palletization and filling rate for unit load will be much more complicated than it for single product. Delay incurred by one single supplier may lead to the failure of on-time delivery of other consolidated products to overseas market.

Secondly, package requests for different goods vary a lot. Nordic enterprises are famous for their environmentally friendly & recyclable packages while the cost of this packing material is much higher than the regular one and qualified packing suppliers are quite limited in China. The package cost of Ikea in China contributes a lot to its overall logistic cost as a combined result of both flat pack and recycling. As we learn, Volvo faces the same problem on its way of manufacturing outsourcing to China. However, manufacturer like Holmberg doesn't need to worry about its package since its products only need to be packed in small plastic bags and deliver to next tier customers.

Thirdly, characteristics of product like weight, volume and quantity also determines the mode of transport to overseas market. For example, for Sony-Ericsson, cellular phone manufactured in China are always transported to European market firstly by the airfreight service of SAS and then delivered to individual national markets. But other accessories like buttery and charger are shipped to European main ports by sea freight on considering their weight. Elasticity of the product also affects mode of transport. In fashion industry, airborne service is

always the choices of high-end luxury goods to ensure the high gross profit margin. For Nordic fashion manufacturers Bestseller Group and H&M, plenty basic garments like sweaters are generally delivered from China to overseas market by international marine transport. Fashionable costumes produced in small quantity to meet specific demand need to be delivered by airfreight as soon as possible in order to catch the season.

Finally 'make to order' or 'make to request' also lead to different situation on stock availability or order fill rate by affecting inventory level and safety stock.

7.1.3 Production Volume Outsourced

Production volume outsourced in China could also determine different logistic consequences for Nordic companies. When it is related with company size, which means a small Nordic organization like Holmberg starting up its outsourcing business in China, logistic consequences seems more acceptable due to small volume of logistic operation, especially on logistic costs. However, on the other hand, production volume could also be changed through coordination on investment. In the case of Volvo, one logistic staff comments that its relatively less logistic problems in China partly dues to Volvo's limited manufacturing capability in this phase. With the increase on production volume, its logistic consequences will be more complicated. It is also the case for Nordic fashion retailers. Some of them considered dispersing the risk of out of stock through reducing the outsourcing volume in China due to trade friction.

7.1.4 Sales Volume

After manufacturing phase, products are distributed to their final markets:

- European & other overseas markets
- Chinese market
- Both

'How much percentage of products manufacturing outsourced in China sold out in local market?' also leads to different logistic consequences. In the cases of Volvo & Holmberg, most of their products outsourced in China is locally consumed and thus incurred less transport costs as well as shortened lead time.

7.1.5 Length of Supply Chain Served

The length of supply chain in charged by Nordic manufacturers in China also determines the scope of logistic consequences they need to face from both inbound (procurement) and outbound (distribution) directions:

- Inbound (procurement)
  - ✓ Building up own factories in China
  - ✓ Leasing manufacturing facilities in China
  - ✓ Buying products directly from Chinese suppliers

- Outbound (distribution)

- ✓ Sales to end customers
- ✓ Sales to distributors, e.g. wholesalers, retailers

For the upstream flow, the logistic problems encountered by buying products directly from Chinese suppliers are different with the ones produced by building up own or leasing manufacturing facilities because those Nordic purchasers don't need to take part in the upstream supply chain management. For example, Bestseller and H&M have successfully shifted part of logistic consequences and inventory to their Chinese suppliers by directly purchasing final products from them. Although Bestseller and H&M still have to keep a rather high inventory in each final market so as to prevent the situation of out of stock, they only need to concentrate on the logistic consequences engendered in downstream supply chain.

So does the down stream of the supply chain. Ikea has to deal with the complaint of late delivery, out of stock as well as commodity damage from their end customers in person due to its combined role of manufacturer & retailer. If franchising or distributing agencies is available, Nordic manufacturing outsourcers may find the logistic consequences shrink.

7.1.6 Power of OEM

As stated in the theory of supply chain management, the more powerful a participant is, the more control it will have within the supply chain. It is also the case for Nordic enterprises seeking for manufacturing outsourcing to China. In the comparison on supply chain between Nokia and Sony-Ericsson in China (See Table 6.5), we can definitely find out the logistic difference led by different control capabilities within their own supply chain flows. Undoubtedly Nokia has more power in controlling its own material flow due to significant self-production capability and therefore better smoothes its logistic operation in China.

7.1.7 Incoterms

There are many incoterms could be selected in the contract between Nordic manufacturing outsourcers and their Chinese suppliers:

- FOB
- CIF
- CFR
- EX works
- …

The choice on incoterms directly leads to different situation on transport loss and obligation incurred. Foreign outsourcers will take more risks if the contract with their Chinese suppliers indicates 'ex works', especially on considering the poor logistic service level in nowadays' China. However, the selection of CIF & CFR maybe also results in uncertainty on lead time, when local suppliers are in charge of delivery activity.

7.1.8 Main Transport Mode

Mode of transportation directly determines transportation costs and lead time. Products delivered by airfreight from China to other markets have obvious advantage on lead time

comparing to generally adopted international sea freight. However, the trade off on transportation costs also increases sharply.

7.1.9 Geographic Location

Regarding the vast geographic expansion of China, overseas manufacturers need to consider logistic consequences incurred by location selection:

- Location of manufacturing facilities, suppliers & distribution centres
- Delivery distance among manufacturing facilities, suppliers & distribution centres
- Problems arises from bonded area in China

Nordic manufacturers always choose relatively developed south eastern China as their outsourcing base not only for better manufacturing facilities and pool of educated work force in this area, but also from logistic perspective. As the most developed areas in China, Yangtze River Delta, Pearl River Delta and Bohai Economic Circle Rim are generally the first choices on considering better logistic infrastructure and service level. Besides, the top 10 seaports with largest container output in China also locate in these three areas, which made the overseas transport rather convenient and cost efficiency.

On the other hand, location of Chinese suppliers is also a key for Nordic manufacturers to reduce the logistic cost in China. From this perspective, Nordic enterprises should enlarge their standards of choosing Chinese suppliers via the equilibrium among cost, quality and logistic reliability. For instance, most of the 370 Chinese suppliers of Ikea come from logistically developed area, e.g. Qingdao, Shanghai and Guangzhou[75].

In addition, layout of distribution centres, warehouses and other support logistic facilities influence global inventory distribution. On considering the cost differentiation on space, handling as well as labor, global inventory distribution then results in change on both inventory carrying costs and warehousing costs

Moreover, the delivery distace among Nordic manufacturers, their suppliers and distribution centres could also influence logistic cost and customer service, especially when the main transport mode within China is the inefficient road haulage with low delivery reliability and high transport loss. The extremity of geographic access is industrial cluster, which presents a trend within telecommunication and electronics industry. Xingwang Industrial Park of Nokia in Beijing has already given out illustration on geographic approximation, which could reduce the logistic cost and improve customer service within the whole global supply chain.

When outsourcing to China, policies of preferential taxation in some typical areas are particularly attractive. But the problems arise when they want to distribute semi products or component to Chinese factories outside this area, or sell final products on Chinese market. Under this circumstance, semi products, components or final products produced or deposited in these tax-free areas have to be levied customs duties, related import value added tax, consumption as well as income tax.

[75] Annual report of Ikea, 2004

7.1.10 Trade Off between Logistic Costs and Customer Service

Universally the trade off between price and customer service are applicable for all business sectors including logistics. Free of obligation always followed by the increase on logistic cost while the reduction on transport freight maybe incurred serious transport damages. Choices between logistic costs and customer service have be confronted by all Nordic manufacturers who need to deliver products made in China to overseas market. How to choose between logistic costs and relevant service level will always be the problem for Nordic manufacturing outsourcers in China. For example, Ikea sometimes chooses directly delivery provided by Chinese suppliers to its Chinese warehouses for reducing considerable transport cost. However, at the same time, Ikea has to accept the consequences of higher cargo damage brought about by poor loading modes of its suppliers[76].

7.2 External Factors

Compared with the above-mentioned internal factors, there are other external factors considered. Taking one with another, laggard logistic development in China cannot reach satisfactory level. Here, we group external factors to several parts: political/legal, economic, sociological/cultural as well as technological conditions, which influence logistic consequences for Nordic enterprises during their manufacturing outsourcing process to China.

7.2.1 Political/legal Conditions

Even after entering WTO, Chinese government also reserves its restriction on several business sectors tightly related with logistics so as to protect its own business (See Table 7.2). The way for foreign investors majoring in these business scopes in China is to launch joint ventures with Chinese partners before the market is fully opened to them.

Table 7.2: Limitation on Relevant Business Areas for Foreign Investors in China

Logistic service sectors	Competitive Status	Foreign stake limit	Time of 100% foreign owned
Distribution services like wholesaling, retailing, franchising & commission agencies	Highly fragmented, mainly based on province, no nationally based distribution network	- Minority from Dec 11, 2002 - Majority from Dec 11, 2003	100% after Dec 11, 2004
Transport & warehousing	- Highly fragmented - Price competitive with thin margins	Majority	100% after Dec 11, 2005
Freight forwarding	- Major sea FF: COSCO & China Shipping - Major air FF: EAS - Sinotrans (has 10%	Maximum 75% from Dec 11, 2002	100% after Dec 11, 2005

[76] Interview Julianna Ma

	share of both)		
Domestic express	- Fragmented - EMS by China Post express - EAS	0%	100% after Dec 11, 2005 with delivery of letters under 350 grams excluded
Int'l express	- Highly concentrated - 5 firms have 95% of market - DHL Sinotrans 38% - EMS 30% - FedEx Datian 16% - UPS-Sinotrans 10% - TNT-Marchplus 6%	Minority	100% after Dec 11, 2005

Source: '2004 Report to Congress on China's WTO compliances' by United States Trade Representative

Due to the underdevelopment of logistic service in China and the long term cooperation with overseas logistic providers in native countries, MNCs with manufacturing outsourcing in China prefer to extend this relationship within China to better smooth the operation and thus increase the logistic efficiency. However, according to the regulation of Chinese government, although the transport &logistics market will be gradually opened to foreign investors as one of the commissions of entering WTO, foreign logistic service providers have to cooperate with Chinese partners till December, 2005, when the Chinese logistic market will be totally opened. Moreover, foreign logistic providers are prohibited to enter into specific service sectors, e.g. domestic express service until Dec 2005.

The regulation limits the service scope and further affects the service quality as well as operation efficiency of foreign logistic providers. For instance, Maersk Logistics had to found the joint venture when it first entered into Chinese transport market. International express service providers like DHL, TNT, UPS & Fedex all needs to cooperate with Chinese freight forwarders e.g. Sinotrans, EAS as to launch their business in China.

7.2.2 Economic Conditions

The economic backup undoubtedly determines the logistic service level of an area while a highly efficient logistic system will in turn accelerates the economic development. There are some indexes by which could indicate the logistic development level of a country:

- **Total logistic cost as a proportion of GDP**

It is believed that the logistic development could be gauged by the proportion of overall logistic cost of a country accounting for its annual GDP. In 2004, the logistic cost in China sums up to 2.9 trillion RMB and accounts for 21.3% of GDP. However, the same indicator from EU is lower than 10%, far lower than that of China.

- **Logistic cost as a percentage of sales price for products**

From the below listed Table 7.3, we could easily find out the logistic costs in China are absolutely higher than those of EU, even with some relevant costs excluded from the calculation on Chinese logistic costs.

Table 7.3: Comparisons on Logistic Costs between EU & China

	Logistic cost as a percentage of sales price for products	Items included
EU	5%-20%	• Transportation • Warehousing • Inventory carrying • Order processing
China	Average 20%, 50% higher than that in USA & EU	• Transportation • Warehousing Usually other logistic costs are excluded, e.g. inventory carrying costs, order processing & information costs

Source: http://supplychain.establishinc.com/

As the largest developing country in the world, China just realized the importance of logistic a few years ago and starts up its expansion in this area. Although logistics is a burgeoning industry in nowadays' China and gets strong support from Chinese government, its situation in China still lags far behind from developed countries. Foreign investors, especially Nordic enterprises coming from the most advanced logistic service market have to face a lot of problems incurred by the underdeveloped local logistic service on their way of manufacturing outsourcing to China.

Hereby we have a list for insufficiency of economical conditions in China, which impact efficiency of logistic operation:

- Poor logistic infrastructure and facilities
- Limited function and poor facilities of warehousing industry
- Poor inter model transport system
- Laggard service mode of 3PL providers

Poor logistic infrastructure and facilities

The logistic infrastructure & facilities in China are far behind the developed areas like Europe (See Table 7.4). Definitely it was caused by the limited investment in this area and ignorance on logistics.

Table 7.4: Comparison on transport infrastructure between EU-25 & China (2001)

Unit: 1000 Km

Modes of	Road	Motorway	Rail	Inland water

transport				way
EU-25	4800	55.6	199.7	34.7
China	1700	20.0	70.1	121.0

Source: http://europa.eu.int

Although Chinese government has already acknowledged the importance of infrastructure as well facilities for developing logistics and therefore sharply increases the investment volume, it still needs a long time to upgrade them thoroughly. In the following Table 7.5, we list the defects on infrastructure and facilities for different modes of transport and point out the relevant logistic problems incurred.

Table 7.5: Logistic Consequences of Poor Transport Infrastructure & Facilities in China

	Poor infrastructure & facilities	**Operation problems**	**Relevant logistic consequences**
Road haulage	*- Lack of nationally based highway system* *- Lack of Big trucking companies, containerised trucks & heavy duty vehicles* *- Lack of tracking system* *- Lack of modern loading facilities*	*- High deadhead rate* *- Lack of LTL service with board reach* *- Inefficient logistic handling* *- Low freight visibility* *- Overloading of trucks*	***Logistic costs*** • ***High transportation costs*** • ***High inventory carrying costs*** ***Customer service*** • ***Bad 'on time delivery'*** • ***Longer lead time*** • ***High transport damage***
Railway	*- Lack of inter modal links* *- Lack of automated facilities* *- Lack of tracking system & IT facilities* *- Lack of facilities for refrigerating cargoes*	*- Low capacity* *- Limited commodity service scope* *- Limited inter modal transport* *- Break Bulk oriented instead of containerized cargoes*	
Inland waterway shipping	*- Lack of containerization* *- Lack of standardized vessels* *- Lack of modern handling facilities* *- Lack of tracking system*	*- Low volume capacity* *- Limited commodity service scope* *- Limited inter modal transport* *- Accidents*	
Ocean shipping	*- Limited capacity compared to the demands* *- Lack of container yards & cranes*	*- Increasing ocean freight rate* *- High theft & damages for LCL cargoes*	

Source: 2003 China Logistics Profile by Christina Wu

The huge gap on logistic infrastructure between China and other advanced countries directly results in the low efficiency on logistic operation, and finally affects both on logistic costs and customer service level for Nordic manufacturing outsourcers.

Limited function & poor facilities of warehousing industry

Nowadays a lot of warehousing service providers in China still regard warehouse as a single functioned place for keeping stock while overseas competitors have realized the importance of warehouse in improving the logistic operation efficiency long before. Value added service like packing & package, breaking bulk as well as consolidation are usually provided by large warehouses and can rarely be found out within small ones.

Moreover, the warehousing facilities like pallets and racks are too outmoded or not standardized to fit mechanical handling. So only hand working can be preceded in some warehouses. The application of bar code & RFID is also a problem due to lack of basic operation facilities. Foreign manufacturers sometimes have to build up their own warehouses due to the laggard service level in this area in China.

Poor inter modal transport system

The poor terminal construction and low standardization of unit loads constraints the development of inter modal transport in China. The failure of adaptation to this modern efficient transport mode leads to rather high cargo loss as well as inefficiency of operation while the increased filling rate & economies of scale, two of the achievements by inter modal transport are just what need to be significantly enhanced in nowadays' China.

For instance, as the most important connecting way of inter model transport, the development of road freight indicates the logistic as well as the development of inter model transport of a country. However, we can find the huge gap on road freight transport between China and EU from Table 7.6:

Table 7.6: Comparison on road freight between EU-25 & China

	EU-25	China
Number of commercial vehicles in 2000 (Million)	26.8	7.2
Road freight volume in 2001 (Billion ton kilometre)	1516	597

Source: http://europa.eu.int

Laggard service mode of 3PL providers in China

The extension of employing 3PL service indicates the efficiency within logistic industry of a country. In western countries, the logistic service from 3PL companies accounts for more than half of the market share, while in China, 3PL service is just in its infancy with extremely low market coverage, as shown in Table 7.7:

Table 7.7: Comparison of 3PL Service among Countries

	USA	EU	China
Percentage of 3PL costs accounting for total national logistic cost	8-10%	8-10%	3.2%

Market share of 3PL service in total logistics demands	73% in 2000	76% in 1996	-Raw materials 21% -Finished products 21% -Commercial enterprises 18%
Percentage of essential logistic service & value added logistic service in 3PL industry	N/A	N/A	-Transport & Warehousing services 85% -Other value added logistic services 15%
Cost savings by using 3PL services	62%	N/A	28%

Source: the logistic research centre of University of Tennessee

Furthermore, the composition of logistic service provided by 3PL service is also an important indicator of logistic development of a country. Basically, 3PL companies provide essential logistic service like transport, warehousing as well as other value added logistic services, e.g. order processing, packing & package, inventory management tracking & trace services etc. The value added logistic services, which are significant in optimizing the supply chain management, represent the tendency of modern logistics. While the proportion of value added services catered by Chinese 3PL service providers is just around 15% of their total business. It indicates that most of the 3PL service providers in China still concentrate on transport and warehousing sectors, which can't produce extra value and bring cost reduction within the whole supply chain

7.2.3 Sociological/Cultural Conditions

It is said that sociological and cultural conditions are the major obstacles to achieving integration within the supply chain in China. Among global pipeline, lack of communication and cooperation may lead to serious consequences. Some main reasons are listed below:

- Undisclosed information
- Lack of trust
- Bureaucracy
- Language barrier
- Consumption
- Education level

Undisclosed information

From the perspective of SCM, information sharing among supply chain partners is particularly important for cutting down the cost and improving the logistic efficiency of each participant. However, for example, suppliers in China affected by traditional Chinese theories may keep relevant information as confidential and don't want it to be disclosed neither to the foreign manufacturers outsourcing to China nor other tiers of suppliers, which will definitely decrease the information transparency and consequently increase the operation cost within the whole supply chain.

Lack of trust

The reason for undisclosed information may due to lack of trust among different companies. Short-term cooperation with foreign partner leads to incomprehension and distrust, thus some Chinese participants within the global supply chain only want to ensure their own benefits. For instance, when the demand for specific product can't be met in the market, some Chinese distributors will claim out of stock and send out urgent booking orders to foreign manufacturer although they still have some stock in their warehouses. Or they may cancel the order or reduce the booking quantity with the announcement of over stock when the profit margin of the product reduces. So do some Chinese suppliers. Nordic manufacturers outsourcing in china will then be sacrificed for this lack of trust, although such kind of trust relationship could be established and improved in long term.

Bureaucracy

Bureaucracy in Chinese administrative systems, from our viewpoint, is caused by the absence of democracy in history, which is also an important constitute of Chinese culture. Undoubtedly it reduces the efficiency of the operation of whole supply chain for Nordic companies, as the most obvious example is the frequent delay occurred at Chinese Customs. The situation will be improved with the development of both economy and democracy while it can't be completely removed. To foreign participants, they need to keep their own working style, but meanwhile they should know how to adapt to this concept from a certain extent.

Language & Cultural barriers

Language difference is one aspect influencing daily logistic work and cooperation efficiency. Presently, more and more Chinese people are learning English, however, different language background leads to much difficulty while learning, understanding and communicating. Furthermore, it is very hard for local employees to accept certain enterprise style and culture due to various ways of thinking and different viewpoint on value accomplishment.

Consumption

Due to geographic population distributing, different areas in China have different consumption abilities and habits, which will directly decide the market coverage and consequently affect the logistic operation on specific product. For companies focusing on Chinese market, they need to understand this diversity, although within one country.

Education level

Chinese government pay more attention on education development from junior-class to high-class. But inequality input between eastern and western area still exists because of economic level. Higher education has developed dramatically recent years; more than 9,530,000[77] people have the opportunity to enter college. But junior high school is still the average level in China. Low education level brings indirect consequences to the process of logistic operation, such as establishment of cooperation relationship and acceptance to other cultures.

[77] http://www.usc.cuhk.edu.hk, visited on 2005-12-26

On the other hand, the academic education and research in logistic area are extremely poor in China. Chinese universities and colleges rarely settle the major or even relevant courses in their schedule. Academic research on logistics or SCM is also constrained by ignorance on logistics. Although the situation has started to be improved with recognize of the importance on logistic education, Nordic enterprisers have to face higher training costs due to lack of proficient logistic employees in nowadays China.

7.2.4 Technological Conditions

In recent twenty years, technological development, especially the achievement on information technology, greatly contributes the improvement of logistic operation efficiency. Technology has become another driven factor for modern logistics. However, it is not the case in China.

Bar coding and computerized operation was only adopted by large transport and warehousing companies in China while it is not the case for small companies. Other advanced technologies, e.g. RFID and GPS were just introduced to Chinese logistic services while they are still restrained by the poor infrastructure. Most of the small Chinese trucking companies only own a few staffs, a room, one or two old truck as well as a fixed telephone. GPS system sounds more like a dream to them. Even for the largest Chinese freight forwarder Sino-trans, GPS system is seldom installed on its trucks.

The poor service catered by Chinese telecommunication providers also constraints the implementation of advance logistic information system in China. For example, UPS and Fedex both use wireless technology on their handheld facilities during pickup stage for instantaneously transmitting relevant package information to their distributions centres. While they have to degrade their handheld machines from the 3rd generation to the 2nd one in China because Chinese telecommunication runners can't provide relevant service backing up the implementation of wireless transmission. Their couriers in China then have to store the package information into the 2nd handheld facilities and transit relevant data into computer by plugging handheld facilities into servers. Furthermore, the package information sent to Chinese customs from UPS needs to be inputted into computer by hands.

8 CONCLUSIONS AND SUGGESTIONS

More Nordic enterprises have turned to China as one important manufacturing pot and potential market during recent years. Low cost as well as large markets in China are definitely their main impetus. Our topic concentrates on the logistic consequences concerned during the process of manufacturing outsourcing to China. Apparently, more pressure has been pushed to some supporting department in international operation, including logistics. It is significant to find existent problems, search why these problems happen, and try to provide possible solutions.

In this chapter, general conclusions are summarised after our research process. These conclusions are made in terms of research purpose and sub-problems proposed (See Chapter 3). Then, some probable suggestions are presented based on problems concerned.

8.1 General Conclusions

Manufacturing outsourcing is an essential tendency globally. And China, as we mentioned before, is one of the most appealing spots selected. Our purpose is to find out the logistic consequences of manufacturing outsourcing to China for Nordic enterprises.

The first sub-problem is to conclude specific logistic consequences after describing and analyzing logistic operation status of certain Nordic enterprises in China. After historical study, we group these consequences into two main parts: customer service and cost efficiency (See Chapter 2). And these two sectors influence each other during practical work. Afterwards, some Nordic enterprises are chosen according to their particularity (See Chapter 4), and then these companies are reviewed, interviewed, analyzed and compared, in order to set out detail logistic consequences going with manufacturing outsourcing (See Table 6.11 & 6.12).

The second sub-problem is to explore what factors could influence logistic consequences of manufacturing outsourcing to China for Nordic enterprises. Certain influencing matters are divided into internal and external groups, and then we try to list essential ones depending on information from general data (See Chapter 5) and case studies (See Chapter 6). We mainly focus on factors leading to specific logistic problems, especially in China. Internal factors refer to reasons producing from internal organization operation. And external factors are discussed from political/legal, economic, sociological/cultural as well as technological conditions of China (See Table 7.1).

8.2 Suggestions

In general, logistic cost ranges from 5% to 35% of the selling price[78]. Hence, Nordic outsourcers need better control on its overall logistic cost to prevent the trade-off between logistic cost & manufacturing cost in China within its global supply chain system. The route from Chinese suppliers to its global customers must be as direct, cost-efficient as possible to achieve the outsourcing advantage both on cost and customer satisfaction. Mainly from view of outsourcers, we try to give some suggestions in terms of influencing factors mentioned in Chapter 7.

[78] http://www.enet.com.cn, visited on 2005-10-27

8.2.1 Geographic Location

Description:

Manufacturing facility locations are essential for designing distribution system, influencing efficiency of the whole pipeline.

Solution:

- Location of suppliers

For Nordic companies who want to expand manufacturing outsourcing business to China, location of its suppliers should always be considered. Not only the delivery distance from supplier to Nordic manufacturers, but also the adjacency to base export ports within China will directly affect the logistic consequence. Generally geographic proximity is advantageous on logistic operation on considering the laggard logistic level in China.

- Establish manufacturing network

For suppliers, it is ideal to establish network in order to integrate the distribution of raw material and components, reduce delivery distance and consequently reduce the length of supply chain from geographical viewpoint. **Industrial cluster** is one good choice to reduce logistic cost and increase operation efficiency of whole supply chain. Today, products are manufactured closed to their end customers from the consideration of keeping flexibility of the downstream supply chain and quickly responding to customer request. However, for better smoothing upstream supply chain operation, the industrial cluster between manufacturer and its suppliers become a global tendency. Working with suppliers within walking distance in where the end market situates undoubtedly increases the responding speed and the flexibility, as well as get economy of scale from both upstream and downstream of the supply chain.

- Build up distribution centre in low cost areas

The location of distribution centre is also another influencing factor considered. Basically Nordic outsourcers always choose countries such as German, Netherlands, or Belgium to be the location for their European distribution centres, because most frequently transport mode used from China to Europe is sea freight and main European ports are situated in those countries. But costs for handling and maintenance inventory level there are extraordinarily arresting. So enterprises may consider to build distribution centres in other Asian or eastern European countries. This strategy will be feasible only at the premise of consolidation operation should be proved to be theoretically efficient. On the other hand, if the manufacturing outsourcing volume in China is huge enough, the Nordic enterprise with global market coverage should think about launching another distribution centre in eastern Chinese cities to streamline the global delivery.

8.2.2 Product Diversity

Description:

A deep assortment on both final products and components makes cooperation and management on logistics difficult and inefficient.

Solution:

- Modularisation of components

The modularisation of components reduces diversity and consequently makes it possible for enterprises to reach economy of scale by cutting down number of its suppliers and choosing globally based co-operators. It also helps to relieve pressure on inventory level, which is advantageous for launching new product into market and keep gross profit.

- Improve consolidation level

Consolidation is primary function of distribution centre. However, if deep assortment on final products is a must, manufacturers should think about starting consolidation operation as early as possible, even within warehouses so as to help decrease operation complexity brought from diversification of products.

8.2.3 Packing and Package

Description:

Long distance transport, numbers of consolidation and break-bulk need high standard for packing and package.

Solution:

- Regulate and communicate packing & package standards with local suppliers

In order to reach low cost or convenience on operation, some Nordic outsourcers prefer to Chinese suppliers on packing & package. Within this situation, enterprisers have to inform, keep or regulate their package standards, in order to prevent remediation caused by diversification on packing standards or different cultural backgrounds.

- Innovate suitable packing & package methods

Outsourcers may try to develop their own package methods, based on special products demands. Undoubtedly, flat packaging is a famous and attractive innovation of Ikea, which greatly enhances filling rate, and thus sharply reduces unit transport costs and warehousing costs as well. Ikea never stops its paces on re-designing and further improvement on flat packs. The package of products outsourced to China has always been further enhanced to save more shipping space and consequently increase shipping efficiency.

8.2.4 Cooperation with Suppliers

Description:

Supplier selection is one of the most important aspects to decide final results after manufacturing outsourcing to China. Many related problems are involved to deal with, for instance, training, information exchange, mutual trust and cultural differences from different partners, which may impact performance of outsourcing strategy.

Solution:

- Overall evaluation Chinese suppliers

Products cost is always set as the benchmark of supplier selection. However, during the procedure of manufacturing outsourcing in China, Nordic outsourcers need to further evaluate how much gross profit would be covered by the consequently increasing logistic cost. The principle of choosing Chinese suppliers should base on overall evaluation both on production cost and logistic cost at the premise of qualification of products.

- Communicate and train local Chinese suppliers for establish better long-term cooperation

The object is to reach integration with local enterprises in long term. The localization and better training of logistic employees may be one useful method for better communication with relevant Chinese partners. During operation process, some theories could be employed, such as Vendor Managed Inventory (VMI), to control local distribution system and optimize inventory level. However, it doesn't make sense to simply transfer the inventory pressure from powerful Nordic manufacturers to their Chinese suppliers since all the costs incurred will be covered through increasing unit price on components or final products. But if the Nordic manufacturer can reduce the whole chain's inventory, then it will be very competitive.

- Extend collaboration with global suppliers to China (for Nordic enterprises engaging manufacturing operation in China)

However, the trust and smooth cooperation with local Chinese suppliers always spend rather long time and a lot of expenses as well. Hence, the business extension with global suppliers to China may be a fast and efficient method selected to solve this problem. When a manufacturer is powerful enough to control the whole supply chain channel, it is possible to ask for its suppliers developing business close to its manufacturing facilities in China. Nokia is one of the most typical examples in such kind of global business extension. Its suppliers are always requested to launch factories wherever Nokia has its own plants, just like operation model of Xingwang Industrial Park in Beijing, China. The concept of industrial clusters makes suppliers work within walking distance in where the end market situates increases the responding speed and flexibility, as well as reach economy of scale from both upstream and downstream of supply chain of Nokia.

- Develop relationships with professional outsourcing agencies (for Nordic enterprises directly purchasing products from China)

For other Nordic enterprises directly buying final products from China, turning to outsourcing agencies may be a good choice. There are a lot of expertises dealing with products sourcing in Hong Kong, who can provide highly efficient overall service from selection of local Chinese suppliers in initial phase, inspection and supervision service during manufacturing process to final global delivery of components and final products. For instance, Li & Fung Trading

Company from Hong Kong serves for H&M Group for sourcing of textile products in China by contacting and selecting suitable factories in Chinese mainland, managing manufacturing procedure in Chinese factories according to requests from H&M and finally arranging products delivery to several spots globally. With cooperation with Li & Fung, H&M can concentrate its core business and enhance to improve its core competitiveness of design.

- Supplier Relationship Management (SRM)

SRM can be introduced as a comprehensive approach to managing the interaction between Nordic manufacturer and its outsourcing suppliers. With the ultimate goal of streamline the procurement process between an enterprise and its suppliers, SRM includes both business practise and software. In the practise sector, SRM aims to increase the efficiency of material processing, acquiring goods as well as inventory management by improving communication level. On the other hand, implementation of SRM software can reduce production cost while at the same time improve its quality. Vendors providing SRM softwares include: 12 Technologies, Manugistics, Peoplesoft and SAP.

8.2.5 Local Logistic Service

Description:

Logistic service level impacts delivery reliability, leading to uncertainties on customer service and increased logistic costs.

Solution:

- Extend cooperation with global logistic partners to China

With the fully opening logistic market to foreign investors at the end of 2005, the competitive situation in China on logistic will be more intensified. However, it is also a good chance to improve overall logistic service level in China.

Nordic enterprises are highly recommended to choose their global logistic partners and extend this cooperation to China. This long-term relationship could be greatly helpful for Nordic manufacturers to smooth their global pipeline operation, improve efficiency and minimize negative logistic consequences brought by poor logistic service level in China. The business extension between Ikea and Maersk Logistics has given out an excellent example of global cooperation extension with logistic partners, resulting in satisfactory win-win situation.

- Select prestigious Chinese 3PL service providers

Besides the above-mentioned extension, we also suggest Nordic manufacturing outsourcers to choose large and reputable Chinese 3PL service providers due to their better facilities, technological implementation and integrated network in China. Although small Chinese 3PL providers are advantageous on pricing charged, collaborate results are always proven to be unsatisfying. Nationally based 3PL companies, such as Sinotrans, are good choices for Nordic companies on considering trade-off between service quality and logistic cost and thus abandoning the service from overseas 3PL providers.

8.2.6 Information Exchange

Description:

Larger transaction picture consists of more operators. Different information system adopted among various participants or the opacity on information sharing increase the difficulty for information exchange, which directly reduces the logistic operation efficiency.

Solution:

- Flexible criteria for important information exchange

Integrated information system and uniform information standards make information exchange correct and efficient. But it is impossible to request all partners to install same information system, flexible criteria for information sharing will help to eliminate or reduce negative impact.

For a cost driven supply chain, the manufacturer should pay much attention on the inbound information flow and thus strives for building up a public platform for better communication with its upstream suppliers, e.g. the supply chain management system of Ikea. However, for companies like Volvo, a uniform system with information sharing among distributors, retailers and final customers, just like A4D, would be more helpful to achieve 'make to orders'.

- Information sharing among Nordic manufacturers, their Chinese logistic service providers and Chinese administrative institutes

The application of VMI and JIT also depends on the trust and information sharing among participants within the supply chain. Furthermore, the cooperation on information exchange beyond the supply chain is equally important. For example, logistic information system between Nordic manufacturers and their logistic service providers is equally important, especially in China with lower logistic service level. The electronic administration on foreign investors could be fulfilled in some developed areas in China through electronic data interchange and correspondingly reduces intervene from government. Electronic customs clearance is also a good example of achieving information sharing between foreign outsourcers and local Chinese administration.

8.2.7 Customs Clearance

Description:

Many Nordic enterprises complained about low efficiency of Chinese Customs, which directly leads to delay and uncertain lead time and thus influences smoothing running of their global supply chain.

Solution:

- Localization raw materials & components procurement

Almost all the interviewers having import operation in our case studies complained the delay at Chinese customs. In order to minimize this consequence, Nordic enterprises should try to find out replacement of their overseas suppliers in China and reduce quantities of import for raw materials, components as well as semi-products.

- Cooperate with professional local customs clearance agencies

When import for components or raw materials is a must due to technological consideration, Nordic enterprises should learn how to cooperate with professional customs clearance agencies in China, who always have close and long-term relationships with local customs to accelerate clearance process.

- Apply electronic customs clearance procedure

At the same time, electronic customs clearance is also anther good choice for Nordic investors. By electronically declaring and issuing certificates on Internet, importers and exporters can largely reduce time-consuming paper tasks requested by ordinary customs clearance procedure. Xingwang Industrial Park in Beijing is one good example of electronic customs clearance in China. Nokia successfully decreases compulsory documents for export for 11 paper-versions to 6 electronic-versions and consequently sharply advance the operation efficiency[79].

8.2.8 Risk Management

Description:

Risk management is extremely important for every foreign investor with manufacturing outsourcing business in China.

Solution:

- Concurrent engineering

In order to decrease risks and relevant logistic problems, Nordic enterprises should get their logistic teams involved when making outsourcing decision. Concurrent engineering is feasible in this way, which integrates staffs engaging in different operation phases within one group. It not only accelerates reaction speed for diversified customer requests, but also shortens distribution process to enter into market, keeping lower inventory level and higher gross profit rate. Products are easier to packed, transported, and distributed in-phase.

- Simulation programme

Simulation is a good way to improve logistic decision-making. Strategic-decision, e.g. location selection either on manufacturing facilities in China or Chinese manufacturing suppliers has long time significance as the first step of manufacturing outsourcing to China. This programme could also be implemented into operation procedure as a benchmark for coordinating manufacturing capability and market demands. Moreover, introduction of simulation model into both evaluation and prediction of specific logistic policy, e.g. VMI has

[79] www.jxtrans.com.net, visited on 2005-11-03

long been proved to be effective.

- Increasing the dependence on single suppliers

Risk of stock out could be alleviated through increasing the number of suppliers on same products, components or raw material. Ericsson used to be the victim of over dependence on single supplier. In March of 2000, being the exclusive supplier for Ericsson on specific chip, a factory of Philip was on fire and the following out of stock of this chip brought about the breakdown on Ericsson 's production on cellular phones and finally incurred a loss around 1.7 billion USD within that year. Nowadays, as the pioneer of global outsourcing, Nokia insists at least three independent suppliers on each component to prevent the risk of out of stock[80].

- Preparation for emergency situation

Besides the comprehensive acknowledge of local logistic situation and problems within China, Nordic organizations should also have a clear layout of how to deal with logistic business under emergency situation, such as SARS in 2003 and possible financial crisis in Asian area.

[80] http://www.sina.net, visited on 2005-10-15

REFERENCES

LITERATURE

Bowersox, D.J., Closs D.J. and Cooper, M.B., (2002), "*Supply Chain Logistics Management",* McGraw-Hill

Butler, Janet, (2000), "*Winning the Outsourcing Game: Making the Best Deals and Making Them Work"*, Auerbach Publishers, Incorporated

Christopher M. (1998), "*Logistics and Supply Chain Management*", Prentice Hall

Corbett, Michael F., (2004), "*Outsourcing Revolution: Why It Makes Sense and How to Do It Right"',* Dearborn Trade, A Kaplan Professional Company

Cresswell J. W., (1998), "*Qualitative Inquiry and Research Design: Choosing among Five Traditions*", Sage Publication, Inc

Fine, C. H., R. Pethick and J. El-Hout, (2002), "*Rapid-Response Capability in Value-Chain Design*", MIT Sloan Management Review

Ghauri, P., Grönhaug, K., (2002), "*Research Methods in Business Studies*", Prentice Hall

Gill, J., Phil, J., (1997), "*Research Methods for Managers*", Paul Chapman Publishing Ltd

Harrison, A., Hoek, V., (2002), "*Logistics Management and Strategy*", Prentice Hall

ITRG, (2003), "*How to Optimize Outsourcing Relationships",* London, Canada

James, R., Stock, & Douglas, M. Lambert, (2001), "*Strategic Logistics Management*", McGraw-Hill

Kolb, D., A., Rubin, I. M. And McIntryre, J. M., (1979), "*Organizational Psychology: an Experimental Approach",* Prentice Hall

Michael F. Corbett, (2004), "*Outsourcing Revolution: Why It Makes Sense and How to Do It Right",* Dearborn Trade Publishing

National Research Council Staff, (2000), "*Surviving Supply Chain Integration: Strategies for Small Manufacturers",* Washington, DC, USA: National Academies Press

Rick L.Click, Thomas N. Duening, (2004), "*Business Process Outsourcing: the Competitive Advantage*", John Wiley & Sons, Inc

Yin, R., (2003), "*Case Study Research: Design and Methods*", Sage Publication, Inc

JOURNALS AND ARTICLES

Al Delattre, Tom Hess and Ken Chieh, (2003), *"Strategic Outsourcing: Electronics Manufacturing Transformation in Changing Business Climates"*, Accenture

Alan Braithwaite, (2003), "*The Supply Chain Risks of Global Sourcing*", LCP Consulting

Danish Trade Council in China, (2005), "*The 2005 Report on Danish Companies in China*"

Erik Widman, (2005), "*China Business Climate Report 2005*"

Ernst & Young, (2005), "*Customs & Trade Alert: China Bonded Logistic Centres"*

Irene Schipper, Esther de Hann, (2005), *"CSR Issues in the ICT Hardware Manufacturing Sector", SOMO ICT Sector Report*

Jacqueline Liu, (2004) "*Outsourcing To China*", Synovate Business Consulting, Hong Kong

Robi Bendorf, C. P. M., (2004), "*International Comparisons of Hourly Compensation Costs for Production Workers in Manufacturing*", Bendorf & Associates

Stephen J. Doig, Ronald C. Ritter, Kurt Speckhals, and Daniel Woolson, *"Outsourcing: Part I"*, The McKinsey Quarterly, 2001 Number 4

Suresh Gupta, (2003), "*Risks, Rewards, and Trade-offs of Offshore Outsourcing",* The Capco Institute Journal #8

United States Trade Representative, (2004), "*Report to Congress on China's WTO Compliance*"

Wang Wei, (2003), "*Retrospect and Prospect of Logistic Development in China*", Development Research Centre of the State Council, China

LECTURE NOTES

Jensen Arne, (2004), "*Trade Facilitation and International Logistics Performance*", Lecture Notes, Gothenburg University

Jensen Arne, (2004), "*Strategic Logistics Management in Supply Chains – Compendium*", Gothenburg University

Roger Lindau, (2004), "*Managing Logistics Internationally*", Lecture Notes, Kalshamns

INTERNET

http://www.aqholmbergs.cn/, visited on 2005-07-01

http://www.volvo.com/, visited on 2005-07-10

http://www.ikea.com/, visited on 2005-07-29

http://www.xinhuanet.com/, visited on 2005-08-08

http://www.ahbofcom.gov.cn/, visited on 2005-8-17

http://www.helsinginsanomat.fi/, visited on 2005-09-28

http://www.southcn.com/, visited on 2005-09-30

http://www.bestseller.com/, visited on 2005-10-10

http://www.hm.com/, visited on 2005-10-10

http://news.ctei.gov.cn/ , visited on 2005-10-14

http://www.nftz.gov.cn/, visited on 2005-10-15

http://www.sina.net/ , visited on 2005-10-15

http://flextronics.com/, visited on 2005-10-18

http://www.nokia.com/, visited on 2005-10-18

http://arimacomm.com.tw/, visited on 2005-10-20

http://elcoteq.com/, visited on 2005-10-20

http://www.norway.cn/embassy/embassy.htm, visited on 2005-10-20

http://www.swedenabroad.com/, visited on 2005-10-21

http://www.enet.com.cn/, visited on 2005-10-27

http://www.auto.sina.com.cn/, visited on 2005-10-28

http://www.businessballs.com/, visited on 2005-10-29

http://www.jxtrans.com.net/, visited on 2005-11-03

http://www.bda.gov.com/, visited on 2005-11-05

http://61.181.251.10/, visited on 2005-11-18

http://www.people.com.cn/, visited on 2005-11-20

http://www.sonyericsson.com/, visited on 2005-11-23

http://supplychain.establishinc.com/, visited on 2005-11-27

http://www.zhaopin.com/, visited on 2005-11-29

http://www.ft.com/, visited on 2005-12-01

http://www.cadz.org.cn/, visited on 2005-12-06

http://www.qm365.com/, visited on 2005-12-07

http://europa.eu.int, visited on 2006-01-04

http://dbl.swedishtrade.se, visited on 2006-01-06

INTERVIEWS

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Appendix I

General Questions

1 How do you describe the way of your manufacturing outsourcing activity in China? How many suppliers do you have in China?

A. Outsourcing by building up own factories
B. Buying final products directly from Chinese suppliers

2 Where do you procure raw materials and accessories?

A. Procurement from local Chinese market
B. Imported from overseas market to China
C. Both

3 Import/export situation between Europe and China:

Import	Raw materials	
	Components or accessories	
	Semi-products	
	Final products	
Export	Raw material	
	Components or accessories	
	Semi-products	
	Final products	

Questions on Logistic Status

1 How do you think of your supply chain?

Lean SC	
Agile SC	
Cost driven	
Demand driven	
Push system	
Pull system	

2 Do you have any warehouses or distribution centers in China?
A.Yes
*(Locations and relevant squares)*_____
B.No

3 What are the main transport modes in Imp/Exp?
A. Ocean shipping
B. Airfreight
C. Railway
D. Road

E. Inland waterway

What do you think of corresponding delivery reliability?

Ocean shipping	
Airfreight	
Railway	
Road	
Inland waterway	

4 What are main ports?
Main ports in China _____
Main ports in EU _____

5 What is delivery mode of your suppliers?
A. Suppliers --- Domestic distribution center (cross-docking)
B. Suppliers --- Overseas distribution center (cross-docking)
C. Both

6 Do you install any software system supporting the Logistics and SCM in your corporation?
A. Yes
B. No
Are you satisfied with practical effect?
A. Yes
B. No

7 What is the Incoterms adopted by you, your 3PL service provider, your supplier and your customer?

_____

Questions on Relationship between OEMs and their Partners

1 Business scope arrangement between EMS & ODM providers and your company:

_____

2 Who are in charge of logistic management for you in China?
A. OEM
B. EMS or ODM

3 From logistic angle, how do you evaluate your cooperation?

_____

4 Do you have any ideas to evaluate related problems?

_____

Questions on Logistic Consequences

1 What is your competitive advantage in European market?

2 What is percentage of Chinese-manufactured-products sold in European market?

3 Are your customers satisfied with quality level of products manufactured in China?

A. Yes

B. No

4 Which ones do you think are the first three highest costs in your logistic operation?

Transportation costs	
Warehousing costs	
Order processing & information costs	
Lot quantity costs	
Inventory carrying costs	
Training costs	
Packing & package costs	
Stock-out costs	

Others:_____

5 Which ones do you think have change when manufacturing outsourcing to China?

Lead time	
Stock availability	
Order fill rate	
On time delivery	
Shipping losses	

Others:_____

6 Did you experience any big problems because of the process of manufacturing outsourcing?

A. Yes

_____

B. No

If so, what are the main reasons to lead to these problems?

Price	
Forecast accuracy	
Order cycle	
Transport damage	
Delivery time	
Uncertain of products flow	
Stock availability	
Product quality	
Training	

Financial problems	
Customs	

Others: _____

7 Do you have any ideas to evaluate related problems?

_____

Appendix II
Questionnaire for Textile Industry

General Questions

1 How do you describe the way of your manufacturing outsourcing activity in China? How many suppliers do you have in China?

A. Outsourcing products to Chinese factories
B. Only sourcing products on Chinese market (without regular contracted suppliers in China)

2 Where do you procure raw materials and accessories?

A. Procurement from local Chinese market
B. Imported from overseas market to China
C. Both

3 What is percentage of the total costume volume do you outsource in China?

_____

4 Do you have any plan to enlarge your outsourcing volume in China?
A. Yes
B. No

5 Do you have any plan to enter Chinese market in the future? (For H&M)
A. Yes
B. No

What is the percentage of sales volume in China within scope of global sales volume? (For Bestseller)

_____

6 Do you have the same fashion range in different areas?
A. Yes
B. No

Questions on Logistic Status

1 Do you have any warehouses or distribution centers in China?
A. Yes
*(Locations)*_____
B. No

2 Who are in charge of stocking management for you in China?
A. Third party logistic provider
B. Chinese suppliers

3 Do you have the same order cycle on basic garments and trendy garments?
A. Yes

B. No

4 What is delivery mode of your suppliers? (For Bestseller)
A. Chinese suppliers --- Chinese stores (directly)
B. Chinese suppliers --- Distribution center (cross-docking) --- Chinese stores

5 What is the main transport mode in Imp/Exp?
A. Ocean shipping
B. Airfreight
C. Railway
D. Road
E. Inland waterway

6 What are main ports?
Main ports in China _____
Main ports in EU _____

7 Do you use different transport mode to delivery different costumes? (E.g. sea freight for basic garments like sweater & airfreight for trendy garments with relevant smaller volume)
A. Yes
B. No

8 Do you install information system for your Chinese suppliers?
A. Yes
(Comments) _____
B. No

9 Which ones do you think are the first three highest costs in your logistic operation?

Transportation costs	
Warehousing costs	
Order processing & information costs	
Lot quantity costs	
Inventory carrying costs	
Training costs	
Packing & package costs	
Stock-out costs	

Others:_____

10 Which ones do you think impact customer service when manufacturing outsourcing to China?

Lead time	
Stock availability	
Order fill rate	
On time delivery	
Shipping losses	

Others:_____

Questions on Textile Quota

1 Is there disqualification problem according to technical & environmental safeguard measures of Europe?

A. Yes
B. No

2 Does your import from China have a huge increase on volume within this year following the abolishment of quotas on textiles?

A. Yes
B. No

3 Is there any decrease on price for your outsourcing in China within this year, although the newly added export tax on textiles by Chinese government partly counterparts the positive effect of with the removal of quotas?

A. Yes
B. No

4 Will your end customers enjoy the deflation on price due to the abolishment of quotas?

A. Yes
B. No

5 Will the inflation of Chinese currency affect the cost of your outsourcing in China?

A. Yes
B. No

6 Do you have delay on delivery due to the export license issued by your Chinese suppliers, as requested by Chinese Custom, after the negotiation between EU & China on textiles this year?

A. Yes
B. No

7 Do you need to keep a higher inventory level in EU in order to prevent the emergency on textiles friction between EU & China, just like what happened in this summer?

A. Yes
B. No

8 Do you have the problem of out of stock in your stores incurred by outsourcing to China?

A. Yes
B. No

9 Have you ever think of reducing the outsourcing volume in China to smooth the running of your supply chain on considering the trade barriers on textiles between EU & China?

A. Yes
B. No