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1 Introduction

1.1 Background

B2C e-commerce in China has developed rapidly and greatly in the past few years and more and more people have experienced online shopping. According to a report presented by the Boston Consultant Group (BCG, 2011), the number of the Internet users in China has reached 457 millions, of which 145 million are Internet-consumers. It is predicted that the number of Internet-consumers will rise to 329 millions in 2015.

There are some external factors that are favorable for the development of B2C e-commerce.One factor for that is the continuous research and upgrading of information technology (IT) (Carr, Nicholas G. 2003). The result is that the cost of using IT is getting lower and lower for both consumers and companies. The application of IT and relevant software in logistics enables B2C companies to supply consumers with better service.

B2C companies will take use of advanced logistics management systems in order to manage and operate logistics processes more effectively and efficiently. The warehouse management system (WMS) helps control goods inventory, and know when goods will be stock out, and when to replenish. The transportation system (TS) plays an important role in providing visible tracing and checking information of vehicles, and alternative solutions in case of any incident which might cause delayed deliveries. Besides, the construction of infrastructure and improvement of networks provide substantial support to the development of e-commerce. The coverage of the access of the Internet spreads from the coastal developed cities to the inland less-developed areas, so that more people can enjoy the interest of online shopping. Meanwhile, logistics network can be also enlarged to new regions through either setting up new branches or offices, or logistics companies alliance. As a result, the expanded coverage of logistics service and the shorter logistics cycle time drive B2C companies to serve more customers and increase the customer satisfaction.

Furthermore, relevant regulations and policies were imposed to formalize the e-commerce activities. One one hand, the regulations reduce the risks of buying and paying online for consumers; on the other hand, they stimulate more companies to launch e-commerce. They are *The Suggestions of Promoting the Development of E-Commerce* issued by the end of 2004, *The Electronic Signature Law* in effect on Arp.1st, 2005, *The Instructions of Electronic Payment (No.1)* published on Oct.26th, 2005, andthe *Instructions about Online Transaction* issued on Mar.6th, 2007, and the like.

Experiencing the phases of emergence, development, bubbling and adjustment (China E-Commerce Research Center, 2009), China e-commerce enters a new era which is characterized with fierce competition. Not only the pure online B2C companies, but also traditional bricks and mortar chain stores attempt to launch their own B2C websites to sell products and services, for instance, Suning and Gome, the two biggest chain stores of home appliances and electronic products in China.

Under the competition pressure B2C companies strive to optimize their supply chains management, for example, leveraging various logistics solutions to provide products and services better as well as reduce costs and improve efficiency. Some B2C websites such as T-mall, the subsidiary of Alibaba Group, outsource third party logistics (TPL or

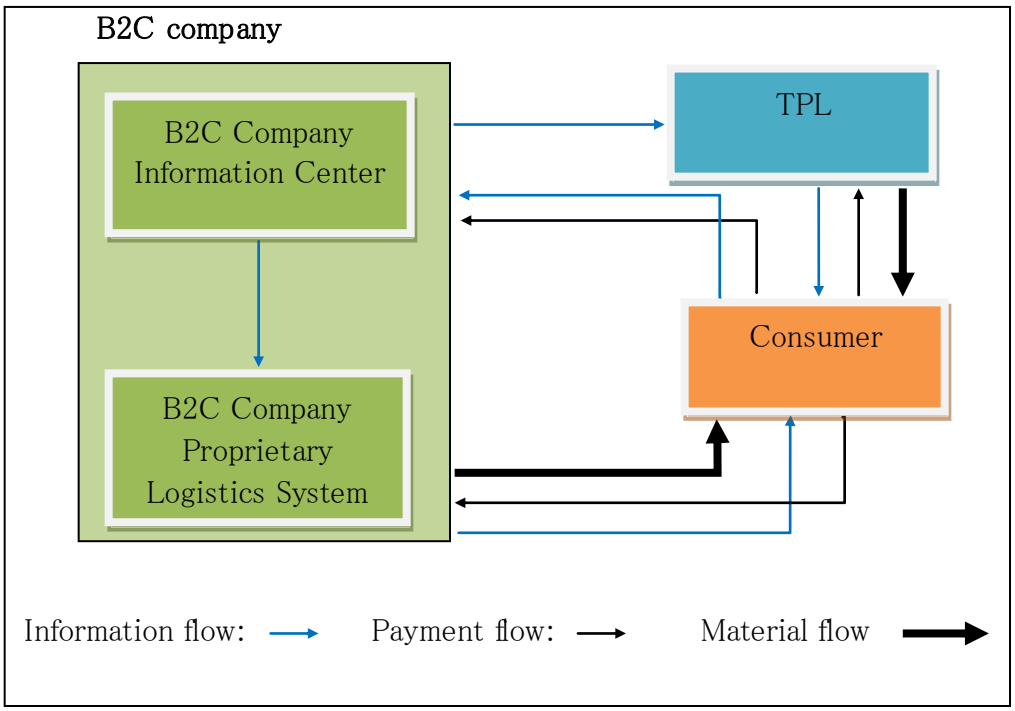
3PL) providers who offer professional warehouse management and broader delivery networks. Whereas other B2C companies, typically Dangdang and Jingdong, take another solution, i.e. establishing proprietary (or internal) logistics systems, which means the B2C company owns distribution centers, manages the warehouses and delivery networks, and delivers and returns goods by himself.

1.2 Current Situation of Logistics Service in B2C E-commerce

In the following parts we willintroduce the business flows of B2C e-commerce in order to give a picture that in which steps logistics play an role, the problems of customer service in logistics area, and the more detailed situation of proprietary logistics system of B2C companies.

1.2.1 Business flows of B2C e-commerce

Figure 1.1 Business flows between a B2C company and consumer



The transaction of B2C e-commerce contains information flows, material flows and payment flows. Information flows happen when a consumer orders online and the information center of B2C places a delivery instruction to either its proprietary logistics system or TPL. After receipt of the delivery instruction, the proprietary logistics system or TPL check the inventory, selecttransport mode and then deliver the goods to the consumer. Meanwhile, the delivery information will be visible to the consumer through the tracing system. The consumer can pay either online in advance or against the receipt of goods. B2C companies finish the final transaction through the goods delivery by their logistics system which is a key step to provide customer service.

1.2.2 Problems of customer service in logistics areas

IT is universally regarded as a driver in managing a supply chain management effectively and efficiently. However, only 39% of companies in China utilize IT and computer systems in management and operations (Gu Zhen, 2010). That means most of the companies haven't used IT and they manage and operate with low-efficiency.

In addition, the extended logistics network doesn't seem to help in efficiency. Chinese researchers find that most TPL firms are confronted with various problems that tends to be obstacles to further expansion of business. They contain a lack of automated material handling equipment (XuFei, 2010, Gu Zhen, 2010. & Kang Xiangrong, 2011), manual sorting and picking up goods (Gu Zhen, 2010. & Kang Xiangrong, 2011), and inadequacy of logistics professionals (XuFei, 2010, Gu Zhen, 2010, Kang Xiangrong, 2011 & Liu Zhenpeng, 2010). These typical phenomena happen commonly in TPL providers in China.

The above problemsinfluence the customer service to consumers in terms of delivery time, goods damage and return, and shipment accuracy. The extreme example occurs in the sales peak season—Spring Festival, between the end of January and early of February, when order volumes skyrocket enormously in short time. The orders should be delivered within certain time, whereas many couriers or transport drivers are not willing to work until the festival for they wish to enjoy the holiday also. As a result, a large number of back orders are retained in the warehouses of 3PL companies. Unluckily, they are not capable to solve these problems immediately. This factor can be viewed as a facilitator by more and more B2C companies in China to set up proprietary logistics system.

1.2.3 Current situation of proprietary logistics system (PLS)

One of the objectives of establishing PLS is to keep the controlling and management of material flows, information flows and payment flows, by which B2C companies can respond to consumers' needs immediately. Other advantages are that they don't have to negotiate with 3PL providers for new outsourcing contracts every time. The process cycle time is shorten so that the efficiency is improved. The proprietary logistic system increases the delivery flexibility when out-of- stock incurs in one warehouse and others can make supplementation. In addition, it is easier for B2C companies with proprietary logistics system to collect and return back the goods in case of goods damage. In return, consumers not only are satisfied with the quick response and reliability but also feel safety. Therefore, the credit and brand value of the company will be greatly increased.

Nevertheless, the high service cost of B2C company in proprietary logisticsis the key problem with the expansion of the business scale and region extension due to the asset investment. Only in case that the company is massive enough can it conduct the proprietary logistics system in a competitive cost. Or it will have a negative impact on the financing respect. The high costs have more or less decreased the profitability of the company. Moreover, the problems such as overstock and quality expiry time also brought the consumers with bad shopping experiences, leading to lower the credit of the company. However, it is hard to solve these problems due to the limitation of the stock capacity and the possible high risks if broadening the production line.

1.3 Research Questions and Purpose

This work will study two research questions. 1) How are the logistics services conducted by B2C companies' PLS? Here we set a hypothesis that the performance of logistics service of PLS is better than that of TPL.

2) Are these services satisfied by consumers? To what extent?

B2C companies realize the process of material flow in the way of delivering or returning goods finished by its proprietary logistics system. This process covers a series of logistics services, e.g. warehousing, picking up and packing goods, transportation, delivery, invoicing, and goods return, and so on. Therefore, the purpose of this work is to investigate how strong the relations are between PLS and increased customer satisfaction in the way of measuring the performance of proprietary logistics service of B2C companies.

1.4 Definitions

The key terms that appear frequently in this work will be defined as follows.

1.4.1 E-commerce

E-commerce (EC) is the process of buying, selling, transferring, or exchanging products, services, and or information via computer networks, mostly the Internet and intranets. EC can also be defined from the following perspectives: business process, service, learning, collaborative and community (E. Turban, King, Lee, Liang & D. Turban, 2010, pp.46).

1.4.2 B2C

B2C is short for the business-to-consumer. EC includes retail transactions of products or services from business to individual shoppers. This EC type is also named e-tailing (E. Turban, King, Lee, Liang & D. Turban, 2010, pp.51).

1.4.3 Logistics

Logistics is the process of anticipating customer needs and wants; acquiring the capital, materials, people, technologies, and information necessary to meet those needs and wants; optimizing the goods-or service-producing networks to fulfill customer requests; and utilizing the network to fulfill customer requests in a timely manner (Langley,et al. 2009, p36).

1.4.4 Proprietary Logistics

In the supply chain, the shipper is regarded as the first part, and the consignee or the receiver as the second part. Traditionally, shippers or consignees establish their own fleets and warehouses to manage the logistics. We call it proprietary logistics.

1.4.5 Third Party Logistics

Companies sometimes outsource the logistics services from other companies due to certain reasons, i.e. third party logistics. There is not a definition of third party logistics (TPL or 3PL) accepted universally. Lieb (1992, p.29) defined third part logistics as the use of external companies to perform logistics functions that have traditionally been

performed within an organization. Laarhoven (et al. 2000, p.426) viewed third party logistics as the activities that are carried out by a logistics service provider on behalf of a shipper and consist of at least management and execution of transportation and warehousing. From these two definitions we can find that TPL is performed by an external company rather than the organization i.e. shipper, and transportation and warehousing are the core activities of logistics service providers.

2 Frame of Reference

In this section we are going to study the theories of performance measures in supply chain management and logistics service in B2C e-commerce, and leveraging some supply chain metrics to assess how the logistics service provided by the proprietary logistics system of B2C companies are performing.This will be relatedconsumer satisfaction.

2.1 Literature Review

2.1.1 Why performance measurements?

The areas of supply chain performance measurement covers the measurements of end customer satisfaction, supplier performance, logistics performance, purchasing performance, process measure, and numerous other alternatives exist.

Harrington (1991) said, what you measure is what you get, what gets measured gets done, what gets measured is only what gets done, what gets measured gets managed, what gets measured gets improved. Performance measurement helps to learn how we are doing well and what can be improved further; it plays a critical role in understanding how a business is operating; it helps to identify where improvements might be made and ultimately informs the strategic planning process (Bititci et al., 2002; Bourne et al., 2000).Caplice and Sheffi(1995) argue that performance measurement at system level can guide management decisions. Performance measurement in logistics management facilitates in clarifying different aspects of logistics activities, managing the direct flow of materials, setting goals, and controlling the fulfillment of objectives (Andersson et al. 1989). Dubelaar et al. (2005) even found in their research that performance measurement of delivery becomes a critical success factor in B2C e-commerce adoption.

2.1.2 Development of performance measurement methods

Researchers developed numerous measurement methods that can be generally divided into two major groups: financial measurement methods and non-financial methods.CapliceandSheffi (1995) summarized the principles concerning performance measurements, which should meet six criteria: comprehensive, causally oriented, vertically integrated, horizontally integrated, internally comparable and useful. VenkatramanandR. (1986) proposed financial measures including sales growth, profitability, earnings per share, etc., and non-financial measures including market share, new product introductions, product quality, marketing effectiveness, manufacturing value-added, and other measures of technological efficiency. Andersson et al (1989) argued that measurements are financial measures and engineered physical measures. Financial measures include budget techniques, cost accounting, cost determination, standard costing, cost estimation and mission costing, while engineered physical measures contain productivity, lead times, quality, customer service, turnover rate, etc.Kaplan and Norton(1991) presented financial measures and operational measures involving customer satisfaction, internal processes, and organization's innovation and learning.

The summary of various performance measurement methods are presented in Table 2.1.

Table 2.1Performance Measurement Methods

Authors	Financial Measurement	Non-financial Measurement
Venkatraman, N. andRamanujam, V., 1986	Sales growth, profitability, earnings per share, etc.	Market share, new product introduction, product quality, marketing effectiveness, manufacturing value-added and other measures of technological efficiency within the domain of business process, and so forth.
Andersson et al., 1989	Budget techniques, cost accounting, cost determination, standard costing, cost estimation, mission costing, etc.	Or named engineered physical measures: productivity, lead times, quality, customer service, turnover rate, etc.
Kaplan & Norton, 1991	Cash flow, quarterly sales growth, operating income by division, market share by segment, return on equity.	Operational measures such as customer satisfaction, internal processes, and organizational innovation and improvement activities-operational measures.
Gunasekaran,2002	Target costing, total costing, process costing, job costing, activity-based costing (ABC), back flush costing	Productivity of knowledge, and information technology investment and strategies

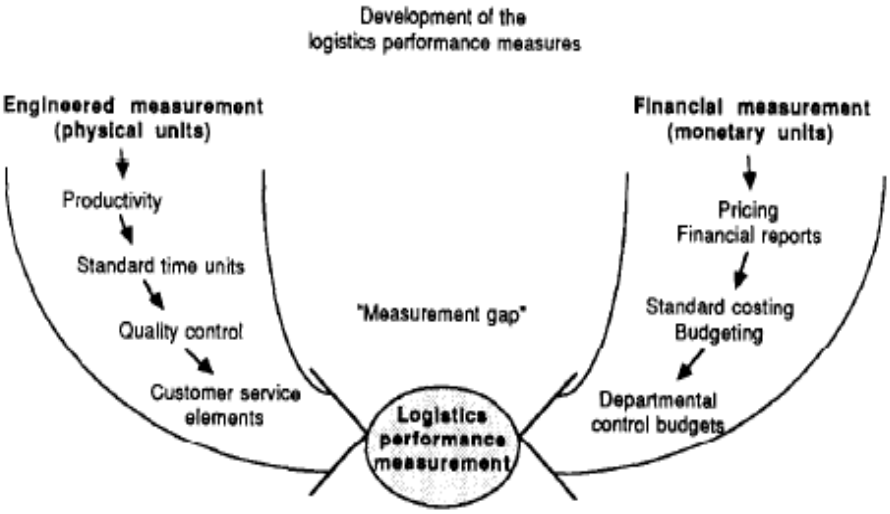
From the various performance measurement methods mentioned above, we perceive that those financial measures are targeting the performance of distinct departments of a company, such as marketing, and financial and account department. Whereas, the non-financial measures focus on other departments of the company, concluding production, quality control, customer service, and so on. Different departments in a company have disparate goals to realize, so they use distinct measure methods to evaluate their performances, either financial or non-financial measures. Financial department, for instance, concentrating on cost and profit, and investment and return, is dedicated to maximize the efficiency of internal processes of the company. On the contrary, customer service department tries efforts to realize the effectiveness, i.e. to solve the problems concerned by customers, sometimes on the expense of additional cost.

The logistics performance measures used to be carried out either by financial measures or non-financial measures, causing a measurement gap between the two groups of

measuring (Andersson et al., 1989). Bullinger et al (2002) also argued that the tracking of financial performance is insufficient to measure the supply chain performance because it does not give farsighted perspective and focus on cross-functional processes, and it is not related to strategy.

Andersson et al. (1989) have drawna picture of the holistic development of logistics performance measurement (Figure 2.1). They proposed to bridge the measuring gap through a) trading off numerous different factors to find the best alternatives; b) developing other ways to collect information than through measures, such as previous experience, knowledge and keeping doing what have been done; c) drawing strategies and using coordinating objectives; d) and analyzing the trade-off situations by the time of performing the audit, "locking"certain variables and forming goals in the logistics strategy. Therefore, Andersson et al. (1989) designed an overall model, which tries to balance the internal efficiency and external effectiveness and study how the conflicting financial and customer service objectives can be measured and structured.

Figure 2.1 Holistic development of logistics performance measurement



Source: Andersson et al. (1989). Measuring logistics performance

A balanced supply chain operational reference (SCORE) model, or named BSC, or Scorecard, was proposed by Kaplan and Norton (1991). It provides top managers with a fast but comprehensive view of the business. Kaplan and Norton (1991) find that BSC was adopted by some companies, attributed to the fact that BSC meets the managerial needs. Scorecard combines together many different components of a company in a business report, and it forces managers to consider all the important operational measures together. Scorecard includes two major groups of performance measures: financial measures, and operational measures covering customer satisfaction, internal business processes, and the organization's innovation and improvement. From the customer perspective, Scorecard requires managers to interpret their general mission statement to specific customer service that will be indicated from time, quality, performance and service, and cost.

Combining financial measures and non-financial measures, BSC was utilized as a framework by Mistry (2003) to examine and evaluate the relative efficiency of the measures in e-commerce companies, and the effectiveness in predicting the success or failure of e-commerce companies, in the way of comparing analyses via Data Envelopment Analysis (DEA) and Key Performance Indicator (KPI) methodology. Mistry asserted that the customer and innovation and learning dimension, through both analyses (DEA and KPI), are important to differentiate successful e-commerce companies from failed ones, while the results on financial and internal process dimensions are mixed. BSC methodology, together with taxonomies of e-business models, was also employed by Bremser and Chung (2005) as a framework and structure to develop strategy for e-commerce company, to draw useful performance metrics, and to assess the performance in an e-commerce environment.

BSC, as a comprehensive performance measure method, provides managers make a profile of the company's disparate elements. It can be executed within a whole company rather than in a single department. An operating department is familiar with what they are doing and willing to accept the relevant assessment, while the measurements non-related to their processes will be disregarded. Besides, there are tradeoffs when considering both financial results and other performances. For instance, the infrastructure of IT is invested to create and increase the visibility of logistics service to customers. The responsibility of the logistics manager is to guarantee the service quality and provide value-added service. It is unrealistic for him to always prioritize cost, then service next. It is the top manager who balances and reduces tradeoffs.

The empirical study of performance measurement methods shows that, companies pay attention to evaluate the performance of their disparate sections with the goals of survival, success and prosperity (Kaplan and Norton, 1991). We also learn that customer issue is an imperative dimension in performance measurement, no matter what exact terms is used in articles, such as customer satisfaction and customer service. Also, customer dimension is important for successful e-commerce companies to distinct with the failed ones.

2.1.3 The metrics of performance measurement

After figuring out the development of performance measure methods, we continue to study the detailed metrics or criteria of performance measurement applied in logistics service, particularly from the perspective of customer service.

Kaplan and Norton (1991) argue that customer concerns tend to fall into four categories: a) time, b) quality, c) performance and service, d) and cost. Langley et al. (2009, pp.255-258) point out that the four traditional dimensions of customer service from a logistics perspective are time, dependability, convenience and communication, and they indicate the basis for establishing standards of performance for customer service in the logistics area. The literature presents the metrics of performance measures from the point of view of customers: orders received on time, orders received complete, orders received damage free, orders filled accurately, and orders billed accurately.

Kallioet al. (2000) stated measuring delivery process performance based on the classification of processes. They are classified into routine process, normal process and custom process, and then measured in terms of four criteria: cost, time, quality and efficiency. Routine process deliveries are standardized in quantity, packaging and transportation model and there is little option for customers to choose. Normal process

consists of standardized products and components together with small part of special ones to the request of customers. Time minimization and efficiency maximization can be realized in normal process attributed to the big share of standardized products, but the quality and cost are kept standardized. Kallio et al. (2000) continue to point out that custom process requires that suppliers meet customers' differentiated requirements, such as high quality, small order volume for each product, different packaging, delivery time and arrival time, etc. Suppliers are adaptive to customers' need which results that quality is maximized in custom process, whereas cost, time and efficiency are standardized.

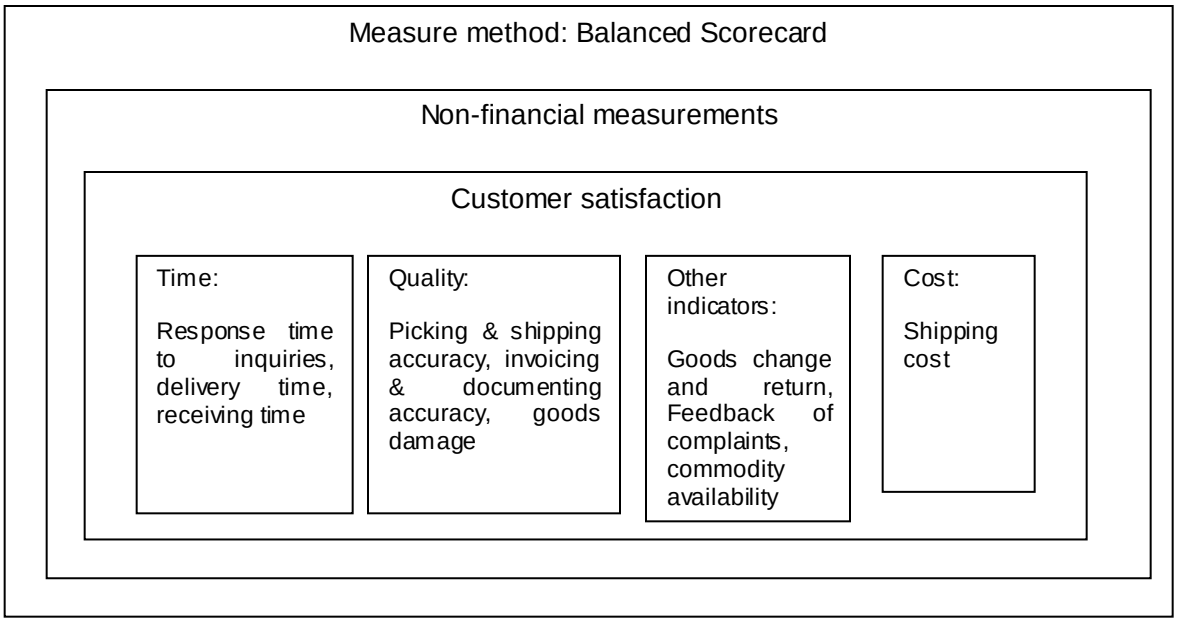
The research of supply chain strategy, capability and performance was carried out by Edward Morash (2001). He examined the four major types of supply chain performance: logistics cost and productivity versus customer service and quality. The problems were discussed respectively from the perspective of supply-focused performance and of demand-focused performance. Morash (2001) argued that the demand-side performance focuses more on customer service and proactive quality, and the capability is closely related to customer closeness strategies, such as customized logistics and agility. The supply-side performance stresses on the cost, productivity, distribution and speed. Its capability is associated with operational excellence strategies, such as time-based strategies, e.g. Just-In-Time and lean network.

The literatures all mention time and quality when they examine the performance measures from the perspective of customer service, which means time and quality are critical criteria in assessing customer service. Time, in general, refers to, time to customer or time to market. In B2C e-commerce company, time includes response time when consumers place orders, order processing time, transport time, and the like. Quality is a metric to check how well a B2C company process the order, i.e. whether the goods or service is picked and delivered accurately, whether there is goods damage, whether invoice is accurate, and so forth.

2.2 Our Theoretical Framework

This work aims at the customer service of B2C company, and assessing the proprietary logistics system of the company. Therefore, we are going to use part of Scorecard, i.e. the non-financial measurements, particular customer satisfaction, to measure the customer service provided by the proprietary logistics system of the B2C company. The detailed performance measurement metrics will come from the Morash's (2001), and Kaplan and Norton's (1991) studies, and the design of our questionnaire will be based on these metrics. Due to the questionnaire is targeted to e-consumers, all the indicators of each measurement metric are set from the demand side. Please see Figure 2.2.

Since both time and quality are mentioned by all researchers above, it proves that the two metrics are quite significant to evaluate the logistics service. Besides, we are considering more metrics because logistics service covers a wide range, such as shipping cost, reverse logistics which happens in case of goods change and return, inventory management for replenishment and avoiding stock-out, and the like. Therefore, the measurement metrics in this work are set in time, quality, service and cost.



Time indicators include response time to inquiries, seller's delivery time after receiving orders, receiving time after seller's shipping goods. The overall logistics cycle time will be affected by different factors, such as different regions, B2C promotion seasons, holidays, characteristics of goods, and the like. Therefore, how to deliver goods to their customers on time becomes a challenge to many B2C companies.

Quality indicators are picking and shipping accuracy, invoicing and documenting accuracy, and goods damage. Picking and shipping accuracy means logistics system pick up and ship the right goods according to orders. Invoicing and documenting accuracy refers to issue invoice and other documents correctly. The indicator of goods damage is also important to assess the performance of logistics service in that it indicates that how the company values its customers.

Other indicators contain goods change and return, commodity availability, feedback of complaints. The activity of goods change and return belongs to the reverse logistics of B2C company, and it is concerned a lot by consumers. Commodity availability here means no stock-out and timely replenishment, which are a main activity of logistics service of TPL, not to mention the proprietary logistics system of B2C companies. Feedbacks of complaints are also important to consumers because most of complaints come from the concerns of logistics service.

Cost indicator is shipping cost. Although shipping cost can be regarded as an indicator from the supply side, it will be paid by consumers finally. So, we use shipping cost as in important indicator in this work.

Customer satisfaction will be analyzed with a simulation of standard deviation, which will be utilized to describe the dispersion of satisfaction. The bigger the value of standard deviation is, the lower the overall satisfaction of the indicator is.

Standard Deviation = $\sqrt{[\sum_{i=1}^{n} Ni * (Xi - \mu)\text{^}2]/(N-1)}$

Not every consumer shares the same expectation of logistics service from B2C companies. Some consumers require goods urgently, so they may require fast delivery and agree to pay higher shipping cost. However, others prefer to a normal delivery time at low price just because they don’t need the goods immediately. Therefore, we will analyze the satisfaction about these indicators, rather than only working on the data.

3 Methodology

This chapter introduces the research approaches by illustrating the study and the methods chosen by the authors to carry out both primary and secondary data collection in order to meet the purpose of the thesis. Reliability and validity of the study that we faced are also discussed in this chapter.

3.1 Research Strategy

There are two main research strategies to choose from, inductive and deductive research according to Saunders, Lewis and Thornill (2009). Inductive research applies to situations where specificmeasurements or observations are undertaken towards generatingor broader new conclusions or theories (Saunders et al. 2003). Opposed to inductive research is deductive reasoning research, where researcher starts with thinking about generalizations, and then proceeds on the way to how to prove or implement the generalizations (Saunders et al. 2003). Generally, the approaches used are distinct with induction being based on empirical evidence, whilst deduction based on logic.

- Deductive:
- 

- Inductive:
- 

Commonly, researchers could use both induction and deduction based research approaches according to the specific nature of their studies (Sekaran, 2003). The literature reviewed will be involved in the deductive research approach, which supports the researchers with relevant theories in order to analysis and evaluating of the primary data (Saunders et al., 2009). Adapted from this theory, the model below demonstrates a visual representation of the steps that need to be followed so as to achieve the ultimate research goal.

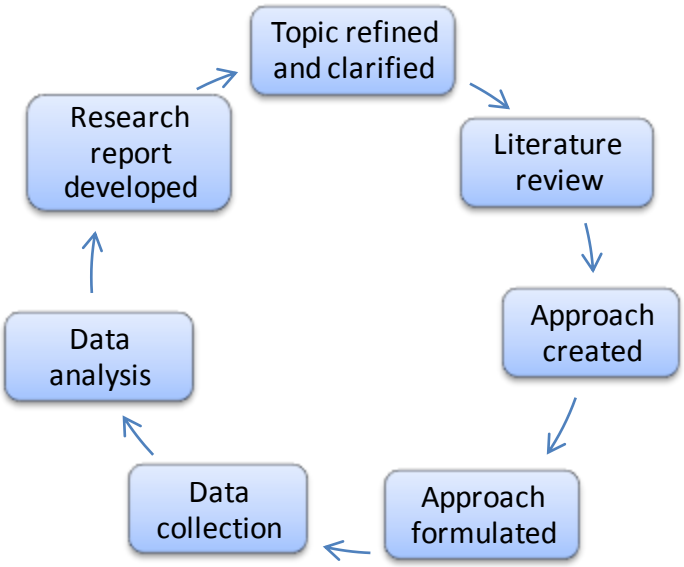


Figure 3.1 Research process (Adapted from Saunders et. al., 2009)

As for our thesis, initially, we refined clarified our topic into two research questions: (1) *how* are the logistics services conducted by B2C companies' PLS, and (2) *what* are the impacts of logistics service on customer satisfaction. According to Yin (2003), deductive research approach is to answer questions such as *why* and *how*. Whilst, in order to answer questions such as: *who, what, where, how much and how many*, the research strategy should be based on inductive method. Thus, the question (1) leads itself to deductive reasoning, while the question (2) is more adapted to inductive based on research. Thus, in the second place we utilized literature review to sort out answer to question (1) and will use what we have found out to choose and formulate approach to question (2). After the formulation of research approach, data collection will be involved.

3.2 Data Sources

3.2.1 Secondary data

Secondary data is usually that which has been created by previous authors who used it for another reason (Malhotra &Briks, 2007). More often than not, research studies usually begin by searching a host of literature and we embarked on our thesis journey by researching and reading a host of literature in relation to our topic for the purpose of getting a better understanding of the research area.

The literature reviewidentify, synthesize and analyze the conceptual literature as well as completed articles, theses, books and other materials in relation to the research topic and problem (Williamson, 2002). Alongside the above mentioned secondary sources, we also used key words related to the topic and research questions to search the internet for databases.

3.2.1.1 Databases

1. Google Scholar
2. Diva Essays
3. Google
4. JULIA (Jönköping University Library)

3.2.1.2 Keywords

1. B2C
2. E-ecommerce
3. Logistics service
4. Proprietary logistics
5. Consumer service
6. Performance measurement

However, what we have to mention here is that secondary data is not always reliable as information retrieved may not be current hence not suitable for the purpose of the research. Thus information retrieved has been cross-checked in order to be assured of its current and accurate nature.

3.2.2 Primary data

Our primary data is gathered from questionnaire. The advantages of this choice are as follows (Oppenheim, 1992):

- Questionnaires are more objective because all the responses are gathered in a standard way. Compared with that, interview could be greatly influenced by both internal and external environment.
- It is relatively a quick way to collect information via a questionnaire. Nevertheless, it takes long time not only to design but also to distribute and analyze results.
- It is not often realized that potential information can be collected from relatively large samples due to the low rate of response. However, return rates can be dramatically improved if the questionnaire is delivered and responded by person to person chatting tools rather than emails.

3.2.3 Choice of sample

The sample for this study was non-randomly chosen from Chinese people. We non-randomly selected 126 Chinese young people from different areas and genders to participate in this study. Choosing the respondents non-randomly was to ensure the rate of responds, because young people are the major consumer group in using computer as well as in on-line shopping.The purpose for selecting more than one area was to find out whether the logistic service offers to the customers from big cities or small towns engage in differ or is the same.

According to Nordqvist (2005), a balance should be striked between the breadth and depth of the cases. By implication, even though selecting more respondents in different ages would have given a wider scope, at the same time, it would make it difficult for us to thoroughly analyze the major consumer group inthe limited time frame to complete the thesis.

3.3 Data Collection Method

Two main types of research methods are usually applied by researchers in data collection: qualitative and quantitative research.

- Qualitative research helps the researcher to understand the richness, depth and complexity of consumers - their thought processes and motivations. It is good when you need to understand phenomena and get insight into circumstances and changes (Creswell 2003; Malhotra, N. &Briks, D. 2007).
- Quantitative research is one data collection technique in which the investigators primarily uses postpositive claims for developing knowledge (e.g. reduction to specific variables and hypotheses, use of measurement and observation, and test of the theory), deals with questionnaires or a data analysis procedure which requires the utilization of numerical data (Saunders et al., 2007).

In other words, it can be said that quantitative research appears to answer the question of what, whilst the qualitative research appears to answer the question of why.

Thus, the data collection of our question (2) should be both based on quantitative method.

3.3.1 Quantitative research-questionnaire design

Depth-interview, observation, questionnaire and focus group as quantitative methods are major tools of primary data collection methods. In our thesis, questionnaire is the best selection in the part of quantitative survey design. The reason for this has been discussed in the primary data section.

According to Malhotra, N. &Briks, D. (2007), questionnaire design process can be described as follows:

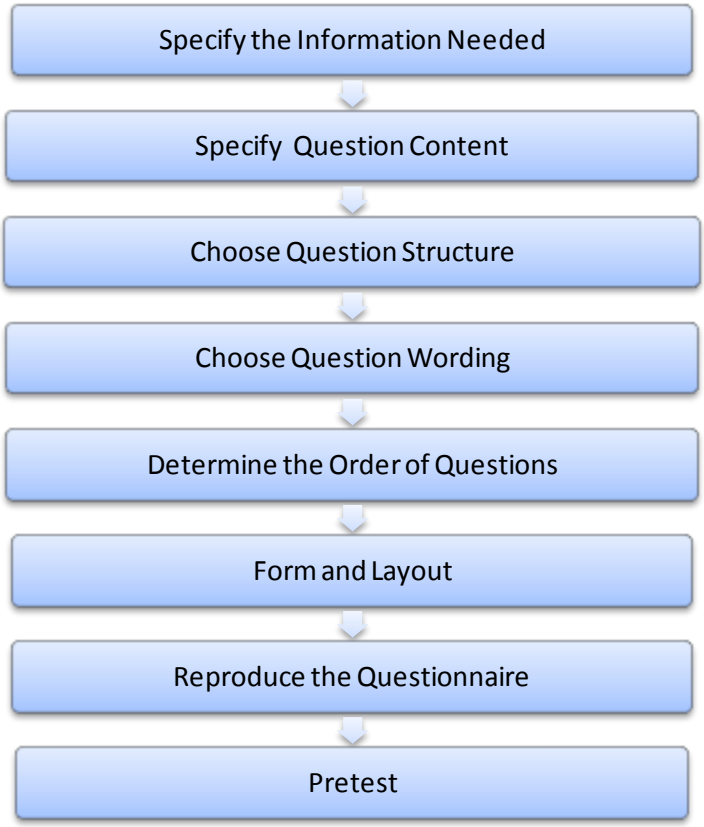


Figure 3.2Questionnaire design process (Malhotra, N. & Briks, D. 2007)

Our questionnaires both in English and Chinese are attached in the Appendix A.

Q1 starts with *'Do you have experience of on-line shopping',* to exclude those who have not got on-line shopping experience. We add a tool of logic skip following this question. If respondents answer'yes', they can continue tothe next question. But if the answer is 'no', the system will automatically skip to Q10 *'Why don't you shop on-line'*. This will efficiently help the respondents save time and enable us to filter out unnecessary answers.

Q2 '*How often do you shop on-line'* enables us to identify to which extend this respondent's answer can be valuable reference. The more frequently the respondent shops on-line, the more reliable the answer is.

Q3 '*Where do you live'* is set to find whether the results are different among different living regions or not.

Apart from that, the subjectical questions listed in our questionnaire are mainly based on the three indicators- Time indicators, Quality indicators and Customer satisfaction- we discussed in the frame of reference part, which are used to measure the performance of logistics service in the aspect of customer. Questions like *'response time to inquiries'*, *'delivery time after receiving order'*, *'receiving time after delivery* belong to Time indicators ; *'goods damage'*, *'delayed delivery'*, *'picking and shipping errors'* and *'invoicing and documenting errors'* are Quality indicators. The overall satisfaction investigation, which is so-called Customer satisfaction, contains the performances of major indicators (time, quality and cost), and also other service indicators, such as

feedback to complaints, as well as goods change and return, available stock, and so forth.

Besides, our questionnaire should minimize response errors. So we carefully choose wording, questions order, layout, In order to motivate the respondent to cooperate, become involved, and provide complete, honest and accurate answers. According to Malhotra, N. &Briks, D. (2007), pilot-testing refers to the testing of the questionnaire on a small sample of respondents to identify and eliminate potential problems. A questionnaire should not be used in the field survey without adequate pilot-testing. Thus, before formally distribute out, we undertake a pilot-testing survey to get feedbacks and suggestions, based on what, we revise our questionnaire.

3.4 Trustworthiness of the Study

If we are to go by Robson (2007) who emphasizes that any type of data collection approach must be supported by the authors. Thus, research that involves any type of data collection needs to be defended by the authors. This will help the reader to be able to understand what was done and why it was done in that specific manner as well.Seale (1999) said that 'the trustworthiness of a research report lies at the heart of issues conventionally discussed asvalidity and reliability'.

3.4.1 Validity and reliability

Reliability refers to how stable or consistent the findings of adata collection methods measure are and if it can produce the same results when implemented in other environment or settings (Ghauri&Grønhaug, 2010).

Validity refers to the extent to which data collection methods measure what it intends to measure or capture (Ghauri&Grønhaug, 2010; Saunders et al., 2007). There are two kinds of validity commonly applied for measurements in marketing research methods: internal and external validity. Internal validity deals with the degree to which we can infer that a causal relationship exists between two or more variables, whilst external validity implies that how the findings can be generalized to particular persons, times, settings, as well as to the whole population (Ghauri&Grønhaug, 2010). Since external validity is connected to the generalizability of results it is important to do a pilot-testing to ensurevalidity.

Our survey pretest is done by personal interviews, even if the actual survey is to be conducted by mail, because interviewers can observe respondents' reactions and attitudes. In order to make sure that the respondents for the pretest and for the actual survey are drawn from the same population, we chose a small group of Chinese people from different areas and in different genders to do the personal interviews. All aspects of the questionnaire have been tested, including question content, wording, sequence, form and layout, question difficulty and instructions.

We also made sure that our secondary data sources were accurate, verified and reviewed against that of studies created previously to our study to ensure validity of our thesis.

4 Empirical Findings

4.1 General Data

The questionnaire was formally sent to respondents in different regions of China through emails and survey link from 16 April with ending on 26 Apr. 2012. Due to the technical problem, many potential respondents could not open the website as easily as we did the pre-test in Sweden. And some gave up finishing the survey in that the survey system worked too slowly. Therefore, we received 126 effective results in total, which can be traced in JIBS Qualtrics Survey Software.

Among 126 respondents, 116 people have experience in shopping on-line, and 10 not. Therefore, we'll study the data at the basis of 116 respondents in the rest parts of this work. 70.6% responses usually shop at the website of Taobao.com, a typical example of using of TPL as logistics solution. 21.4% responses shop through Jingdong, Dangdang, Amazon China, etc., who deliver goods by their proprietary logistics system (PLS). In order to avoid repeating the names of B2C companies in the following parts, we will use PLS for short to stand for the companies who have proprietary logistics system and TPL for short for those who outsource third part logistics.

Here below are the performance results of B2C companies in terms of various indicators and the customer satisfaction to them.

4.2 Time Indicators

The results of time indicators are presented in Table 4.1.

(1) *Response time to inquiries*

Over half of inquiries can be responded by both PLS and TPL. PLS can give feedback to 55.56% of inquiries less than 0.5 hour, 25.93% within 0.5 to 1 hour, 11.11% in 1 to 6 hours, and 7.41% over 6 hours. TPL response 75% of inquiries within 0.5 hour, 17.05% in 0.5 to 1 hour, and 7.95% in 1 to 6 hour, and no response answered more than 6 hours.

(2) *Delivery time after receiving order*

PLS can ship over one third of orders within one day after receiving them, half of them in 1 to 3 days, and 11.11% in 3 to 7 days. TPL deliver 19.32% of orders within one day after receiving them, 77.27% in 1 to 3 days, 2.27% in 3 to 7 days, and 1.14% over 7 days.

(3) *Receiving time after delivery*

3.7% of consumers can receive goods within one day after delivery though PLS, 59.26% in 1 to 3 days, 37.04% in 3 to 7 days, and no goods received over 7 days. Through TPL 1.15% of consumers can get their goods within one day after delivery, 42.53% in 1 to 3 days, 55.17% in 3 to 7 days, and 1.15% exceeding 7 days.

Table 4.1 Results of time indicators

Indicators	Time(Hours)	TPL	PLS
Response time to inquiries	**0.5hr**	75.00%	55.56%
	0.5~1hr	17.05%	25.93%
	1~6hrs	7.95%	11.11%
	>6hrs	0.00%	7.41%
	Total	100%	100.00%
Delivery time after receiving order	**< 1day**	19.32%	37.04%
	1~3days	77.27%	51.85%
	3~7days	2.27%	11.11%
	>7days	1.14%	0.00%
	Total	100.00%	100.00%
receiving time after delivery	**< 1day**	1.15%	3.70%
	1~3days	42.53%	59.26%
	3~7days	55.17%	37.04%
	>7days	1.15%	0.00%
	Total	100.00%	100.00%

4.3 Quality Indicators

Quality indicators include goods damage, picking and shipping errors, invoicing and documenting errors, and delayed delivery. Table 4.2 are the results of PLS quality indicators, and Table 4.3 are the results of TPL indicators.

(1)*Goods damage*

55.56% of goods are free of damage via PLS; 37.04% of goods damage happens rarely, and 7.41% take place occasionally. In TPL solutions, 32.22% of goods never suffer from goods damages; 45.56% happens rarely, 20% occasionally; the often frequency and always frequency are both 1.11%.

(2)*Picking and shipping errors*

PLS has a high rate of no picking and shipping errors at 81.48%, and 14.81% happen rarely with 3.7% occasionally. TPL has a rate of 62.22% of no picking and shipping errors, 27.78% of rare frequency, 7.78% of occasional, and very small rate of often and always frequencies.

(3) *Invoicing and documenting errors*

The best performance of PLS is the indicator of invoicing and documenting errors, with 77.78% never happening and 22.28% rarely happening. The similar situation happens to

TPL, with 64.44% never happening, 26.67% rarely, 6.67% occasionally, and very tiny proportion of often and always frequencies.

Table 4.2 Results of PLS quality indicators

Frequency	Goods Damage	Picking &shipping Error	Invoicing & documenting error	Delayed delivery
Never	32.22%	62.22%	64.44%	16.67%
Rare	45.56%	27.78%	26.67%	28.89%
Occasional	20%	7.78%	6.67%	47.78%
Often	1.11%	1.11%	1.11%	5.56%
Always	1.11%	1.11%	1.11%	1.11%
Total	100%	100%	100%	100%

(4) *Delayed delivery*

In PLS 33.33% of delayed delivery never happen, 29.63% rarely, and 37.04% occasionally. Only 16.67% of delivery is never delayed by TPL, 28.89% rarely, 47.78% occasionally, and small part of often and always frequencies.

Table 4.3 Results of TPL quality indicators

Frequency	Goods Damage	Picking & shipping Error	Invoicing & documenting error	Delayed delivery
Never	55.56%	81.48%	77.78%	33.33%
Rare	37.04%	14.81%	22.22%	29.63%
Occasional	7.41%	3.70%	0.00%	37.04%
Often	0.00%	0.00%	0.00%	0.00%
Always	0.00%	0.00%	0.00%	0.00%
Total	100.00%	100.00%	100.00%	100.00%

4.4 Customer Satisfaction of PLS

The investigation of overall satisfaction contains the performances of major indicators (time, quality and cost), and also other service indicators, such as feedback to complaints, as well as goods change and return, available stock, and so forth. Table 4.4 are the results of customer satisfaction.

In the very satisfied range, invoicing and documenting accuracy takes the biggest account, followed by picking and shipping accuracy, and then shipping cost.

In satisfied range, delivery time takes up the biggest proportion; invoicing and documenting accuracy together with picking and shipping accuracy share the same rate.

In somewhat satisfied range, response time to inquiries accounts for the most proportion, following with available stock.

From range of somewhat dissatisfied to very dissatisfied, there is zero response to the indicators of invoicing and documenting accuracy, and picking and shipping accuracy as well. And in the range of very dissatisfied, only one response comes from the indicator of goods change and return.

Table4.4 Results of customer satisfaction

Indicators	Very satisfied	Satisfied	Somewhat satisfied	neutral	Somewhat dissatisfied	Dissatisfied	Very dissatisfied	Responses
Response time to inquiries	6	7	11	2	1	0	0	27
Available stock	5	7	10	2	2	1	0	27
Delivery time	7	10	7	2	1	0	0	27
Shipping cost	9	5	6	4	3	0	0	27
Picking&shipping accuracy	10	8	7	2	0	0	0	27
Invoicing &documenting accuracy	11	8	7	1	0	0	0	27
Feedback to complaints	7	6	5	8	0	1	0	27
Goods change and return	7	5	7	5	1	1	1	27

5 Analysis

This part is divided into three sections. The analysis and discussion are based on the frame of reference in Chapter 2 and the survey in methodology of Chapter 3. The first section measures the performance and discusses possible reasons of the indicators, particularly time indicators and quality indicators, on the basis of the comparison between PLS and TPL. The second section analyses the general satisfaction of indicators by the calculation of standard deviation, and then illustrates the relation of satisfaction and time indicators with more details. The third section is the summary of survey analysis.

5.1 The Performance of Logistics Service

5.1.1 The performance of time indicators

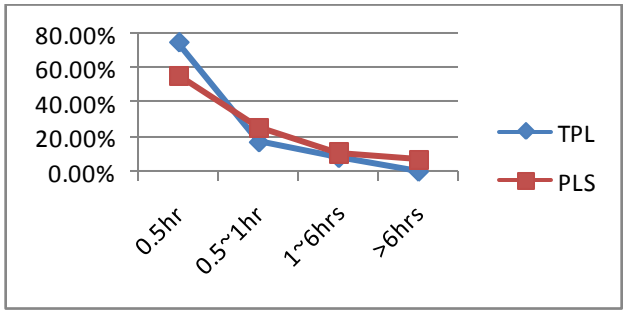
(1) *Response time to inquiries*

More inquiries are responded by TPL than PLS in shortest time, but later that PLS has generally better performance than TPL.

Both PLS and TPL can response inquires less one hour, but TPL perform better than PLS with higher rate by 35.49% than that of PLS. The reason is that B2C companies who outsource TPL spend more time on marketing. As a result, they will employ more people to focus on customers' inquiries on-line, give response in shortest time. Tmall, for instance, utilizes their own on-line chatting tool to communicate with buyers. In the contrast, companies with PLS, like Dangdang, tackle the notes of customers left on their websites, rather than using similar chatting tools. They need to refresh the page to get newest messages, leading to longer response time to inquiries.

In the after ranges PLS generally has better performance than TPL, but there are not big gaps of response time during the time ranges of 0.5~ 1 hour and 1~6 hours. In the time range of more than 6 hours, TPL still has better performance of PLS because TPL can control no inquires answered until 6 hours later. Meanwhile, the number of response time over 1 hour is getting smaller. Consumers are not willing to wait for a response for a long time. If the first inquiries cannot be answered within 1 hour, it is probable for them to quit the conversation, and transfer to other pages.

Figure 5.1Comparison of response time to inquiries



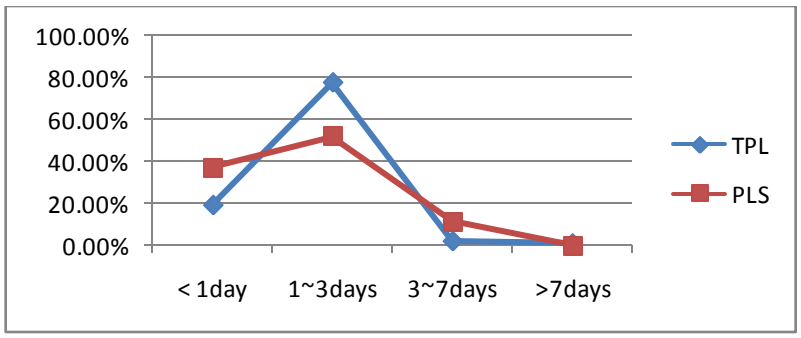
(2) *Delivery time after receiving order*

The amount of goods that PLS can ship within one day is almost twice as TPL does after receiving orders. As time goes, the quantities of goods shipped by TPL increase to the climax which exceeds those by PLS, and then dramatically go down.

PLS has distribution centers in major metropolitan cities or provincial capital cities which serve certain regions, and sub-warehouses in medium and small cities. Therefore, they can response and deliver goods as quickly as possible after receiving orders. As introduced in previous part that many TPL companies have not adopt IT in management and operations, they might spend more time in collecting goods from B2C companies or checking inventory in their warehouses, picking and packing goods, planning transport modes, and then shipping. Therefore, PLS has better performance than TPL in shipping more goods within one day after receiving order.

In addition, PLS does not have orders to ship in 7 days after receiving orders. B2C companies with PLS must comply with their service promise, so they must ship the goods before the deadline. Whereas, TPL works in different ways. There is a phenomenon in our survey that the goods to small towns and rural areas will be shipped in more than 7 days after receiving the order. One reason for using TPL is to saving transport cost because TPL has multiple solutions in transport. They will assess different transport modes, and then select the most economical one to ship the goods on the condition that the shipping cost is fixed. In that case, the shipment time is prolonged.

Figure 5.2 Comparison of delivery time after receiving order



(3) *Receiving time after delivery*

Neither PLS nor TPL has high rate of receiving time after delivery less than one day, but PLS still has better performance than TPL, with rate separately 3.7% and 1.15%. In the middle ranges of 1~3 days and 3~7 days, there is a shift of performance between PLS and TPL. In our survey, no respondents say they receive goods through PLS more than 7days.

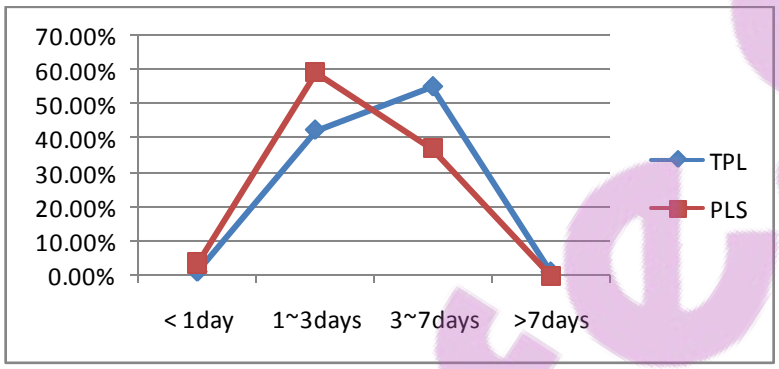
The fact that consumers receive the goods after delivery within one day takes place in major metropolitan cities and provincial capital cities, applicable to both PLS and TPL. Logistics distribution centers (DCs) are always located in or around big cities. Therefore, the distance between these DCs and consumers are not long and it is possible to realize receiving time less than one day.

Meanwhile, we also find that more goods are received by consumers within one day through PLS than though TPL. This can be credited to the different operation processes of PLS and TPL. PLS pick and pack goods, and then send out to the consignee. So

consumers in big cities can receive goods much more quickly. TPL shares almost the same process, but its distinction lies in two more processes. In order to reduce the waste of repeating time and operations, TPL has relatively fixed time to collect goods and ship goods in a day. For example, they consolidate different small shipments in the morning, and then deliver in the afternoon. If the goods is not collected until the very late of the morning, it will miss the time to ship in the afternoon of that day, and postpone to the next day, causing consignees receive the goods over one day after delivery from the B2C company.

Moreover, no goods through PLS is received by consignees more than 7 days. The reason is the same as discussed in the content of delivery time after receiving orders. Therefore, we are not going to repeat again.

Figure 5.3 Comparison of receiving time after delivery



5.1.2 The performance of quality indicators

(1) *Invoicing and documenting errors, and picking and shipping errors*

Among all quality indicators, the best performance of PLS are invoicing and documenting errors, and picking and shipping errors, with the results zero. And, TPL has very low rate of the two indicators. The errors can be reduced or even avoided by double checking automatic auditing.

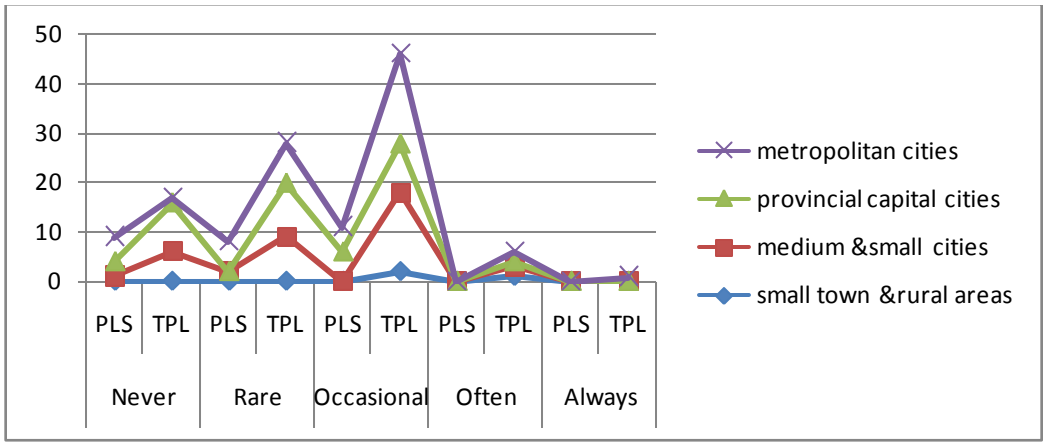
(2) *Goods damage*

Many goods damages happen in operation processes, such as picking, loading, unloading and transporting, etc. PLS belongs to a B2C company. Understanding the characteristics of each goods and customers' requirement, PLS is careful in every detail of those operations. Therefore, over half of goods are free of damage. TPL does not treat goods so well as PLS. Goods have been already packed by B2C companies when TPL collects goods from them. However, manual picking and rough handling usually lead to goods damage.

(3) *Delayed delivery*

The frequency of delayed delivery is not very high, no matter the goods is delivered by PLS or TPL. The general performance of PLS is better than TPL. Just like we discussed in the performance of time indicators, PLS must comply with their service promise so try to deliver goods before the deadline. The consequence is low rate of delayed delivery. TPL tries to save cost so chooses slow transport mode.

Figure 5.4 Comparison of delayed delivery



Besides, delayed delivery is associated with regions, but the situation of PLS is different from that of TPL. The biggest frequency of delayed delivery for TPL is occasional, and they mainly come from metropolitan cities and provincial capital cities. There is no respondent from small town and rural areas in our survey, who shop on-line through B2C companies with PLS. So the rate of delayed delivery of PLS is zero. From this point of view, we can find that the major coverage of PLS is in big cities. When using TPL, the biggest frequency of delayed delivery is the 'often' frequency, incurring in all regions without apparent gap. While in the range of 'occasional' frequency, the bigger the city is, the higher the frequency of delayed delivery is.

5.1.3 Shipping cost

Consumers usually need not pay for the shipping cost if they buy though the B2C companies with PLS. While, if they use TPL they have to pay for it. Therefore, this work does not analyze whose cost is high or low, but will analyze the customer satisfaction in later part.

5.1.4 Other indicators

Other indicators like available stock, feedback to complaints, and goods change and return will be analyzed in the part of satisfaction.

5.2 The relationsBetween PLS and Customer Satisfaction

The following part will discuss the general satisfaction of indications via the calculation of standard deviation, and reveal the relation between satisfaction and time indicators with more details.

5.2.1 General satisfaction of indicators

Here we are using the calculation of standard deviation in order to understand the performance of indicators in the range of satisfaction. The calculation is divided into two major steps:

1) Find Mean

μ=（X1*N1+X2*N2.....+Xi*Ni)/(N1+N2.....+Ni)

μ: mean

Xi: the weight scale of satisfaction (1,2,..6,7)

Ni: the number of response to each satisfaction of indicator

2) Find Standard Deviation

$$\sqrt{[\sum_{i=1}^{n} Ni * (Xi - \mu)\text{^}2]/(N-1)}$$

Ni: the number of response to each satisfaction of indicator

Xi: the weight scale of satisfaction (1,2,..6,7)

N: the total number of response of each indicator

μ: Mean

Let us take response time to inquiries as an example.

Step 1: Mean=（X1*N1+X2*N2.....+Xi*Ni)/(N1+N2.....+Ni)

=(1*6+2*7+3*11+4*2+5*1+6*0+7*0) / (6+7+11+2+1+0+0)

=66/27

=2.44

Step 2: Standard Deviation

(1) Sum= $Ni*(X1-\mu)^2 + N2*(X2-\mu)^2 + \cdots\cdots + Ni*(Xi-\mu)^2$

$=6*(1-2.44)^2 + 7*(2-2.44)^2 + 11*(3-2.44)^2 + 2*(4-2.44)^2 + 1*(5-2.44)^2 + 0*(6-2.44) + 0*(7-2.44)^2$

=6*2.07+7*0.19+11*0.31+2*2.43+1*6.55+0+0

= 12.44 + 1.36 + 3.45 + 4.87 + 6.55

=28.67

(2) Sum/(N-1)

=28.67/(27-1)

=1.1

(3) Standard deviation=$\sqrt{1.1}$

=1.05

Please see the calculation of other indicators in Appendix 2. Table 5.1 is the statistic results of standard deviation of every indicator. The lowest two standard deviations are 0.92 and 0.98, which are respectively correspondent to invoicing & documenting accuracy and picking & shipping accuracy, followed by response time to inquiries with 1.05. The highest standard deviation is 1.59, correspondent to goods change & return, and the next one is shipping cost with value 1.4.

The results show that the top three highest general satisfactions are the performances of invoicing and documenting accuracy, picking and shipping accuracy and response time to inquiries. The opposite results are goods change and return with standard deviation, shipping cost and feedback to complaints.

Table 5.1 Statistic results of satisfaction of indicators

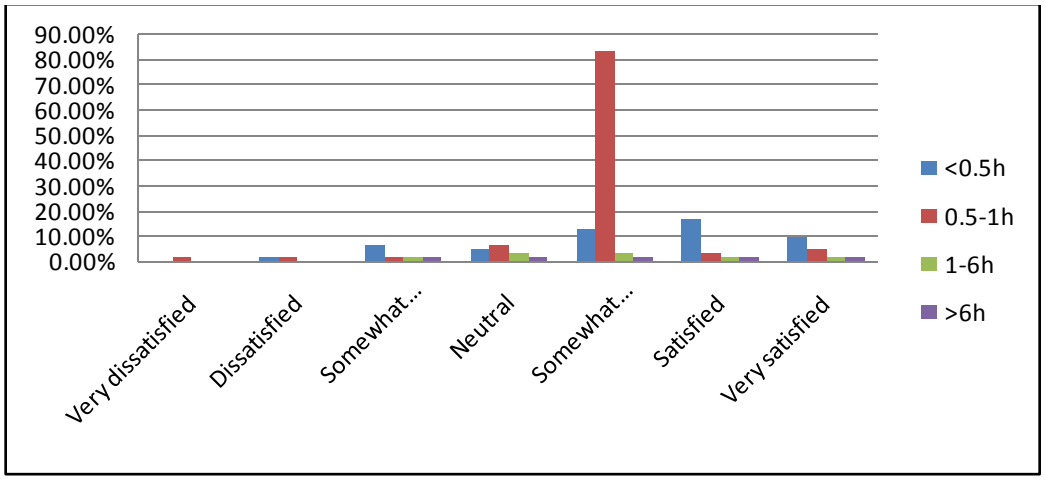
Statistic	Response time to inquiries	Available stock	Delivery time	Shipping cost	Picking & shipping accuracy	Invoicing& documenting accuracy	Feedback to complaints	Goods change& return
Min Value	1	1	1	1	1	1	1	1
Max Value	5	6	5	5	4	4	6	7
Mean	2.44	2.7	2.26	2.52	2.04	1.93	2.67	2.81
Standard Deviation	1.05	1.3	1.06	1.4	0.98	0.92	1.36	1.59

5.2.2 PLS time indicators and satisfaction

(1) Satisfaction and response time to inquiries

The cross tabulation of response time to inquiries plus satisfaction shows that, the overall customer satisfaction is not closely linked to short response time. Response time within 0.5 hour can be satisfied or dissatisfied. Over 80% consumers feel somewhat satisfied if their inquiries can be responded in 0.5 to 1 hour. Therefore, it is best to control the response time to inquiries no more than 1 hour.

Figure 5.5 satisfaction and response time to inquiries

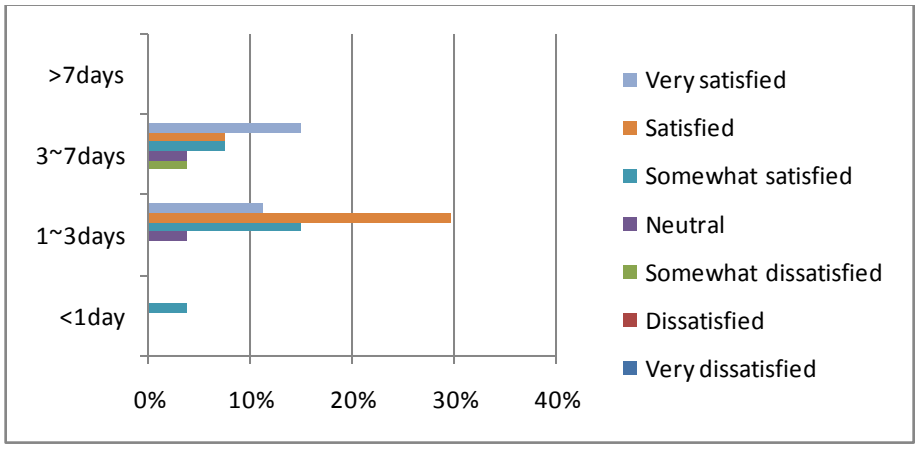


(2) Satisfaction and delivery time

Here we combine the delivering time after receiving order together with receiving time after delivery. Figure 5.6 indicates that customer satisfaction has closer relation to delivery time, but it does not mean the shorter the delivery time is, the more satisfied

the customer is; or vice versus. The delivery time of less than one day is somewhat satisfied by only 3.7% of consumers. The delivery time of 1 to 3 days gets most satisfaction, among of which 11.11% of consumers feel very satisfied, about 30% satisfied, 14.81% somewhat satisfied, and 3.7% neutral. Facing the same delivery time of 3 to 7 days, approximate 15% of consumers feel very satisfied, but 7.41% feels satisfied and 7.41% feel somewhat satisfied, and smaller proportion of that even feels dissatisfied. Therefore, the ideal delivery time for customers is 1 to 3 days.

Figure 5.6 Satisfaction and delivery time



5.3 Summary of Survey Analysis

The comparisons between PLS and TPL in terms of time indicators and quality indicators provide us with a clear picture that how B2C companies with PLS perform in customer service, and what impacts of these performance have on customer satisfaction.

Due to the different application of IT tools, PLS does not have as good performance as TPL in shortest response time to inquiries, but in later time ranges PLS generally performs better than TPL. The proprietary logistics structure enables B2C companies to make soonest shipment after receiving orders, which TPL cannot reach the same effectiveness. Companies with PLS will not wait until 7 days later to ship goods after receiving orders, whereas those who outsource TPL have such problem because TPL need to assess and select the most suitable solution. The length of receiving time after delivery has something to do with the locations of consumers. DCs and warehouses are located in or around big cities where there are large number of on-line shoppers. They are more likely to receive goods after delivery within one day through PLS.

The PLS quality indicators have outstanding performance, particularly the accuracy of invoicing and documenting, and accuracy of picking and shipping. The free of goods damage is controlled well by PLS for they understand well the goods property and customers need. The frequency of delayed delivery is not very high, but PLS has higher frequency of delayed delivery to consumers in big cities than in medium and small cities and rural areas.

Two quality indicators have the highest customer satisfaction, i.e. invoicing and documenting accuracy, and picking and shipping accuracy. Customer satisfaction is not closely linked to short response time to inquiries, but it is better to control within 1 hour.

The shipping time and receiving time limited in 1 to 3 days will get most satisfaction. The indicators with lowest satisfaction are goods change and return, shipping cost, and feedback to complaints.

6 Conclusions

This chapter will summarize the main findings of the research in relation to the purpose of the thesis and will show how the research questions formulated for the study are answered. Moreover, it will also provide limitation of the study and possible further research related to this research area.

6.1 Conclusion of the Study

The rapid development and competition of B2C e-commerce in China triggers B2C companies to seek different solutions to optimize their logistics service. The common two solutions at present are outsourcing TPL and founding PLS. TPL is generally regarded to be advantageous on broad networks and low operation cost, but that cannot stop many B2C companies establishing PLS. In order to examine whether PLS and TPL work as effectively and efficiently as their expectation, this thesis investigate the performance of time indicators, quality indicators, and other indicators associated with customer service. Therefore, we set a hypothesis in the early part of the thesis which alleged that PLS performs more effectively and efficiently than TPL.

The hypothesis was basically confirmedby the results of the empirical study. Although PLS does not have as good performance as TPL in minimizing response time to inquiries, but in later time ranges PLS generally performs better than TPL. PLS enables B2C companies to make soonest shipment after receiving orders, while TPL cannot reach the same effectiveness. In addition, PLS has outstanding performance in quality indicators, e.g. the accuracy of invoicing and documenting, accuracy of picking and shipping, as well as good performance in control of goods damage. That means the performance of quality indicators are maximized by PLS. The time and quality indicators can be viewed as advantages of PLS, compared with TPL, to provide better customer services. From consumers' point of view,they can receive goods with maximized quality at minimized time.

Customer satisfaction of PLS is highly related to the quality indicators together with shipping and receiving time, but not closely linked to short response time to inquiries that is better to control within 1 hour.The indicators of invoicing and documenting accuracy , as well as picking and shipping accuracy should be maintained and continued by PLS due to their marvelous performance.The shipping time and receiving time limited in 1 to 3 days will get most satisfaction. The PLS indicators with lowest satisfaction are goods change and return, shipping cost, and feedback to complaints as well. Goods change and return, relevant with the reverse logistics of B2C companies, can not only increase customer satisfaction but also become a new channel of profit increasing, only if it is treated well. Shipping cost, affected by both administrative factors and logistics factors, should be minimized by companies in order to boost customer satisfaction, in the way of applying automatic material handling equipment, barcode, RFID, and the like. Feed back to complaints examines the after-sales service of B2C companies. If they did not treat those complaints seriously, they will reduce customer satisfaction and lose customers finally.

6.2 Limitation of the Study

Even though we have achieved our research purpose by analyzing the performance of PLS and TPL in respect tocustomer satisfaction, we figure out some limitation in the process of the research.

First and foremost, even though we the distribution of survey regarding regions is random, it can be seen in our survey data that the occupation proportion of respondents from small towns and rural areas are approximately near 0. It results in a the analysis is in terms of people from all the regions except for samll towns and rural areas.

In the second place, we set the questions in terms of quality indicators collectively in one chart for the sake of convenience. Nevertheless, when analyzing the relationship between the extent of satisfaction and quality indicators, we found it impracticable to pick out the data term by term. Thus, the relationship between quality indictors and customer satisfactions can only be drawn with a conclusion in the many-to-many level because of unavailable gathering of the one-to-one data.

Last but not the least, we draw a conclusion that PLS does not have as good performance as TPL in shortest response time to inquiries due to the different applications of IT tools, we did not further study how these different applications of IT tools work. By this we mean that whether it is possible or not for PLS to use the same IT tools as TPL does. In terms of this, other implementations such as website security and the cost of human resource to administrate this kind of installation have to be taken into consideration.

6.3 Implications

This work reveals the performance of the time-based, quality and other indicators through the comparison of PLS and TPL. It provides B2C companies with reference values. B2C companies know what steps can be improved in order to increase customer satisfaction. Besides, it is more flexible to combine the two logistics solutions (PLS and TPL). PLS has restrictions of area coverage and small shipment so that it is difficult to ship a small quantity to a consumer in broader region at lowest cost in proper time. This problem does not exist in big cities, but it does in small towns and rural areas. While TPL can consolidate less-than-truck loads into a big consignment from different shippers, and deliver through their alliances or their own subsidiaries.

6.4 Future Research

The contents of logistics service are numerous. But the methodology applied in this work deals with the performance measurements of logistics service only from the demand side, i.e. customer side, and the scale is the customer satisfaction. Therefore, the future research should be conducted from the following aspects.

- The measurements should be expanded to the supply side, i.e. B2C companies side. The measurements from supply side include cost indicators such as the total cost, inbound cost and cost per unit, as well as productivity indicators such as total productivity index, warehouse labor productivity, warehouse space productivity, and the like.
- The relations between the logistics performance and other dimensions can be also studied, such as sales performance, customer trust and customer retention.

- At last, it would also be interesting to study what solutions can be used to improve the performance of time, quality, cost indicators in order to increase customer satisfaction and customer trust.

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Appendix 1

Questionnaire（English version）

1. Do you have experience of on-line shopping?
   ☐yes ☐no
2. If yes, how often do you shop on-line?
   ☐less than once a month ☐once a month ☐2-3 times a month ☐once a week ☐2-3 times a week ☐daily
3. Where do you live?
   ☐Beijing, Shanghai, Guangzhou ☐provincial capital cities ☐small and medium cities ☐small towns and rural areas
4. Which kind of website do you usually use?
   ☐Taobao.com ☐Jingdong, Dangdang, Amazon
5. How fast does the companies response to inquiries?
   ☐<0.5 hour ☐0.5-1 hour ☐1-6 hours ☐>6 hours
6. How long does the seller deliver goods after receiving orders?
   ☐<1 day ☐1-3 days ☐3-7 days ☐>7 days
7. How long do you receive goods after the seller deliver them?
   ☐<1 day ☐1-3 days ☐3-7 days ☐>7 days
8. To which degree do the following incidents happen?

	Never	Rarely	Sometimes	Often	All of the time
Stock-out					
Delay delivery					
Goods damage					
Picking and shipping errors					
Document or invoicing errors					

9. Satisfaction on the service of b2c website you usually use

	Very satisfied	Satisfied	Somewhat satisfied	Neural	Somewhat dissatisfied	Dissatisfied	Very dissatisfied

Response time to inquiries							
Commodity available							
Delivery time							
Shipping cost							
Picking and shipping accuracy							
Document and invoicing accuracy							
Feedback of complaints							
Goods change and return							

10. Why don't you shop on-line? _____
11. What suggestions and comments do you have on the logistic service of b2c companies? _____

Questionnaire（Chinese version）

1. 您有网购经历吗?
   □有□没有
2. 如有，您的网购频率是?
   □不到每月一次□每月一次□每月 2-3 次□每周一次□每周 2-3 次□每天
3. 您的居住地在?
   □北京，上海，广州□省会城市□中小城市□小城镇或农村
4. 您更经常用以下哪种购物网站?
   □淘宝□京东，当当，亚马逊
5. 卖家一般多久能对您的提问作出回应?
   □<0.5 小时□0.5-1 小时□1-6 小时□>6 小时
6. 您下订单后，卖家一般多久发货?
   □<1 天□1-3 天□3-7 天□>7 天
7. 卖家发货后，您一般多久能收到?
   □<1 天□1-3 天□3-7 天□>7 天
8. 以下情况的发生频率是

	从不	偶尔	有时	经常	总是如此
缺货					
延迟到货					
货品损坏					
配送货品有误					
发票、单据有误					

9. 您对该电子商务网站的满意度

	非常满意	比较满意	基本满意	中立	比较不满意	不满意	非常不满意
回应询盘的时间							
库存							
送货时间							
运费							
配货准确							
发票单据准备							
对投诉的反馈							
退换货服务							

10. 您为何不在网上购物? _____
11. 您对电子商网站的物流服务有什么意见和建议?_____

Appendix 2

Indicator	Mean	Xi(scale)	Ni(response)	Xi-mean	(Xi-mean)^2	Ni*sq
response time to inquiries	2.44	1	6	-1.44	2.07	12.44
		2	7	-0.44	0.19	1.36
		3	11	0.56	0.31	3.45
		4	2	1.56	2.43	4.87
		5	1	2.56	6.55	6.55
		6	0	3.56	12.67	0.00
		7	0	4.56	20.79	0.00
	SUM					28.67
	SUM/(27-1)					1.10
	Standard deviation					1.05
Indicator	**Mean**	**Xi(scale)**	**Ni(response)**	**Xi-mean**	**(Xi-mean)^2**	**Ni*sq**
available stock	2.7	1	5	-1.7	2.89	14.45
		2	7	-0.7	0.49	3.43
		3	10	0.3	0.09	0.9
		4	2	1.3	1.69	3.38
		5	2	2.3	5.29	10.58
		6	1	3.3	10.89	10.89
		7	0	4.3	18.49	0
	SUM					43.63
	SUM/(27-1)					1.68
	Standard deviation					1.30
Indicator	**Mean**	**Xi(scale)**	**Ni(response)**	**Xi-mean**	**(Xi-mean)^2**	**Ni*sq**
delivery time	2.26	1	7	-1.26	1.59	11.11
		2	10	-0.26	0.07	0.68
		3	7	0.74	0.55	3.83
		4	2	1.74	3.03	6.06
		5	1	2.74	7.51	7.51
		6	0	3.74	13.99	0.00
		7	0	4.74	22.47	0.00
	SUM					29.19
	SUM/(27-1)					1.12
	Standard deviation					1.06

Indicator	Mean	Xi(scale)	Ni(response)	Xi-mean	(Xi-mean)^2	Ni*sq
shipping cost	2.52	1	9	-1.52	2.31	20.79
		2	5	-0.52	0.27	1.35
		3	6	0.48	0.23	1.38
		4	4	1.48	2.19	8.76
		5	3	2.48	6.15	18.45
		6	0	3.48	12.11	0.00
		7	0	4.48	20.07	0.00
	SUM					50.74
	SUM/(27-1)					1.95
	Standard deviation					1.40
Indicator	**Mean**	**Xi(scale)**	**Ni(response)**	**Xi-mean**	**(Xi-mean)^2**	**Ni*sq**
picking& shipping accuracy	2.04	1	10	-1.04	1.08	10.82
		2	8	-0.04	0.00	0.01
		3	7	0.96	0.92	6.45
		4	2	1.96	3.84	7.68
		5	0	2.96	8.76	0.00
		6	0	3.96	15.68	0.00
		7	0	4.96	24.60	0.00
	SUM					24.96
	SUM/(27-1)					0.96
	Standard deviation					0.98
Indicator	**Mean**	**Xi(scale)**	**Ni(response)**	**Xi-mean**	**(Xi-mean)^2**	**Ni*sq**
invoicing& documenting accuracy	1.93	1	11	-0.93	0.86	9.51
		2	8	0.07	0.00	0.04
		3	7	1.07	1.14	8.01
		4	1	2.07	4.28	4.28
		5	0	3.07	9.42	0.00
		6	0	4.07	16.56	0.00
		7	0	5.07	25.70	0.00
	SUM					21.85
	SUM/(27-1)					0.84
	Standard deviation					0.92

Indicator	Mean	Xi(scale)	Ni(response)	Xi-mean	(Xi-mean)^2	Ni*sq
feedback to complaints	2.67	1	7	-1.67	2.79	19.52
		2	6	-0.67	0.45	2.69
		3	5	0.33	0.11	0.54
		4	8	1.33	1.77	14.15
		5	0	2.33	5.43	0.00
		6	1	3.33	11.09	11.09
		7	0	4.33	18.75	0.00
	SUM					48.00
	SUM/(27-1)					1.85
	Standard deviation					1.36
Indicator	**Mean**	**Xi(scale)**	**Ni(response)**	**Xi-mean**	**(Xi-mean)^2**	**Ni*sq**
goods change & return	2.81	1	7	-1.81	3.28	22.93
		2	5	-0.81	0.66	3.28
		3	7	0.19	0.04	0.25
		4	5	1.19	1.42	7.08
		5	1	2.19	4.80	4.80
		6	1	3.19	10.18	10.18
		7	1	4.19	17.56	17.56
	SUM					66.07
	SUM/(27-1)					2.54
	Standard deviation					1.59