



**UNIVERSITY
OF GÄVLE**

**FACULTY OF ENGINEERING
AND SUSTAINABLE DEVELOPMENT**

Capsule purchasing practices in Chinese
pharmaceutical companies —a multiple-case
study analysis

Authors: Wei Wei & Zhiwei Zhang

June 2012

Bachelor's Thesis in Industrial Management & Logistics

**Supervisor: Muhammad Abid
Examiner: Robin von Haartman**

ACKNOWLEDGEMENT

We would like to express our gratitude to all those who helped us during the writing of this thesis. Our deepest gratitude goes first to Robin von Haartman, from his lectures we have benefited a lot and academically prepared for the thesis. We also would like to express our heartfelt gratitude to Muhammad Abid, our supervisor, for his constant encouragement, patience and guidance during our thesis writing. Without his consistent and illuminating instruction, this thesis could not have reached its present form. Second, we feel grateful to all the interviewees who kindly gave us a hand during the interviews of companies. Last, our thanks would go to our beloved parents who have been helping us out of difficulties and supporting without complaints.

Gävle, June 2012

Wei Wei & Zhiwei Zhang

ABSTRACT

China is now the main supplier in the generic pharmaceutical and bulk drugs supply market. The low-cost sourcing of raw materials from domestic manufacturers allows Chinese pharmaceutical companies to be competitive. Purchasing becomes strategic importance to the overall business performance through the implementation of concrete purchasing practices. This thesis is mainly to study the capsule purchasing practices in Chinese pharmaceutical companies. Three objectives are proposed in order to achieve the purpose: 1) Describe the capsule purchasing procedures of the companies; 2) Compare and analyse similarities and differences of their purchasing procedures; 3) Give acceptable reasons for these similarities and differences. These objectives are fulfilled on the basis of the developed van Weele's purchasing procedure model and the factors integrated in purchasing. In this multiple-case study, qualitative approach is utilized in order to describe and interpret the *how* and *why* questions. The unstructured face-to face interviews are used. The study finds that the capsule purchasing strategy in Chinese pharmaceutical companies is at the stage of supply management and this may induct the raw material purchasing strategy in Chinese pharmaceutical industry.

Key words: purchasing, purchasing strategy, capsule, pharmaceutical industry, China, multiple-case study

CONTENTS

1. Introduction	1
1.1 Background	1
1.2 Purpose	2
1.3 Outline	2
2. Methodology	4
2.1 Quantitative and Qualitative research	4
2.2 Deductive and Inductive approach	5
2.3 Literature review	5
2.4 Multiple-case study	6
2.5 Data collection.....	7
2.6 Validity & Reliability	8
2.7 Limitations.....	9
3. Theoretical framework.....	11
3.1 Purchasing and supply chain	11
3.1.1 Purchasing	11
3.1.2 Purchasing in the supply chain	11
3.2 Purchasing strategy.....	13
3.3 Purchasing procedure model	14
3.4 Factors integrated in purchasing.....	18
3.4.1 Quality	18
3.4.2 Price	20
3.4.3 Organization	20
3.4.4 Supply and demand	21
3.4.5 Transportation.....	22
3.4.6 Information system.....	22
4 Empirical findings	24
4.1 Nanjing Zhongke Institute of Biology (Company A).....	24
4.1.1 Company overview.....	24

Supply Chain Management towards Purchasing

4.1.2	Capsule purchasing practices.....	25
4.2	Nanjing Zhongke Pharmaceutical Co., Ltd. (Company B)	26
4.2.1	Company overview.....	26
4.2.2	Capsule purchasing practices.....	26
4.3	Nanjing Cuccess Pharmaceutical Co., Ltd. (Company C)	28
4.3.1	Company overview.....	28
4.3.2	Capsule purchasing practices.....	28
4.4	Nanjing Baijingyu Pharmaceutical Co., Ltd. (Company D).....	30
4.4.1	Company overview.....	30
4.4.2	Capsule purchasing practices.....	30
4.5	Jinling Pharmaceutical Co., Ltd. (Company E).....	31
4.5.1	Company overview.....	31
4.5.2	Capsule purchasing practices.....	32
5	Analysis & Discussion.....	34
5.1	Purchasing procedure model	34
5.2	Factors integrated in purchasing	38
5.3	Purchasing strategy	42
6	Conclusion	44
6.1	Contribution.....	45
6.2	Limitation	45
6.3	Further studies	45
	References	47

1. INTRODUCTION

1.1 Background

Previous statistics showed that the generic market in the United States has been growing and representing about 56 per cent of the total global generic pharmaceutical market (IMS Health). This makes the US market becomes the most attractive market in the world for both generic pharmaceutical and API (Active Pharmaceutical Ingredients) companies (Stafford, 2006). Therefore, a number of studies are relevant to the patent expiration, entry and competition issues in the US pharmaceutical industry (Caves et al., 1991; Scott Morton, 1999). Meanwhile, some other researchers in the area focus on marketing regarding to consumers' buying behaviours or the pricing strategy (Ladha, 2007; Rojas, 2009; Wang, 2006). Only limited study relates to the sourcing from the supply market (Rezaei and Salimi, 2012). According to Stafford (2006), Asian countries such as Indian and China are the main suppliers in the generic pharmaceutical and bulk drugs supply market due to the labour cost advantage and lower investment costs. Currently, China has grown its capacity to manufacture APIs and its ex-patriots are bringing back expertises in operating API manufacturing plants according to GMPs (Good Manufacturing Practices). Therefore, Chinese companies are increasing their share of the API supply market. It is not surprising to see a number of European companies establish joint ventures in China in access to the low-cost intermediates.

Stafford (2006) further stressed in his study that the cost of raw materials is the largest contributor to API production cost. The back integration into production of basic chemicals or low-cost sourcing of basic chemicals from domestic manufacturers allows Chinese pharmaceutical companies to be competitive. Narasimhan et al. (2001) assumed the contribution of purchasing function to business performance lies in the implementation of concrete purchasing practices. Afterwards, various studies noted that purchasing activities have been shown to contribute to and critically influence both the commercial and financial performance of firms (Gonzalez-Benito, 2007; Chen et al., 2004; Hendricks and Singhal, 2003). Moreover, purchasing may have the impact on overall corporate success (Pohl and Förstl, 2011). The strategic importance and competitive potential of purchasing will keep increasing as time goes by (Trent and Monczka, 1998). However, few papers theoretically or empirically describe or analyze the purchasing practices of raw materials in Chinese pharmaceutical industry.

Recently, BBC China has released that some Chinese pharmaceutical companies use capsule made of industrial gelatine containing a high level of chromium during production (BBC China). After the exposure of the news, the public awareness of food and drug's quality and safety has

been in panic. Behind the incident, it can be indicated that such severe consequences are caused by intensified competition in capsule supply market (Kraljic, 1983). Therefore, the procurement of raw materials in pharmaceutical industry not only influences the companies' business behaviours and performances, but also plays an important role in aspects of quality control. After all, the purchased raw materials will be produced into medicine that is highly concerned with people's health.

In the future, more and more foreign companies, like the European companies, will establish joint ventures or pharmaceutical plants in China. As new entrants, the lack of purchasing practices experience may influence the overall business performance. A study of purchasing practices of raw materials in Chinese pharmaceutical companies may benefit these entrants as a study reference. But, the high complexity and diversity level of pharmaceutical ingredients increases the difficulty of study and implementation. However, capsule, as one of the raw materials, is relatively simple to cover and is widely used by many pharmaceutical companies. Therefore, this study will focus on the capsule purchasing practices, which may further imply the purchasing practices of raw materials or the purchasing strategy of raw materials in Chinese pharmaceutical companies. Moreover, this study may help to alleviate the public panics by presenting the authentic capsule purchasing practices.

1.2 Purpose

This paper is aimed to study the capsule purchasing practices within representative pharmaceutical companies in China. Three objectives are put forward in order to achieve the purpose:

- i. Describe the capsule purchasing procedures of the companies;
- ii. Compare and analyse similarities and differences of their purchasing procedures;
- iii. Give acceptable reasons for these similarities and differences.

1.3 Outline

There are seven sections contained in this thesis. We have already introduced the background and proposed the ultimate purpose with three objectives. Section 2 explains the methods we used throughout this thesis work in order to achieve the purpose, and the limitations are clarified as well. Section 3 reflects the substances from literature review, mainly regarding to the purchasing procedure model and factors integrated in purchasing. Section 4 describes the empirical findings in the Chinese pharmaceutical companies, such as the firms' background information and the practical capsule purchasing activities. Since this is a multiple-case study, two kinds of comparison tables are designed under the combination of elements involved in

Supply Chain Management towards Purchasing

framework and empirical findings. Within the same section, a specific analysis in accordance with the three objectives is taken into account. A brief and purposeful conclusion has been made in section 6, coming up with the future studies. In the last section, a list contains all the references from books, journals, interviewed people and Internet has been structured.

2. METHODOLOGY

As mentioned in background, there is a limited number of studies relate to sourcing from the supply market in pharmaceutical industry and the purchasing practices of raw materials in Chinese pharmaceutical companies. Therefore, this raises the authors' interests to do a research on capsule purchasing practices in Chinese pharmaceutical companies based on the suggestions from Yin (2009 and 2012). From sufficient literature review, the authors decide to implement a multiple-case study as the main research method. All the data are collected, interpreted and concluded through qualitative approach (Yin, 2011). During the multiple-case study, five Chinese pharmaceutical companies are selected as the empirical cases. Articles, journals, books and Internet are the fundamental sources to find the context close related to purchasing, like purchasing procedure model. In the study, face-to-face qualitative interviews (Walliman, 2005) with the managers or employees from the five companies are adopted, for which the information is the basis of primary data. These qualitative data are described and explained through interpreting the *how* and *why* question. The results concluded could make this thesis as a study reference for foreign pharmaceutical companies entering China. However, the study contains several limitations.

2.1 Quantitative and Qualitative research

Quantitative approach is a research method refers to quantities and measurements. It is not only used to gather quantitative information, but also utilized to calculate those data collected. Thus, quantitative research is the scientific research deals with quantifiable data (Biggam, 2008). In the approach, numbers, diagrams, statistics and tables are mostly used to measure (Walliman, 2005). Generally, quantitative research answers the *how* question (Biggam, 2008). However, this approach will not be used in this thesis.

As the subjects of human feelings and emotions had been becoming difficult to quantify, qualitative approach was evolved to describe and analysis qualities, attributes and make distinctions (Walliman, 2005). Therefore, qualitative research is attempting to answer the *why* question through interpreting the phenomenon (Biggam, 2008; Yin, 2011). The collecting data is not numerical and statistical, but more concerned with the depth of data. According to Yin (2011), description, description plus a call for action and explanation are the three modes of interpreting a qualitative study. Qualitative data provide a strong basis for "description". In addition, explanation always can occur as a part of a descriptive interpretation. The interpretive framework assumes an explanatory mode when the whole interpretation is dedicated to *explaining how or why events came about or how or why people were able to pursue particular courses of action*. In this thesis, qualitative approach is utilized for describing capsule

purchasing procedures, interpreting how the capsule purchasing practices work differ from each other in reality and why there exist these similarities and differences among companies.

2.2 Deductive and Inductive approach

According to Walliman (2005), there is the claim its premises provide some grounds for the truth of its conclusion in both the deductive and inductive approach. However, only the premises of the claim in a deductive approach provide conclusive grounds. And the deductive approach must be either valid or invalid due to the logic between premises and conclusion. In comparison to a deductive approach, the claim that its premises in an inductive approach only provide support for the conclusion. The stronger the support, the more likely that the conclusions to be true. Thus, these two approaches seek the truth from opposite directions that deductive approach is inferred the particular from the general while inductive approach is inferred general truths from the particular. In this thesis, an inductive approach is served to determine whether the purchasing strategy of raw materials in Chinese pharmaceutical companies can be derived by reviewing the interpretations found in the qualitative studies on capsule purchasing practices in Chinese pharmaceutical companies (Yin, 2011). However, the factors integrated in purchasing are deductive from the common factors got from the interviewees and the idea of the sandcone theory (Ferdows and de Meyer, 1990). These factors are the persuasive evidences to analyse the reasons for similarities and differences, therefore, they cannot be isolated from the purchasing procedures. And they are arranged according to the importance in the theory section.

2.3 Literature review

Literature review is a conventional way to do empirical research (Yin, 2011; Croom, 2009). In the beginning, it helps to give preliminary notions about the topic, method and source of evidence for emerging study. After decided what to do, the selective review helps to target other similar studies which further establish a niche for new study. Also, it helps to sharpen the initial considerations. Based on that, a comprehensive review helps to summarize (Yin, 2011; Croom, 2009). On the basis of the pre-existing knowledge in the study field and a broad overview of existing texts and Internet source, the topic of raw materials purchasing regarding Chinese pharmaceutical companies came into interests. By browsing and speed reading through the materials, we took notes about the relevant theories and also used sticky notes (Croom, 2009) to help. Later we reviewed and drew a map of the theories we found, and identified their potential relations. Through a deep understanding and compared analysis, we concluded and developed the main framework which is purchasing procedure model (van Weele, 2010). According to this, the questions for interviews were structured. In addition, we got the method suggestions from Yin (2009, 2011, and 2012), Walliman (2005), etc. through literature review and then

determined the methods before interviewing people. After interviews, we realized there were still several factors which cannot be isolated that integrated in purchasing. Therefore, we did the similar but easier literature review work as a kind of theory support within the purchasing scope. The time we started to write a review, we carefully read the materials again, made some adjustments and deleted/added some unnecessary/necessary information. Throughout the literature review process, we tried to make it as succinctly as possible.

2.4 Multiple-case study

In this thesis, a multiple-case study is implemented as the main research method. Case study is one of several ways of doing social science research. According to Schramm (1971), a case study tries to illuminate a decision or set of decisions: how they were implemented, why they were taken, and what resulted. Usually, a case study does not require control of behavioural events, but focuses on contemporary events. As said by Yin (2009), a case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context. It is the right time to use case study when boundaries between phenomenon and context are not clearly obvious (Yin, 2009; Voss et al., 2002). Therefore, case study is suitable for analysing the unknown capsule purchasing practices in the authentic Chinese pharmaceutical industry.

There are three main types of case studies: exploratory, descriptive and explanatory (Yin, 2012). In this thesis, two types of case studies are used: descriptive and explanatory. The thesis has description as its main objective to reach the purpose. Descriptive is a suitable type for multiple-case design followed a pattern-matching analysis within replication logic where the differences and similarities can be easy to interpret under the support of descriptive theory. In the explanatory case studies, there are two kinds of theories. A factor theory is the most common one used in quantitative analysis while “how” and “why” theories can be used for qualitative study during the situation mentioned in section 2.1. It may help to interpret and then fulfil the other two objectives.

A case study can cover multiple cases and then compare similarities and differences, and further analyse the reasons of it, discuss merits and demerits, and last make a single set of “cross-case” conclusions (Yin, 2009). This is called multiple-case study that can be considered as a “replication” design. Thus, the implementation of a multiple-case study can help to achieve the objectives. Each case must be carefully selected so that it can predict similar results or contrast results but for anticipatable reasons. Another important step in multiple-case study is to develop a rich theoretical framework which needs to state the conditions under which a particular phenomenon is likely to be found as well as the conditions when it is not likely to be found (Yin, 2009). In order to meet these features, the authors choose five pharmaceutical companies as

cases to make a multiple-case study. The authors believe that the number of cases can help to be persuasive and get a more general conclusion through comparing the similarities and differences and analyse the reasons, which can further help to reach the purpose of this thesis. Also, this may help to alleviate the regional bias and improve the academic level of this thesis. Each case is carefully selected and screened under the suggestion from Yin (2012) and the help of two division chiefs from NJFDA (Nanjing Food and Drug Administration). Before we chose multiple-case study, we had made numerous literature reviews, which made a rich theoretical framework possible.

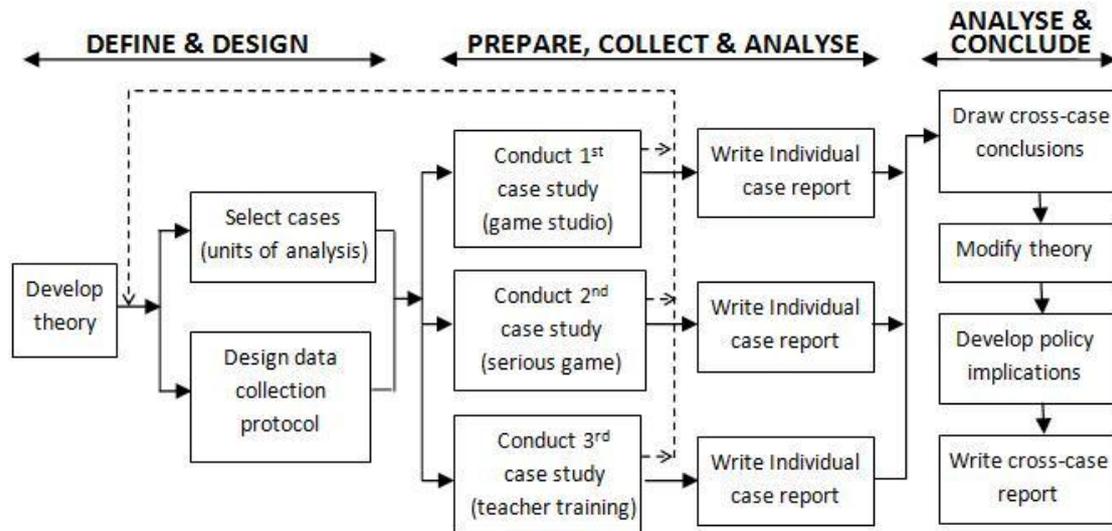


Figure 2.1 The Multiple-Case Study Design (Yin, 2009)

The first step in multiple-case study is to develop the theory framework and then you have to select cases and confirm the data collection methods. Each individual case study must consist of a whole study and each case's conclusion is then considered to be the information needing replication by other individual cases. Both the individual cases and the multiple-case results can and should be the focus of a summary report. For the individual case, the report should indicate how and why a particular proposition was solved. Across cases, the report should indicate the extent of the replication logic and why these cases were predicted to have certain results (Yin, 2009).

2.5 Data collection

As stated in Walliman (2005, pp. 241) that "primary data is the data observed, experienced or recorded closest to the event, are the nearest one can get to the truth, distortions inevitably occur as the proximity to the event decreases." As interview is the vital source of case study information, we used it for our primary data collection. However, we constructed a framework of purchasing procedure model and the integrated factors through sufficient literature review before interviews (Walliman, 2005; Yin, 2009). Meanwhile, the authors had a meeting with two

experienced division chiefs from NJFDA (Nanjing Food and Drug Administration) in order to figure out the weaknesses of our ideas and select five pharmaceutical companies that satisfied our initial requirements. Then, the unstructured interviews (Yin, 2011; Walliman, 2005) were conducted with each company's purchasing specialist (Qu Yi), purchasing manager (Wang Xiufen), production manager (Wang Yunpeng; Yang Qiongyao; Yan Shengbin) or general manager (Zhu Feifei) who is experienced. However, the authors interviewed two persons at one time if one of them has less than one year working period. This is because we found the one who has less than one year working time sometimes cannot give comprehensive information. According to Walliman (2005), face-to-face and telephone are the two main methods of conducting interviews. In comparison, we chose to have a face-to-face interview which is more suitable for unstructured interview as it is more flexible, effective and visual. Also, it is possible to view two persons at one time. And each interview lasted on an average for one hour and a half. During and after the interviews, information was confirmed by the interviewees and space has been left for future communications. The active involvement ensured us to collect and analyse data successfully.

Unlike primary data, secondary data is the data collected by someone else, which may be less abundant and be added with others' interpretation of the facts when adopted by users. The coming source for secondary data can be seen as several forms, including newspaper reports, articles, writings in books and other publications. Although there might be some limited value provided by secondary data, it still could be valuable by looking at different viewpoints and backgrounds to gain the most appropriate data (Walliman, 2005). In order to further strengthen our research, published books, journals and the information on Internet were carefully selected to expand the contexts and companies' information. Visiting the companies' official websites allowed us to get a deep understanding of their backgrounds, culture and so forth to replenish the information omit during interviews. Since these companies are big companies with English webpage, the collection is easier and reliable.

2.6 Validity & Reliability

According to Yin (2009), four tests, which can establish the quality of the research, relate to case studies. Construct validity, internal validity, external validity and reliability are the four tests, which offer the concepts like trustworthiness and credibility. Therefore, validity and reliability should review in terms of quality.

Validity

Validity for case studies involves three tests and concerns from different perspectives. First, construct validity means the identification of correct operational measures for the studied

concepts. Second, internal validity concerns for explanatory case studies and making inferences. Third, whether the context of the study can be generalized determines the external validity of the case. And case studies rely on analytic generalization where a particular set of results can be generalized to some broader theory (Yin, 2009).

In our case, the authors planned to study Chinese pharmaceutical companies' raw materials purchasing strategies by focusing on capsule purchasing practices due to its property and simplicity, which would not bias the study. As mentioned, the data collection process was valid and based under the framework of purchasing procedure model which used as the dominate measure. Meanwhile, suggestions from supervisors and specialists from pharmaceutical companies were adopted by us. After the interviews, the authors realized that the integrated factors involved were those help to explain and infer the implication of the study. Moreover, our study is a multiple-case study based on five companies which is a strong support for convincing. And the theory can help to identify for food companies' purchasing also. Overall, our approach is objective and passing the three tests. Therefore, validity is ensured.

Reliability

Reliability refers to the consistency of conducting the same case study all over again by different investigators, which helps to minimize errors and bias (Yin, 2009). During the interviews, we obtained the permission from informants to record the conversations with voice devices (Yin, 2011). This is helpful for the establishment of database in our case (Yin, 2009). Moreover, we checked the recordings repeatedly in order to make sure the information was reliable. In addition, the data collection process was always under a reliable way. The theory part abstracted from publications that already has proved effective and developed in many years. It can also be the guideline that enables someone else to repeat the procedures. Even different interviewee came to make interview with us in different time; it is still reliable, because the situation does not change that quickly within two weeks. Therefore, the reliability is guaranteed as well.

2.7 Limitations

Due to a time limitation, the content of the case study is mainly based on an interview with each company, which may not be a full case study that should contain more research with longer time. In addition, the chosen pharmaceutical companies are all located in Nanjing, China which may cause regional bias due to the time limitation. As we known, these companies are developing and all the collected data is valid temporary and may change in the future. As mentioned, some data is collected from the companies' websites which may have bias that only the bright side

Supply Chain Management towards Purchasing

can be found. Although these companies have English webpage, some applied information is still in Chinese, there might be bias of translations also.

3. THEORETICAL FRAMEWORK

As stated by Croom (2009), the first step of writing the theoretical framework is to define the topic which has been announced in previous section. In order to sharpen our preliminary considerations regarding the topic of capsule purchasing within Chinese pharmaceutical industry, we chose the selective review to find the relative studies, methods and data sources (Yin, 2011). Croom (2009) also suggests the framework should be critical in nature by providing a systematic expression of opinion and judgment. In addition, Biggam (2008) reminded us a good theoretical framework must be always relevant to our research questions. Therefore, according to their suggestions, the theoretical framework in this study is structured into four main sections which are purchasing and supply chain, purchasing strategy (Kraljic, 1983), purchasing procedure model (van Weele, 2010) and factors integrated in purchasing. These theories are strongly connected to the objectives, which may help to reach the purpose.

3.1 Purchasing and supply chain

3.1.1 Purchasing

Traditionally, purchasing can be seen as a process of buying that obtains materials with the right quality and quantity from the right source to the right place at the right price (Aljian, 1984; Lysons and Gillingham, 2003). However, it has changed over the last decade and become strategic in its perspective (Gadde and Håkansson, 1994; Freytag and Mikkelsen, 2007). According to van Weele (2010), it can current be seen as the management of a company's external resources that can help company to run, maintain and manage primary and support activities. There are several activities covered by purchasing which can be concluded as internal and external sourcing, supplier selection, relationship establishment with suppliers, contracts for negotiation (Gadde and Håkansson, 2001; Burt et al., 2003; Monczka et al., 2005; van Weele, 2010). Since business becomes more and more competitive, top managers have recognized purchasing as a key business driver (van Weele, 2010).

3.1.2 Purchasing in the supply chain

Supply chain is a network that connects multiple suppliers and customers from upstream to downstream in order to deliver customer value through products and services. Different processes and activities like procurement, production, storage and etc. are involved in the whole chain (Christopher, 1999 and 2011; Harland, 1996; Lambert, 2004). The description of supply chain can be easily understood through Figure 3.1, identified by Cooper et al. (1997).

Supply Chain Management towards Purchasing

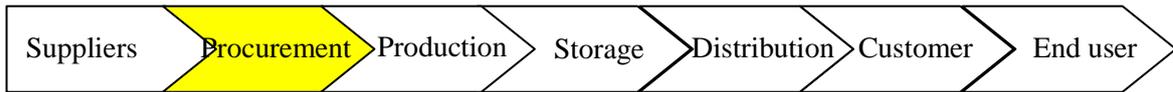


Figure 3.1 A simple supply chain (Cooper et al., 1997)

In a manner, a supply chain can be seen as a value chain that breaks down a firm into strategically relevant activities, which help to gain competitive advantage through cost and differentiation (Porter, 1985; van Weele, 2010; Christopher 2011). As shown in Figure 2, activities involved in the value chain can be divided into two categories: primary activities (inbound logistics, operations, outbound logistics, marketing and sales, and service) and support activities (infrastructure, human resource management, technology development and procurement). The efficient performance of each activity may help a firm to deliver customer value and create a competitive advantage (Christopher, 2011). The purchasing function, a support activity in the value chain, is thus rather important.

As mentioned previously, purchased inputs may relate to primary and support activities: meet the material requirements related to logistics and operations for primary activities while supply products services for other support functions, for example, raw materials, supplies, machinery, equipment and etc. (van Weele, 2010). Therefore, purchasing is closely related to the company's costs. Moreover, according to Christopher (2011), if a company does not pay attention to each activity in the value chain and the assessment of them, an outsourcing activity with partners should be taken into consideration in order to provide cost or value advantage.

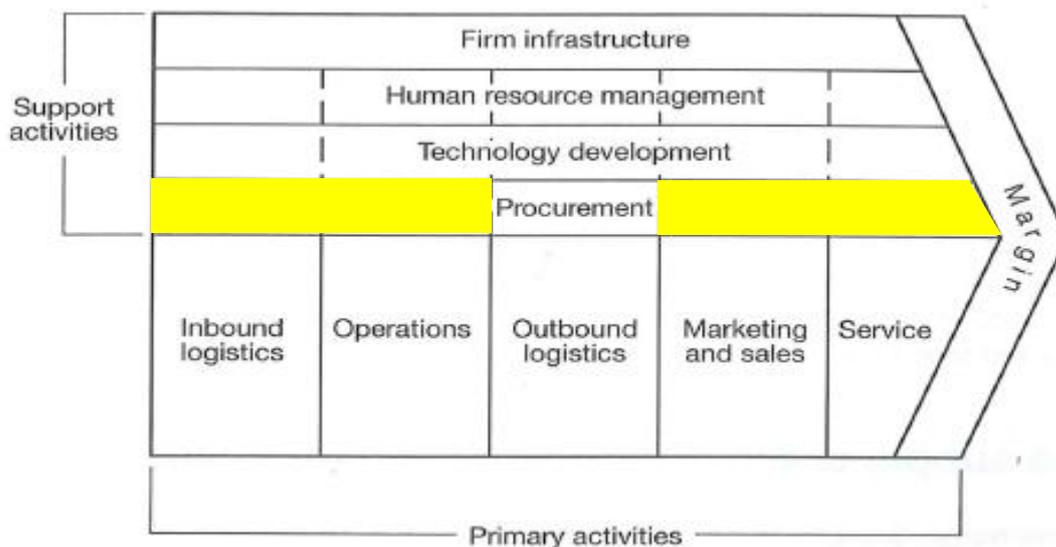


Figure 3.2 Purchasing and the value chain (Porter, 1985)

3.2 Purchasing strategy

According to the research by Patanakul and Shenhar (2011), “strategy” was first written after Napoleonic wars in the early eighteenth century. During that time, it was only focused on how to win the war. Nowadays, the term of strategy has been widely used in different kinds of environment, including organizations. A typical definition of strategy by Wright et al. (1992) is the plans developed by top management to achieve outcomes that are consistent with the missions and goals of the organization. Bakir and Todorovic (2010) also state strategy is a series of partly instrumental and partly interpretive actions, which is goal directed and requires resource deployment. Combine Lysons and Gillingham’s (2003) theory and our thesis work, it can be concluded that a purchasing strategy should contain the strategic vision, the mission statement, the objective that is regarded to purchasing procedure model, and determination of strategic decisions that refer to factors integrated in purchasing.

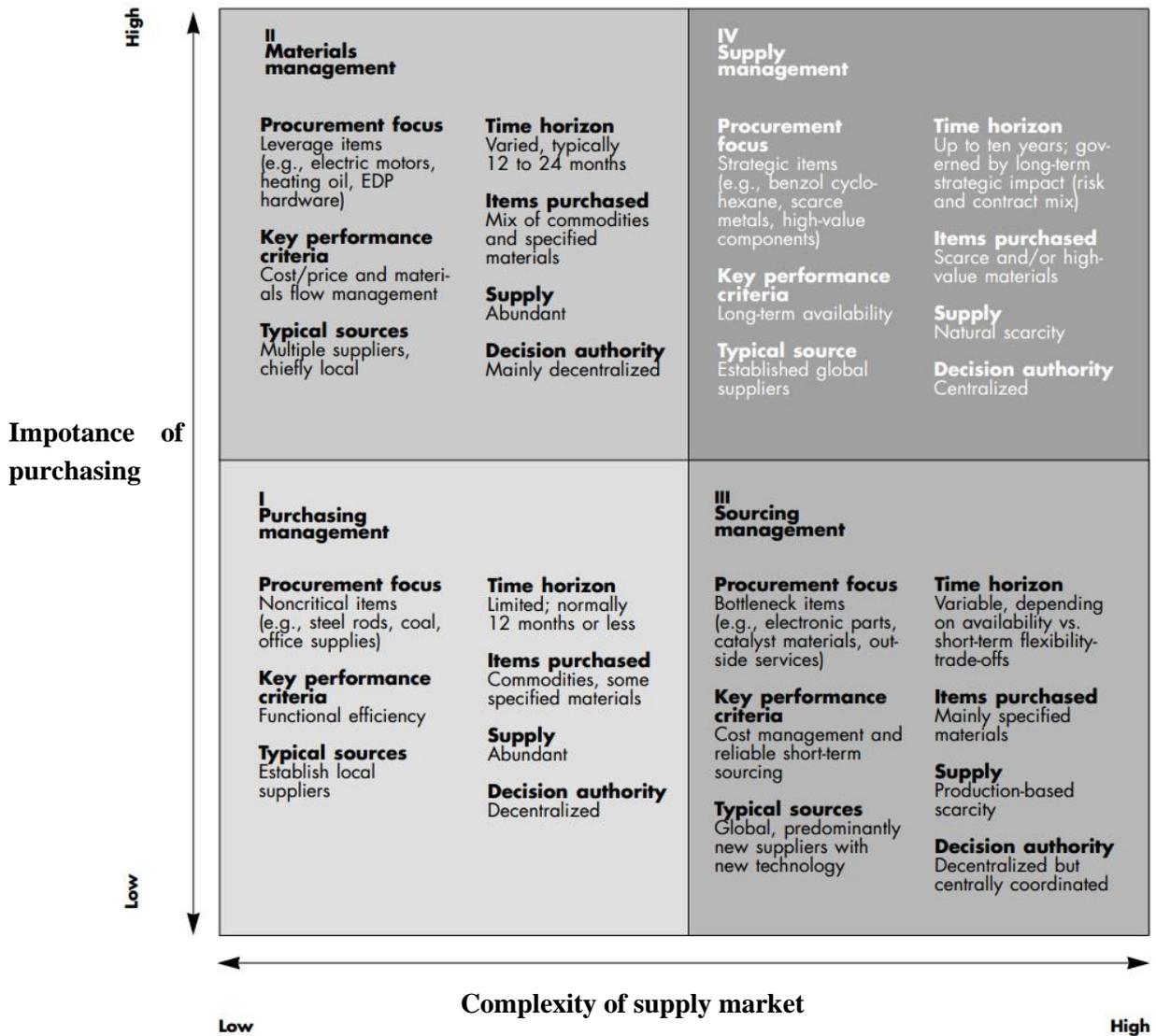


Figure 3.3 Stages of Purchasing Sophistication (Kraljic, 1983)

According to Kraljic (1983), companies should consider from two aspects to diagnose if they implement a purchasing strategy. One is the strategic importance of purchasing in terms of the value added by product line. The other one is the complexity of the supply market gauged by supply scarcity, technology and so on. Based on the two dimensions, purchasing sophistication is divided into four stages as shown in Figure 3.3. Each of the four stages has different characteristics lying on seven points that are procurement focus, time horizon, key performance criteria, items purchased, and typical sources, supply and decision authority.

3.3 Purchasing procedure model

Procedures are a system of consequent steps of techniques describing how a task or job is done. Procedures are also linked to strategy (Lysons and Gillingham, 2003). Lysons and Gillingham (2003) have discussed a lot about purchasing procedures, but they did not create a clear model of purchasing. Compared to van Weele (2010), Lysons and Gillingham (2003) gave more theoretical terms, like E-procurement, purchasing manuals and reverse auctions. At last, the model of purchasing from van Weele (2010) is chosen, because it has a clear framework containing a system of continuous steps of techniques describing how purchasing is implemented and it will help to interpret the empirical findings.

Table 3.1 Purchasing Procedure Model

Steps	Roles	Elements
1. Define specification	Get specification	Functional & Technical specification
2. Select supplier	Assure adequate supplier selection	Prequalification of suppliers; Request for quotation
3. Contract agreement	Prepare contract	Contracting & Negotiating
4. Ordering	Establish order routine	Order routine
5. Expediting	Establish expediting routine	Expediting; Acceptance test; "Trouble shooting"
6. Evaluation	Assess supplier	Supplier relationship

Source: van Weele (2010)

According to van Weele (2010), the first step of purchasing is to define the specification of the product, including functional as well as technical specifications. After the company knows their product specifications, they should start to select suppliers. Usually some suppliers will be

qualified after a series of tests. Then the company will request suppliers for quotation. That which supplier would be selected depends on which determinate the company focuses more on. Once the company and the supplier are prepared, they will make a contract agreement. Later, the company will send purchase order to the supplier according to some routine. Then the supplier will expedite the materials. The company may have some acceptance test before using it. The last phase is to evaluate the performance of supplier. In the model, each step contains several terminologies or requires a clear definition for readers to understand. For examples, the functional and technical specification, supplier selection, subcontract and contract, etc. Therefore, we will explain some of the unfamiliar terms clearly as following:

Functional & Technical specification

Functional specification is the functionality which the product must have for users. Technical specification is the technical properties and characteristics of the product as well as the activities to be performed by the supplier (van Weele, 2010).

Supplier selection

Supplier selection relates to all activities which are required to select the best possible supplier and includes determining on the method of subcontracting, preliminary qualification of suppliers and so on (van Weele, 2010). Usually the buyer should consider how to contribute most effectively to the value creation process together with the supplier (Freytag and Mikkelsen, 2007). According to van Weele (2010), supplier selection contains four steps:

- I. determining the method of subcontracting;
- II. preliminary qualification of suppliers;
- III. preparation of the request for quotation;
- IV. selection of the supplier.

Subcontract

Subcontract has two main types. One is turnkey subcontracting, the other is partial subcontracting. These two types are different from each other. Both of the two types have their own advantages and disadvantages (see Table 3.2).

Table 3.2 Advantages and disadvantages of turnkey and partial subcontracting

	Advantages	Disadvantages
Turnkey subcontracting	Limited interference; No experience in similar projects; Limited efforts.	No insight in cost structure of project; Limited influence only on materials used.
Partial subcontracting	Better insight in cost structure of project; Better grip on suppliers and materials used; Lower overall project costs in general.	In-depth knowledge and experience required; Much time and effort required; Risk of delay caused by information sharing.

Source: van Weele (2010)

Contract

Although the establishment of long-term and trust-based relationships is important, “true” partnerships are rare in reality (Wagner and Boutellier, 2002). Therefore, a conservative way for companies is to write contracts to avoid uncertainty (van Weele, 2010). Another way is the cooperation without contract, which is based more on trust (Freytag and Mikkelsen, 2007).

According to Freytag and Mikkelsen (2007), there are two types of agreements/contracts often used. One is collaborative agreement, the other is blanket contract. A collaborative agreement is a general agreement that contains information about the objective and character of the cooperation. Roughly speaking, this kind of agreement describes how the companies want to cooperate. Moreover, a collaborative agreement has three roles or merits. First, collaborative agreements simply reflect good intentions rather than legally binding agreements. Second, collaborative agreements can make employees in both companies aware of the importance of their cooperation. The last, collaborative agreements can guide expectations in both companies in a certain direction (Freytag and Mikkelsen, 2007).

A blanket contract is often used to regulate supplier relationship. Typically, the agreement contains almost everything, like specifications of the product, delivery terms and delay terms and so on. It is very detailed and clear that what is to be delivered and on what conditions.

Furthermore, the blanket agreement also comprises clear indications of the power balance between two companies. By the way, blanket agreements contain strong commercial elements. This is sometimes ignored in practice where buyers, sellers do not cooperate as closely as might be appropriate (Freytag and Mikkelsen, 2007).

Ordering

Ordering refers to the placing of purchase orders at a supplier against previously arranged conditions or when orders are placed directly at the supplier without questioning the supplier's conditions. In practice, most purchasing transactions are straight re-buy or modified re-buy. Straight re-buy is to purchase a known product from a known supplier. Modified re-buy is to purchase a new product from a known supplier, or an existing product from a new supplier (van Weele, 2010).

Acceptance test

Acceptance test is a technical test performed at either the supplier's site, the buyer's site or both, to check if the goods that bought from the supplier meet the declared specifications (van Weele, 2010).

Terms of payment

When capital goods are purchased, it is time for payment taking place. In general, the preferred method of payment is based on the supplier's performance. For example, payment of 50% of the total sum can be transferred to the supplier when 75% of the work is completed. The last 50% is held back until the supplier's work has achieved the customer's satisfaction. It would be perfect that the advance payments can be covered by a bank guarantee in which the supplier agrees to fulfil his obligations (van Weele, 2010). The mostly used method in this situation is called acceptance bill, which is an informal letter by which one merchant ordered his agent-banker to make payment on his behalf to another merchant when the bill is mature. The maturity time of an acceptance bill in China is six months at most (University of Toronto, China Everbright Bank and China Minsheng Banking Group).

Supplier relationship

Due to the external and internal factors, supplier relationship can be short-term, non-cooperative relationships (arm's length) and long-term, cooperative relationships (partnership) in the supplier portfolio (Wagner and Boutellier, 2002). And, arm's length relationship relates to non-strategic inputs without differentiation, while the strategic inputs of partnerships are related to core skills (Wagner and Boutellier, 2002). According to Bengtsson et al. (2009), strategic outsourcing aims at creating a partnership while lower cost outsourcing does not. An advanced

step of the partnership is the strategic partnership where a win-win situation stands (Wagner and Boutellier, 2002). From arm's length to partnership to strategic partnership, the relationship intensity becomes high with higher supplier management capabilities (Wagner and Boutellier, 2002). However, the management of too many suppliers would exceed the company's resources and capabilities (Wagner and Boutellier, 2002).

3.4 Factors integrated in purchasing

As mentioned in section 2.2, the factors integrated in purchasing are deductive from the common factors got from the interviewees and the idea of the sandcone theory (Ferdows and de Meyer, 1990). These factors were not mentioned by van Weele (2010), but they cannot be isolated from the purchasing procedure as they do exist and affect the procedure in reality. In order to provide sufficient theory support for descriptive and explanatory interpretation and further accomplish the three objectives, six common factors are selected and screened. The six factors are quality, price, organization, supply and demand, transportation and information system. They are organized and ranked by the importance from top to bottom.

3.4.1 Quality

There are numerous definitions towards the quality concept, which are initiated from five approaches: transcendent, product-based, user-based, manufacturing-based and value-based (Garvin, 1984). Since the purchasing department must assure the product specifications met by their suppliers and be manufactured within scope and has to ensure their suppliers carry out their agreements at the same time (van Weele, 2010), the concept therefore is more related to the product-based, user-based, manufacturing-based and value-based approach. Thus, 'quality' can be narrowed and understood as the characteristics of a product or service that bear on its ability to meet customer requirements, and the requirements agreed between supplier and customer (van Weele, 2010; Bergman and Klefsjö, 2003). These requirements and objectives are met by most companies through quality management which has four interrelated functions: setting standards, assessment, control and assurance (van Weele, 2010).

Quality assurance, a phase before production and an important criterion for supplier selection, refers to the methods and procedures kept continuously of quality management (van Weele, 2010; Bergman and Klefsjö, 2003). Usually, this phase is called auditing within company and verification outside the company (van Weele, 2010). Since quality of pharmaceuticals has been a great concern of the World Health Organization (WHO), it published the good manufacturing practice (GMP), a part of quality assurance, as the guideline to ensure medicinal products are produced and controlled to quality standards. Moreover, it defines both quality and general

measures under the concern of production and testing (WHO). In pharmaceutical production, GMP may diminish risks such as cross contamination and false labelling (WHO).

According to van Weele (2010), companies always conduct a number of activities to arrive at a zero defects quality performance in its relationship with suppliers, which is known as the supply quality assurance (SQA). In order to assure the quality of goods and services, the purchasing department should select suppliers that can guarantee a sufficient quality level at present and in the future. And the selection within a quality scope can be measured through:

- Preparing the purchase order specification
- Preliminary qualification of (potential) suppliers
- Sample inspection procedure
- Delivery of first and subsequent preproduction series
- Manufacture of the first production series
- Quality agreement and certification
- Periodic verification

Moreover, the purchasing department aims to maintain and improve quality all the time, if their suppliers fail in this issue, the relationships may eventually be terminated. And for the company's purchasing department, it may change suppliers and measure new suppliers from the beginning.

According to the value-based approach, quality is related to cost and price (Garvin, 1984). Generally, a product with high quality is at a high price. Quality has cost and according to Bergman and Klefsjö (2003), Joseph Juran points out this in 1951 and it consists four parts:

- Internal failure costs
- External failure costs
- Appraisal costs
- Prevention costs

These quality costs cause expenditure; however, the lack of quality is the real cost. Costs may arise from rework or compensation of the defective products, which at the cost of both money and time (Bergman and Klefsjö, 2003; van Weele, 2010).

3.4.2 Price

In general, the buyer should insist on a fixed price through negotiation with the supplier. This price must be acceptable to both of them. Ideally the supplier should be willing to accept all risks. In practice, different price arrangements are used in purchasing activity (van Weele, 2010).

Fixed price plus incentive fee. This type of contract is designed to motivate suppliers by means of rewards to implement the work above the agreed standard.

Cost-plus contract. This type of contract is used in situations where the work cannot be specified adequately, or when a fixed price brings risk continuously to both the supplier and the buyer.

Cost-reimbursable contracts. This type of contract is usually based on fixed hourly rates for labour and equipment.

Agreement with price-adjustment. This type of contract is used mainly for agreements with a long-term delivery, or when specific, market-sensitive materials are purchased.

3.4.3 Organization

Organizational Purchasing Structure

According to van Weele (2010), there are three types of structure of purchasing. One is decentralized purchasing structure. Its major characteristic is that every business-unit manager is responsible for his own financial results. Hence, the management of this business unit is fully responsible for all its purchasing units. Decentralized purchasing structure is particularly attractive to an organization where each business-unit purchases products that are unique and different from those of other units. This structure would only provide limited advantages.

Centralized purchasing structure can be found where corporate contracting specialists operate at the strategic and tactical level. Decisions on product specifications are made centrally and the same goes for supplier selection decisions. Contracts with suppliers are also prepared and negotiated centrally. The main advantage of this structure is that better conditions from suppliers can be achieved through co-ordination of purchasing. Another advantage is that it will help to build product and supplier standardization. The disadvantage is also obvious: the management of the individual business unit has limited responsibility for decisions on purchasing (van Weele, 2010).

A hybrid structure is a combination of the previous two organizational purchasing structures. Both concepts relate to efforts aimed at combining common materials requirements among two or more business-units. However, a lot of variety still exists in practice, depending on the type of commodity. Co-ordination in purchasing may be forced upon the business units or may have a more voluntary character (van Weele, 2010).

Organizational Culture

According to Lund (2003), the term of ‘culture’ is often associated with exotic, distant people and places, also with myths, foreign languages and practices. Within our society, organization members similarly engage in rituals, pass along corporate myths and stories. These informal practices may foster management’s goal for the organization. Hence, the organizational culture can be the pattern of shared values and beliefs that help individuals understand the organization’s functioning. Organizational culture also provides the norms for individuals to behave in the organization.

3.4.4 Supply and demand

There are two systems known as the ‘push’ and ‘pull’ systems in logistics. Traditionally, companies implement ‘push’ system where products are manufactured in anticipation of demand and orders for production are scheduled in advance (Christopher, 2011; David, 2002). Make to forecast (MTF) (or make to stock) is thus a type for product manufacturing involved in this system (Jonsson, 2008). Conversely, the adoption of Just-in-time (JIT) of the ‘pull’ system enables demand at the end of the pipeline pulls products and the components behind the products (Christopher, 2011). In this model, goods are made once customer demand is known (David, 2002). And the product manufacturing type refers to make to order (MTO) (Jonsson, 2008).

Generally, conventional companies forecast customer demand and carry inventory in case of the lead-time gap. When the inventory levels fall to the reorder point, companies reorder through statistical inventory control, which under the concern of lead time (Christopher, 2011, Jonsson, 2008). In addition, companies use safety stock and safety time in order to avoid disruptions such as delayed inbound deliveries, less expected inbound quantities, and the less accurate forecast (Jonsson, 2008). This process is known as the reorder point method and can be illustrated in Figure 3.4 (Christopher, 2011). Moreover, there are stocks with purchased components, raw materials and components produced within the company for make to order product manufacturing as well (Jonsson, 2008).

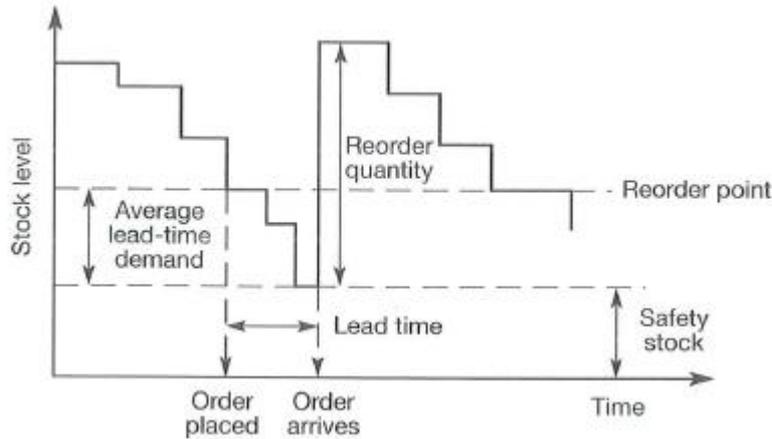


Figure 3.4 The reorder point method of stock control (Christopher, 2011)

However, the fact is that every order, transportation and delivery is associated with ordering costs. Thus, companies can gain a less ordering cost per unit through a larger order quantity. But, this will lead to increased incremental inventory carrying costs (Jonsson, 2008).

3.4.5 *Transportation*

Generally, goods transportation means the transportation between geographically separated plants (Jonsson, 2008). During the transportation, four main traffic modes can be used which are sea, rail, road and air (Jonsson, 2008; Lumsden, 2007). However, some companies use a combined transportation that uses different traffic modes for one consignment with different types of vehicles (Jonsson, 2008), for example, goods is first transported on a truck and transported by train for the second part. However, the choice of transportation may depend on geographical distance, transportation cost, delivery times and flexibility, and etc. The consideration of these elements may affect the selection of suppliers as well. For example, short distances lead to lower transportation costs and enable more frequent deliveries of small quantities with shorter delivery times. In addition, this may improve the delivery flexibility and quality co-operation, more communications between companies that can consolidate their partnerships. During transportation, some goods may have special requirements like cooling or heating systems. In this situation, some companies may turn to third party logistics (3PL) which means a transportation company takes over part of the customer's (producer's) logistics function (Jonsson, 2008; Lumsden, 2007).

3.4.6 *Information system*

In reality, the administrative complexity in purchasing is at a high level (van Weele, 2010). Thus, the acquisition of the complete, up-to-date and correct information becomes the prerequisite for purchasing decision-making. There are different types of information systems

which can be divided into four main groups: planning and execution systems, communication systems, identification systems and electronic market places (Jonsson, 2008). These are supported by various computer systems and become available to buyers and purchasing managers, purchasing activities like the requisitioning and ordering; product, contract and supplier database; order follow-up; delivery; and invoice handling and payment can be handled under a systematic way (van Weele, 2010). However, it is simple and preferred by buyers to communicate with suppliers on telephone to send an order (Jonsson, 2008).

The ERP (Enterprise Resource Planning) system, one kind of planning and execution systems, is based on company-wide for managing all business processes, such as operational and support processes, administrative processes, human resources, material resources and financial resources (Jonsson, 2008; van Weele, 2010; Lysons and Gillingham, 2003). It can track the purchasing process and monitor the delivery and supplier performance (Lysons and Gillingham, 2003). According to Jonsson (2008), ERP enables the storage with large amounts of data and handle large volumes of transactions in a rather simple way. According to Lysons and Gillingham (2003), Kampf also summarized its advantages and disadvantages that shown as follows.

Advantages:

- Faster inventory turnover
- Improved customer service
- Better inventory accuracy
- Reduced set up times
- Higher quality work
- Time revenue collection and improved cash flow

Disadvantages

- ERP implementation is difficult
- ERP systems are expensive
- Cost of training employees to use ERP systems can be high
- There may be a number of unintended consequences
- ERP systems tend to focus on operational decisions

4 EMPIRICAL FINDINGS

Based on the purchasing procedure model from van Weele (2010), we made unstructured interviews with five pharmaceutical companies. They are Nanjing Zhongke Institute of Biology, Nanjing Zhongke Pharmaceutical Co., Ltd., Nanjing Cuccess Pharmaceutical Co., Ltd., Nanjing Baijingyu Pharmaceutical Co., Ltd., and Jinling Pharmaceutical Co., Ltd. The information about the companies and the capsule purchasing practices was the basis of the empirical findings. The five companies are all located in Nanjing, China. The first two companies are producing health care medical products; the others manufacture general use medicine. But they all have capsule-made products. We mark the first company Nanjing Zhongke Institute of Biology as Company A in order to make it easier to analyse in the discussion part. So is for the left companies.

There are some things in common for the macro business environment in China. For instance, the capacity of capsule that suppliers can offer is more than the demand of pharmaceutical companies. Meanwhile, the third party inspection has been cancelled in the new GMP (Good Manufacturing Practices) regulation since this year. SFDA (State Food and Drug Administration) declares there is no need to do third party inspection, because the inspection equipment has been developed in most of the pharmaceutical companies. Besides, all the pharmaceutical companies should register in SFDA and follow the GMP regulation.

4.1 Nanjing Zhongke Institute of Biology (Company A)

4.1.1 *Company overview*

Nanjing Zhongke Institute of Biology is the sub company of Nanjing Zhongke Biotechnology Co., Ltd., established on 25th May, 1999, which is a research organization with the integration of scientific research, production and sales. The company devotes to develop biological healthcare medical products for middle-aged and elderly people. Moreover, it pays close attention to the development of new technology. Currently, the company keeps up with the development and tendency both domestically and internationally. Some scientists from CAS (Chinese Academy of Sciences) and other authority scientific research organizations are the main co-operators. By now, it has been awarded nearly 30 certificates by SFDA (State Food and Drug Administration). Nearly 10 new products are invested in R&D each year.

The institute uses high technology to develop traditional Chinese medicines into biological products based on bio-engineering and modern health science. The series of products can be divided into two categories: domestic independent R&D products and original imported products from Australia. There are dozens of domestic products that can be divided into three

types: multi-functional comprehensive, professional functional and special effective. However, there are only four kinds of imported products. Most of these products are capsule products and selling well in China and overseas, at an average of 40-50 ten thousand grains produced per day. Moreover, the production strictly follows the GMP (Good Manufacturing Practices) standard.

4.1.2 Capsule purchasing practices

Each year, the purchasing department of Nanjing Zhongke Institute of Biology goes to the exhibition of pharmaceutical materials or consults the insider to know more about suppliers. During selection, five suppliers are visited and asked for three batches of samples. After testing these samples by Zhongke's quality department, three suppliers are remained. Meanwhile, general qualifications like manufacturing license and organization institute code should be provided by the suppliers. However, if they are unqualified, buyers would search for new suppliers follow the same steps until there are three suppliers. Next, the company's purchasing department, quality department and general manager audit these suppliers together, including the environment, production condition, equipment and operational process. Moreover, they check the 2nd tier suppliers' license and their legality of raw material channels. In addition, suppliers' warehouses are required with only capsules in storage. Afterwards, Zhongke will sign contracts with the one that fulfils GMP's requirements and start the pilot production. Each year, the purchasing department audits and tracks on its suppliers, and sends samples for a third party inspection.

Currently, Zhongke purchases capsules from Wuxi Changjiang Capsules Co., Ltd. which is the main supplier for 4-5 years corporation. However, Zhongke also purchases some capsules from Suzhou Capsugel and plans to change it as the main supplier within two years, even it is more expensive. The manager Mrs. Zhu addressed that Zhongke focuses more on quality and only cooperates with the best inside supplier. Later, Wuxi Changjiang Capsules Co., Ltd. will become its spare supplier. Except quality and cost, suppliers' credits, lead time and service are all the aspects for consideration, added by Mrs. Zhu. Now, the company plans to adopt an ERP system.

There are two kinds of contracts in Zhongke. One is the annual contract that focuses on the requirements of quality, on-time delivery, etc. The other is in the form of purchasing agreement that determines the quantity, price and lead time. Zhongke only signs contracts with its main supplier. Unless the main supplier has problems or production halts, the company will not buy from the spare suppliers. However, the company will sign purchasing agreement with spare suppliers once they have transactions, and the price will be higher. All the suppliers are paid in

cash after the qualified quality test. Zhongke keeps communication with them by phone all the time.

Each time, production capacity is determined through customer order. And the purchased quantity of capsules is obtained from the same month last year. The capsules kept in stock are only for one month production, which can be seen as a safety stock. Mrs. Zhu explained this make to order way may let Zhongke's customers believe these are good selling products. The demand of capsules is approximately 0.4 to 0.5 million grains per day. Usually, it takes 15-20 days for supplier manufacturing capsules every time. So the company orders capsule 30 days ahead. And the supplier deliveries capsules by a car with cooling system.

4.2 Nanjing Zhongke Pharmaceutical Co., Ltd. (Company B)

4.2.1 Company overview

Nanjing Zhongke Group Co., Ltd. is a Hi-tech enterprise working on the development, production and sales of the health food with the registered capital of USD 5,110,000, set up in May, 1990. Nanjing Zhongke Pharmaceutical Co., Ltd., established in April, 2005, is the wholly-owned subsidiary and production base of Nanjing Zhongke Group Co., Ltd. which has over 300 employees. CAS and the company's researchers hold the shares. The whole company has a high reputation among pharmaceutical industry and has been honored as "the new high-tech enterprise of Jiangsu Province", "consumer's trustworthy products", "China's high-quality brand" and etc. Moreover, the two companies have both passed GMP and hold Quality System Certificate of ISO9002 and ISO14000.

The health care food of this brand covers all areas, for example, the anti-cancer series, cardiovascular, blood sugar, beauty and daily health care series with the overall 26 kinds of products spread all over more than 100 domestic and international areas. Most of these products are made of capsules with the yield of 150 million grains per year.

4.2.2 Capsule purchasing practices

Nanjing Zhongke Pharmaceutical Co., Ltd does not set a separate purchasing department according to the company's production manager Mr. Wang, who is also responsible for all the purchasing activities. So far, the company has only one capsule supplier which is the Anhui Huangshan Capsule Co., Ltd., who has remained a long term relationship for over ten years. Moreover, their corporation is so stable, based on trust, even without signing any contracts. It is for this reason that this company will not change this supplier currently. However, the change of supplier follows the company's procedure.

Supply Chain Management towards Purchasing

Since the characteristics of capsule and this industry's requirements, quality has been an important criterion for the company's supplier selection. Cost is another factor closely related to the company's profit. Therefore, their decision is made according to the quality and price comparison among several suppliers. Each year, Mr. Wang and his employees go to the exhibition of pharmaceutical materials, and keep communications with capsule suppliers from Suzhou, Shanxi, Shanghai and Qingdao. In their mind, larger companies have better quality than smaller companies. Their choice prefers better quality within the same price range. Mr. Wang reviews the manufacturers before signing contract. Once the qualified supplier has been selected, it should accept a full inspection and provide a quality testing report of each volume each time according to the SFDA's specifications. Moreover, the company will check the quality again according to GMP's requirements. In addition, a third party inspection is required each year and at least one full inspection by SFDA yearly. The company audits the supplier yearly, including supplier's production situations, operation, products' quality, and etc.

As mentioned, the company's corporation with its supplier is based on trust without signing contracts. After negotiating, the price of the capsule is based on the quantity for one year using, thus a price discount is gained. The company pays cash for its supplier every time after testing the quality. Once the capsule has quality problems or delayed delivery, the company calls its supplier for an exchange due to a long term relationship. The company does not have an ERP system and will have in the future.

Each month, the company has its production planning for next month according to the current products' inventory and sales. Meanwhile, the amount of capsule purchasing can be confirmed and ordered at the beginning of each month. Generally, the purchased quantity is enough for one or two months' usage. However, the best-selling months are from September to January and April. So, during this period, the order quantity is larger and the purchased point is one month ahead of schedule. Since the order quantity is on the basis of forecast, experience and former data, it might be inaccurate. Therefore, the company has certain amount for safety stock. And, if they find the purchased capsules consumed a lot and less in stock in the middle of the month, the company will replenish some.

The capsule supplier is responsible for the transportation. The distance is only 5-6 hours by car, but the supplier should guarantee the temperature and humidity in case of quality problems. However, this supplier does not provide any extra services, such as training, information sharing. Mr. Wang showed his dissatisfaction about this and said that Suzhou Capsugel has a better service. But he addressed that, under the consideration of quality, price, cost, location and on-time delivery, the current supplier is the most suitable for them. After all, the exchange of

supplier costs more and is hard to build a good relationship. Additionally, he expressed his wishes for setting a purchasing department with more employees.

4.3 Nanjing Cuccess Pharmaceutical Co., Ltd. (Company C)

4.3.1 Company overview

Nanjing Cuccess Pharmaceutical Co., Ltd, established on 9th March, 1992, is a wholly-owned subsidiary of Nanjing Xinggang Hi-tech Co., Ltd. with the registered capital 30, 000, 000 RMB and total assets 400 million RMB. It is a professional enterprise of manufacturing Chinese-Western combination medicines with the integration of scientific research, production and international trade. Since the company was founded, it has been repeatedly rated as AAA-credit enterprise. Recently, it starts to do R&D on generic and innovative anti-cancer medications with close cooperation with medical universities, pharmaceuticals institutions and etc. Moreover, it has two certified GMP manufacturing facilities, 6 technical patents, 41 production licenses and etc.

Oral liquid preparation, water injection, powder injection and etc. are included in Cuccess's multiple assembly lines. And its products cover many therapeutic areas, for example, paediatric, cardiovascular, antineoplastic, dermatologic, and etc. Each year, it produces capsule products at the yield of 230 million grains. "Chengong" and "ChengongZaixin" are the representative products for anting cancer, which are credited as the well-known trademarks in pharmaceutical industry nationwide. Currently, 20 drugs are under research.

4.3.2 Capsule purchasing practices

Since the purchasing manager Mrs. Wang only works in this company for 6 months, we also interviewed the production manager Mrs Yang. According to them, Nanjing Cuccess Pharmaceutical Co., Ltd. has a very strict supplier selection procedure which can be divided into four steps:

- Check the general qualifications (manufacturing license, organization institute code);
- Sample match test;
- Trial test, pilot plan test and large scale production;
- Declare to SFDA for a record and sign up a long term contract.

Usually, suppliers contact the purchasing manager directly. During selection, the manager focuses more on quality rather than price. Among the four steps, there are several measures in details. The quality department helps the purchasing department establish an evaluation group to evaluate the hygienic conditions, production environment, process flows, equipment,

Supply Chain Management towards Purchasing

employees, etc. of the potential suppliers. Correspondingly, the group makes an evaluation table for recording. These potential suppliers should provide the quality testing report with standard specification. The tests involved in the third step are mainly to test the stability of the materials. For example, capsule is easily damaged, has high requirements for temperature and humidity, and the filling rate should be over 90%. In order to save costs, the company should ensure the purchased capsule will not easily change its property. Once the quality department agrees, the qualified suppliers can become the real suppliers. Other factors that influence the selection can be the companies' size, location and transportation.

Each year, Cuccess does a full inspection on the suppliers. And it will not change the selected supplier due to that is a waste of time, human resources and capital. Communication and negotiation are the common ways to deal with the problems. For quality issues, Cuccess asks its suppliers to change for a new batch. However, both of the two companies do not need to provide any third party inspection report due to the new published regulations. In case of the risks in supply chain, they have 2-3 spare suppliers. Currently, the company has only one capsule supplier which has a quite high price. This is because the materials are made into antitumor capsule.

In this company, there are two ways of signing contracts. For those exclusive suppliers that may have risks, the company signs a one-year contract with them to determine the quantity, price, lead time and the way of payment. The ideal way is that the suppliers give a certain price without changes during the year. If they do not agree, they should inform Cuccess before raising the price. In that case, the purchasing manager will buy more and keep in stock. Another way of contract is based on trust and communication. Generally, the company pays its suppliers when the goods are qualified with cash or acceptance bill. The company also signs up an annual contract with a third party logistics company which is responsible for the delivery of capsule with refrigerator car.

Usually, the purchase manager buys materials twice every month. One is at the end of this month and the other is in the middle of next month. The buying quantity is decided by the production plan and inventory. The lead time for suppliers is 10 days, and the manager orders 10 days ahead. According to the purchasing manager, capsule is not the frequent used raw material. Thus, they order it only based on inventory. And the quantity of stock is on the basis of price. The cost of stock management is not a problem for the company.

The two managers addressed that they follow all the requirements of GMP, SFDA and the national pharmacopeia. The purchasing manager said they remain good relationships with their

suppliers, track on them and get the information feedback instantly. In the future, the company will adopt the ERP system.

4.4 Nanjing Baijingu Pharmaceutical Co., Ltd. (Company D)

4.4.1 Company overview

Baijingu Pharmaceutical Co., Ltd. is a private-run and GMP certified manufacturer producing both bulk pharmaceutical chemicals and finished pharmaceuticals since 1937. The registered capital was 7.72 million USD when the company was reorganized in 2004. The brand of Baijingu has a long history that can be dated back to Ming Dynasty (1368-1644 AC). A civilian named Baijingu ran an eye ointment shop and the eye ointment earned him fame due to its excellent medicinal effects. Up to modern times in December 2006, the company was recognized as the “Time-honoured Enterprise” in China and their products are exported to over 30 countries (Nanjing Baijingu Pharmaceutical Co., Ltd.).

Nowadays, the company’s production base of bulk drugs is equipped with an independent production line with an annual capacity of 800 tons. Meanwhile, the production base of formulation drugs has an annual production capacity of 8 billion solid tablets, one million litres of tincture, 40,000 litres of lotion and 50 million units of ointments, which fall into nearly a hundred kinds under 15 categories. Almost 45 million grains of capsules are used every year (Qu Yi, 2012). Moreover, the products of anesthetic and oral contraceptive are included in the key national projects. By the way, the company’s annual profit has been continuously over 10 million RMB since 2004 (Nanjing Baijingu Pharmaceutical Co., Ltd.).

4.4.2 Capsule purchasing practices

According to the interviewed purchasing specialist Miss. Qu, Baijingu Pharmaceutical Co., Ltd. has a separate department for purchasing where there are four employees. Each year, it purchases around 45 million grains.

The company has two ways to find suppliers. One is to attend the exhibition of pharmaceutical materials. The other is through the advice from other pharmaceutical companies of the same trade. These suppliers must have the license to produce pharmaceutical materials and they have to be registered in SFDA. Baijingu asks its interested supplier to send the samples of capsules with self-test report and it inspects the capsules also. Moreover, a third party inspection report is required. Sometimes, the company sends professional employees to the supplier’s manufacturing base to investigate the supplier’s qualifications. The supplier whose capsule is of the best quality and with the ideal price will be selected. This is its principle for supplier

selection. Other factors influencing the selection are transportation and service. Before the mass production, Baijingyu still tests the capsule systematically until the quality department accepts it. In order to ensure the quality, it inspects every time when the goods are delivered. Even these goods were produced in the same manufacturing line as the goods of last delivery. Annually, Baijingyu audits its supplier.

Baijingyu makes orders by ways of telephone or fax and it purchases from only one capsule supplier that is Taizhou Yangtze River Capsules Factory, because the company wants to keep a stable supplier relationship. In addition, they have been cooperated for four years. But the company still has two alternative suppliers and just keeps in touch with them right now. In general, Baijingyu does not consider changing the supplier, unless something irresistible happens, e.g. earthquake.

Baijingyu does not sign the annual contract with the suppliers. It only signs the purchasing agreement with the supplier each time when it purchases. This agreement indicates the quality, quantity, price, transportation and so on. The most used methods of payment for Baijingyu are acceptance bill, cash and check. The period of its acceptance bill is under 60 days. Usually the order quantity is related to the manufacturing plan based on previous sales and forecast. There is a small safety stock of capsule in case of the uncertain customer demand. Baijingyu has adopted ERP system for at least five years. Miss Qu told us, the expensive ERP system has helped them to increase the working efficiency and order precision but decrease the resource waste.

The purchased capsule is sent by either the third party logistics company or the particular van from the supplier. The lead time is about 15 days. Sometimes, the detention of delivery happens. But this could be negotiated to make up, for instance, Baijingyu can ask for a cost reduction. They discuss the business fairly and share the information; neither of them holds the power priority. All of these purchasing activities are following GMP's requirements.

4.5 Jinling Pharmaceutical Co., Ltd. (Company E)

4.5.1 Company overview

Jingling (The alias of Nanjing City) Pharmaceutical Co., Ltd. was formed up by five enterprises in 1998 and it is a state-owned listed company since establishment. Among the five enterprises, one was Nanjing Jinling Pharmaceutical Group Co., Ltd., which was ranked in the top 520 enterprises in China. The precursor of Nanjing Jinling Pharmaceutical Group was Jinling Pharmaceutical Factory founded by PLA (People's Liberation Army) Nanjing Military Area. In

1999, 80 million shares A of Jinling Pharmaceutical Co., Ltd. were issued and listed in stock exchange (Nanjing Jingling Pharmaceutical Co., Ltd.).

Jingling Pharmaceutical Co., Ltd. concentrates on producing Chinese traditional medicines in modern technology. They have four GMP certified manufacturing bases, and their product line contains over two hundreds kinds of medicines. Besides, they have two trading companies, which help them to build the developed sales channels all over the country. Furthermore, they have five herb planting bases in China. All of these bases are following GAP (Good Agriculture Practices) codes (Nanjing Jingling Pharmaceutical Co., Ltd.). Each year, they will purchase around 10 million grains of capsules (Yan Shengbin, 2012).

4.5.2 Capsule purchasing practices

Jingling Pharmaceutical Co., Ltd. is a state-owned listed company and does not have an independent purchasing department. Instead, it is included in the department of manufacturing. Through the interview with their production manager Mr. Yan, we know they consume 10 million grains of capsules every year.

Compared to other companies, Jinling does not attend the exhibition of pharmaceutical materials very often. Even if they attend, the exhibition location must be in Nanjing. They prefer to find the suppliers by the suggestions from other companies within the same industry. In general, suppliers contact the company first to sound out if it has the intension to cooperate. Usually five suppliers with pharmaceutical manufacturing licenses will be in Jinling's interested list. The company asks suppliers to send the samples. These samples are tested by Jinling and the top three suppliers with the best quality will be selected. The third party test is seldom applied in Jinling. After this phase, Jinling sends professional employees to suppliers' manufacturing base to evaluate their qualifications according to GMP and other relevant regulations. The three factors they consider mostly are quality, price and service. The focus of the evaluation lies on the quality of the materials used to produce capsules by suppliers, which means Jinling even inspects the supply chain of their suppliers. At last, Jinling selects three suppliers, one as the main supplier, the other two as backup. Thus, Jinling purchases from the two spare suppliers randomly. In general, it wants to keep stable relationship with one supplier, even this supplier has a higher price. But in a condition when another supplier can offer better quality with lower price, it will think about changing the supplier.

Jinling does not sign any contracts, but it signs purchasing agreement with the supplier. The order is made by telephone or Internet, and the quantity is around three-month consumption. The methods of payment are acceptance bill, cash or check, but cash and check are delayed until

Supply Chain Management towards Purchasing

Jinling thinks this batch of materials is good after production. The period of acceptance bill is maximum three months. The company has a small stock of capsule as a buffer for a 15-day production, because Jinling needs to inspect the goods each time when the company receives it. Besides, the company inspects the supplier's qualifications every two years.

Its supplier delivers the goods by train and Jinling picks it up by truck without the cooling system. Sometimes, the delivery is delayed. But Jinling has count the detention time into the lead time. Once the detention results in very serious problem, Jinling will ask for compensation or end this relationship.

Jinling has not applied ERP system, but it developed a system. This system is more practical for itself, because the education level of its employees is not very high. But, this system cannot alarm when the inventory is under safety stock. However, the company thinks the best is the most suitable one. Jinling does not share information with suppliers, but it desires it would be possible in the future. In their minds, everything goes well if it is following GMP and other regulations. They do not want to make innovations.

5 ANALYSIS & DISCUSSION

5.1 Purchasing procedure model

Based on the purchasing procedure model from van Weele (2010), we found more elements in practice. Therefore, a new purchasing procedure model (see Table 5.1) combines van Weele's theory and the empirical findings is established for both describing and interpreting the capsule purchasing practices in this section. By comparing to the original model in section 3.3, it can be found that this new model is on the basis of the original one, but more close to practice. In reality, the capsule purchasing procedures are following the six steps, so there is no change to the steps. We think the "roles" in the original model is to guide readers how to implement the purchasing procedure. Therefore, we just adopt the more detailed "elements" to present what should be contained in the procedure. However, there are more new elements involved. So the "elements" in the new model is almost in a new setting and following the authentic practice.

According to the capsule purchasing practices in the empirical findings, the capsule purchasing procedures of the companies can be described as following. Companies attend the exhibition or adopt the advice from insiders to find suppliers after defining the specifications of capsule. Some companies who have good sales and plenty of capital to purchase will be contacted directly by suppliers. All the potential suppliers should be quantified as providing both the production license and organisation institute code. Later, companies will quote the price and ask suppliers to send samples with self-test reports if companies think the price is affordable. But companies will still inspect the samples by themselves. However, the sending of samples is not required necessary in each company. Some of the companies will have TPL (Trial-Pilot-Large) in order to ensure quality before signing a turnkey contract. Once the suppliers are confirmed, the companies should declare to SFDA about their suppliers. Annual contract is common, but it only regulates the quantity, product quality etc. The purchasing agreement that states the price and terms of payment is more popular when each time they purchase. There are still some companies cooperate with their suppliers based on trust, but this way is not regular. Companies prefer to buy from a known supplier. They like to pay in cash or check, acceptance bill is also adopted. The study indicates that companies usually like to have a stable supplier relationship. They do not change it so often unless in a condition where suppliers can offer better quality with lower price. Currently, they prefer to use telephone to communicate instead of email. It seems that they like to deal with business in ordinary way. After this description, we make a comparison to find the similarities and differences among these companies' purchasing procedures. At the same time, we also analyse and interpret the reasons.

Define specifications

Obviously, they all define the functional and technological specifications (van Weele, 2010) of their products to ensure the capsule types. This is the very basic step that no company can avoid it.

Select supplier

In the step of supplier selection (see Table 5.1), they should find supplier and have contact first (van Weele, 2010). Company A and D do attend the exhibition of pharmaceutical materials as well as adopt the advice from employees who are working in other companies. Table 5.1, Step 1 shows Company A and D have separate purchasing departments with enough human resources. That may be the reason why they can go to exhibitions very often and collect the advice from insider. However, the purchasing department of Company B or E is integrated in its production department in order to save cost. Company B only wants to find the supplier through the way of attending exhibition. And Company C's unique way to be found by suppliers is that the supplier contacts it firstly. So is it for Company E, but Company E still takes the advice from insiders as well. As stated in introduction, the representative product of Company C is for anti cancer with good sales, and Company E is a state-owned enterprise. Both of them have plenty of capital to purchase. In another words, money is not a problem for them only if the supplier can offer the best quality. This could be another reason why suppliers contact Company C and E voluntarily.

The supplier of any of these companies must have production license and organisation institute code. It is compulsory to have if you manufacture goods in China. Quotation is obviously necessary before selecting suppliers. Hence, every company here does it. Besides, they all adopt sample test except Company B. We assume that is a private behaviour, which is in lack of theories to support why Company B does not make sample test.

Table 5.1 illustrates these five companies all use turnkey subcontracting, which is best suitable in their situations. Relating to the advantages and disadvantages between turnkey and partial subcontracting (van Weele, 2010), we know that turnkey subcontracting does not require the five companies to have professional experience in producing capsules, and they even do not need to put so much effort except controlling the quality. In contrast, partial subcontracting can bring companies clearer cost structure and better grip in materials used, but it would not be a loss for companies in current situation where supply is more than demand.

Before large production, Company A and C like to have trial production and pilot production. Compared to the other three, Company A and C have more research in developing new

medicine, which requires capsules to have high quality performance (see Table 5.1, Step 1). As van Weele (2010) stated, one way to ensure the quality is to receive subsequent capsules and make a preproduction to check. This leads Company A and C to take stricter quality control process, like trail-pilot-large. Furthermore, when all of these are done, it is time to declare the information of their suppliers to SFDA, which is claimed by SFDA. There is no exception for any company.

Contract agreement & Evaluation

The third step in Table 5.1 is to make contract agreement. As Freytag and Mikkelsen (2007) stated, collaborative agreement and blanket contract are the two most popular contract types. In our case, the collaborative agreement relates to purchasing agreement, and blanket contract relates to annual contract. Freytag and Mikkelsen (2007) did not state the two types of contracts cannot be used together by one company. In reality, Company A signs annual contract with the supplier to regulate the product specifications, quality and insurance terms etc. At each time when they order, they still make a purchasing agreement with the supplier to ensure the price, transportation and terms of payment (see Table 5.1, Step 3). Connect to supplier relationship to discuss, Company A does not change the supplier so often and they remain a strategic partnership. Although Company B has a strategic partnership as well, it does business with the supplier only based on trust. It is different from the others, and it seems impossible to operate. While, the truth is Company B has cooperated with this supplier successfully for over 10 years without signing any contract. Company C also does business based on trust, but it prefers to sign an annual contract with the supplier who has been in a strategic partnership for many years. Both Company D and E only make purchasing agreement with suppliers. Relatively speaking, they keep a partnership with suppliers instead of strategic partnership (see Table 5.1, Step 6).

Let us make a general review of contract type and supplier relationship. Through the comparison above, we can find no company has arm's length relationship, and these companies who sign the annual contract all keep strategic relationship with suppliers. As Bengtsson et al., (2009) stated strategic sourcing aims at creating a partnership while lower cost sourcing does not. Moreover, the strategic relationship makes the win-win situation possible (Wagner and Boutellier, 2002), which let both sides can benefit. Thus, the two elements are closely connected and influence each other mutually. The other companies who only sign collaborative agreements usually have normal partnership with suppliers. Of course, there is a very important factor that cannot be ignored, which is trust. Only if everything goes in the right track, it is possible to deal with the supplier just based on trust.

Ordering

In the fourth step of Table 5.1, we find all the five companies use the straight re-buy as order routine. Linked to the explanation of straight re-buy in theoretical framework (van Weele, 2010), it is clear that each of the five companies likes to purchase the same capsule from the same supplier. Besides, modified re-buy routine is operated by Company E, because Company E keeps the connection with spare suppliers through the way of buying little quantity of capsules from them. About payment method, cash and check are the mostly used methods by the five companies. Although transaction through banks is very popular in many countries, Chinese business men still prefer to take cash. It is worth to see, only Company C, D and E also use acceptance bill, by which the company asks its banker to pay the supplier when the bill is mature. This maturity period brings the company enough time to secure the cash flow. Generally speaking, companies can benefit from the acceptance bill, while suppliers cannot, because they have to wait for maximum 6 months (China Minsheng Banking Group). From another view, most of the companies who use acceptance bill to pay do not have strategic partnership with suppliers, as normal partnership for Company D and E.

Expediting

Step 5 of Table 5.1 illustrates, the five companies all execute the acceptance test to ensure the quality when the goods arrive. It is a very necessary process and this activity meets the requirement of making test for the first delivery suggested by van Weele (2010). Certainly, detention of goods sometimes happens. Faced to this situation, the five companies will initiate the “trouble shooting” procedure, by which they prefer to negotiate with suppliers by phone. Because in China, Email is not widely adopted by people, they like to contact by phone directly. The best example is that Internet is only applied in Company C in our case. In evaluation step, the most important element is supplier relationship that has been discussed with contract agreement in previous page.

In general, compared to the purchasing model suggested by van Weele (2010), the new one contains more practical elements that are found by the interview. This is exactly what we expect to have. These elements have distinctive practical features, which is very helpful for us to deduce how Chinese pharmaceutical companies purchase.

Table 5.1 The purchasing procedure model

		Companies					
		A	B	C	D	E	
Separated purchasing department		X		X	X		
Purchasing Process Model							
Steps	Elements						
1. Define specifications	Capsule specifications		X	X	X	X	X
2. Select supplier	Find supplier	Attend exhibition	X	X		X	
		Advice from insider	X			X	X
		Suppliers direct contact			X		X
	Qualifications	Production license	X	X	X	X	X
		Organisation code	X	X	X	X	X
	Quotation		X	X	X	X	X
	Sample test		X		X	X	X
	Subcontracting	Turnkey	X	X	X	X	X
		Partial					
	Trial-Pilot-Large		X		X		
Declare to SFDA		X	X	X	X	X	
3. Contract agreement	Contract type	Annual contract	X		X		
		Purchasing agreement	X			X	X
		Based on trust		X	X		
4. Ordering	Order routine	Straight re-buy	X	X	X	X	X
		Modified re-buy					X
	Payment method	Acceptance bill			X	X	X
		Cash or check	X	X	X	X	X
5. Expediting	Acceptance test		X	X	X	X	X
	"Trouble shooting"	Negotiation by phone	X	X	X	X	X
		Negotiation by Internet			X		
6. Evaluation	Supplier relationship	Arm's length					
		Partnership				X	X
		Strategic partnership	X	X	X		

5.2 Factors integrated in purchasing

Quality

According to van Weele (2010), quality is an important factor integrated in purchasing, particularly, in the pharmaceutical industry. Since quality can be created as a value for products, users and manufacturing (Garvin, 1984), it is a direct approach and advantage to reach customers' requirements and expectations. However, this should be realized, agreed and pushed by both suppliers and the purchasing department (van Weele, 2010). Although not all the five companies set a purchasing department (see Table 5.1), they are rather critical about this aspect throughout the organizations by looking at their supplier selection procedure. This is mainly due to the product specifications of drugs. The added value for drugs with good quality for customers can be inferred as effectiveness, safety and stability.

For pharmaceutical companies' purchasing, quality is guaranteed by supply quality assurance (SQR) (van Weele, 2010) which is also stressed by WHO under the concern of pharmaceuticals' characteristics and consumers' interests. GMP is thus formulated and used as the general guideline. The five selected pharmaceutical companies carry out a series of quality activities according to GMP's requirements, including third party inspection, suppliers self-test, company's self-test; batch testing and annual auditing (see Table 5.2, Factor 1). However, via the table, not all the activities are involved in each company due to each company's practical situations and understanding towards GMP. Therefore, none of them are proved to be wrong.

In Table 5.2, Factor 1, we find that all of them have annual auditing of suppliers and company's self-test which ensure a further cooperation with continuous good quality. Company B and D require both the supplier's self-test and third party inspection. This is no doubt a double check for security, but also costly and time consuming. It can be questioned that do they really believe in their suppliers? Company A and E's suppliers rely on a third party inspection without any self-tests. This may result from the lack of technical supports and it is cheaper than buying testing instruments. Also, it seems that third party inspection is more credible. Company C does not have a third party inspection. The reason is that this company strictly follows regulations which have newly published with no need for a third party inspection any longer. Thus the company has to trust its suppliers who are credible, otherwise it is risky. Company B and D have batch testing in addition. The reason for this is to avoid the polluted capsules during transportation, storage and etc. This is also an effective way avoiding the costs brought by such internal failure. Although Company B and D have more appraisal costs and prevention costs than other companies currently, they may definitely benefit from this in the long run, for example, the possibility for them to have internal and external failure costs is quite low. The latter two costs may cost more. Generally, these five companies all pay attention to quality and follow GMP.

Price

There are four price arrangements: fixed price plus incentive fee, cost-plus contract, cost-reimbursable contracts and agreement with price-adjustment (van Weele, 2010). Different companies arrange their price strategy in a different way (see Table 5.2, Factor 2). However, this is close related to the goods quality, suppliers' interests, company's interests, contract forms or agreements, service and etc. Commonly, all of these five companies adopt the agreement with price-adjustment strategy. There are two main reasons. One is that it is used for agreements with long-term deliveries. The other is that the material costs of capsule are not fixed and will change through time. Based on this, Company A, D, E also adopt the cost-plus contract. For Company A, it turns to the spare suppliers under emergency situations, which is no doubt

following a cost-plus. Company D and E are concerning for potential risks. Company C and E adopt the fixed price plus incentive fee strategy due to they prefer pay higher, but gain better quality, earlier delivery and better reliability in return.

Table 5.2 Factors integrated in purchasing

		Companies				
		A	B	C	D	E
Factors integrated in purchasing						
Factors	Elements					
1. Quality	Third-party inspection	X	X		X	X
	Supplier's self-test		X	X	X	
	Company's self-test	X	X	X	X	X
	Batch testing		X		X	
	Annual auditing by company	X	X	X	X	X
	Following GMP	X	X	X	X	X
2. Price	Fixed price plus incentive fee			X		X
	Cost-plus price	X			X	X
	Cost-reimbursable price					
	Agreement with price adjustment	X	X	X	X	X
3. Organization	Centralized	X	X	X	X	X
	Decentralized					
4. Supply and demand	Push system (MTF)		X	X	X	X
	Pull system (MTO)	X				
	Safety stock	X	X	X	X	X
	Safety time	X	X			X
5. Transportation	Road	X	X	X	X	X
	Rail combined with road					X
	Third-party logistics			X	X	X
	Truck from suppliers	X	X		X	
	Cooling system	X	X	X	X	
6. Information system	Telephone	X	X	X	X	X
	Fax			X	X	
	Internet			X		X
	Self-developed system					X
	ERP				X	

Organization

Besides, there is another vital factor integrated in purchasing, which is organization. Within this element, all the five companies adopt the centralized purchasing structure (see Table 5.2, Factor 3); even Company C and D are private-owned companies. This indicates the purchasing structure has nothing to do with the company nature, at least in our case. Although each company has many manufacturing lines to produce different medicine, they still choose to purchase capsule intensively. Because a better conditions from suppliers can be achieved through coordination of centralized purchasing structure (van Weele, 2010). Another reason is

the centralized purchasing can help to build the capsule and supplier standardization, which is useful for companies to keep the quality level of capsules (van Weele, 2010).

Supply and demand

During manufacturing, there are two main types involved which known as make to order and make to forecast. Make to order is a way to pull the manufacturing flow while make to forecast is to push the flow (David, 2002; Jonsson, 2008). However, in either way, the purchasing department should buy the raw materials in advance through forecast and keep in inventory. From Table 5.2, Factor 4 we can see that Company A adopts the former one while others adopt the latter. This is mainly due to the products' types. Company A and B are producing health care medical products while others are producing pharmaceuticals. The required quantities, distribution channels, functions, customer groups and etc. are different. For Company A, make to order does not influence its sales and makes its customers believe in the products' functions. Also, this could save costs and more effective. Conversely, the consumer group in Company B is impulse consumption. The application of make to forecast plays a role for sales promotion. In general, purchasing plays an initial role in balancing supply and demand (Christopher, 2011), safety stock should be kept just in case. The use of safety time is determined by companies' collaboration and negotiation with suppliers.

Transportation

Traditionally, sea, rail, road and air are used during transportation (Jonsson, 2008; Lumsden, 2007). Also, a combination of them is used for goods transportation (Jonsson, 2008). In Table 5.2, Factor 5, Company A to D are using the traditional road transportation while Company E using a combine of road and rail. The reasons can be varied. One common reason for the four companies use road transportation is that the vans they use have cooling systems which fulfil the capsule specification and ensure the quality. Since the location of their suppliers are in Jiangsu province or near Jiangsu. The adoption of road transportation is more flexible and cost saving. In addition, it allows frequent deliveries and communication in terms of ordering or expediting issues. They are transported either by third party logistics or by the supplier is due to the concern for quality and service. However, the combined way of transportation for Company E does not have a cooling system. But, the capsules sent by suppliers fulfil the quality inspections; the company thus has no complaints. Although the company can torture this currently, this could bring troubles like quality in the future.

Information system

According to Jonsson (2008) and van Weele (2010), information systems become important in dealing with the complexity of purchasing, and closely relates to ordering. In reality, it seems

that telephone is still the popular way for communication. This is not only because its simplicity, but also due to the traditional Chinese behaviours as mentioned. Fax and/or Internet are used in Company C, D, E (see Table 5.2, Factor 6). However, the use of them must be less frequent.

The ERP system is an excellent performing system for planning and execution (Jonsson, 2008; van Weele, 2010; Lysons and Gillingham, 2003). However, from Table 5.2, Factor 6, we can see that the system is only adopted by Company D at the moment. However, Company A to C are planning to adopt it in the future. Company E developed an information system for self-using. ERP has advantages but also disadvantages (Lysons and Gillingham, 2003); companies have different choices and decisions under the consideration from these two aspects and their practical situations. The using of ERP system enables Company D increase working efficiency and order precision. In addition, it helps to decrease the resource waste. Even this system is quite expensive, the benefits brought are absolutely larger than input. Especially, this reflects in large companies with only one purchasing department that deals with a number of purchasing materials. Contrasted to Company D, Company E uses a self-developed system which is utility for its employees' low education level. But this system does not have an alarm system in terms of inventory. Moreover, the company's production department is handling all the purchasing activities with limited labours. Therefore, the operation in practical is complex, troublesome and inefficient. And it can be questioned is this system really suitable?

5.3 Purchasing strategy

During purchasing, the five companies follow the general steps in the procedure model. However, the real operations and approaches are not exactly the same. Some are different with various reasons according to each company's practical situation. In addition, the five companies all concern about the factors integrated in purchasing and react to them. Their ideas are largely identical but with minor differences. From the two tables, it can be found that all of them focus on quality which is also paid attention during supplier selection. Thus, the vision of the five companies is to become the outstanding enterprises, working for and society's health. While the mission can be inferred as provide their customers healthy and safe products with the best quality under preferable price. And this can be achieved by ensuring quality.

According to Kraljic (1983), four stages are involved in the purchasing sophistication. By estimating the involved characteristics, the capsule purchasing in the five pharmaceutical companies belongs to the fourth stage which is called the supply management. This is indicated by the high complexity of capsule supply market and its importance for producing into medicines. The procurement focus is capsule which is a high-value component. The purchasing department ensures the long-term availability of the materials possible. However, this study

Supply Chain Management towards Purchasing

only focuses on the domestic sourcing, so the suppliers are within Jiangsu province or near rather than globally. As mentioned in the beginning of section 5.1, most companies do not want to change their suppliers and devote to maintain a stable relationship. This is mainly due to the risk of changing in aspects of quality. However, they may change if the supplier offers a better quality with lower price. The decision authority is centralized purchasing. Therefore, the capsule purchasing matches well to the supply management. Capsule is one kind of raw materials. From the interviewees' description, we may induct the raw material purchasing strategy as at the stage of supply management.

6 CONCLUSION

Due to there is a limited number of studies relate to sourcing raw materials from the supply market in Chinese pharmaceutical industry and the increasing importance of purchasing, the authors lie the interests in studying the capsule purchasing practices within Chinese pharmaceutical companies. In order to achieve this ultimate purpose, three approaches are proposed:

- i. Describe the capsule purchasing procedures of the companies;
- ii. Compare and analyse similarities and differences of their purchasing procedures;
- iii. Give acceptable reasons for these similarities and differences.

Define the capsule specification is the first thing to do while capsule purchasing. During selecting suppliers, some attend the exhibition; some adopt the advice from insiders and some are contacted directly by the suppliers. The choice is up to the companies, however, if the company has good sales and plenty of capital to purchase, suppliers would definitely contact actively. Suppliers who provide materials to companies must have production license and organisation institute code according to GMPs' (Good Manufacturing Practices) requirements. All the companies quote the price in their own way. But not all will ask for samples with self-test reports. Some companies will inspect these samples again. The quality level required by companies is the determinant. Before the new GMP regulation published, third-party inspection had been required also. Besides, to ensure the quality, the acceptance test, batch test and the annual inspection are all applied more or less. When the quality is approved, companies will sign contracts with suppliers. Annual contract is common, but it only regulates the quantity, product quality etc. The purchasing agreement that states the price and terms of payment is more popular when each time they purchase. The studied companies prefer to see fixed price with adjustment, in case of detention or poor quality. After that, they will declare suppliers' information to SFDA (State Food and Drug Administration), which is a compulsory step. The goods are mostly sent by special trucks with cooling system from suppliers. Almost every pharmaceutical company is in push production mode, and has safety stock, because of the uncertain demand in each month. They like to pay in cash or check, acceptance bill is also adopted. These companies prefer to have a stable supplier relationship and always buy from the known suppliers. They do not change suppliers frequent unless in a condition where suppliers can offer better quality with lower price. Currently, they prefer to use telephone to communicate instead of email. Some information system like ERP is not widely applied. It seems that Chinese like to deal with business in ordinary way. Anyhow, all the purchasing activities involved should follow the requirements of GMP.

6.1 Contribution

The accomplishment of this thesis contributes both theoretically and practically. As introduced in the background, there is a limited number of studies relate to sourcing from the supply market in pharmaceutical industry and the purchasing practices of raw materials in Chinese pharmaceutical companies. This would no doubt augment the implement difficulty for the increasingly new foreign entrants who want to establish pharmaceutical plants in order to gain the raw materials cost advantage in China. Since purchasing becomes strategic importance to the overall business performance, the lack of purchasing practices experience in China may cause the unexpected consequence. This study focuses on the purchasing practices of one of the raw materials: capsule. The authentic capsule purchasing procedures described and interpreted would be a study reference for those foreign entrants. Though discussion, the raw materials purchasing strategy in Chinese pharmaceutical industry can be inducted at the stage of supply management. This may somehow provide some ideas for foreign companies to consider. Theoretically, this study develops van Weele's purchasing procedure model into a new and more practical model closely related to Chinese pharmaceutical industry. Also, a new model of the factors integrated in purchasing is deducted by the authors. The results of this thesis may contribute to the absence of study that relates to purchasing raw materials from supply market in pharmaceutical industry.

6.2 Limitation

There are several limitations in this study. Due to a time limitation, the content of the case study is mainly based on an interview with each company, which may not be a full case study that should contain more research with longer time. In addition, the chosen pharmaceutical companies are all located in Nanjing, China which may cause regional bias due to the time limitation. As we known, these companies are developing and all the collected data is valid temporary and may change in the future. As mentioned, some data is collected from the companies' websites which may have bias that only the bright side can be found. Although these companies have English webpage, some applied information is still in Chinese, there might be bias of translations also.

6.3 Further studies

In this study, a multiple-case study of the capsule purchasing practices in Chinese pharmaceutical industry is made. However, why not make a research about the bullet purchasing strategy in Chinese military industry. The military industry is also very mysterious and concerns about the public safety as the pharmaceutical industry. We guess the inducted purchasing strategy could be much stricter and contains more complex procedures. And it is

Supply Chain Management towards Purchasing

very hard to get connection with people from the managerial level in Chinese military. Thus there is almost nobody has done it. Anyhow, this topic would be very interesting if someone can do it in the future.

REFERENCES

Books, journals and articles

Aljian, G.W., (1984). *Purchasing Handbook*, McGraw-Hill, NY.

Bakir, A., and Todorovic, M., (2010). A Hermeneutic Reading into “What Strategy is”: Ambiguous Means-End Relationship, *The Qualitative Report*, Vol. 15, No. 5, pp. 1037-1057.

Bengtsson, L., Haartman, R.V., and Dabhilkar, M., (2009). Low-Cost versus Innovation: Contrasting Outsourcing and Integration Strategies in Manufacturing, *The Authors Journals compilation*, Vol. 18, No. 1.

Bergman, B., and Klefsjö, B., (2003). *Quality from Customer Needs to Customer Satisfaction* (2nd Edition), Studentlitteratur, Lund, Sweden.

Biggam, J., (2008). *Succeeding with Your Master Dissertation, A step-by-step Handbook*, Open University Press, UK.

Burt, D., Dobler, D.W., and Starling, S.L., (2003). *World Class Supply Management. The Key to Supply Chain Management* (7th edition), McGraw- Hill Irwin, Boston, MA.

Caves, R.E., Whinston, M.D., Hurwitz, M.A., Pakes, A., and Temin, P., (1991). Patent Expiration, Entry, and Competition in the U.S. Pharmaceutical Industry, *Brookings Papers on Economic Activity. Microeconomics*, Vol. 1991, pp. 1-66.

Chen, I.J., Paulraj, A., and Lado, A., (2004). Strategic purchasing, supply management, and firm performance, *Journal of Operations Management*, Vol. 22, No. 5, pp. 505–523.

Christopher, M., (1999). Supply chain strategy: its impact on shareholder value, *International Journal of Logistics Management*, Vol. 10, No. 1, pp. 3.

Christopher, M., (2011). *Logistics & Supply Chain Management* (4th edition), Pearson Education Limited, UK.

Cooper, M.C., Lambert, D.M., and Pugh, J.D., (1997). Supply chain management—more than a new name for logistics, *International Journal of Logistics Management*, Vol. 8, No. 1, pp. 1-4.

Supply Chain Management towards Purchasing

Croom, S., *Introduction to research methodology in operations management*, in: Karlsson, C., (Eds.) (2009), *Researching Operations Management*, Routledge, NY.

David, J., (2002). *Logistics*, Prentice-Hall, Upper Saddle River, NJ.

Ferdows, K., and de Meyer, A., (1990). Lasting improvement in manufacturing, *Journal of Operations Management*, Vol. 9, No. 2.

Freytag, P.V., and Mikkelsen, O.S., (2007). Sourcing from outside—six managerial challenges, *Journal of Business & Industrial Marketing*, Vol. 22, No. 3, pp. 187-195.

Gadde, L.E., and Håkansson, H., (1994). The changing role of purchasing: reconsidering three strategic issues, *European Journal of Purchasing and Supply Management*, Vol. 1, No. 1, pp. 27-36.

Gadde, L.E., and Håkansson, H., (2001). *Supply Network Strategies*, Wiley, Chichester, UK.

Garvin, D.A., (1984). What Does “Product Quality” Really Mean? *Sloan Management Review*, Vol. 26, No.1, pp. 25-43.

Gonzalez-Benito, J., (2007). A theory of purchasing’s contribution to business performance, *Journal of Operations Management*, Vol. 25, No. 4, pp. 901–917.

Harland, C.M., (1996). *Supply Chain Management, Purchasing and Supply Management, Logistics, Vertical Integration, Materials Management and Supply Chain Dynamics*, in: Slack, N (Eds.). *Blackwell Encyclopedic Dictionary of Operations Management*, UK.

Hendricks, K.B., and Singhal, V.R., (2003). The effect of supply chain glitches on share- holder wealth, *Journal of Operations Management*, Vol. 21, No. 5, pp. 501–522.

Jonsson, P., (2008). *Logistics and supply chain management*, McGraw-Hill Education, UK.

Kraljic, P., (1983). Purchasing Must Become Supply Management, *Harvard Business Review*.

Ladha, Z., (2007). Marketing Strategy: Are consumers really influenced by brands when purchasing pharmaceutical products? *Journal of Medical Marketing: Device, Diagnostic and Pharmaceutical Marketing*, Vol. 7, No. 2, pp. 146-151.

Lambert, D., (2004). The eight essential supply chain management processes, *Supply Chain Management Review*, Vol. 8, No. 4, pp. 18-26.

Lumsden, K., (2007). *Fundamentals of Logistics*, Chalmers University of Technology, Goteborg, Sweden.

Lund, D.B., (2003). Organizational culture and job satisfaction, *Journal of Business & Industrial Marketing*, Vol. 18, No. 3, pp. 219-236.

Lysons, K., and Gillingham, M., (2003). *Purchasing and Supply Chain Management*, Financial Times Prentice Hall, Harlow, UK.

Monczka, R., Trent, T., and Handfield, R., (2005). *Purchasing and Supply Management* (3rd edition), Thomson, Mason, OH.

Narasimhan, R., Jayaram, J., and Carter, J.R., (2001). An empirical examination of the underlying dimensions of purchasing competence, *Production and Operations Management*, Vol. 10, No. 1, pp.1–15.

Patanakul, P., and Shenhar, A.J., (2011). What Project Strategy Really Is: The Fundamental Building Block in Strategic Project Management, *Project Management Journal*, Vol. 43, No. 1, pp. 4-20.

Pohl, M., and Förstl, K., (2011). Achieving purchasing competence through purchasing performance measurement system design—A multiple-case study analysis, *Journals of Purchasing & Supply Management*, Vol. 17, pp. 231-245.

Porter, M.E., (1985). *Competitive Advantage*, The Free Press, NY.

Rezaei, J., and Salimi, N., (2012). Economic order quantity and purchasing price for items with imperfect quality when inspection shifts from buyer to supplier, *International Journal of Production Economics*, Vol. 137, No. 1, pp. 11-18.

Rojas, M., (2009). Price discrimination by pharmaceutical companies across Central American countries, *International Journal of Pharmaceutical and Healthcare Marketing*, Vol. 3, No. 2, pp. 118-136.

Scott Morton, F.M., (1999). Entry decisions in the generic pharmaceutical industry, *The RAND Journal of Economics*, Vol. 30, No. 3, pp. 421-440.

Schramm, W., (1971). *Notes on case studies of instructional media projects*, Working paper for the Academy for Educational Development, Washington, DC.

Stafford, A., (2006). The evolution of the global active pharmaceutical ingredients supply market and the impact on the generic pharmaceuticals business in the United States, *Journal of Generic Medicines: The Business Journal for the Generic Medicines Sector*, Vol.3, No. 4, pp. 295-305.

Trent, R.J., and Monczka, R.M., (1998). Purchasing and supply management:trends and changes throughout the 1990s, *International Journal of Purchasing and Materials Management*, Vol. 34, No. 4, pp. 2–11.

van Weele, A.J., (2010). *Purchasing and Supply Chain Management* (5th edition), Cengage Learning EMEA, Hampshire, UK.

Voss, C.A., Frohlich M., and Tsikriktsis N., (2002). Case research in operations management, *International Journal of Operations and Production Management*, in: Karlsson, C., (Eds.) (2009). *Researching Operations Management*, Routeledge, NY.

Wagner, S.M., and Boutellier, R., (2002). Capabilities for managing a portfolio of supplier relationships, *Business Horizons*, November-December.

Walliman, N., (2005). *Your Research Project* (2nd Edition), SAGE Ltd., UK.

Wang, Y.R., (2006). Price competition in the chinese pharmaceutical market, *International Journal of Health Care Finance and Economics*, Vol. 6, No. 2, pp. 119-129.

Wright, P., Pringle, C., and Kroll, M., (1992). *Strategic management text and cases*, Needham Heights, Allyn & Bacon, MA.

Yin, R.K., (2009). *Case Study Research Design and Methods* (4th Edition), SAGE Ltd., UK.

Yin, R.K., (2011). *Qualitative Research from Start to Finish*, The Guilford Press, NY.

Yin, R.K., (2012). *Applications of case study research* (3rd edition), SAGE, LA, CA.

Internet

BBC China,

http://www.bbc.co.uk/zhongwen/simp/chinese_news/2012/04/120416_china_capsules.shtml,
access on April 16, 2012

University of Toronto, *The bill of exchange, draft or acceptance bill*,

<http://www.economics.utoronto.ca/munro5/BILLEXCH.pdf>, access on April 24, 2012

China Minsheng Banking Group, *Banker's acceptance bill*,

http://www.cmbc.com.cn/en/qy_piaoju/piaoju.shtml, access on April 24, 2012

China Everbright Bank, *Bill financing*

<http://www.cebbank.com/Channel/89814>, access on April 24, 2012

IMS Health

<http://www.imshealth.com>

WHO, *Good Manufacturing Practices*,

http://www.who.int/biologicals/vaccines/good_manufacturing_practice/en/, access on April 23,
2012

WHO, Production,

http://www.who.int/medicines/areas/quality_safety/quality_assurance/production/en/, access on
April 23, 2012

Nanjing Zhongke Institute of Biology,

<http://www.zkbi.com/>, access on April 16, 2012

Nanjing Zhongke Pharmaceutical Co., Ltd.,

<http://www.zhongke.com/>, access on April 16, 2012

Nanjing Cuccess Pharmaceutical Co., Ltd.,

<http://www.cuccess.com/>, access on April 16, 2012

Nanjing Baijingyu Pharmaceutical Co., Ltd.,

<http://www.baijingyu.com/>, access on April 16, 2012

Jinling Pharmaceutical Co., Ltd.,

<http://www.jlyy000919.com/>, access on April 16, 2012

Interviewed people

Zhu Feifei, general manager, Nanjing Zhongke Institute of Biology, interviewed 2012-04-05, during 1 hour

Wang Yunpeng, production manager, Nanjing Zhongke Pharmaceutical Co., Ltd., interviewed 2012-04-05, during 1.5 hours

Wang Xiufen, purchasing manager; Yang Qiongyao, production manager, Nanjing Cuccess Pharmaceutical Co., Ltd., interviewed 2012-04-09, during 3 hours

Qu Yi, purchasing specialist, Nanjing Baijingyu Pharmaceutical Co., Ltd., interviewed 2012-04-09, during 1 hour

Yan Shengbin, production manager, Nanjing Jingling Pharmaceutical Co., Ltd., interviewed 2012-04-10, during 1.5 hours