A CASE STUDY OF THE SECOND-HAND MOBILE PHONE SUPPLY CHAIN IN CHINA

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ABSTRACT

This paper provides a case study for understanding the fundamental structure, operations and issues of a second-hand mobile phone supply chain in China. It describes how several companies other than the mobile phone OEM are working together to complete a reverse supply chain. The study reveals key issues related to procurement, sales, logistics, inspection, and refurbishment, as well as potential solutions.

Key Words: second-hand mobile phone, reverse supply chain, China, case study

INTRODUCTION

It is becoming increasingly frequent to see almost everyone in present China doing something with their cell phones. A large portion of the users even have two phones. Murphy (2013) has speculated that the global population will be less than the number of mobile phone devices in circulation by the end of this year. Therefore, the second-hand mobile phone business has a great deal of potential under the emerging trend of green supply chain (Hazen et al., 2011). For example, ‘ecoATM’ has been working on an innovative method to collect phones which is similar to the method used to recycle bottles and cans (Ha et al., 2013). According to a survey conducted in 2008 in Hong Kong, more than half of the mobile phones have a life cycle of 3 to 6 months and only 10.6% can be used over one year (Chan, et al., 2008). As Hong Kong is a free trade zone linking Shenzhen in mainland China both geographically and culturally, the status-quo of used mobile phones in Hong Kong will impact the second-hand mobile phone market with the world’s largest population.

Many participants related to the second-hand mobile phone supply chain want to become major players with sufficient influence. Among them, some located in Shenzhen are very competitive because of two reasons. One is that their services include building customers’ supply chains on a platform to provide solutions in importation and exportation through ports of China, more precisely between Shenzhen and Hong Kong. Besides providing these services to solve problems associated with the complicated regulations of China’s customs and currency control, they also offer value-added services ranging from supply chain finance to logistics. All these experiences allow them to engage in forging an innovative supply chain. The other reason is that Shenzhen is the ideal location to distribute and re-sell the second-hand mobile phones in mainland China (Lai, 2011), because its neighbor, Hong Kong, separated by only a river, happens to be one of the places with the highest volume in trading such kinds of products. These two metropolises have in total of seven ports connected
(Bendibao.com, 2011), notwithstanding the fact that Shenzhen is the first market economy trial implementation in 1979 (Export.gov, 2013). Consequently, a favorable business environment has been formed based on the region’s enormous trading volumes (McKinnon, 2011). With all these factors, the implementation of a new business model in Shenzhen is not as complicated as before. On the other hand, according to McKinnon (2011), the barriers associated with reverse logistics, as well as other issues such as company policies, lack of systems, financial resources, and personnel resources still exist in Shenzhen, which is why the new mobile phones sellers are not interested in or lack of facility to build their own reverse systems. This study will show how other used mobile device specialists collaborate to form an efficient reverse supply chain.

One of the leading pioneers in China’s second-hand smartphone business is the source of the case study for this paper. To protect the identity of the company, we refer to this company as Q. Its founders have both strong industrial experiences and remarkable networks in ICT industries and have developed over 80% of their business, including mobile phone brands, manufacturers for mobile phones, tablet PCs, laptops, desktops, and servers wholesalers in mainland China. Company Q’s current abilities allow it to capture the second-hand mobile phone business opportunity. Based on a dozen of Fortune 500 companies’ feedback, the ICT industries adequately fit the Moore’s law; hence company Q could not wait any longer to tap into the second-hand mobile phone business.

**LITERATURE REVIEW**

There is a variety of literature on reverse supply chain and studies focusing on electronic devices. However, the majority of the research has limited to how one company that produces or sells brand-new products recycles on its own. The issues and suggested implementations in existing literature are mainly related to how that particular key player should recycle the phones. Figure 1 below shows a recent study of closed loop supply chain (CLSC).

![An example CLSC](Georgiadis, 2013)

The diagram shows the way in which a product flows from its initial production to different kinds of disposal situations. With both economic and social impacts, the reverse system is so complicated that one single company is not sufficient to complete the entire mission. The situation emphasized in our paper spans from collection to sales. Each part of the
second-hand mobile phone supply chain in this case is established after the collection step. This study may not cover the entire system but it presents a practical method applied by a reverse supply chain consisting of several enterprises.

The transactions highlighted in this paper occur in Hong Kong. One study has already shown that Hong Kong is the highest mobile phone penetration point in Asia-Pacific region (Chan, et al., 2008). It is also well known that the reverse supply chain system is still far away from being perfect because mobile phone companies in Hong Kong do not give top priority due to reverse logistics challenges (Chan, et al., 2008). In this case study, Company Q deals with the second-hand mobile phones more professionally but is different from those that sell new mobile phones.

Korea, as one of the nations with the most innovative mobile telecommunication industry, is cited both in existing literature and in this case study. One of the publications indicates that from 2000 to 2007, Korea generated 14.5 million used cell phones annually (Jang, et al., 2010). It also describes the collection process as follows: consumers first return their used mobile phones to retailers or suppliers with a trade-in price ranging from 5 to 30 USD, and then the used cell phones will be refurbished before reuse or resale. Figure 2 reflects this collection process. In the other side of the globe, a total of 235 million phones are disposed each year in the US and Europe (Canning, 2006). No effective regulations and policies came into being until some environmental agencies argued in late 1990s. UK is similar to Korea, although a massive consumer market exists; collecting used phones is done only by the mobile phone operators and the retailers.

Figure 2: Collection systems of the used and the end-of-life mobile phones in Korea (Jang, et al., 2010)

Additionally, forming a professional team to handle the daily collection operation is another key to a successful application of reverse supply chain strategy (Ho, et al., 2012). This is a very important point highlighted in many other papers, and is even more important for operating mobile phone reverse supply chains.
COMPANY Q’S BUSINESS PROCESS

Process

After company Q completed the marketing research, its leadership decided to buy the second-hand cell phones from phone suppliers and then sell them in Hong Kong market at a profit margin of a few percent. Company Q’s suppliers are enterprises that have large quantities of refurbished phones and are able to collect used phones. Company Q’s customers are Hong Kong traders involved in trading large volume of used cell phones. It should be noted that Company Q’s suppliers and customers can be corporations or individuals. There are three reasons why company Q has chosen Hong Kong to be the center for transactions and distribution. First of all, the company owns a subsidiary in Hong Kong with a centralized warehouse equipped with advanced tools and operated by professionals, but it is the only international subsidiary of company Q’s with this necessary function. Second, Hong Kong has become probably the most developed and active second-hand mobile phone market in Asia. Finally, since the mainland China restricts the importation of used items including the second-hand mobile phones, company Q has to conduct the business within Hong Kong.

How does company Q sell its used cell phones? One way is called “the whole in and out” (or “all in and all out”), which means it orders a certain number of phones and then sells the exactly the same products to their customers. The other way is called “the whole in but scattered out” (or “all in but separate out”), in which it orders a certain number of phones but then separates them before they are sold. How they separate the phones depends on the condition and model of the used phones. Since different customers have different interests and preferences, company Q makes higher margins with the second way. However, the second method requires a high-quality operating team working with a more complicated process. Thus, Company Q presently focuses on “the whole in and out” mode. The fundamental business flow can be sketched in Figure 3 below.

![The fundamental business flow of company Q’s up and down streams](image)

As shown in Figure 3, central to company Q’s strategy is to make sure that customers would
buy the used cell phones before company Q buys. Subsequently the business volume depends on the demand of company Q’s customers. Unlike other types of business that company Q has dealt with for years, for this particular downstream, no official contract or agreement is established except oral guarantees. Therefore, the business style of such situation is casual, and the credibility of the customers completely depends on their reputation.

What happens after company Q’s customers purchasing the 2nd hand mobile phones can be explained by Figure 4.

![Figure 4: Company Q’s downstream process](image)

Company Q buys from suppliers around the globe. Negotiation can significantly impact each deal. Figure 5 below shows the working process with typical suppliers.

![Figure 5: Company Q’s upstream process](image)
Figure 5 reveals three ways for consumers to sell their used mobile phones. The first way is through most of company Q’s targeted suppliers’ websites. The second way is to walk in local phone houses and sell unwanted phones at a certain price. The last way is through operators’ trade-in policies which allow the consumers switch to a new phone and pay some fees. Apparently the third way is most convenient for consumers that have unfinished contracts with carriers. Except for the first way, the suppliers buy the collected used phones periodically from the phone houses and the operators.

When both streams are prepared, company Q’s supply chain process of second-hand mobile phones has emerged. At the beginning of the process, the consumers from a specific region with sell/trade-in availability choose a preferred way to get rid of their used phones. Beyond this step, every subsequent action may take place internationally. If not acquiring directly from the consumers, the suppliers purchase the used phones from either the operators or the phone houses and make full payment in advance. Most suppliers in company Q’s circle hire 3PL providers to handle transportation.

After that, the suppliers offer used mobile phones deal by deal using three methods. The first method is auction – the suppliers run auctions with their phones in stock once or twice a week and invite every possible buyer to bid on site or on line. The highest bidder gets the offer and that bidder must make full payment in advance, usually in US Dollars (USD). The second method is contract based. The agreement specifies the types of phones the buyer purchases at locked prices in every 3, 6, or 12 months. Only the most reliable buyers with approved long-term flawless records are offered with such an opportunity. The last method is direct offering, which works like this: a supplier offers a list of phones as one deal with its quotation, and the buyer will then respond to the supplier if acceptable. Bargaining is allowed, and once the two parties reach an agreement, they would proceed to delivery.

**Logistics**

No matter which method is employed, most suppliers set the trading term as Ex-works (EXW) and some use free on board (FOB). Company Q replies on a 3PL to pick up at the supplier’ indicated warehouse within 3 business days after the purchase payment is received. Then the 3PL’s service continues through sending the cargo to Hong Kong airport. When the cargo arrives in Hong Kong, company Q’s own logistics department will pick it up.

Company Q weighs timeliness and reliability more heavily than cost when evaluating the logistics providers. As the second-hand mobile phone prices fluctuate quite frequently, company Q needs to finish each deal as fast as possible, such as within a week. The process begins with getting the initial offer and ends with receiving payment from customers. Besides price fluctuation, company Q takes currency exchange fluctuation into consideration as well. In particular, company Q pays in USD when they buy, whereas they receive in HKD when they sell. Thus, the sooner the deal is processed the higher return company Q may have. As such, it is not surprising that company Q sometimes pays a higher fee for a faster 3PL service to reduce turnaround time.
Inspection

The inspection is necessary for quality assurance and the procedure company Q uses is relatively simple. Before a purchase occurs, the company is well informed in advance with the product conditions. The company sometimes asks the suppliers to show product pictures, which generally appear great. After cargos arrive in Hong Kong, if any noticeable problem on the phones is found, company Q will evaluate the possibility of their customers’ willingness to accept, and will return or refund if no customer is likely to accept. A professional cell phone expert checks the phones every time although the inspection is limited to eye check. The phones are then classified based on a four-grade system: Grade A represents almost new phones; Grade B indicates those phones with negligible flaws; Grade C refers to the phones with noticeable but acceptable scratches; and grade D contains phones with obvious damages. This system works fine for company Q because their customers also apply eye check as well.

Refurbishment

How does Company Q deal with the used phones with varied quality problems or flaws? The answer depends on various situations. Company Q tries to buy used mobile phones in grade A or B, which either do not require refurbishment or already reworked before purchased. For these phones, there is no need to worry about the quality issue unless the phones arrived are far beyond the acceptable requirements set by their customers. In that case, company Q will outsource the repair to a local factory in Shenzhen or Hong Kong specializing in mobile phone refurbishment. Except for this situation, company Q sells the products at their original conditions upon purchase.

The refurbishment of used mobile phones is mentioned because it is a wonderful business opportunity for the reverse supply chain. The quality of the refurbishment can affect the retailers’ sales volumes, which in turn will affect the wholesalers’. Although using in-house resources for refurbishment will likely reduce repair cost, company Q is currently outsourcing this function, but is considering developing the capability in the near future. Meanwhile, some customers may want to refurbish the used mobile phones on their own after they purchase from company Q. Therefore, where to get phones repaired depends on the customers’ needs.

ANALYSIS ON AN EXAMPLE DEAL

The preceding section describes the second-hand mobile phone supply chain. We now present a real case so as to provide a basis for future research directions. In this case, a competitive supplier from Seoul, Korea named company M is able to offer over 200,000 used phones per month. Compared to Company Q’s many suppliers that have monthly supply capacity ranging from 5,000 to 70,000 units, Company M is obviously a top priority for sourcing. Considering the purchase cost, company Q tries to avoid bidding with other buyers, and fortunately company M has agreed to offer deals directly to company Q without auction because company M seeks an opportunity to tap into Chinese market through company Q’s
excellent platform and vast networks. However, because of its extraordinary supply capacity, company M could easily attract buyers from all over the world, and thus does not consider company Q as an important client. As such, a price locked agreement is not possible and company Q needs to find a more appropriate procurement strategy for sourcing from company M.

Right after the Chinese Spring Festival of 2013, company Q received a deal from company M that offered a range of LG refurbished mobile phones with the details shown in Table 1.

**Table 1: Company M’s offer (Seller’s offer)**

<table>
<thead>
<tr>
<th>Brand</th>
<th>Type</th>
<th>Unit Price (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LG</td>
<td>F100S</td>
<td>200</td>
</tr>
<tr>
<td>LG</td>
<td>F120S</td>
<td>130</td>
</tr>
<tr>
<td>LG</td>
<td>F160K</td>
<td>200</td>
</tr>
<tr>
<td>LG</td>
<td>KU5400</td>
<td>130</td>
</tr>
<tr>
<td>LG</td>
<td>LU6200</td>
<td>130</td>
</tr>
<tr>
<td>LG</td>
<td>SU640</td>
<td>130</td>
</tr>
</tbody>
</table>

Upon the receipt of the deal, Company Q immediately contacted their customers about the types and quantities of the LG used phones they may consider purchasing. Since the customers observed market potential for F160K and KU5400, they were interested in those two types and wanted as quantities as possible. Although determining the buying quantity based on the exact customer demands sounds favorable for company Q, there are several possible risks. The first disadvantage is the accuracy of the customers’ oral feedback – what if they are incorrect about the actual needs from their consumers? The second disadvantage is the lack of legal protection – if any customer breaks their promises, company Q has to pay the loss. Therefore, according to the given information, along with the profit strategy, company Q bargained with company M in the feedback shown in Table 2.

**Table 2: Company Q’s feedback (Buyer’s feedback)**

<table>
<thead>
<tr>
<th>Brand</th>
<th>Type</th>
<th>Unit Price (USD)</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>LG</td>
<td>F160K</td>
<td>193</td>
<td>200+</td>
</tr>
<tr>
<td>LG</td>
<td>KU5400</td>
<td>116</td>
<td>200+</td>
</tr>
</tbody>
</table>

It is seen that company Q tried to reduce the unit price by about 3% for both types and order as many as possible by stating that “at least 200 units for each type”. As a result of accomplishing their own goal, company M agreed to accept company Q’s unit price with a slight change in quantity. The final deal is presented in Table 3.

**Table 3: Final deal**

<table>
<thead>
<tr>
<th>Brand</th>
<th>Type</th>
<th>Unit Price (USD)</th>
<th>Quantity</th>
</tr>
</thead>
</table>

After company Q was shown the satisfactory photos of these products, it proceeded with payment and was promised to receive the delivery in only one business day. Company M introduced a Korean freight forwarder for the delivery. Company Q compared the Korean freight forwarder’s quotation with some other freight forwarders’ and found surprisingly that the Korean’s quoted price was almost twice as much as the others’ average price. However, considering that the Korean freight forwarder has a perfect business record that guarantees reliability and timeliness, company Q decided to reduce a small portion of profit margin to make sure everything went faultlessly. This logistics outsourcing method has a lot of room to improve for company M, because other candidates are actively developing their capabilities to survive and develop in the market, and could offer similar service at half of the cost.

A piece of negative news disturbed company Q right after they set up the shipment – Company M made a mistake in delivery quantities, as the actual cargo has the details shown in Table 4.

<table>
<thead>
<tr>
<th>Brand</th>
<th>Type</th>
<th>Unit Price (USD)</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>LG</td>
<td>F160K</td>
<td>193</td>
<td>305</td>
</tr>
<tr>
<td>LG</td>
<td>KU5400</td>
<td>116</td>
<td>175</td>
</tr>
<tr>
<td>LG</td>
<td>SU540</td>
<td>N/A</td>
<td>20</td>
</tr>
</tbody>
</table>

Company M apologized with an excuse that KU5400 and SU540 were alike. But this mistake left a troublesome question to company Q. If they decided to get refunded or exchange, it would be very costly; if not, they would come up with an immediate solution for the wrong cargo. What company Q ended up doing was to quickly contact the customers and figuring out whether SU540 was demanded in the market. Fortunately company Q was able to accept SU540 because SU540 could be sold as GSM standard required by the customers. Regarding the extra 5 pieces of F160K, company Q felt no pressure of selling with them and proposed to pay in the next order, which was accepted by Company M.

This incident reveals that company Q does not have someone at the supplier site to rely on to inspect the cargo before shipped out from the supplier. Without an on-site resource for inspection before the cargo leaves the supplier, it is usually too late if the cargo is incorrect. Therefore, company Q needs to develop an inspection process for foreign supplies.

As soon as the cargo arrived in Hong Kong, company Q sent a truck to take it back to their warehouse and run an eye inspection. Some of the phones with poorer conditions than described by company M were found. About 70% were grade C and D even though company M had promised to offer only grade A and B phones during earlier meetings. Fortunately, company Q’s customers accepted all these phones for this deal. In order to reduce the
difficulty of sales in the future and to protect its own reputation, company Q asked company M to control the quality of the cargo by limiting the grade C and D phones to less than 30%. It took a couple of days for company M to reach an agreement. Eventually, company Q’s customers made the full payment and picked up the goods up on site, which ended company Q’s involvement in this chain.

This case study indicates strongly that lack of control is a major source for potential problems. Without any further action plan, Company M could break promise again. Thus, to improve its supply chain operations, company Q can work on two areas immediately: (1) logistics outsourcing decision making, and (2) installation of inspection at supplier sites to ensure the right shipment of almost right products.

**CONCLUSION**

The second-hand mobile phone market has grown explosively in recent years with the society’s increasing awareness of the importance for being green and sustainable. Numerous companies have been looking for different ways to build effective reverse supply chain for second-hand mobile phones. Some enterprises have been very successful with their self-developed systems consisting of such functions as collection, refurbishment, procurement, and sales, among others. In addition, many relevant players including the collecting companies, supply chain service providers, regional traders, retailers, and the 3PL providers can collaborate to forge a reverse supply chain to transfer used cell phones in different areas around the world. Such a supply chain can be global in nature, linking players located in developed as well as developing regions. The case provides an example, where the Korean supplier is located in a developed region and has a well-developed system for used electronic devices under mature regulations, whereas the buyer, company Q, is headquartered in an emerging market and still has a long way to develop its own reverse system.

The case study describes the reverse supply chain of company Q located in Shenzhen, China. A number of issues are exposed from every link of the supply chain. First of all, as consumers have a few choices to handle their used phones, a better collection method such as offering higher financial return or more convenience needs to be in place to encourage consumers to return. Secondly, the imbalance between the players’ powers and sizes, as well as their different locations affect the efficiency of the reverse supply chain. Thirdly, a more secured system needs to be developed to ensure reliable shipment, high quality of products, and safety of payment receipt. Finally, the traditional sales approach might help in time reduction, but may lead to financial losses when a company has no backup plan if any customer fails to honor their promises or the sales prices drop.

Studies of other second-hand mobile phone supply chains can reveal more useful insights and increase the variety of solutions. In addition, studying the chain participants such as phone collectors, supply chain service providers, and phone traders is also useful for those that plan to develop a more sufficient system. Without any doubt, successful second-hand mobile phone reverse systems create benefits in economic, environmental and social dimensions.
REFERENCES


