

Study on lowering the risk of product breakage for external transportation in Zwilling



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Chapter One Introduction

1.1 Company profile.....	5
1.1.1 Organization's history.....	5
1.1.2 Product market.....	6
1.1.3 Line of business.....	6
1.2 Problem statement.....	6
1.3 Research.....	7
1.3.1 Research Objective.....	7
1.3.2 Research questions.....	7
1.4 Chapter summary.....	8

Chapter Two Theoretical framework

2.1 Relevance tree.....	9
2.2 Literature review.....	9
2.2.1 Function of packaging.....	9
2.2.2 Types of packaging materials.....	10
2.2.3 Reasons for cartons damage.....	12
2.2.4 Package testing.....	13
2.2.5 Loading and unloading theories.....	15
2.2.6 Supplier selection and evaluation.....	16
2.2.7 3PL selection criteria.....	17
2.2.8 Supplier relationship management.....	18
2.2.9 Benchmarking.....	20
2.2.10 Customer satisfaction.....	20
2.3 Conceptual Framework.....	21
2.4 Chapter summary.....	22

Chapter Three Methodology

3.1 Research strategy.....	23
3.2 Data collection method.....	23
3.2.1 Primary data collection.....	23
3.2.2 Secondary data collection.....	24
3.3 Data analysis.....	25
3.4 Validity and reliability.....	25
3.5 Limitation of the research.....	25
3.6 Chapter conclusion.....	26

Chapter Four Findings

4.1 Research question 1.....	27
4.2 Research question 2.....	30
4.3 Research question 3.....	32
4.4 Research question 4.....	35
4.5 Research question 5.....	38
4.6 Main research question.....	42

4.7 Chapter summary.....	43
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Chapter Five Discussion

5.1 Discussion.....	44
5.2 Chapter summary.....	46

Chapter Six Conclusions / recommendations

Conclusions and recommendations.....	47
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Bibliography / References

Appendix

Executive summary

This paper is about Zwilling J.A. Henckels Shanghai Ltd. It is a manufacturing company that produces a variety of kitchen utensils in terms of knives, cookware etc. It entered the Chinese market in the year of 1995. Shanghai is Zwilling's headquarter in Asia-Pacific Region. The vision of Zwilling is to offer products to the people who pursue quality life. The problem now encountered with Zwilling is the product breakage in external transportation from distribution to retailers in China. The title of this paper is **"The study on lowering the risk of product breakage for external transport in Zwilling."**

The main objective of this paper is to recommend Zwilling the steps to take that can reduce product breakage in external transportation process. Relevance tree and conceptual model is used to unify a variety of theories from different perspectives which can contribute to the main research questions. The main research question of this paper is "What measurements should Zwilling Company take during external transportation in order to lower the risk of product breakage?"

Sub-research questions are

1. *What are the causes that result in product breakage during external transportation?*
2. *What protective packaging materials can be used for external transportation in order to lower product breakage?*
3. *What kind of tests should be used to test the packaging before external transport?*
4. *What are the requirements for staffs loading and unloading of products?*
5. *What is the standard for selecting a qualified third party logistics partner?*

Case study approach is used in this qualitative research. In-depth interviews and documentations are the primary and secondary data used in this qualitative research. Purposive sampling is used to select the proper candidates for interviews. Template analysis is used to collect and classify the different theme based on data. The findings are loading, packaging, test and 3PL which are the main reasons for resulting in product breakage. For packing fragile products, company should not only consider the protective package outside but also inner-packing. ISTA testing series can simulate the transport situation through shock and vibration test. The rules for loading and discharging can help company to regulate the usage of forklifts and pallets. Criteria of 3PL selection and evaluation can assist company in targeting qualified partners. To conclude, five-layer corrugated box and inner package materials can enhance the stability of ceramic pots while the cost is quite high. Applying ISTA tests before delivery can prevent breakage in real transport though company has to spend more time in taking tests. Moreover, Zwilling has to spend time and money in coaching workers. 3PL selection model can help Zwilling to target qualified partner while it is hard to maintain the relationship between partners. The recommendation for Zwilling is to apply green packaging because it is eco-friendly materials and it can be recycled. The application of green package can provide good protection function for packing products and it can help company to save cost for packaging.

(Key word: *Breakage, Transportation*)

Chapter One Introduction

The title of this thesis is ***“Study on lowering the risk of product breakage for external transportation in Zwilling.”***

The nature of this paper is to lower the risk of ceramic pot breakage for external transportation in Zwilling Company. This paper will focus on implementing rational packaging, loading, a variety of tests before transportation and improve 3PL selection performance to lower the product breakage. Thus, some research questions will be made to assist the Zwilling Company to achieve minimum breakage and realize the alignment of Zwilling's strategy and action.

1.1 Company profile

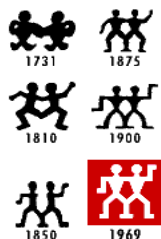
1.1.1 Organization's history

Zwilling J.A. Henckels Shanghai Ltd.¹ is a Sino-German manufacturing company which located in Minhang District, Shanghai, China. The headquarters of Zwilling in Asia-Pacific region is located in Shanghai. Zwilling Company produces a variety of kitchen utensils in terms of knives, cookware, tableware, glasses, scissors and various kinds of kitchen gadgets.

The history of this brand dates back to June 1731², a knife-maker named Johann Peter Henckels registered this brand in a church in Solingen, Germany. This is the one of the oldest trademarks all over the world. In the year of 1995, Zwilling enters Chinese market and selects Shanghai Blade Factory as its partner. There are only 80 staffs in the early days while today more than 1300 employees in the company. Zwilling sets up factory in Shanghai, China, now the business has covered most area in China. It has subsidiaries in Beijing, Dalian, Qingdao, Wuhan, Chengdu, Xiamen and Guangzhou.

The vision of Zwilling is that the products from Zwilling belong to those families who pursue quality life. Its culture is to do everything thing with passion and believe in itself to do the best.

The design of brand has changed quite a bit, with a history of 281 years. Following picture shows the small changes of the brand from year 1730 to year 1969. In 1969, Zwilling fixed the logo of brand image.



¹ Zwilling website, http://www2.zwilling.com/en-CA/Company-profile--company_profile

² Zwilling website, <http://www.zwilling.com.cn/newslist.aspx?flid=23>

Every year, Zwilling Company will produce around 2-3 million knives and 400,000 to 500,000 pans. Zwilling manufactures different kinds of style, some are made of stainless steel, while others made of china, the goblet is made of glass. Such as the ceramic pot and goblet, they are easily to be broken during the transportation.

1.1.2 Product market

Shanghai is the headquarters in the Asia-Pacific region of manufacturing and selling Zwilling products. Now it has expanded the scale, there are 6 sub-companies 12 dealers and 186 points of sale in China.

Figure 1-1 (18-01-2010) (Zwilling profile)



1.1.3 Line of business

The main products manufactured by Zwilling are cutter and cookware. Knives are made of stainless steel. Some pots are made of steel while others are made of glass and ceramic. Some pots are fragile and they are easy to be damaged during external transportation. Here are the pictures for the cutter and cookware. Ceramic pots are fragile in transport section from distribution center to the Chinese retailers.



Figure 1-2 Products in Zwilling

1.2 Problem statement

Zwilling Company produces a variety of cookware in terms of knives and pots every day. Truck is the main transportation mode for Zwilling to transport products to the Chinese market. In recent years, the production for the knives and pots are enhanced. Zwilling transports the products from distribution center to Chinese retailers twice or three times in a week. The problem is ceramic pots are fragile and they are damaged in each delivery from distribution to Chinese retailers. The proportion of breakage is increased because of the enlargement of production. The impact is Zwilling has to

reproduce and resend the products to the retailers again. It wastes transportation and production fee for approximately 500 thousand RMB³ every year. The customer satisfaction is influenced because products cannot be sent to the retailers in time. If the breakage of cookware could be reduced, Zwilling could save the cost for transportation and reproduction. It can also send the products to the retailers on time. The customer satisfaction can be greatly improved. In this point, Zwilling Company decides to take some measures that can lower the ceramic pot breakage in external transportation.

1.3 Research

Both the research objectives and research questions will be identified in this section according to the problem definition in Zwilling Company.

1.3.1 Research Objective

The objective for the research is to recommend Zwilling Company the steps that they can take to reduce breakage in the external transportation process

1.3.2 Research questions

Main research question

What measurements should Zwilling Company take during external transportation in order to lower the risk of product breakage?

Sub-research questions

1. What are the causes that result in product breakage during external transportation?
2. What protective packaging materials can be used for external transportation in order to lower product breakage?
3. What kind of tests should be used to test the packaging before external transport?
4. What are the requirements for staffs loading and unloading of products?
5. What is the standard for selecting a qualified third party logistics partner?

These research questions focus on the measures that could be taken to lower the risk of product breakage for external transportation from packaging materials, tests, requirements for material handling, and third party logistics qualifications. Through target these dimensions, it can help Zwilling Company to minimize the product breakage. The task for the researcher is to collect data and information from employees through interviews and company documents in order to find out the possible factors that cause breakage issue, and then the researcher will investigate the possible counter-measures to deal with the problem. In the meanwhile, the researcher will analyze the feasibility and limitations for implementing these measures for lowering product breakage in external transport.

³ The number is estimated based on the production of cookware.

1.4 Chapter summary

This chapter gives a detailed introduction of the Zwilling Company, from its history to the product market. Based on the problem statement, research objectives and questions are put forwarded. These research questions will be explored further in the following chapters.

Chapter Two Theoretical framework

In this section, theories that relevant to the product breakage problem will be discussed. Relevance tree and conceptual model are used to clearly illustrate and combine the theories that contribute to the main problem issue.

2.1 Relevance tree

The relevance tree allows researcher to map out initial ideas on a topic. It elaborates the detailed outline thereby it can help the company to solve the research questions and improve the situation.

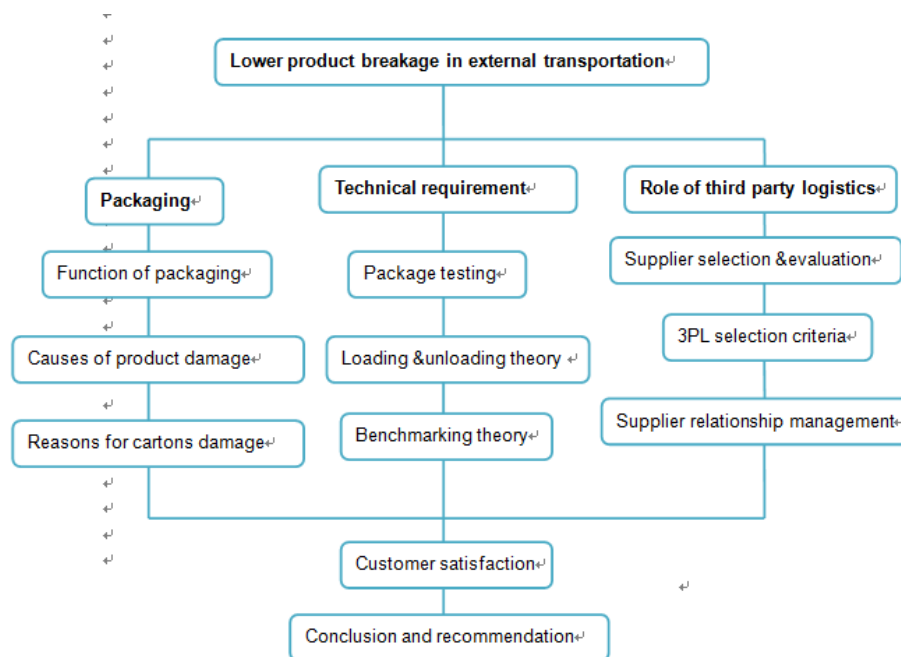


Figure 2-1 Relevance tree (Self-illustration, 2013)

2.2 Literature review

2.2.1 Function of packaging

Packaging has been defined in various ways. Populist defines packaging as an industrial and marketing technique that can contain, protect, identify and facilitate the sales and distribution of consumer products (Bhonyongwa, 2011). Packaging Institute International defines packaging as goods in a wrapped bag, box, bottle or other container that perform the functions for containment, protection, preservation, communication and performance (Bhonyongwa, 2011). To be more specific, containment function is the basic function of packaging, it means the products can be contained before moving from one place to another. Protection function refers to the package can protect contents from external environmental effects in terms of dust, shocks, vibration, compressive forces etc. Convenience function for packaging has two aspects. One aspect refers to the apportionment of packaging. It depends on the scale and quantity of products that apportioning into consumer- sized function. For example, wine is filling into bottles, batch of ice cream are put in large tubs. Another

aspect is the shape of packaging, which means the primary package is easy to hold by consumers and it allows primary packages to be unitized into secondary packages. Communication function of packaging is defined as silent salesman. It can express information that can be recognized by retailers in terms of labeling and brand.

Besides, packaging also defined as the materials used for the containment, protection, handling, delivery and presentation of goods. In general, there are three functions of package, which is to promote, to protect and to identify the relevant products (Murphy& Wood, 2010). First of all, promotional function of packaging is packaging contains the feature with the sales orientation. Merchants embellish the appearance of packaging in order to attract customers. Packaging as the face of products can express the image of products to the buyers at first sight. The second function of packaging is protective function, which means products may be damaged or go spoilage in handling, loading& unloading and transportation process. To be more specific, packaging can protect the materials and protect other stuffs from these materials. It can also restrain the movement of products inside container. It can avoid the undesired contact of products in shipment. The third function of packaging is labeling. Once the materials are packed and the cover is closed, the contents are hidden. So in this condition, it is necessary to label the box (Murphy &Wood, 2010).

Johns (2007) mentioned the purpose of packaging is defined as necessity, preservation, marketing, convenience and safety. To be more specific, necessity function is the function to store or sell, for example, rice, cheese etc. Preservation refers to the function of preventing product from going bad. Marketing function is used to attract the attention of customers. Convenience and safety is the other two function of packaging. Convenience refers to the package of products are easy to handle and safety function means the hazardous products to be sold with safety feature can prevent the accidents. For example, the glass or chemical cleaning products may hurt the child in buying process.

Based on the definition of packaging from Murphy, Wood (2010) and Bhonyongwa (2011), the researcher defined the function of packaging is packaging should have function of protect, contain, promote, and identify products. Moreover, packaging should also be easy to handle and deliver in transportation. The reason for this definition is packaged-products should protect and contain the fragile ceramic pots in Zwilling. And the package used should easy to be transport and sell to the retailers in China. The definition of packaging function can help researcher to see whether the packaging used in Zwilling meet requirements for these function. If not, the definition of packaging function can assist Zwilling to explore suitable packaging for fragile products.

2.2.2 Causes for product damage

There are many elements that influence the product damage. Product damage can be caused by packaging and equipments. It may happen in handling and transportation

practices. In the following part are the aspects that can cause product damage.

1) Packaging damage

According to the Darlene Jones, manager in APL Logistics⁴, an experienced shipping company, mentioned that products can sustain damage if the products are not packed properly. Cartons may be too weak to hold products. Fragile packaging can cause damage to the products and large loss of products (Martin, 2012). The damage from packaging has three essentials, and they are outer packaging, inner packaging and sealing method. Yifeng logistics⁵ said, nearly 47.5% of product damage is from improper packaging. The reason can be cartons do not have protection power, is has been used for several times. The package size is not match with the weight of products. Moreover, product are packed simply rather than packed according to product characteristics. Thus, it can result in product damage.

2) Damage in handling practices

The most common cause of load damage is forklifts mentioned by Terry Morgan, owner of Terry Morgan Inc. He has over 40 years of experience in distribution services. He said workers do their jobs too quickly lead to damage even if they have received training on how to operate forklifts safety. According to Randy Belliboni said, v.p. of sales for Pengate Handling Systems Company⁶, it is a company expertise in offering delivery solutions. Randy Belliboni said workers may handle loads with a walkie pallet truck rather than a counterbalanced truck. Forks may pierce packaged-products on the pallets. If the loads are too heavy, then it can cause topple of products. He also mentioned specific trucks have their specific jobs. For example, a walkie pallet truck can handle double-stacked pallets and a counterbalanced truck can be a better choice for loading safety because the operator can tilt the load back against the backrest in moving.

3) Damage in loading practices

One of the most common causes from loading is jolts occur to the loads when the forklifts are crossing the dock levelers from the dock to the trailers mentioned by Rite-Hite Corp.⁷ A company that investigates the loading practices for ten years. Besides, another damage cause is unstable moving loads from dock floor to the trailer floor. A study investigated by Carolina Supply Chain Service illustrated that product damage is directly related to loading wrapping and handling. In his study it said product damage is caused by poor unit load wrapping, nearly 14% of units load were not wrapped to pallets (Witt, 2007).

4) Damage in transportation

Impact and vibration are main causes for product damage in transportation. Cushioning materials can effectively protect the impact and vibration the products

⁴ APL Logisitcs, <http://www.apl.com/>

⁵ Yifeng Logisitcs, <http://www.4000005156.com/dongtai/2138.htm>

⁶ Pengate Handling Systems Company website, <http://www.pengate.com/>

⁷ Rite-Hite Corp <http://www.ritehite.com/index.php>

(Wang & Lu, 2010). The effects of shock and vibration caused in shipping can result in serious product damage (Chonhenchob & Sittipod, 2009). In transportation, the truck may come to a sudden stop and it can lead to the movement of cartons. Road condition can also influence the damage of products. They may bump and shake on the trucks. Looseness among stacked products can cause strike and thus it can cause high damage rate (Yang, 2011).

The theory illustrates the different kinds of common causes that result in product damage. It can help Zwilling to investigate the reasons that lead to product breakage in external transportation. The research scope is to investigate the distance from distribution center to retailers. So in this process, activities such as loading and handling are included and the common damage in each section is analyzed. All the possible causes for product damage are collected from empiricism in terms of professional logistics company and experts. The experience concluded by experienced people can help Zwilling to concern and avoid the damage risk in these aspects.

2.2.3 Reasons for cartons damage

The factors that cause damage of cartons are different.⁸

1) Unreasonable size of cartons

The damage of package is closely related to the length, width and height of the boxes. If the length and width of cartons are same, the height of box will have a great impact on the compressive strength of empty boxes. Under the condition of invariable of carton perimeter, the compressive strength of carton box will be reduced by 20 percent according to the increase of height.

2) Thickness of corrugated board cannot meet the requirement

During the use of corrugated board, it will be abraded. The compressive strength of is influenced and the thickness of corrugated board is reduced.

3) Deformation of corrugated board

There are three shapes of corrugated board. U shape has good stretch function and good absorbing ability. The weakness is its poor flat crush strength. V shape has good flat crush strength but poor adhesion. UV shape combines the feature of both shapes and it is the ideal corrugated board.

4) Irrational design for the layer number of cardboard

The improper design of the layer number of cardboard may cause high breakage of package. The layer number of cardboard should be decided based on the weight, storing space and stacking height etc.

5) Poor bond strength of cardboard

⁸Liford name plate Inc. website

The way to judge the performance of bond strength is by riving bonding surface. If the surface is destroyed, it proves the good performance for bonding. If there is no paper fiber, it shows the poor function for compressive strength.

6) Irrational printing design

The printing for corrugated board will have certain influence on the compressive strength. The printing area and force of printing are the main factor for influencing the strength of corrugated board. If the boxes are entirely printed, the compressive strength will be reduced by 40 percent.

The theory analyzes the different types of damage caused by corrugated box. The purpose of applying this theory is to help Zwilling investigate the reason of product breakage that caused by corrugated box because the main packaging used in Zwilling is corrugated cartons. According to these issues, Zwilling can check the thickness, size, design etc. when it selects the corrugated box. Thus, it helps Zwilling to apply good quality of corrugated box for packing products which can lower the risk of product breakage of using corrugated boxes.

2.2.4 Package testing

Package testing also called distribution testing or pre-shipment and transit testing (Kipp, 2004). The function of package testing is to evaluate the suitability of cushioning or bracing material surrounding products prepared for shipping to customers. These tests through a variety of experiments can decide whether packaging materials can protect contents of products from damage or breakage. Package testing can be used for individual boxes or entire shipping container to measure the movement for transport. The package testing is the measures that could assess the performance of packaged-products before delivery. Taking package tests can lower the risk of product breakage in transport. The significance and principles for package testing will be investigated, other company that expertise in package testing field will be used as Benchmark Company⁹ to learn from.

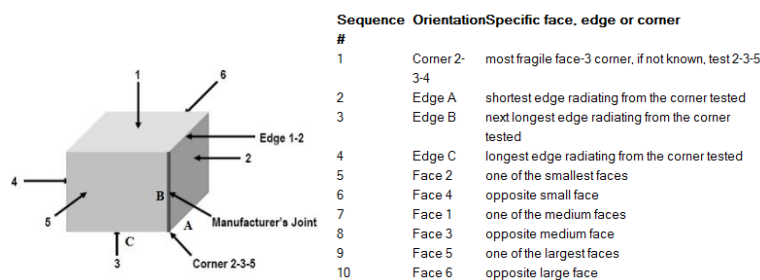
ISTA package testing

ISTA package testing is a famous testing procedure established since 1948. ISTA stands for International Safe Transit Association, a non-profit organization that delegated to developing a series of package tests in order to improve transport safety and performance and reduce the damage of products in transport. There are three series in ISTA package testing. Series 1 is Non-simulation integrity performance test, which is used to test the combination strength and robustness of product and packaging. Series 1 is not designed according to the simulation of real environment. Series 2 is Partial simulation performance tests, it is built based on series 1, the main test program is putting packaged products which is less than or over 68kg for vibration and impact tests. Series 3 is general simulation performance tests. It simulates the

⁹ Benchmark Company refers to the company's business and performance is the best practice from others.

different kinds of force, transport condition that may cause breakage. It considers the different size of packages that drop from different height. There are four size of packaged –products that could be tested, they are small, flat, elongated and normal one. The content of series 3 is vibration test and shock test. There are three categories of tests in the shock test.

1) The first one is drop test, which is testing the durability of a product by throwing it from a predetermined height. The most common drop test procedure is ISTA procedure 1A 10-drop procedure. 1A 10-drop procedure refers to one drop on a base corner, one drop on each edge and one on each flat of the product. Totally, there are ten impacts.



The specifications number of drop orientations is 10 times drop, that is 6 flat (flat 1,2,3,4,5,6), 1 corner (2-3-5) and 3 edges (A, B, C). The testing height varies with the weight of products. The packaged products are tested based on different height and weight.

Drop Height

The test drop height varies with the weight of the packaged-product

Packaged-Product Weight				Drop Height Free Fall			
<=		<		1A		2A	
lbs	kg	lbs	kg	in.	mm	in.	mm
0	0	21	10	30	760	38	970
21	10	41	19	24	610	32	810
41	19	61	28	18	460	26	660
61	28	100	45	12	310	20	510
100	45	150	68	8	200	12	310

Table 2-2 Drop height (Batz, 2009)

2) The other two shock tests are incline impact and horizontal impact test. The incline-impact test is simulated through a beveled velocity to test the products encountered incline force. While the horizontal impact test is simulated by applying horizontal velocity to test the products from horizontal impact. These tests simulate the real condition in transport process.



3) The last one is vibration test, which is a kind of shaking simulation for testing

products. There are two types of vibration test, sinusoidal vibration and random vibration. Sinusoidal vibration can simulate the real condition of products in trucks, plane and vessels. Based on the frequency and time, the performance of products to endure the transportation condition is tested. Random vibration can check the integrity of shock resistance in the distribution section.

The ISTA testing is the arthritic testing item used in package testing field. It simulates the real transportation condition for delivering products. The tests could target different size of packaged-products and different forms of force condition in transport. In order to apply it into Zwilling, the principles and characteristics of each test will be discuss. Based on these characteristics of tests, the researcher will analyze whether the characteristics of test match with the transport situation in Zwilling and also discuss the condition for Zwilling to apply these tests. These tests can test the different kinds of force condition occurred in transport which can lower the risk of product breakage.

2.2.5 Loading and unloading theories

There are many issues that should be concerned in loading and unloading section. Loading and unloading can cause breakage of products and injury of workers. Irrational loading and discharging means the irrational loading and discharging refers to the unqualified operation for using vehicles, no certificate for driving vehicles etc. According the study published by Carolina Supply Chain Services (CSCS) said \$388 million of product damage is directly related to the poor loading wrapping and handling (Witt, 2007). This is the study that CSCS worked with Dow Chemical Company. The study investigated over 28,000 unit loads in 866 shipments of consumer goods. They found that product damage is caused by poor unit load wrapping, nearly 14% of units load were not wrapped to pallets. Mike Rawlins, director of performance research system for CSCS said nearly 39% of unit loads were not fit effectively within the footprint.

Hereby are the instruction and notes illustrated by Transport and Storage Industry Sector Standing Committee (2008). Pallets should be checked to guarantee that they are in good condition and they are strong enough to hold and support the products. The capacity of pallets should not be overloaded. Pallets should be stacked stabilized properly with stretch wrap. If the pallets are damaged, workers cannot use it anymore. The rules for using forklift are forklift instability can be a risk that may cause breakage and injury, in terms of forklifts are driving in incline ground, carrying a load forward down a slope. The maximum load capacity supported by the lift should be considered in order to avoid forklift instability. A height difference in excess of 20 mm can influence forklift's stability when carrying load at full height. Forklift can easily lose stability if operators apply brakes on the laden forklifts. The lift capacity, maximum load for the forklift and vertical lift travel are the most important specifications for using forklifts in order to prevent forklift instability. Workers can minimize forklift instability through establishing appropriate sized pedestrian zones. Seatbelts should be worn

and the incentives that encourage forklift operators to drive fast should be removed. The forklift used is of speed limiting devices. The capacity and limitations of forklift should be known by the workers. Overloading can cause damage for the forklift as well as the risk of product breakage and safety issues. In Truck loading& unloading (2008), it mentioned small equipment should be loaded as tightly as possible to prevent shifting in transport. Cardboard boxes can use to wedge in small cases. Unloading must take from the top to bottom. Double-stacked cases need at least two to moving all the times. Moreover, protective equipments used in loading and unloading section for workers can lower the product breakage as well as enhance safety during working. The extension of unloading knowledge and protective equipments can to some extent lower the risk of manmade product breakage. For Zwilling, rules and instructions for using vehicles can lower the product breakage in loading and unloading part.

The loading and unloading theory is the rules and regulations that should be concerned in loading and discharging process. It can help Zwilling to lower product breakage by enhancing the performance of using tools in loading and unloading section. The rules about loading and unloading can enhance the knowledge and awareness in loading and unloading section which can lower the product breakage risk.

2.2.6 Supplier selection and evaluation

Supplier is a person or business unit that serves source for goods or services to the company. Supplier selection and evaluation is the process performed in the organization which is to select and evaluate the performance of suppliers. The procedure for supplier selection and evaluation is listed below.

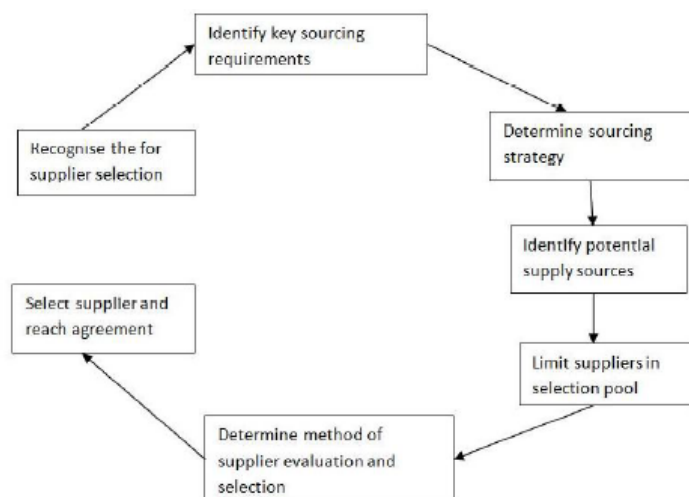


Figure 2-3 Flowchart of supplier selection and evaluation (Monczka et al, 2005)

The flow chart shows the steps for selecting the supplier. In the first step is the recognize need for supplier selection. In this step, the organization should recognize the need exists for applying a supplier. In step two, it is identify the key sourcing

requirements in terms of quality, cost and technological capabilities. The third step is determining sourcing strategy. The company should decide single sources or multiple sources, short-term or long-term contracts, domestic or foreign suppliers. The fourth step is to identify potential supply sources. It is about the sources that the current supplier can offer to the company. The fifth step is limit suppliers in selection pool. There are several methods that can reduce suppliers in the pool such as financial risk analysis, evaluation of previous performance, evaluation of the information provided by supplier. The six step is to determine method of supplier evaluation and selection. There are some possible areas that could be evaluated for the supplier such as workforce capability, delivery performance, management capability, flexibility, process and technological capability, financial capability etc. The last step is to select supplier and reach agreement. Negotiation and weighting could be used to select the supplier partner at last. Weighting means grading the performance of supplier in each area. The candidate suppliers that get highest points will become the final supplier for the company. The supplier with highest score must have good service and strong capability in the field.

The supplier selection and evaluation theory illustrates the process for Zwilling to select and evaluate qualified third party logistics partner. The significance of this process is it can help Zwilling to target possible candidates step by step.

2.2.7 3PL selection criteria

Third party logistics (3PL) companies is a kind of outsourcing service which lead to greater saving for many employer companies. When the companies start to applying third party logistics, they should consider what to outsource. And then they should consider the cost by asking what current costs will I save? Are the 3PL has competitive advantage? The companies should also pay attention to the reliability and responsiveness through ask what are my guarantees? How do I deal with when the things go wrong? Besides, companies should take information technology into consideration like what kind of technology will they use and how do their technology match with the one used in the company? After that, company should turn to relationship management aspect, it is important to maintain good relationship with between third party logistics and companies. Frequent communication and in time feedback will improve the efficiency and effectiveness of 3PL. Moreover, companies should concern the environmental awareness and financial status inside 3PL because their performance is closely related to the company's reputation and image.

Third party logistics has become an increasing important role in current supply chain. Nowadays, many 3PL offer a wide range of service in terms of distribution, warehousing, inbound freight, order fulfillment, outbound freight etc. The development of 3PL could reduce asset but offer professional service on their core business. The picture as follow shows the order and significance of the 3PL selection criteria.

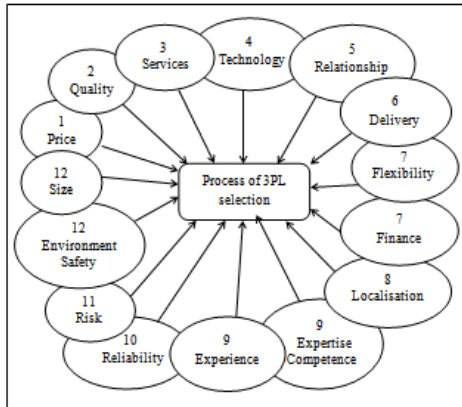


Figure 2-4 Criteria for 3PL Selection (Aguzezoul, 2010)

According to Aguezoul (2010), it mentioned 13 elements for 3PL selection criteria. Firstly, price refers to the cost for hiring 3PL partner, which refers to the cost for 3PL to deliver products to the destination. Quality means the products can be transported with safety and low damage. Service represents the attitudes and the way of dealing with a series of things. If the products are delayed or damaged, 3PL partner could contact company in time. Technology is the systems that applied in 3PL to improve the efficiency of delivering products such as scanning and tracking. Relationship refers to whether the connection and association between partners are reliable and dependable. Flexibility stands for the availability for 3PL to deliver the products effectively. Finance represents the cash flow and financial situation in 3PL Company. Localization refers to the orientation of 3PL business and its ability to deliver products to the local area. Expertise competence and experience are the professional capability and time for delegating in transport field. Company can also concern the risk, environmental situation and scale of the 3PL.

3PL selection criteria illustrate the factors that influence the performance of third party logistics provider. The 3PL provider does well in these areas have the strong and professional capability to transport products. These criteria can help Zwilling Company to target comprehensive dimensions when selecting a third party logistics provider. In Zwilling case, researcher can find out whether the company is targeting these areas in selecting a 3PL from interviews. The third party logistics partner can offer good and professional transport service to the retailers. Thus, the breakage risks of products are reduced.

2.2.8 Supplier relationship management

Supplier relationship management is defined as the strategic planning and managing of discipline to target third party organizations that supply goods or service to an organization in order to maximize the value of interactions. Good relationship with suppliers can achieve win-win situation and mutual benefits. It can get long-term collaboration with both parties. The guidelines for positive supplier relationship are to be fair. Company should give equal opportunities for all the qualified suppliers to

compete for the business. The price from suppliers should be never shared to another supplier. Moreover, company should communicate with suppliers frequently and honestly. Suppliers should be treated courteously with respect. Putting too much financial hardship on suppliers is not reasonable. Both partners have obligations to provide timely requirements for documents and payments (Gallen, 2009). Bajec & Zanne (2009) purposed successful outsourcing should no longer be a transactional relationship but the relationship needs integration, cooperation and collaboration.

In order to better manage the supplier relationship, the roles of suppliers should be identified firstly. Kraljic portfolio model (Gelderman, 2005) can help company to define the segmentation of suppliers. The model is created by Peter Kraljic and it was first introduced in Harvard Business Review in 1983. This category segmentation could let company take supplier in relationship management and understand the value provided by suppliers.

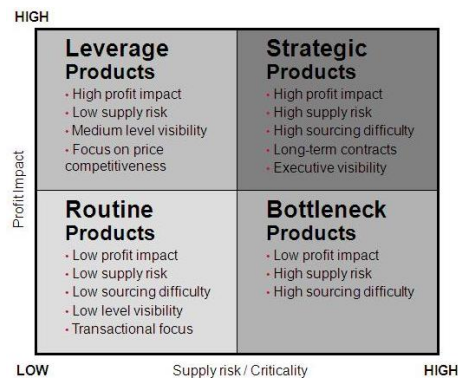


Figure 2-5 Kraljic portfolio model (Peter Kraljic, 1983)

According to the figure, supply risk refers to the scarcity of raw materials or service. It can be easily disrupted by natural disasters, government interference. Profit impact means the significance of value added to the organization's output.

Strategic products: high profit impact and high supply risk. The characteristic is small number of suppliers, difficult to replacement with unique specifications. The strategy is to form partnership with suppliers. Company could increase role of selected suppliers by adding contingency plans, analyzing market competition.

Leverage products: high profit impact and low supply risk. The characteristic is many suppliers, respond to the price movement and they are value providers. Leverage commodity has high volume of consumption and important to business, thus, the need for maintaining a high level of quality and compliance with company goal is paramount. The strategy is to maximize commercial advantage, and company will exploit full purchasing power through price target, substituting products. Leverage items allow the buying organization to exploit their purchasing power (Handfield, 2011). For example, price targeting.

Bottleneck products: low profit impact and high supply risk. The characteristic is niche

suppliers with unique requirements. The strategy is company shall decrease uniqueness of suppliers by increase competition, widen specification, develop new suppliers and add contracts for suppliers.

Routine products: low profit impact and low supply risk. The characteristic is many suppliers, many alternative products and services. Products and services in this category are with low cost. The strategy for routine products is to simplify acquisition process by rationalizing supplier base, minimizing administrative costs.

The theory and model about supplier relationship management is used to help company identify the roles and give guidelines for the company to cooperate with supplier partners. Kraljic portfolio model can help Zwilling to minimize supply risk and make most of buying power. Through analyzing supplier segmentation, Zwilling can better target and establish the strategy with suppliers.

2.2.9 Benchmarking

Benchmarking is a process of comparing the activities of a company to the best-in-class in these areas. Through comparison, the company can find the insufficient. Benchmarking is a way to evaluate self-company and other organizations. Watson (1993) mentions the concept of benchmarking should be regard as the process of adaptation rather than adoption, which means benchmarking is not copy other, but studying how to improve by sharing ideas. While Kumar and Chandra (2001) claimed that benchmarking can be viewed as performance goals from other successful companies are assumed to be achievable (Moriarty, 2008). Benchmarking as a continuous process that enables organizations to assess world-class performance and evaluate themselves against that. The goal of benchmarking can be described as identify world-class performance levels, decide the drivers for superior performances, identify the gap between benchmarker's performance and world-class performance, identify the best practices in the business process, share knowledge of best practices and build plan to improve performance.

There are seven steps to approach benchmarking (Giese& Joseph, 2000). Step1, it is preparing and planning. Company should determine what to benchmark and the methodology to be used. Company should be also decides the participants in the project. Step 2, data collection. Company is able to collect datasets that the company wants to benchmark. Step 3, data analysis. Company must study the strength and weakness of benchmarker's performance. The gap should be identified between benchmarker's performance and the leader's. Step 4, reporting. The analysis should be reported clearly through appropriate medium. Step 5, learning from practices. The leader can share their best practices to the benchmarkers. Step 6, planning and implementing improvement actions. Company shall set up an action plan to improve the insufficient. Step 7, institutionalizing learning. The performance improvement should be embedded in corporate, operational and functional levels inside company. Benchmarking theory is used to identify the insufficient with world-class organization.

It helps the company to improve performance according to comparing and learning. Zwilling can compare the performance of lowering product breakage to other organization that do well in this area. By identifying the differentiation, Zwilling can find the gap and then Zwilling can improve this field based on leader's experience or ideas. Through benchmarking, Zwilling can enhance the performance in lowering product breakage in external transport.

2.2.10 Customer satisfaction

Customer satisfaction is defined as the number of customers, whose reported experiences with a product or service compares with the value of expectation, customer may feel enjoyable or upset with the experiences. It also states whether the customer's expectations of a supplier's performance are met to exceeded, the customer will be happy if the performance is good. If perceived performance is not good, customer may feel upset and dissatisfaction. Customer satisfaction is defined as consumer's fulfillment response. A judgment that product or service, provides a pleasant level of consumption-level fulfillment (Oliver, 1997). Customer expectations stand for reliability, responsiveness, access, communication, credibility, security, courtesy, competency, tangibles and knowing the customer. Customer satisfaction consists of four dimensions. Firstly, it is quality requirement, which includes performance, shelf life, reliability, safety and appearance. Secondly, it is function requirement, which includes dominant function, secondary function and compatible function. Extensive requirement is the third dimension; it refers to the need for service, psychological need and cultural demand. The last dimension is price requirement, it refers to the price, price elasticity etc.

There are three levels of customer focus. First lever is customer service, the second level is customer satisfaction and the third level is customer success. Knowledge of individual customer requirements is important for achieving customer success. Value-added service is the first step to achieve customer success. It refers to the special activities offered by the company to enhance the efficiency, effectiveness of its business. It also refers to carriers for transport, warehouse factories and a series of specialists that involved in value-adding activities. Moreover, company should develop a customer accommodation strategy. For example, appropriate customer specific strategies, projects for customer relationship management.

In this case, it is important to achieve customer satisfaction for end users. Low product breakage enhances the customer satisfaction from customers. Zwilling should pay attention to the customer satisfaction since it is closely related to the product breakage. Sound customer satisfaction lead to competitive advantage over other competitors. Lower product breakage can realize the customer satisfaction.

2.3 Conceptual Framework

The conceptual modal is a type of diagram which shows the relationships between factors that lead to a target situation. It represents the concepts and relationship that

contributed to problem domain.

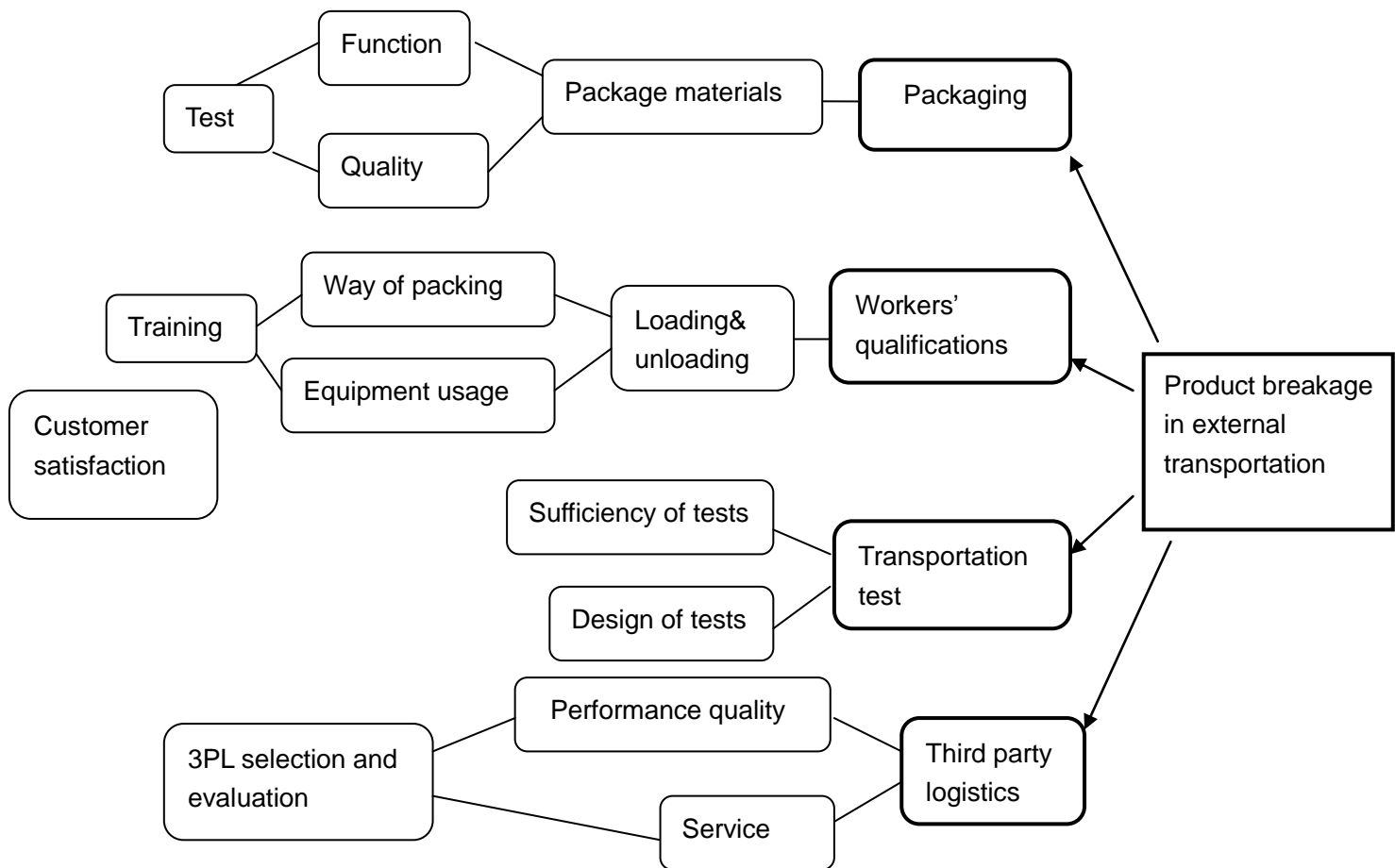


Figure 2-6 Conceptual model (Self-illustration, 2013)

In the model, packaging, workers' qualifications, tests, third party logistics are the targeted aspects for product breakage in external transportation. A series of theories will be applied for each targeted aspect. These theories can help Zwilling Company to lower product breakage in external transport from different perspective in order to achieve high customer satisfaction.

2.4 Chapter summary

This chapter gives detailed information about a series of theories used in the research. Relevance tree shows all the theories that will be used in the research. These theories can be useful to put practice into Zwilling Company to lower product breakage in lowering product breakage for external transportation. These theories are important to solve the research questions and conclude findings in the following chapters. The conceptual model applied in the end of this chapter is to build the connection of the concepts related to the topic.

Chapter Three Methodology

This chapter gives detailed information about the strategy used in the research, and both the primary and secondary database is used to collect information. The methods applied in collecting data are illustrated clearly in this part with reliability.

3.1 Research strategy

In this paper, qualitative research will be used for Zwilling Company to improve the risk of product breakage issue for external transportation because qualitative research concern the complete and detailed description of issues and events in an organization. It can help researcher to get a holistic overview and deep understanding about the thought and behavior from targeted group. Qualitative research studies the things in their nature setting, attempting to understand or to explain in terms of the meanings people bring to them (Denzin 1994). Qualitative research is a field of inquiry in its own right and it crosscuts disciplines, fields and subject matters. A complex, interconnected family of terms, concepts, and assumptions surround the term quality research (Denzin and Lincoln, 2005). Case study approach as one types of qualitative approach will be used in this paper, it emphasizes on the contextual analysis in detail by investigating the limited number of activities and its relationship. Case study approach is applied by researcher because it helps the researcher to get an in-depth appreciation of the issue and event in the company. There are three types of case study, single case study methods, intrinsic case study and multiple case study. In this paper, single case study is used as it focuses on a single issue and then this issue is explored by bounded case (Creswell, 2007). In this point, Zwilling Company will be the real case to explore the breakage issue occurred in external transportation. Both the document analysis and in-depth interviews are used as method tool to gather data about the problems in Zwilling Company.

3.2 Data collection method

In this section, both the primary and secondary data are illustrated in the research. Primary data is the information collected by the researcher in terms of interviews. Secondary data refers to the information that is not generated by the researcher but acquired from others' sources in terms of reports, books, journals and academic articles. The concept of each method is clearly illustrated in the following part.

3.2.1 Primary data collection

➤ Interview

Interviews are the primary data offers the researcher up-to-date information. The in-depth interview as a useful qualitative data collection technique is used for collecting primary data. The in-depth interview refers to a conversation between two or more people where questions are asked by the interviewer based on some statements. It is appropriate for use in the open-ended questions to get further information from relatively few people. In Zwilling case, ten in-depth interviews are used for collecting the feedbacks and opinions about the current situation for lowering

product breakage in Zwilling. These ten interviews have been taken by Skype in August, Skype is an international internet communication tool that could make two parties see each other and talk to each side. The forms of interview are like real face-to-face interviews. The researcher can ask questions to the interviewees and interviewees can give direct answer to the researcher.

Purposive sampling as one types of judgemental sampling is used to select interviewees. Purposive sampling refers to the selection based on the knowledge of a population and the purpose on a study (Jupp, 2006). This process can help the researcher to get target the candidates with a certain characteristic. In Zwilling case, Criterion Sampling is used and the purpose of criterion sampling is search for the individuals that meet certain criterion (Palys, 2008). In this point, all the interviewees selected by researcher have working experience in Zwilling Company for several years. They can have a deep understanding of operation in Zwilling. Thus, this sampling technique could make sure that the quality of acquired information from interviewees. The ten interviewee candidates are from different department in terms of marketing, supply chain, quality and purchasing departments. Because these candidates are involved in the different section of delivering products, they could give opinions from different perspective. They could illustrate the breakage issue occurred in whole transportation part. The detailed information related to interviewees is listed below.

Department of interviewees	Job position of interviewees
Quality Knives, Cookware, Trading Goods Department	Quality Coordinator x2
	Quality Manager x1
	Quality Engineer-Production x1
Production Cookware Department	Production planner x1
	Production Clerk x1
Sales and Marketing Department	Sales support supervisor domestic operations x1
Purchasing Department	Purchasing I Senior Buyer x2
Supply Chain Department	Deputy Director Supply Chain Management x1

Table 3-1 Interviewee job background (Self-illustration, 2013)

3.2.2 Secondary data collection

➤ Document analysis

Documentation analysis is a research tool that used existed data material and documents for the project (Philipp Mayring, 2002). It involves a lot of reading materials such as public records, media, private paper, visual documents etc. Document analysis is used in Zwilling case. In order to solve breakage problem for transportation in Zwilling, data in terms of company's pictures, industry websites which related to product breakage and product transportation issues will be collected as reference. For

example, other companies' cases applying tests to checking the performance of product breakage and applying qualified materials to pack product will be analyzed and referenced for Zwilling.

3.3 Data analysis

In qualitative research approach, after the information is collected from in-depth interviews. Template analysis acts as a structured technique will be used to analyze the qualitative textual data. Template analysis means organizing and analyzing textual data according to the themes. It could reduce large amounts of unstructured text to a more structured way. The key advantage of the technique is researchers can get a relatively clear path to develop a structured analysis of their data (Thorpe& Holt, 2009). Template analysis is applied for analyzing qualitative data through developing a coding template (Waring& Wainwright, 2008). The steps for formulating template analysis is define the themes of each research question. Secondly, transcribe the data and develop the coding. Then the initial template is made by gathering high frequency codes. After that, template is made and it is used to interpret the findings (King, 2012). In Zwilling case, template analysis will be used to classify and gather reliable results.

Specifically, ten employees in the company have been interviewed. They are given specific code in the template analysis. The code represents for each interviewee is listed in appendix1. Based on interview questions and literature, the themes were defined. The codes of themes were listed from highly mentioned to low mention. The information collected is put in the related coding. The whole template analysis is listed in the appendix 2.

3.4 Validity and reliability

Validity and reliability are the criteria to evaluate the qualitative research (Bryman& Bell, 2007). The interviewees selected have sufficient working experience in Zwilling Company and they are experts in marketing and logistics field. They could give exact opinions on product breakage issue occurred in external transportation. Thereby it could make sure that the data collected from them were reliable. The interviews were taken by Skype, a visual communication tool that can let interviewer and interviewee see each other. This could guarantee the effectiveness of interviews. The photos illustrated in the research were taken by the employees as well as the interviewees in Zwilling Company. These can make sure the validity and reliability of collected data.

3.5 Limitation of the research

The limitation for this research is the feedback get from employees are quite subjective in qualitative research. Rather than quantitative research, large amount of information is collected and investigated. Another limitation is the investigation is focus on the roadway. The breakage that happened in overseas transport is not investigated in this research. The Gantt chart as follows shows the general time for the research investigation. Gantt chart is a time shaft to demonstrate the process of

each activity during each time period.

April, 2013-Feb, 2014







Month/item	4	5	6	7	8	9	10	11	12	1	2
Pitch											
Proposal											
Information collection											
Interviews											
Writing thesis											
Defense											

Table 3-2 Gantt Chart (Self-illustration, 2014)

3.6 Chapter conclusion

This chapter discussed the research strategy and methods used for investigating the whole paper. Case study approach as the research strategy is used in this qualitative research. The techniques used for analyzing and gathering data are explained. The primary data from interviews and secondary data from documentations are illustrated and collected. Purposive sampling as technique to pick up interviewees is applied to gather reliable and accurate information in the organization. The template analysis was used to analyze the appropriate data according to the theme. Moreover, the reliability and limitations of the research is explained. Gantt Chart is illustrated the timetable for the whole research.

Chapter Four Findings

In chapter 4, the five sub research questions are clearly discussed and investigated in order to answer the main research questions. The first research question is about the causes that lead to product breakage in external transportation. The following 4 sub research questions are targeted for packaging, test, loading and 3PL dimensions.

4.1 Research question1

What are the causes that result in product breakage during external transportation?

In order to further explore the reasons that cause product breakage, ten interviews are taken from employees who are from different departments in Zwilling. The detailed information about interview can be found in appendix 1. In the following part, it is the summary concluded from Template Analysis.

Causes	Views from interviewees
Loading & discharging	10
Packaging	6
Test	5
Third party logistics	5
Technology	1

Table 4-1 Causes for product breakage (Self-illustration, 2013)

1) Loading and discharging

The loading process in Zwilling is products are moved from factory to distribution center after manufacturing. All the packaged-products will be packed by carton boxes in the distribution center and these packaged-products should take drop test in the distribution center. After that, the packaged-products will be stacked on the pallets. Stretch film is used to pack the packaged-products with pallet. And then workers used forklift to move the stacked-products with pallets from distribution center to the outside of distribution center. Then workers use forklifts to load the products to the truck. 3PL partner will transport these products to the retailers in China.

Here is the flow chart for loading process in Zwilling.

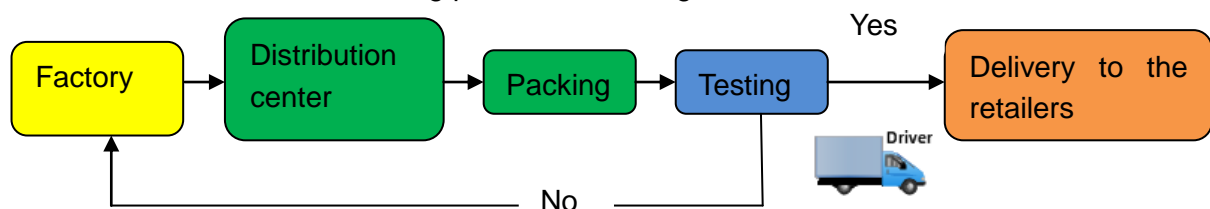


Figure 4-2 Flow chart



Picture 4- 2 Loading process (Company profile, 2013)

According to the table, loading & discharging ranked the first position for product breakage. All the interviewees considered that the poor loading and discharging performance caused product breakage. “When workers are loading and unloading products, some pots are damaged.” This is mentioned by TE-QA-2, a quality coordinator from quality department. It impress that breakage happened in breakage happened in loading and unloading section and it impress of the way of loading by workers is not proper. In the interview 7, a sales supervisor said “workers do not fix the products firmly on trucks, and the movement of pallets causes breakage”. This approved that product breakage is closely related to the loading wrapping. If the products are not wrapped firmly with pallets, they may hit each other in the movement on trucks. In the literature, a study investigated by Carolina Supply Chain Service illustrated that product damage is caused by poor unit load wrapping, nearly 14% of units load were not wrapped to pallets (Witt, 2007).

2) Packaging

In packaging aspect, finished products are packed in the distribution center, TE-QA-3 said they use carton box to pack products. Here is the photo for the package of ceramic pot. Zwilling use ordinary carton box to pack pots. Inside the carton box, there is cardboard to fix the whole pots. On top of the pot, there is no extra protective material to fix the cover of pot inside the box. Outside carton box, Zwilling use three-layer corrugated box to pack the carton box and then transport these products from distribution center to the market.



Picture 4-3 Packaging of pot (Company profile, 2013)

From the template analysis, six out of ten interviewees mentioned the product breakage caused by packaging. TE-ZKS-QA-4 said “the pots are fragile product the paper boxes cannot well protect them.” It impresses that the quality of package is not

durable and protective. In the literature, it illustrated different types of carton damage in terms of size, thickness, design, printing etc. From the pictures, we can see that the cover of pot is not well protected in the box. According to the definition of packaging function, the function of packaging is to protect, contain, promote, and identify products. While the package for pots cannot meet standards for protection function.

3) Testing

Drop test is used in Zwilling to test the force condition of packed-products from certain height in the lab. The researcher will explain the testing procedure in depth in research question 3.



TE-ZKS-QA-1 said “we have drop test to check the shockproof function of package but we don’t know the situation for products in transportation. Maybe it is possible to add other tests that can test the performance of products in the delivery process.” It shows that the tests before transportation are not sufficient. According to the package testing concept, the purpose of for taking packaging testing is the measures that could assess the performance of packaged-products before delivery. In the literature, Chonhenchob & Sittipod (2009) mentioned impact and vibration are main causes for product damage in transportation. Drop test cannot simulate the impact and vibration movement in transport. Lack of test can increase the risk of product damage in transport.

4) Third party logistics

In the distribution center, third party logistics partner will deliver the products to the retailers in China, some retailers are nearby Shanghai, while others not. From the table, five out of ten interviewees think the performance of third party logistics partner influence the product damage in external transportation. TE-QA-3 said “sometimes due to late reply or poor communication, the 3PL cannot deliver the products on time, and it causes accumulation for products.” TE-ZKS-PD-5 mentioned “the inner quality for 3PL in China is quite rude in moving products.” In the literature, there are many criteria that influence the quality and performance of 3PL such as price, technology, quality, relationship etc. On-time delivery and relationship are one of the elements in the 3PL selection criteria.

To conclude, the causes that result in product breakage is collected by template

analysis. The result is loading ranked first position that results in product breakage in external transportation, followed by packaging, tests and third party logistics partner.

4.2 Research question 2

What protective packaging materials can be used for external transportation in order to lower product breakage?

The purpose of this question is to explore the protective packaging materials to better prevent products from breakage in transport. So the current use of packaging materials will be discussed and recommended for Zwilling to improve the product breakage on packaging perspective.

Packaging has its logistics and marketing functions. The logistics function is to protect the products in handling and transport process while the marketing function is to attract the buying power from clients as well as good identification function. In the interview, TE-ZKS-QA-4 said “we use corrugated box to pack products.” The corrugated box is made of corrugated paperboard, and its function is different from normal paper box. In the edge of corrugated paperboard, air columns can be seen. It is act as the cushion to prevent products from force. The characteristic of corrugated is 1) the weight is 1/4 to 1/5 lighter than wooden box. 2) Good design and structure to protect products. 3) Good leakproofness and moistureproof function. 4) Low cost for transport, easy to realize automatic production. 5) Flexibility to adapt to different products. 6) Easy to be printed and beautified. 7) Easy for recycling. Currently, the development of corrugated box is not only target the protection function but also the marketing function. The use of corrugated boxes is popular in the market, in the U.S., more than 95 percent of products are shipped in corrugated boxes.¹⁰ In this point, we can see that corrugated box is popular for packing products.

The corrugated board could be made in one, two or three layers. The inside of corrugated box is called corrugating medium and the outside are named liners. The corrugating medium glued with two liners is single wall corrugated board also named one layer corrugated board. Putting another corrugating medium and a third flat liner on it is the double wall corrugated board. The double corrugated box is often used for packing furniture, appliances. The triple wall corrugated board is composed of three layers of corrugating medium and four flat liners. They are used to pack heavy and large products. The protective function for the triple corrugated box is better than the single one. In the picture, the three types of corrugated board are described.

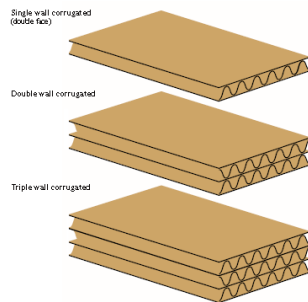


Figure 4-4 Types of corrugated board (Roth& Wybenga, 2012)

The top one is named three-layer corrugated carton, it is usually to light products; the middle one is five-layer corrugated carton, it is mainly used to pack fragile products. The bottom one is seven-layer corrugated carton, it is used to pack large products in terms of motors. In Zwilling, some pots are made of ceramic and glass. So the five-layer corrugated carton could be target for packing these products.

According to the interviews, TE-ZKS-QA-4 mentioned “pots are fragile products, and the paper boxes cannot well protect them”. We can speculate that the packages for the fragile pots are not sufficient. Hongyuan packaging company¹¹ is the company that expertise in packing fragile products. It said, the way to lower product breakage in terms of chinaware, glassware, electrical equipment is to focus on the both inside and outside of package. For the inside packing, the packaging materials should have cushion and fixed function. The qualified inner packing can protect products from vibration and strike in transport and these inner packing materials can get back into shape after the strike. The manager from quality department TE-QA-3 said “sometimes we put foamed plastics to prevent the movement of products.” The function of foamed plastics can reduce the impact of striking from outside but it cannot fix the products inside. In order to fix the products inside box, scaleboard is recommended for fixing. The concept of scaleboard is putting corrugated board as reticular structure and let products fixed in the reticular structure. The advantage for scaleboard is it is easy for mass production and it can fix the products in the box. Bubble wrap could be used to prevent cover of pot from vibration in box.

Besides the inner packaging, the quality of corrugated carton is important. The size, thickness, design and printing can also influence the performance of corrugated carton. In 2010, a quality inspection for corrugated box is investigated in Liaoning province, more than 50 corrugated box suppliers are investigated, 78% of samples met the requirements for standard. (Li &Leng, 2011). While in Zhejiang province, the percent of pass is less than 75%.

To conclude, corrugated carton is good packaging materials to pack products but Zwilling should pay attention to the types of different corrugated cartons. Five-layer

¹¹ Hongyuan website: <http://en.0430.com/cn/web130737/>

corrugated cartons are suitable for packing fragile products. Besides the outer packing, Zwilling should also consider the inner packing by using scaleboard and bubble wrap to stabilize the movement of products inside box. It is important for Zwilling to pay attention to the quality of corrugated box. Good quality of packaging materials can protect the products from breakage.

4.3 Research question 3

What kind of tests should be used to test the packaging before external transport?

The purpose of applying tests before transport is package testing can check the performance of package to protect products in transport. Taking tests before delivery can lower the risk of product breakage. In the template analysis, five out of ten interviewees think the breakage issue is related to package tests. SM-7, an interviewee from marketing department said “the test before transport is not sufficient. We do not have the test that can simulate the real transport environment.” From the interviews, the test used in Zwilling is free fall drop test. Drop test which is a technique for testing the durability of a product by throwing it from a predetermined height. The function of this test is to check whether the products will be damaged if they are falling down on the ground by certain height. Many electronic products use this kind of test. The feature of this test is it can test the packaged-products suffered from dropping while the limitation is it cannot test the performance of horizontal force and the vibration force in transport. In Zwilling case, company should transport products from distribution center to different retailers located China. The products will suffer from a series of movement in this process. TE-ZKS-QA-1 mentioned “all the products are packed in the distribution center, workers will load them on trucks, they will be sent to the Chinese retailers.” In this process, products may hit or drop in loading section. In delivery process by truck, the products will suffer from the force of random movement. Drop test cannot check this performance of transport. In order to test the performance of force situation comprehensively, ISTA testing series are introduced.

ISTA stands for International Safe Transit Association¹². It is the professional organization that delegated to various tests, which assist many companies in lower product breakage and improve customer satisfaction. It has already published a variety of standards for testing products that recognized by many companies and institutions all over the world. ISTA tests can help company to lower the breakage rate, balance the cost for transport and improve customer satisfaction.

The typical benchmarking company that applies ISTA test series is FedEx. FedEx is an international logistics company that offers transport service in terms of air and roadway for customers. According to the report by University Michigan’s American Customer Satisfaction Index (2010), FedEx ranks the first position for its customer satisfaction. The customer satisfaction refers to the quality of service, effective speed

¹² ISTA, <http://www.ista.org/>

for delivery and low breakage rate for parcels. FedEx has different kinds of products to deliver to the world. Before delivery, all the products are used free-fall drop procedure, compression test and vibration test. They check the performance of different types of packaged products though ISTA series, it is a reliable testing series that applied by large company..

ISTA Series 3 is the general simulation performance tests. It simulates a set of test in transport which can test the different kinds of force suffered from products in the movement. The content of Series 3 is take atmospheric preconditioning test, shock test and vibration test for the packaged products. Atmospheric preconditioning test is kind of temperature and humidity test, which is to put packaged-products in the particular temperature for certain hours. For the shock test, there are three categories of tests, they are drop test, which is to test the durability of a product by throwing it from a predetermined height. 1A 10-drop procedure is used. 1A 10-drop procedure refers to one drop on a base corner, one drop on each edge and one on each flat of the product. Totally, there are ten impacts. Hereby is the drop test procedure used in FedEx.

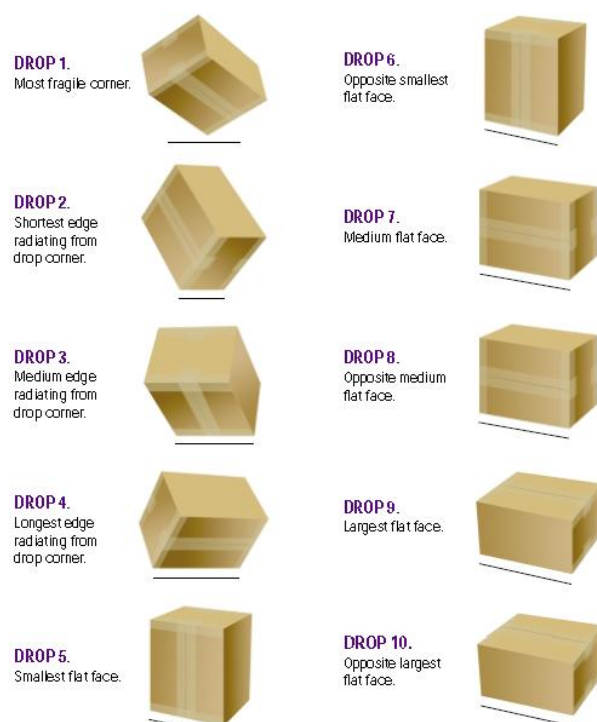


Figure 4-5 Free fall drop test procedure (Wu,2012)

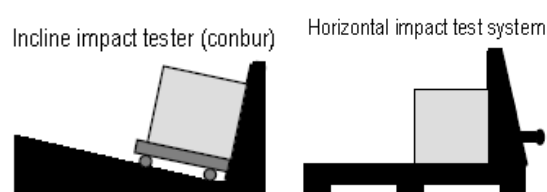
Taking Zwilling's pot into consideration, the packaged products of cookware can be put in a predetermined height by applying 1A 10-drop procedure. The common weight for packaged pots is 5kg-6kg. The drop height standard that illustrated below is recognized by the national authority.

Weight of product (lbs/kg)	Drop height (inches/cm)
1~20.99lbs (0.45~9.54kg)	30in/76.20cm
21~40.99lbs (9.55~18.63kg)	24in/60.96cm

41~60.99lbs (18.64~27.72kg)	18in/45.72cm
61~100lbs (27.73~45.45kg)	12in/30.48cm

Table 4-6 Drop height related to weight of packaged-product (Batz, 2009)

According to the table, cookery pots should be put in 76.20cm or below. The drop procedure should target six flats, three sides and one angle of the packaged product. After the drop test, the staff should check whether the products inside is broken or not. Drop test can check the protection capability of package. The other two shock tests are incline-impact test and horizontal impact test. The incline-impact is simulated through a beveled velocity to test the products encountered incline force. The horizontal impact test is simulated by applying horizontal velocity to test the products from horizontal impact. The pictures as follows show the different types of tests.



Picture 4-7 Incline-impact and horizontal impact test

The procedure for testing is put certain amount of packaged-products on the pallet, and the packaged-products are fixed with pallet as a whole unit. The whole unit should receive the incline and horizontal force in certain speed. These two tests can simulate the real transport condition during brake or highway for trucks. In horizontal and incline impact test, the size of the impact panel is 1,600x2,000mm, the loading capacity is 100kg-600kg¹³. PC-8 mentioned “European standard pallets are used in the warehouse”. So the size of wooden pallet used in Zwilling is 1200x800mm¹⁴ within the weight of 20kg. The weight for one packaged pot is around 6kg, within the width of 240 mm and height of 120 mm. So on the pallet, around 15 pots can be put on the first layer, due the maximum loading capacity, nearly 100 packaged-pots can be tested on the pallet for one time.

Another shock test is vibration test (Kipp, 2000), which includes sinusoidal vibration and random vibration. Sinusoidal vibration can simulate the real condition of vibration by trucks, plane and vessels. Based on the adjustment frequency and time, the performance of products to endure the transportation condition is tested. When the weight of products is over 68kg, the time for vibration is changed.

CPM (time/min)	Frequency (Hz)	Testing time (min)
150	2.5	79
180	3.0	66
210	3.5	57
240	4.0	50
270	4.5	44

¹³ Haida equipment website, <http://en.qc-test.cn/>

¹⁴ 1200x800mm is one types of standard European wooden pallet

300	5.0	40
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Table 4-8 Testing time vs Frequency (Chen, 2009)

Random vibration can check the integrity of shock resistance in the distribution section. In random vibration test, A formula can be conclude from ISTA Resources Book (2009), Testing time(min)=Transport distance(miles)/5=shipment distance(km)/8

Transport distance(Miles)	Shipment distance(km)	Testing time (min)
Below 300	Below 500	30
300-600	500-1000	60
600-900	1000-1500	90
900-1200	1500-2000	120
1200-1500	2000-2500	150
Over 1500	Over 2500	180

Table 4-9 The relationship between transport distance and vibration time (Chen, 2009)

From the table, Zwilling can test the stickered packaged products within relative time based on the distance from new distribution center to the retailers in China by truck. The longer the transport distance, the longer time should be tested.

To conclude, ISTA testing is professional, the series 3 provides an overall simulation transport tests for packaged-products. In Zwilling case, before long-haul delivery, drop test should be taken according to ISTA 1A10 procedure. The drop test simulates the force from dropping. In handling process, packaged products may fall down on the ground. The procedure is putting packaged-product at 70cm and drops it by ten times within six flats, three sides and one corner. It could test the protection performance for single packaged-product from different flat of package. Packaged-products could be stacked with relative amount for taking incline-impact and horizontal-impact tests. These tests can test the stability of products in the occurrence of hitting by sudden pressure. They simulate the brake and highway condition in long-haul transport. Vibration test that applied for Zwilling products can test the vibration condition in long-haul transport. If the packaged-products are ready for overseas transport, it can also take atmospheric preconditioning test.

4.4 Research question 4

What are the requirements for staffs to load and unload the products?

The question is to identify the rules and regulation for loading and unloading products, which could be applied in Zwilling Company. The irrational loading and discharging can cause high product breakage and injury incidents. The irrational loading refers to worker drive forklift over limited speed and carries overweight of products. The stacking of products is not qualified.



Picture 4-10 Stacking condition in Zwilling (Company profile, 2013)

From the pictures, we can see that the stacking of products in Zwilling is not rational. The stacked products are not well packed by stretch wrap. The products are not stabilized on the pallets. Different types of packaged-products are stacked together, and it can cause uneven force in transport. Moreover, TE- QA-2 mentioned “most of workers are of middle school degree or high school degree. Some workers we hired have not working experience before.” So the inexperience and low education level of workers may increase the product breakage because they don’t know how to load the products that can have lower breakage risk for products. PC-8 said “forklift and pallet are the main tools for loading and discharging.” So in order to improve the product breakage occurred in loading and unloading section, the application of forklifts and pallets are investigated.

The rules for using forklifts should be concerned in loading and unloading process. Only the workers that have forklifts can drive forklifts. Forklift instability can be a risk that may cause breakage and injury, in terms of forklifts are driving in incline ground, carrying a load forward down a slope. The maximum load capacity supported by the lift should be considered in order to avoid forklift instability. The incentives that encourage forklift operators to drive fast should be removed. The forklift used is of speed limiting devices. The capacity and limitations of forklift should be known by the workers. Overloading can cause damage for the forklift as well as the risk of product breakage and safety issues.¹⁵ In addition, the usage for pallets should also be concerned by workers. The pallets used in Zwilling are standard European wooden pallet, which is 120x80cm, mentioned by PC-8 from purchasing department. To enhance the requirements for using pallets, TNT, a transport company that expertise in different modes of transportation is benchmarked. The rules for using pallets in TNT are the height for pallet should be at least 15cm away from the ground. The package on the pallets should be neatly stacked. The picture with big cross implies the improper stacking that may cause high breakage. The package that exceeds the pallets can also cause breakage for products, the stability of stacking on the bottom is influenced.

¹⁵ The knowledge for using forklifts, http://www.szsdcc.com/fox_show.asp?u=16



Picture 4-11, Issues for using pallets (TNT official website)

The correct order for loading boxes on the trucks is putting products from two sides on the truck and then put products to the center part. If the gap between products is quite big, small boxes or rubber plastics could be used to prevent the products from waggle in transport.¹⁶ These are the rules purposed by Zhongyang logistics, an experienced and professional logistics company.¹⁷ Moreover, it is essential to guarantee that all the vehicles should be fitted with hand-brake alarms as they could be a safe addition to the workers. Besides, there are some regulations for the staffs to transport the goods. The wood, paper, metal containers of cube cargos should be interlaced stacked in single-layer or multilayer. Before transport, the goods on the pallets should be firmly tied with pallets together. The picture in the following visually shows this process.



From the pictures, all the boxes on the pallets are fixed by stretch films from bottom to the top. It can stabilize the stability for products in transport.

Besides, some protective equipment should be used during loading and unloading section for workers¹⁸ to enhance loading performance and lower the injury accident from product breakage. Moreover, protective equipments used in loading and unloading section for workers can increase the friction of holding products, thus, the risk for product drop on the ground is reduced.

■ High-visibility jacket or uniform

Workers should wear specific uniforms when they are loading and unloading the products.

■ Safety gloves

Gloves should be worn when the workers are moving products. It can enhance the friction of moving products.

■ Long sleeved apparel or arm protectors and safety footwear

They should be worn during loading and unloading operations, which guarantee the safety of workers caused by product breakage.

¹⁶ Zhongyang logistics webiste, 12/08/2013

¹⁷ Suzhou Zhongyang logisitcs company website

¹⁸ Safe delivery and unloading of steel products, 01/02/2007



In Zwilling, the spread knowledge of using forklifts and pallets rules improve the effectiveness for loading and discharging. The workers that have certificate can drive the forklifts, the loading capacity and speed of forklifts should be controlled. When using pallets, workers should pay attention to the capacity and size stacked products. Before transport to retailers, workers should check whether the packaged products are bonded firmly with pallets, including the cushion materials between pallets. The protective equipment can reduce the workers' accident rate by product breakage. Sometimes workers will move the products by hand, wearing protective gloves can increase the friction of holding boxes. In order to improve the loading performance in the company, HR can start a training program for workers. Firstly, the objective of training is to lower product breakage in loading and unloading section should be concerned by every worker. These loading rules could be taught in the forms of power point to express to the workers. Assessing for the workers should be taken in each quarter. The responsible person in quality department can supervise and guideline the workers in loading and unloading section. The training and assessment as the way to improve loading and unloading performance can lower the product breakage caused by workers.

4.5 Research question 5

What is the standard for selecting a qualified third party logistics partner?

The purpose of the question is to explore the qualifications for selecting a third party logistics partner in China. The criteria and procedure for selecting a qualified 3PL partner will be illustrated in the following part.

Third party logistics is one of the outsourcing services, which help the employer company outsource specific work and get professional service. From the template analysis, four out of ten interviewees think the 3PL performance has the influence on product breakage. To be more specific, TE-QA said "sometimes due to late reply or poor communication, the 3pl cannot deliver the products on time, and it causes accumulation for products." TE-ZKS-PD-5 said "the performance of third party might influence the breakage issue. The inner quality for 3PL in china is quite rude in moving products." Based on the feedback from the interviewees, the selection and evaluation of 3PL is investigated.

According to Aguezzoul (2010), the criteria for 3PL selection are price, followed by quality, services, technology, relationship and delivery. While in the template analysis (appendix 2), the criteria mentioned by interviewees are price, quality, delivery, service, delivery, profession, service, technology and finance. These are the criteria

illustrated by the interviewees.

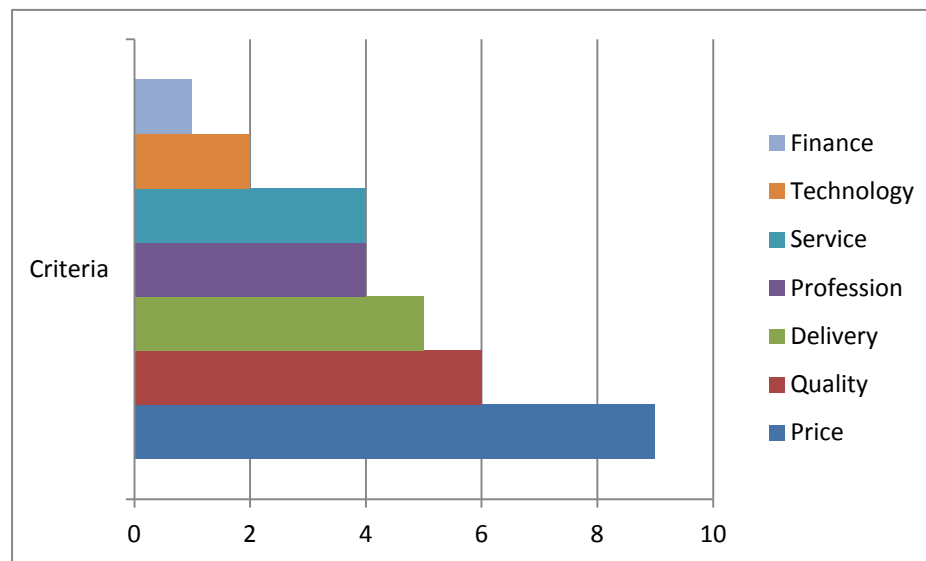


Table 4- 12 PL selection criteria in Zwilling (Self-illustration, 2013)

From the literature and interviews, price and quality are the most important 3PL selection criteria. In the barchart, 9 out of ten interviewees mentioned price and six out of ten people mentioned quality in 3PL selection criteria. Five out of ten interviewees think delivery is the criteria in 3PL selection. Profession, technology and finance are the other criteria purposed in the interviews. Compared to the vendor selection criteria illustrated by Aguezzoul (2010), it is necessary for Zwilling to pay attention to the relationship dimension in the selection criteria.

In China, there are many 3PL providers in terms of EMS, Shunfeng, Shentong, Yuanfeng, Zhongfeng etc. Zwilling is required to select a 3PL partner to transport products from distribution center to retailers. Weighted-point method can be applied to help Zwilling evaluate the partners. Weighted-point method is one of the most widely used techniques in supplier evaluation (Arsan, 2011). The method for weighted point method is all the attributes are chosen and each is assigned a weight based on the importance to the overall performance. The weight for every attribute is then multiplied by the assigned weight. Finally, the supplier got highest rating is determined to be the ideal supplier. (Timmerman, 1986).

Weighted-point method is used for evaluating 3PL in Zwilling case. The points are ranged from 1 to 5. 5 symbolizes very important, four stands for quite important, 3 is important, 2 refers to not very important, 1 means the least important. The seven criteria put forwarded by interviewees are used as criteria for selecting related 3PL partners. The pie chart is used to clearly demonstrate the proportion of selection criteria.

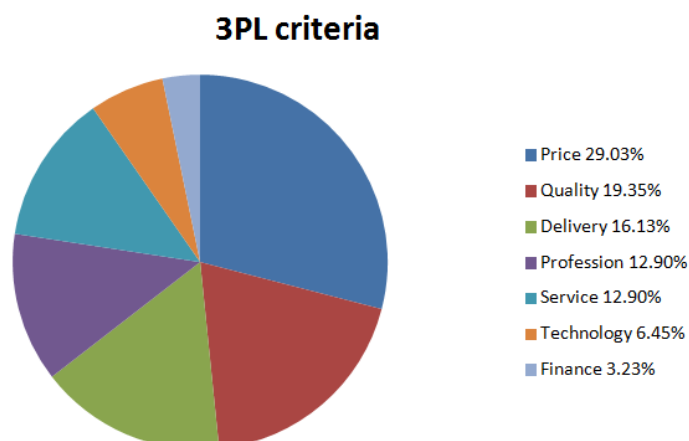


Figure 4-13 Proportion of 3PL criteria (Self-illustration, 2013)

According to the pie chart the proportion for price is 29.03% and 19.35%, which is nine out of ten interviewees mentioned the price and six out of ten interviewees mentioned quality, so we gave five points for price and quality criteria. The proportion for delivery and profession is quite big, so the points are 4 for service and delivery. The expertise and technology ranked proportion of 12.90% and 6.45%, so 3 is given for profession and 2 is given for technology. One out of ten people mention the finance, so 1 point is for finance.

Criteria	Price	Quality	Service	Delivery	Profession	Technology	Finance
Weight	5	5	4	4	3	2	1

These are the basic information about 3PL partners' scale:

Shunfeng: 5193centers, 7,012 transportation hub, nearly 100 transit depot, 6,000 sales networks, it covers 31 provinces, more than 300 big cities and around 1,900 towns in China. In 2011, the annual profit achieved 12 billion rmb.

Yuantong: it covers the business over 31 provinces, including Hongkong, Macao and Taiwan and nearly 200 countries and areas in the world. More than 450,000 sales network. The profit margin is reduced in 7 years from 20% to 5%.

EMS: Earliest express company and supplier in China, it has advanced tracking and inquiry service. The sales network is over 45,000. In 2011, the net profit is 20.9 billion rmb.

Zhongtong: about 5,000sales network, with nearly 80,000 employees.

Here is a comparison for the Shunfeng, Shentong, Yuantong and EMS in the following table.

3PL	Initial weight (rmb)	Additional weight (rmb)	Same city	Time (day)
Shunfeng	20	8	10	1
Shentong	10	8	8	3
Yuantong	10	8	8	3
EMS	22	8	10	1 or 3
Zhongtong	8	6	6	5

Table 4-13 Price for different 3pl partners (Express website)

According to the table 4-1, the price for Shunfeng is quite higher than Shentong and Yuantong while it is the most effective 3PL to deliver the products. Although EMS has the high price for one parcel but once the receiver and send is in the same city, it has the same price with Shunfeng. Besides price, here is the comment for different kinds of 3PL in China.

Name of 3PL	Service
1. Shunfeng	Speed: ★★★★★ Staff quality: ★★★★★ Customer comment: .,★★★★ Price: ★★
2. EMS	Speed: ★★★ Staff quality: ★★★★★ Customer comment: .,★★★★ Price: ★
3. Yuantong	Speed: ★★★★★ Staff quality: ★★★★★ Customer comment: .,★★★★ Price: ★★ ★
4. Zhongtong	Speed: ★★★★★ Staff quality: ★★★★★ Customer comment: .,★★★★ Price: ★★ ★
5. Tiantian	Speed: ★★ Staff quality: ★★★★★ Customer comment: .,★★★ Price: ★★ ★
6. Yunda	Speed: ★★★★★ Staff quality: ★★★★★ Customer comment: .,★★★ Price: ★★ ★★
7. Shentong	Speed: ★ Staff quality: ★ Customer comment: .,★★ Price: ★★ ★

Table 4-14 Comparison of customer satisfaction of 3PLs in China (Taoke, 2011)

According to this information, weighted-point model is established.

Criteria	Weight	Shunfeng		EMS		Yuantong		Zhongtong	
		Score	Points	Score	Points	Score	Point	Score	Point
Price	5	2	10	1	5	3	15	3	15
Quality	5	4	20	5	25	4	20	3	15
Service	4	4	16	4	16	4	16	4	16
Delivery	4	5	20	3	12	4	16	3	12
Profession	3	4	12	4	12	4	12	3	9
Technology	2	4	8	4	8	3	6	2	4
Finance	1	4	4	4	4	2	2	2	2
		90		82		87		73	

Table 4-15 Weighted-point for 3PL candidates (Self-illustration, 2013)

In the table Shunfeng logistics gets the highest score, so the total performance of Shunfeng logistics is quite good among other 3PLs. While in the interview, TE-QA-3 mentioned the poor communication between 3PL. It is not highly mentioned in the interview but it is necessary to concern this element. Bajec & Zanne (2009) purposed

successful outsourcing should no longer be a transactional relationship but the relationship needs integration, cooperation and collaboration. Trust and common objective between two parties can enhance the effectiveness for 3PL to execute its professions. Kraljic portfolio model (Gelderman, 2005) can help company to define the segmentation of suppliers. 3PL belongs to the leverage products. The risk for suppliers is low since there are many 3PL providers in Chinese market. The strategy for leveraged product is collaboration. Price competition is the feature for leveraged product. The strategy for Zwilling to target this supplier is to compare and evaluate. Through cooperation both two parties can achieve common goals. In order to maintain good relationship, it is necessary to focus on people, process and technology. Managers should target the people who have experience in managing outsourcing relation. Technology is important for sharing the information. Besides, trust, openness and commitment are important for both two parties to maintain long-term relationship.

To conclude, the performance of third party logistics is closely related to the product breakage in delivery process. From the literature and interview, the criteria for selecting 3PL are identified for Zwilling. From the comparison and weighting, Shunfeng logistics get the highest points among other suppliers. Besides, the relationship between supplier and Zwilling is important. Both the criteria and relationship management can help Zwilling enhance the transport performance and lower risk of product breakage.

4.6 Main research question

In order to take steps for lowering product breakage in external transport, the first research question focus on the reasons that cause product breakage in external transport. The in-depth interview is used as the way to get opinions from candidates. The results are packaging, tests before delivery, qualification of workers in loading section and third party logistics partner are the main aspects that influence the product breakage. The workers' qualification ranked the first position, followed by packaging materials, tests and third party logistics.

The second research question targeted for protective packaging materials. The packaging used in Zwilling is corrugated cartons and it is the most popular packaging materials used in packing products in transport situation. However, there are different types of corrugated boxes. For packing fragile products, the inner packing is also important, the scaleboard and bubble wrap can be used to fix the stability of products inside boxes. The quality of corrugated box also influences the protection function of packaging. So in this point, Zwilling should pay attention to the quality and types of corrugated box as well as inner packaging.

The third research question focused on the testing. Packaging testing can test the protection function of packaging in simulation condition. ISTA testing series is designed by the professional organization, the purpose of these test is to help companies to lower product breakage in transport condition. ISTA series 3 is a simple

simulation program that has shock and vibration tests. The shock tests simulate the force condition encountered from different position. It simulates the situation in handling process that products suddenly falling down on the ground. And it also simulates the situation that products are putting on the pallets, they encountered the sudden force from truck brakes. The vibration tests simulate the model of vibration from driving trucks. FedEx Company is a logistics company that expertise in delivering product to different places all over the world. It applies ISTA testing procedures before delivery, it could be the benchmark company for Zwilling to learn. After that, the question is about exploring rules in loading& unloading section. The usage and awareness of using forklifts and pallets can enhance the safety and effectiveness for lowering product breakage. The benchmarking company TNT is used as it does well in loading products effectively. The training could be organized for worker in Zwilling and exams can be applied for assessing the performance of workers in loading condition.

The last question is the selection and evaluation of third party logistics. The performance of 3PL is closely related to the product breakage in external transport. Weighing model is used to assessing the capability for different 3PL partners. The criteria for selecting 3PL are combined from interview and literature. In the weighting, Shunfeng logistics got the highest points, so the qualification for Shunfeng logistics is well. Moreover, the communication is the problem that leads to low performance of third party logistics. The way to improve it is to enhance the communication and trust between partners. The goals should be recognized by two parties. All in all, improving packaging materials, adding transport simulation test, improving handling and loading regulation and apply qualified 3PL partner can lower the product breakage from different perspective.

4.7 Chapter summary

In this part, five research questions are illustrated with detail explanation. Template analysis is used to select information in the interview on breakage causes. The result is packaging, testing, loading and 3PL are the most influential causes for product breakage in external transportation. These four aspects are targeted and recommended for Zwilling for improvement.

Chapter Five Discussion

This chapter will discuss the feasibility of results that could be applied in Zwilling to lower product breakage for external transportation.

5.1 Discussion

In order to reduce breakage, the factors that cause product breakage in external transportation were investigated. Interviews are used to target those who have sufficient working experience and knowledge in Zwilling. These candidates work in quality, sales, purchasing and supply chain departments for several years, so researcher thought that they can illustrate the accurate information on breakage issue from the first line. The result is all the interviewees mentioned that loading is the biggest problem, followed by six people mentioned packaging, five people for both testing and 3PL and one mentioned technology.

According to the proportion, researcher thought that loading, packaging, testing and 3PL are the main aspects for exploring because these areas are raised by experienced and qualified staffs in Zwilling. The significance for investigating breakage causes can give direction for researcher to investigate further for the product breakage. These four areas include all the steps from loading product to moving and from moving to delivering.

A). After researcher got a general understanding of situation for product breakage, packaging materials aspect was targeted firstly because packaging is closely related to product breakage. Combining the definition from Bhonyongwa (2011) and Murphy & Wood (2007), researcher defined the function of packaging as packaging should have function of protect, contain, promote, and identify products and easy to handle. The result is five-layer corrugated box meet the standards for different function of packaging and they could be used to pack fragile ceramic pots, the thickness and protective function of box is stronger than the ordinary one. Scaleboard and bubble wrap could be used to stabilize the pot and cover of pots inside. The benefit of using five-layer corrugated box is it can enhance the shockproof function of box. It has function for protection, preservation, identification and promotion. While in Zwilling case, researcher found that company applied three-layer corrugated box and the inner packaging is only cardboard. The instability and poor protective function cannot guarantee the stability of pots in different movement. The risk for apply five-layer corrugated box is its quality. It needs time for company to test and select the qualified suppliers. Zwilling has to spent some time and effort in selecting good raw materials suppliers.

B). Lack of sufficient tests before delivery can also causes product breakage. Taking sufficient shockproof tests before transportation can lower the breakage risk in external transportation. Thereby researcher turned to investigating tests before delivery. From the interviews, Zwilling applied free fall drop tests. The significance of

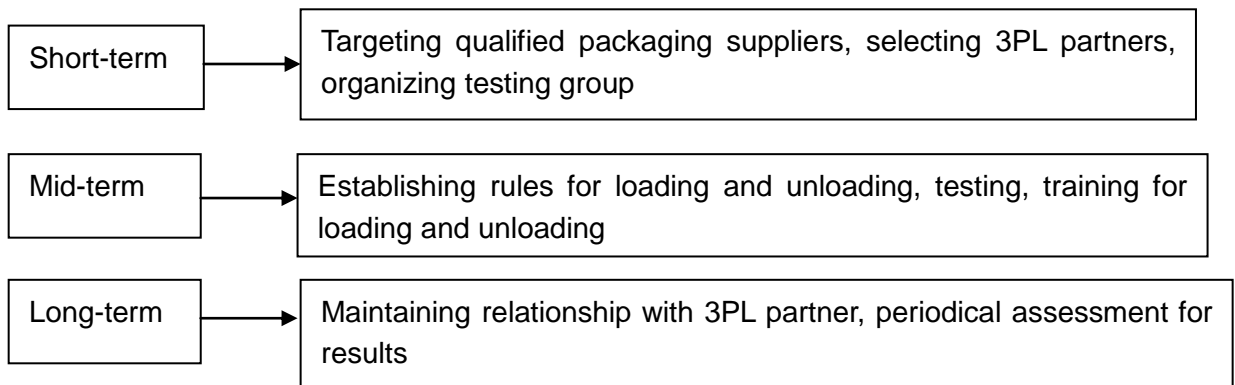
drop test is it can check whether the packaged-products can endure the hitting from dropping force. Taking drop test can prevent the product damage of dropping in handling process. But for the delivery process on truck, the possibility for product breakage cannot be guaranteed. ISTA testing is introduced for its comprehensiveness of testing. The benefit of applying ISTA testing is it can also test the vibration and impact of packaged-products in transportation process. In transport process, packaged-products may hit each other according to the brake or swerve by trucks. ISTA testing also considered the package dropping in handling and moving procedures. Testing is the step that should be taken after packing but before loading products to the trucks.

C). Workers will load products to the trucks, so the qualifications and rules for workers to loading and discharging are very important. In the literature, Witt (2007) mentioned 14% of product damage is caused by the looseness of units and pallets. From the interview, research found that the education level and working experience of workers are low and insufficient. According to the pictures, researcher found the products on the trucks are not fixed with rope or stretch wrap. In the literature, it also mentioned usage of forklifts and pallets can influence damage of products. The qualified operation in loading is pallets should be stacked stabilized properly with stretch wrap. It can minimize collapse in transport and stacking process. The usage of forklifts should be regularized and the protective gloves could be applied since it could enhance the force of friction in holding cartons. Training program for workers can improve the loading level and lower the product damage in material handling process. The benefit for improving loading and unloading performance by workers is it can minimize the product breakage in handling process. The rules and regulations suggested for Zwilling can enhance the loading effectiveness with minimum damage. The training for workers is a continuous program, the significance for applying training program is it can improve the handling and loading performance while the risk is workers should not only have a command of loading knowledge before work but proficient practice.

D). Besides, researcher also investigated 3PL selection and evaluation. The criteria illustrated by empiricism are price ranked the first position, followed by quality, services, technology, relationship, delivery and etc. In the interview, researcher found price, quality, service, delivery, expertise, technology and financial condition are important in Zwilling's 3PL selection. The difference is in the literature it mentioned relationship element, while in the Zwilling case, it was missed. In the literature, it said good relationship with suppliers can get win-win situation and mutual benefit. In Kraljic portfolio model (Gelderman, 2005), 3PL belongs to leverage product because the supply risk is low and profit impact is high. The significance for investigating the role of 3PL is it can help company to apply proper strategy to deal with the relationship with Zwilling. Collaboration is the strategy to manage leverage products, which means the shared value and goals between two parties. Researcher thought the communication between suppliers is important, and Zwilling needs to share the goals with 3PL

partners. The common goals can promote the cooperation and performance of 3PL. The benefit for applying these criteria in selecting 3PL can guarantee the quality of 3PL partners and meet the requirements for Zwilling. The relationship maintenance between Zwilling and partners can promote the long-term cooperation.

In order to apply these measures, 1) Zwilling should firstly target the suppliers that offer good quality of packaging materials. In the meanwhile, Zwilling could pay attention to the selection of 3PL partners. While maintaining relationship with 3PL partners are the continuous process. It needs time and effort for Zwilling to communicate with 3PL partners. 2) In the mid-term, ISTA testing could be applied in Zwilling and the rules for correct loading should be popularized among workers. Training program could be organized by HR department. 3) In the long-term, it is necessary to make periodical assessment for each measure. By comparison, Zwilling can get the progress and effect of each measure.



5.2 Chapter summary

In this chapter, it gives a discussion for comparing the theories in the literature review and the results investigated by researcher. The significance and benefit of investigating are discussed in this chapter. The steps for applying these measures are illustrated.

Chapter Six Conclusions / recommendations

In this section, it is the conclusion for five research questions. Actions for each question will be concluded through packaging, testing, loading and 3PL aspects. The recommendations are made to better implement these measures in lowering product breakage during external transport. SWOT analysis is used to combine the result with suggestions.

Researcher considered that apply five-layer corrugated box and add inner packaging can enhance the protective function of packages. Applying ISTA testing series in terms of drop test, vibration and impact tests can prevent the breakage of products in handling and transportation process, improving loading knowledge for workers can minimize the product breakage in handling and loading process, selecting and evaluating 3PL can guarantee the performance of transportation. Based on these measurements, SWOT analysis is made to identify the benefits and drawbacks.

SWOT analysis stands for strength, weakness, opportunities and threats for abbreviation. It is put forwarded by Albert S Humphrey (2005) and SWOT is a technique for understanding and summarizing the current state of organization through assessing strengths, weakness, opportunities and threats. Here it is used to evaluate the implementation of measures to improve product breakage in external transportation.

Strengths

- Protective packaging
- Comprehensive tests before delivery
- Sufficient knowledge for unloading and unloading practices
- Cooperate with qualified 3PL partners

Weaknesses

- High cost and much effort for target qualified suppliers
- Much time for taking tests
- Cost to hire specialist for coaching workers
- Difficult to maintain long-term relationship

Opportunities

- Trend for applying green package
- Successful benchmarking companies do well in lower product breakage
- Pay attention to CSR

Threats

- Poor quality of packaging suppliers
- Increasing cost for outsourcing
- Many competitors
- High job-hopping for workers

Figure 6.1 SWOT analysis (Self-illustration, 2013)

The strength for implementing actions in terms of improve packaging, testing, loading and 3PL performance is the packaging's shockproof function is improved. There are sufficient tests to simulate the force of dropping, vibration and impact of products in handling and transport process, which can give company a through prospect for the delivery performance. By using weighted-points to select and evaluate 3PL partners can cooperate with most suitable suppliers for Zwilling since the overall performance for each criteria is sound.

While the weakness for this implementation plan is Zwilling has to take time and effort in searching for good suppliers. It has to spend more time in doing testing and it should also spends time and money for hiring coach to guideline workers the theories and operation in loading and discharging section. Another weakness is the challenge for setting up good relationship with 3PL partner. The common goals and frequent communication between Zwilling and provider company is very important.

The opportunities for this implementation are more and more companies concern the environmental friendly and recycled packaging materials. Corrugated box is kind of eco-friendly package, it can be recycled and processed for further uses. Green packaging can improve image for Zwilling as well as save cost. Moreover, there are many cases about companies that do well in lowering product breakage, so Zwilling can regard these companies as benchmarking.

The threats for the implementation are the quality of packaging cannot be guaranteed. Many suppliers offer poor quality of corrugated box on the market, the cost for outsourcing is increasing grow. In the market, there are many competitors that also providing cookware such as WMF, Supor, so Zwilling has to improve the product breakage as soon as possible from different perspectives. In addition, the mobility of workers is another threat, and it may waste time and effort for company to train the workers. Based on SWOT, Zwilling should follow the trend and pay attention to the quality of suppliers. Managers should spend time to communicate with not only employees but also workers. The common goals and values among each staff and partners can help company to lower product breakage but improve competitiveness in the market.

The estimation cost for implementing these actions are made in the following part. Before taking actions in reducing product breakage, Zwilling wastes nearly 500 thousand rmb every year. The breakage rate is about 3%-4%, that is three or four out of ten ceramic pots are damaged in external transportation process. After improving packaging materials, regulating handling rules, adding enough tests before delivery and enhancing transport performance, the breakage risk could be reduced by 1%.

Item	Price	Capacity	Cost
Corrugated box	¥ 0.9-1	$\geq 100,000$	¥ 90,000- 100,000
Testing machine	¥ 4,000-8,000	≥ 3	¥ 12,000-24,000,
3PL	¥ +1,000		¥ +1,000
Training fee	¥ 5,000		¥ 5,000
Total			¥ 211,000

Table 6.2 Yearly estimation for improvement (self-illustration, 2014)

The above table is the general estimation for the improvement of measurements. More than two hundred thousand investment can save the loss of about 500 thousand damage every year. It could help Zwilling to save nearly 300 thousand rmb. In the short-term, Zwilling could target the packaging suppliers that can offer qualified five-layer corrugated boxes. The suppliers should offer the certificate for its quality of corrugated box.

At the same time, Zwilling can set up standards for 3PL partners and build the teams for testing. More staffs should be added in testing group. The procedure for taking tests is drop test first, which is to test the shockproof function of individual packaged-products. After that, packaged-products could be stacked on the pallets and bounded together to take the vibration test and impact test for amounts of packaged-products.

In the mid-term, Zwilling can give a training program for the workers that responsible for loading and unloading products. Experienced and qualified staff can offer tips for the inexperienced workers. Before workers start their jobs, they should be educated with loading rules and some requirements through lecturers, power point and practice. The standards for Zwilling to target 3PL should be clearly stated for bidding. Weighted-points method can be applied to evaluate the ideal candidate. Last but not least, the relationship among suppliers and employees are important for Zwilling to maintain. The in time communication among partners can increase the effectiveness of cooperation. Mutual trust, respect and understanding can promote the long-term relationship for business.

Zwilling has to focus on the quality issue of both materials and suppliers, for the mobility of workers, managers or supervisors should often listen to their ideas and concern their feeling. The competitors that do well in some aspects can be referenced in Zwilling. In addition, the trend for companies to apply green logistics is obvious. Applying corrugated boxes is a start for Zwilling to follow the green trend. The recycling issue for corrugated boxes can further help Zwilling Company to reduce the product breakage and enhance brand image.

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Appendix 1

List and code for interviewees

Interviewee name lists and code for each interviewee

	Department	Name	Code
1	<i>Quality Knives, Cookware, Trading Goods Department-Quality coordinator</i>	Lin Weili	TE-ZKS-QA-1
2	<i>Quality Knives, Cookware, Trading Goods Department- Quality coordinator</i>	Huang Weijun	TE- QA-2
3	<i>Quality Knives, Cookware, Trading Goods Department- Quality Manager</i>	Wan Shaohua	TE- QA-3
4	<i>Quality Knives, Cookware, Trading Goods Department- Quality Engineer-Production</i>	Gu Zhengxiao	TE-ZKS-QA-4
5	<i>Production Cookware Department- Production planner</i>	Gu Luting	TE-ZKS-PD-5
6	<i>Production Cookware Department- Production Clerk</i>	Xia Jiyan	TE-ZKS-PD-6
7	<i>Sales and Marketing Department- Sales support supervisor domestic operations</i>	Qin Shufen	SM-7
8	<i>Purchasing Department- Purchasing I Senior Buyer</i>	Zhou Lei	PC-8
9	<i>Purchasing Department- Purchasing II Senior Buyer</i>	Sun Tingting	PC-9
10	<i>Supply Chain Department- Deputy Director Supply Chain Management</i>	Hu Wangpeng	FL-LO-10

Appendix 2

Template analysis

Template analysis is used for collecting information and data according to the themes in interviews.

1. How long have you been working in Zwilling?

a) 2~3 years

TE-ZKS-QA-1, TE-QA-2, TE-ZKS-QA-4, TE-ZKS-PD-5, TE-ZKS-PD-6, PC-8, PC-9

1.2 Above 3 years

TE-QA-3, SM-7, FL-LO-10

2. Could you share me the working experience at Zwilling?

2.1 Department

2.1.1 Quality department

TE-ZKS-QA-1, TE-QA-2, TE-QA-3, TE-ZKS-QA-4,

2.1.2 Production department

TE-ZKS-PD-5, TE-ZKS-PD-6

2.1.3 Marketing department

SM-7

2.1.4 Purchasing department

PC-8, PC-9

2.1.5 Supply chain department

FL-LO-10

2.2 Responsibilities

2.2.1 Quality check

TE-ZKS-QA-1, TE-QA-2, TE-QA-3, TE-ZKS-QA-4, TE-ZKS-PD-6,

2.2.2 Communicate with suppliers

TE-QA-3, PC-8,

2.2.3 Production planning

TE-ZKS-PD-5, TE-ZKS-PD-6,

2.2.4 Support and manage sales

SM-7

2.2.5 Contact with retailers

SM-7, PC-8,

2.2.6 Control operation and transportation

FL-LO-10

3. Could you describe to me the external transportation (outside the warehouse) process in Zwilling?

a) Pack in distribution center

TE-ZKS-QA-1, TE-QA-3, TE-ZKS-QA-4, TE-ZKS-PD-5, SM-7, PC-9, FL-LO-10

b) Worker load products on truck

TE-ZKS-QA-1, TE-QA-2, TE-QA-3, TE-ZKS-PD-5, TE-ZKS-PD-6, SM-7, PC-8, FL-LO-10

c) Products send to Chinese retailers

TE-ZKS-QA-1, TE-QA-2, TE-QA-3, TE-ZKS-QA-4, TE-ZKS-PD-5, TE-ZKS-PD-6, SM-7, PC-8, PC-9, FL-LO-10

d) Twice for three times in a week for delivery

TE-QA-2, TE-ZKS-QA-4

e) Quality test before delivery

TE-ZKS-PD-5, TE-ZKS-PD-6, SM-7

4. How do you define product breakage in external transportation?

a) Products are damaged in transport

TE-ZKS-QA-1, TE-QA-2, TE-QA-3, TE-ZKS-QA-4, TE-ZKS-PD-5, TE-ZKS-PD-6, SM-7, PC-8, FL-LO-10

4.2 Products damaged in material handling process

TE-QA-2, TE-QA-3, TE-ZKS-QA-4, TE-ZKS-PD-5, TE-ZKS-PD-6, SM-7, PC-8, FL-LO-10

5. How often are products broken in transport?

5.1 Pots are broken in each delivery

TE-ZKS-QA-1, TE-QA-3, TE-ZKS-PD-5, SM-7, PC-8

5.1.1 Pots are damaged frequently in every week

TE-ZKS-PD-6

5.1.2 5-10% breakage of pots in delivery

TE-QA-2, TE-ZKS-QA-4, TE-ZKS-PD-5, PC-8,

6. What do you think of the reasons that cause breakage for external transportation?

6.1 Qualification of workers for loading

6.1.1 Knowledge of loading

TE-ZKS-QA-1, TE-QA-2, TE-ZKS-PD-6, PC-8, PC-9, FL-LO-10

6.1.2 Way of packing on trucks

TE-ZKS-QA-4, TE-ZKS-PD-6, SM-7, PC-8,

6.2 Packaging materials

TE-QA-3, TE-ZKS-QA-4, TE-ZKS-PD-5, TE-ZKS-PD-6, PC-8, PC-9

6.3 Packaging test

TE-ZKS-QA-1, TE-QA-2, SM-7, PC-9, FL-LO-10

6.4 Third party logistics

6.4.1 Performance of 3PL

TE-ZKS-PD-5, TE-ZKS-PD-6, PC-8,

6.4.2 Lack of communication

TE-QA-3,

6.5 Technology

TE-ZKS-PD-6,

7. What kind of packaging materials are you used currently for the products?

7.1 Corrugated carton box

TE-ZKS-QA-1, TE-QA-2, TE-QA-3, TE-ZKS-QA-4, TE-ZKS-PD-5, TE-ZKS-PD-6, SM-7, PC-8, PC-9, FL-LO-10

7.2 Paper bags

TE-ZKS-QA-1, TE-QA-2, TE-QA-3, TE-ZKS-PD-5, TE-ZKS-PD-6, SM-7, PC-8, FL-LO-10

7.3 Foamed plastics

TE-QA-3, TE-ZKS-QA-4, PC-8, PC-9, FL-LO-10

8. What kind of tests is used now to test the package before transportation?

8.1 Free fall drop test

TE-ZKS-QA-1, TE-QA-2, TE-QA-3, TE-ZKS-QA-4, TE-ZKS-PD-5, TE-ZKS-PD-6, SM-7, PC-9, FL-LO-10

9. What kind of equipment do you use for loading and unloading?

9.1 Forklifts

TE-ZKS-QA-1, TE-QA-2, TE-QA-3, TE-ZKS-QA-4, TE-ZKS-PD-5, TE-ZKS-PD-6, SM-7, PC-8, PC-9, FL-LO-10

9.2 Pallets

TE-ZKS-QA-1, TE-QA-3, TE-ZKS-PD-5, PC-8, PC-9, FL-LO-10

9.3 By hand

TE-QA-2, TE-QA-3

9.4 Trolley

TE-QA-2,

10. What are the qualifications for the workers?

10.1 Low education and technological knowledge for loading

TE-ZKS-QA-1, TE-QA-2, TE-QA-3, TE-ZKS-QA-4, TE-ZKS-PD-6, SM-7, PC-8,

FL-LO-10

10.2 Lack of working experience

TE-ZKS-QA-1, TE-QA-2, TE-ZKS-QA-4, TE-ZKS-PD-5, TE-ZKS-PD-6, PC-8, PC-9, FL-LO-10

10.3 Cheap labor cost

TE-QA-3, TE-ZKS-PD-6,

11. What are your criteria for selecting third party logistics partner in Zwilling?

11.1 Price

TE-ZKS-QA-1, TE-QA-2, TE-QA-3, TE-ZKS-QA-4, TE-ZKS-PD-5, TE-ZKS-PD-6, SM-7, PC-8, PC-9

11.2 Quality

TE-QA-3, TE-ZKS-QA-4, SM-7, PC-8, PC-9, FL-LO-10

11.3 Delivery effectively

TE-ZKS-QA-1, TE-ZKS-PD-5, TE-ZKS-PD-6, SM-7, PC-9

11.4 Professional service

TE-QA-3, TE-ZKS-QA-4, TE-ZKS-PD-5, FL-LO-10

11.3 Good service

TE-QA-2, TE-ZKS-PD-5, TE-ZKS-PD-6, PC-9

11.5 Technology

PC-8, FL-LO-10

11.6 Scale and capability

TE-ZKS-QA-4,

12. How does Zwilling deal with the problem of product breakage in external transport?

12.1 Reproduce and repack products

TE-ZKS-QA-1, TE-ZKS-QA-4,

12.2 Employee will supervise transport

TE-QA-2,

12.3 Searching for protective and economical packaging materials

TE-QA-3, PC-8, PC-9, FL-LO-10

12.4 Plan to select new 3PL

TE-ZKS-PD-6

12.5 Improve workers loading level

SM-7, FL-LO-10

Appendix 3

Interview questions 1

-Quality Knives, Cookware, Trading Goods Department (TE-ZKS-QA), Quality Coordinator Lin Weili(TE-ZKS-QA-1)

The theme of the interview is to explore the current condition and measures that taken by Zwilling Company to lower the product breakage for external transportation.

1. How long have you been working in Zwilling?

I have worked in Zwilling for 2 years.

2. Could you share me the working experience at Zwilling?

I am the coordinator of quality department for knives and cookware. My responsibility is to check the quality of various knives and cookware. We have drop tests to test the performance of packaged-products in drop process.

3. Could you describe to me the external transportation (outside the warehouse) process in Zwilling?

After all the products are packed in the distribution center will be loaded on trucks by workers, and later these products will be sent to the Chinese retailers.

4. How do you define product breakage in external transportation?

In my opinion, product breakage means the products are broken in transport. The content inside package is damaged.

5. How often are products broken in transport?

The breakage is often happened in transport, especially for the pots. Some pots are made of ceramics. The ceramics pots are damaged almost in each delivery.

6. What do you think of the reasons that cause breakage for external transportation?

The performance of our products is of good quality. But sometimes after some stores receive the products, they find the package is broken and sometimes the products are influenced. The breakage often occurred in loading and discharging section, workers move the products improperly. I think their qualifications and knowledge is not sufficient. Although we have drop test to check the shockproof function of package but we don't know the condition for products in transportation. Maybe it is possible to add other tests that can test the performance of products in the delivery process.

7. What kind of packaging materials are you used currently for the products?

The carton boxes are the main package materials for us to pack the products. Sometimes we also use paper bags.

8. What kind of tests is used now to test the package before transportation?

Free fall drop test. We test the packaged-products in different height and let them falling freely.

9. What kind of equipment do you use for loading and unloading?

Forklifts and pallets.

10. What are the qualifications for the workers?

The workers are of low education level and they are new to the work sometimes.

11. What are your criteria for selecting third party logistics partner in Zwilling?

We hired Yuantong logistics to help us transport the product from warehouse to different stores in China. They can delivery effectively. We focus on the price and effectiveness.

12. How does Zwilling deal with the problem of product breakage in external transport?

We are worried about the loss of money to reproduce or repack the products. Maybe it is normal situation faced by many companies. I think the breakage problem can be reduced but not solved.

Interview questions 2

*-Quality Knives, Cookware, Trading Goods Department (TE- QA), Quality Coordinator
Huang Weijun (TE- QA-2)*

The theme of the interview is to explore the current condition and measures that taken by Zwilling Company to lower the product breakage for external transportation.

1. How long have you been working in Zwilling?

I have worked in Zwilling for two and a half years.

2. Could you share me the working experience at Zwilling?

I am the coordinator of quality department for knives and cookware. My job is to help manager check the quality of products such as knives and cookware.

3. Could you describe to me the external transportation (outside the warehouse) process in Zwilling?

Twice or sometimes three times in a week, the trucks will take finished packaged-products to the retailers in different cities and regions of China.

4. How do you define product breakage in external transportation?

It can be defined as products are damaged in material handling process before delivery and transport process.

5. How often are products broken in transport?

The breakage for pots are quite high, in the transport section, the proportion of breakage is 10 out of 100 pots are damaged in each delivery. Some need to be reproduced while some need to be repacked. .

6. What do you think of the reasons that cause breakage for external transportation?

The reason for product breakage is in the handling process. When workers are loading or unloading products, some pots are damaged. Moreover, although the tests are taken to check the durability of packaged-products, but in the transportation section, the breakage often happened.

7. What kind of packaging materials are you used currently for the products?

We use carton box and paper bag to pack pots and knives.

8. What kind of tests is used now to test the package before transportation?

Free fall drop test is used to test the performance of packaged-products from different impact of force.

9. What kind of equipment do you use for loading and unloading?

We have electric forklifts to move the pallets. Sometimes, workers load and unload the products by hand and trolley.

10. What are the qualifications for the workers?

Most of workers are of middle school degree or high school degree. Some workers we hired have not working experience before.

11. What are your criteria for selecting third party logistics partner in Zwilling?

Good price and good delivery service by them is the dimension we are focused on for 3PL partner.

12. How does Zwilling deal with the problem of product breakage in external transport?

Till now, Zwilling hasn't taken some measures to get rid of breakage problems in external transport. But in transport section, one employee from Zwilling will be applied in transport part. He can supervise the responsibility of drivers from 3PL.

Interview questions 3

-Quality Knives, Cookware, Trading Goods Department (TE- QA), Quality Manager Wan Shaohua(TE-QA-3)

The theme of the interview is to explore the current condition and measures that taken by Zwilling Company to lower the product breakage for external transportation.

1. How long have you been working in Zwilling?

I have worked in Zwilling for 4 years.

2. Could you share me the working experience at Zwilling?

I am the quality manager in Zwilling. My job is to test the design and communicate with suppliers of metal. I am responsible for the design and quality of knives.

3. Could you describe to me the external transportation (outside the warehouse) process in Zwilling?

The finished packaged-products will be stored in the distribution center. Based on the need from retailers, we will transport the amount of knives and cookery pans or pots to them. We have own trucks but for the long-haul transport, we collaborate with Yuantong logistics to help us deliver the products.

4. How to you define product breakage in external transportation?

The product breakage can occur in the loading section as well as transport section. It is the activities from warehouse to the retailers. The breakage is defined as package and products are all broken or the products are broken.

5. How often are products broken in transport?

In each delivery, pots are often damaged in transport. The production for pots is nearly 1,000 units every day. Every week, we will transport pots to the retailers for twice or three times. In each delivery pot breakage happened.

6. What do you think of the reasons that cause breakage for external transportation?

The package materials can be the cause for breakage. For the pots, sometimes we just use paper bags, for the sets of knives, they are dangerous to use paper bags. The performance for third party is quite well. The only thing I want to mention is the communication. Sometimes due to late reply or poor communication, the 3pl cannot deliver the products on time, and it causes accumulation for products. The risk of product breakage is increased. The way of packing carton boxes on the trucks are not professional, the movement of package causes the breakage during transport.

7. What kind of packaging materials are you used currently for the products?

We use carton box and paper bag. They are mainly used to pack knives and pots.

Sometimes we put foamed plastics to prevent the movement of products inside boxes.

8. What kind of tests is used now to test the package before transportation?

We have drop test. It is used to test the durability of package to see whether it can protect the products.

9. What kind of equipment do you use for loading and unloading?

We have electric forklifts and pallets. Sometimes works have to load the products by hand.

10. What are the qualifications for the workers?

The education level for workers is not high, it is expensive for hiring experts to load or unload products.

11. What are your criteria for selecting third party logistics partner in Zwilling?

We pay attention to the price, quality and professional service offered by 3PL partner.

12. How does Zwilling deal with the problem of product breakage in external transport?

We are going to focus on some packaging materials that is not costly but have strong protection capability.

Interview questions 4

Quality Knives, Cookware, Trading Goods Department (TE-ZKS-QA), Quality Engineer-Production Gu Zhengxiao (TE-ZKS-QA-4)

The theme of the interview is to explore the current condition and measures that taken by Zwilling Company to lower the product breakage for external transportation.

1. How long have you been working in Zwilling?

I have worked in Zwilling for more than three years. Zwilling is my first job after my graduation from school.

2. Could you share me the working experience at Zwilling?

I am working in quality department of production. So when the products are produced, I will check their department of production. So when the products are produced, I will directly influence the quality by doing a series of tests. The quality of products will directly influence the customer satisfaction. Zwilling let me know that kitchen could also be fashionable. Zwilling let me love cooking. By using gorgeous knives and cookery pans, it is nice to making food in the kitchen.

3. Could you describe to me the external transportation (outside the warehouse) process in Zwilling?

Finished products will be transported to retailers and stores from distribution center. We use Yuantong logistics to deliver the products to the retailers every 2-3 time in a week. But due to the poor communication with them, we want to target other 3PL partners.

4. How do you define product breakage in external transportation?

Products are damaged in transport from distribution center to the retailers. It also includes the loading and unloading part.

5. How often are products broken in transport?

We produce nearly 1,000 pots and 40 to 50 thousand knives every day. We deliver products to retailers normally three times in a week. In each delivery approximately 2,000 pots and 5,000 knives are transported to the retailers. Nearly hundreds of pots are damaged in loading and transport section. The breakage for knives is not so much.

6. What do you think of the reasons that cause breakage for external transportation?

The package materials are one reason for breakage. Pots are fragile products, the paper boxes cannot well protect them. Knives are dangerous products to be delivered. They should be well protected especially on the trucks.

7. What kind of packaging materials are you used currently for the products?

We use the ordinary type of corrugated box. Bags sometimes are used to pack sets of knives. Foamed plastics are used to prevent the vibration of products in transport.

8. What kind of tests is used now to test the package before transportation?

We have free fall drop test. It is to put product in a certain height and do the free falling.

9. What kind of equipment do you use for loading and unloading?

Electric forklift is used to move the products from one place to another in the company.

10. What are the qualifications for the workers?

Workers are having low technological and educational background. Many of them do not have working experience in loading and unloading process. Some of them are young but little knowledge about moving products.

11. What are your criteria for selecting third party logistics partner in Zwilling?

The quality and effectiveness from 3PL is important, it can influence the reputation and customer satisfaction of company. The price for 3PL is important for company. Good price for professional service can help company to save cost and improve efficiency. Moreover, the scale of 3PL can influence the efficiency and capability for delivery. 3PL with wide scope business can offer comprehensive transport for companies.

12. How does Zwilling deal with the problem of product breakage in external transport?

Although the breakage problem often occurred, it caused loss of money. Zwilling reproduce the products again and again. But compared to the large production quantity, no one really concerned this situation.

Interview questions 5

Production Cookware Department (TE-ZKS-PD), Production planner, Gu Luting(TE-ZKS-PD-5)

The theme of the interview is to explore the current condition and measures that taken by Zwilling Company to lower the product breakage for external transportation.

1. How long have you been working in Zwilling?

I have worked in Zwilling for more than 2 years in production department of cookware.

2. Could you share me the working experience at Zwilling?

I am the production planner in Zwilling. My task is to planning the production of cookware.

3. Could you describe to me the external transportation (outside the warehouse) process in Zwilling?

When the pots are products, they will be taken to the warehouse for quality test. And then packaged products will be delivered by trucks to the retailers in China.

4. How do you define product breakage in external transportation?

Product s are broken in transport, it includes delivery and handling activities outside warehouse and distribution center.

5. How often are products broken in transport?

In transport, pots are often damaged, especially the cover and shanks for the steel pots. The ceramic pots are damaged seriously in long-haul transport. Around 10 out of 100 pots are damaged in loading and transport section.

6. What do you think of the reasons that cause breakage for external transportation?

The package materials are the reason for product breakage, especially for the pots. The boxes used are not firm. The performance of third party might influence the breakage issue. The inner quality for 3PL in china is quite rude in moving products.

7. What kind of packaging materials are you used currently for the products?

Carton boxes, corrugated box sometimes and some paper bags.

8. What kind of tests is used now to test the package before transportation?

We have free fall drop test.

9. What kind of equipment do you use for loading and unloading?

We put packaged-products on the pallets and then use forklifts to transfer them to the shelves and trucks.

10. What are the qualifications for the workers?

The qualification for the workers is not high. Sometimes they lack of experience in loading process.

11. What are your criteria for selecting third party logistics partner in Zwilling?

Price and profession, on-time delivery and good service are the criteria for selecting 3PL.

12. How does Zwilling deal with the problem of product breakage in external transport?

Till now, we haven't taken any measure to improve the situation because manager doesn't mention that. Only the workers know the breakage issue.

Interview questions 6

Production Cookware Department (TE-ZKS-PD), Production Clerk Xia Jiyuan (TE-ZKS-PD-6).

The theme of the interview is to explore the current condition and measures that taken by Zwilling Company to lower the product breakage for external transportation.

1. How long have you been working in Zwilling?

I have worked in Zwilling for 1 year. It is my first job.

2. Could you share me the working experience at Zwilling?

I am the clerk in production for cookware. My job is to assist the colleagues in planning and controlling cookware. Sometimes I help the manager to check the quality of cookware in the lab.

3. Could you describe to me the external transportation (outside the warehouse) process in Zwilling?

The external transportation is after we do the quality test for the products, they will be moved to the outside, workers will move them on the trucks. They will be sent to different kinds of stores in China.

4. How do you define product breakage in external transportation?

Three or four out of ten pots are damaged in each delivery.

5. How often are products broken in transport?

The products are often damaged in handling process by workers and third party logistics partners. The quality of 3PL is good but during the long-haul distance and different transit point, some products are damaged. Maybe the products are not fixed with pallets and they are hit against by other packages. The breakage of pots happened frequently in a week.

6. What do you think of the reasons that cause breakage for external transportation?

Handling and transport service can cause high breakage for products. The materials and way of packing also influenced the risk of breakage. Lack of advanced technology to load product automatically may also enhance the risk of product breakage.

7. What kind of packaging materials are you used currently for the products?

Normal paper bags, paper boxes.

8. What kind of tests is used now to test the package before transportation?

We have free fall drop test to test the durability of package.

9. What kind of equipment do you use for loading and unloading?

We don't have advanced technology such as automatic shelf in the warehouse or warehousing management system. Sometimes products are moved by workers in hand. They are careless sometimes. Products fall down on the ground.

10. What are the qualifications for the workers?

The labor cost is cheap because workers don't have sufficient knowledge in moving and packing products.

2 What are your criteria for selecting third party logistics partner in Zwilling?

Price, on-time delivery and good service are concerned for 3PL selection.

11. How does Zwilling deal with the problem of product breakage in external transport?

Zwilling wants to change the third party logistics partner and target new ones for long-term relationship.

Interview questions 7

Sales and Marketing Department (SM), Sales support supervisor domestic operations, Qin Shufen(SM-7)

The theme of the interview is to explore the current condition and measures that taken by Zwilling Company to lower the product breakage for external transportation.

1. How long have you been working in Zwilling?

I have worked here for nearly ten years in marketing department.

2. Could you share me the working experience at Zwilling?

I have been working here for a long time, I saw many changes in Zwilling. At first the production line is not that big, but now the production is around 40 to 50 thousand. The scale of development is greatly changed, with more than thousands of employees and 6 sub-companies 12 dealers and 186 points of sale in China. My job is to support the sales and manage the operation of sales in Chinese market. Sometimes I contact with some retailers and manage the promotion sales in China.

3. Could you describe to me the external transportation (outside the warehouse) process in Zwilling?

We will move products from warehouse to the distribution center by our employees. After products are packed and checked, they will be transport by third party logistics partner to other sales of points and retailers in China. In domestic market, trucks are the main transportation tool to delivery products because they are flexible and economical.

4. How do you define product breakage in external transportation?

Products are broken in transport and loading section.

5. How often are products broken in transport?

In each delivery, the pots are often damaged.

6. What do you think of the reasons that cause breakage for external transportation?

Workers do not fix the products firmly on trucks, so the movement of pallets or hit can cause high breakage of products. The test before transport is not sufficient. We do not have the test that can simulate the real transport environment.

7. What kind of packaging materials are you used currently for the products?

Different kinds of paper boxes and bags are used to pack products.

8. What kind of tests is used now to test the package before transportation?

We have free fall drop test.

9. What kind of equipment do you use for loading and unloading?

Forklift is the main tool used in warehouse.

10. What are the qualifications for the workers?

The works' qualification is low. They do not have sufficient knowledge in moving products and loading products.

11. What are your criteria for selecting third party logistics partner in Zwilling?

Price, quality and effectiveness are important for third party logistics selection.

12. How does Zwilling deal with the problem of product breakage in external transport?

We haven't taken any measures to lower breakage now, but later we will improve the quality of workers in loading.

Interview questions 8

Purchasing Department (PC), Purchasing I Senior Buyer, Zhou Lei(PC-8)

The theme of the interview is to explore the current condition and measures that taken by Zwilling Company to lower the product breakage for external transportation.

1. How long have you been working in Zwilling?

Three years.

2. Could you share me the working experience at Zwilling?

I work in the purchasing department and my job is to negotiate with some suppliers for many raw materials or special products. Sometimes I will deal with the orders from other clients over the world. I often communicate with the workers in the warehouse or factory.

3 Could you describe to me the external transportation (outside the warehouse) process in Zwilling?

We have own drivers for transporting the goods inside the company. For the external transportation, we hired Yuantong logistics to transport the goods to our retailers. We also use several 3PL partners to deliver the products to other cities in China.

4 How do you define product breakage in external transportation?

The breakage often occurred in handling and loading section that products are broken especially for the pots and cover of pots.

5 How often are products broken in transport?

Products are damaged in moving process in terms of transport and handling process by workers. The productivity for knives and pots are 3,000 and around 1,000 units every day. Every week, we will transport three times to the retailers in China. For the pots, nearly 5-10% of ceramics pots are broken in delivery.

6 What do you think of the reasons that cause breakage for external transportation?

Qualifications of workers and 3PL performance can cause breakage. Workers do not know how to load products correctly that can avoid risk of product breakage. The communication between Zwilling and Yuantong is not frequent. The packaging materials we used are not very protective.

7 What kind of packaging materials are you used currently for the products?

Corrugated box, carton bags and some support materials.

8 What kind of tests is used now to test the package before transportation?

Drop test is used for testing before delivery the products.

9 What kind of equipment do you use for loading and unloading?

Forklifts and pallets are the main tools for loading and discharging. European standard pallets are used in the warehouse.

10 What are the qualifications for the workers?

They do not have qualifications. They do not have sufficient experience and knowledge on loading products.

11 What are your criteria for selecting third party logistics partner in Zwilling?

I think the quality and price for hiring 3PL is important. Moreover, I will target the service and technology of 3PL. Advanced technology can improve the efficiency in transporting products.

12 How does Zwilling deal with the problem of product breakage in external transport?

Zwilling can target protective materials but low cost in the future.

Interview questions 9

Purchasing Department (PC), Purchasing II Senior Buyer, Sun Tingting(PC-9)

The theme of the interview is to explore the current condition and measures that taken by Zwilling Company to lower the product breakage for external transportation.

1. How long have you been working in Zwilling?

2.5 years in Zwilling.

2. Could you share me the working experience at Zwilling?

I work in purchasing department, group two. Zwilling gives me a free environment to learn and involve.

3. Could you describe to me the external transportation (outside the warehouse) process in Zwilling?

We use Yuantong to transport products from distribution center to the retailers in China.

4. How do you define product breakage in external transportation?

Products are damaged in transport process, it including the loading and discharging.

5. How often are products broken in transport?

The breakage issue happened in the handling process.

6. What do you think of the reasons that cause breakage for external transportation?

Qualifications of workers, poor packaging materials and lack of tests are the main reasons for breakage.

7. What kind of packaging materials are you used currently for the products?

Paper boxes, some supporting materials such as foamed plastics.

8. What kind of tests is used now to test the package before transportation?

Drop test.

9. What kind of equipment do you use for loading and unloading?

Forklifts and pallets are the main tools.

10. What are the qualifications for the workers?

They do not have qualifications. They have no experience in loading.

11. What are your criteria for selecting third party logistics partner in Zwilling?

Price, quality, service and on time delivery are the important aspects for selection.

12. How does Zwilling deal with the problem of product breakage in external transport?

No measures are taken now but in the future we will target some protective packaging materials or technology.

Appendix 4





Interview questions 10

Supply Chain Department (HWP), Deputy Director Supply Chain Management, Hu Wangpeng (FL-LO-10)

The theme of the interview is to explore the current condition and measures that taken by Zwilling Company to lower the product breakage for external transportation.

1. How long have you been working in Zwilling?

Already 10 years in supply chain department.

2. Could you share me the working experience at Zwilling?

I manage and control the operation of distribution center in Zwilling. I am responsible for the transportation from distribution center to Chinese market. The development of Zwilling is big, now it has new distribution center. The scale of warehouse is enlarged. The working environment is positive and colleagues here are energetic.

3. Could you describe to me the external transportation (outside the warehouse) process in Zwilling?

We rent a site as distribution center to store more products, after these finished products are packed in the distribution center, they will be transported by trucks and send them to the retailers in China.

4. How do you define product breakage in external transportation?

It refers to the products are damaged in delivery and handling process outside warehouse. For example, it is about loading products and delivery from warehouse to retailers.

5. How often are products broken in transport?

In each delivery, 5-10 percent of damaged pots are happened in each delivery, especially for chinese pots.

6. What do you think of the reasons that cause breakage for external transportation?

Qualification of workers is the big issue for product breakage. The test used in the lab cannot guarantee the performance of products in transport condition.

7. What kind of packaging materials are you used currently for the products?

Corrugated box, cartons box and bags, some foamed plastics.

8. What kind of tests is used now to test the package before transportation?

Free fall drop test is applied for testing before delivery.

9. What kind of equipment do you use for loading and unloading?

Workers use forklifts to move the pallets from warehouse to the trucks.

10. What are the qualifications for the workers?

Most of them do not have working experience and sufficient knowledge in loading products.

11. What are your criteria for selecting third party logistics partner in Zwilling?

Price and good professional service should be firstly concerned. The technology and performance of 3PL should be evaluated.

12. How does Zwilling deal with the problem of product breakage in external transport?

We try to improve qualification for workers through guideline. The packaging materials that have good protective function will be target as well as the tests.