

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY	1
2. PROBLEM STATEMENT	2
3 COMPANY BACKGROUND	2
3.1 OVERVIEW	2
3.2 BUSINESS MODEL	2
3.3 CURRENT POSITION	3
4. STRATEGIC SOURCING METHODOLOGY	3
4.1 PROJECT APPROACH	3
4.2 IMPLEMENTATION	4
5. FORMULATION PHASE	4
5.1 PORTER MODEL	4
5.1.1 <i>Competitive Analysis</i>	4
5.1.2 <i>Entry Barriers</i>	4
5.1.3 <i>Threat of Substitution</i>	5
5.1.4 <i>Buyer's Bargaining Power</i>	5
5.1.5 <i>Supplier's Bargaining Power</i>	5
5.2 DECISION HIERARCHY	5
5.3 IDENTIFICATION OF ISSUES	5
5.3.1 <i>Product lines for study</i>	5
5.3.4 <i>Important supplier criteria</i>	6
5.4 DEFINITION OF POTENTIAL SUPPLIER MODELS	6
6. EVALUATION PHASE	6
6.1 QUALITATIVE ANALYSIS OF THE 4 SUPPLIER RELATIONSHIP MODELS	6
6.2 STRATEGIC SOURCING DECISION TREE	9
6.3 ECONOMIC ORDER QUANTITY MODEL	10
6.4 EXCHANGE RATE RISK ANALYSIS	11
APPRAISAL PHASE	12
7.1 QUALITATIVE ANALYSIS FOR THE 4 SUPPLIER RELATIONSHIP MODELS	12
7.2 SENSITIVITY ANALYSIS ON MARKET DEMAND OF CHANNEL A	13
7.3 STRATEGIC SCENARIO	13
8. RESULTS	13
8.1 PAINTINGS	13
8.2 POTTERY	14
8.3 VASE	15
8.4 DISCUSSION OF RESULTS	16
9. IMPLEMENTATION PHASE	16
9.1 INVENTORY MANAGEMENT	16
9.2 PAYOFF MATRIX / GAME THEORY	18
10. CONCLUSION	19
11. LESSONS LEARNED	19

APPENDIX A: DECISION HIERARCHY DIAGRAM

APPENDIX B: METHODOLOGY FLOWCHART

APPENDIX C: DECISION TREE FOR VASE

APPENDIX D: CRITERIA IN FORMULATION

APPENDIX E: INVENTORY MANAGEMENT

APPENDIX F: EXCHANGE RATE RISK ANALYSIS

1. Executive Summary

Channel A is a company aiming to be the premier distribution channel for Asian related products in United States. Therefore, appropriate strategic sourcing decisions are critical in boosting Channel A's competitive position and minimizing Channel A's overall cost.

Our group approached the problem using qualitative and quantitative methods to develop a sourcing methodology to isolate the optimal supplier model for Channel A. We then applied the methodology to Asian Art Collectibles product line. Decision analysis tools were applied to compare between the four alternative supplier models and sensitivity analysis was performed on Channel A's market share to determine the optimal supplier model. We also provided an implementation approach for the optimal model by analyzing inventory management models to decide the optimal order size per order, the frequency of orders within a year and the approximate cost of holding the inventory. We recommended the following strategy for the Asian Collectibles product line:

- For Channel A's current order volume, the recommended supplier relationship model for Asian Art Collectibles is Direct Shipment. However, if the overall market volume is high enough to support the Third Party Logistics model, then Channel A should select TPL instead of Direct Shipment as the optimal model.
- For most cases, the Container Shipment model will have the lowest unit price. However, significant order volume is needed to support this model.

We trust that our analysis of the Asian Art Collectible product line will be useful to Channel A in its quest to enter this market segment. However, the important thing to note is that this methodology is not a one-time solution but it can serve as a framework for evaluating future sourcing decisions.

2. Problem Statement

Channel A is a web-based company focusing on providing Asian products and services to Western audiences. One of the main components that contribute to Channel A's success is its sourcing relationship with its Asian suppliers. Therefore, appropriate strategic sourcing decisions are crucial in boosting Channel A's competitive position and minimizing its total cost. The benefit of strategic sourcing, though, extends far beyond cost reduction. Strategic sourcing enables Channel A to drive revenue growth by ensuring an optimal product portfolio from reliable and focused suppliers. Through appropriate strategic sourcing, Channel A can redefine and restructure relationships with suppliers of goods and services to generate competitive advantages--creating a competitive chasm that other firms cannot cross. In this project, we apply our strategic sourcing methodology to Asian cultural arts collectible products to determine the optimal supplier relationship model that Channel A should adopt given its market share.

3 Company Background

3.1 Overview

Channel A, a start-up company incorporated in April 1996, is the first US-based distribution channel on the Internet for Asian-related information, products and services. Channel A's target customers are the community of Asia watchers. These people are interested in purchasing high quality unique Asian products such as Chinese tea set, herbal medicine, Hong Kong film, etc.. These Asia watchers are young in age (18 to 45), highly educated, affluent, English speaking, and concentrated around metropolitan areas.

3.2 Business model

The company's business model focuses on building the first major integrated content and Internet commerce channel using the Internet. Channel A integrates its products and services into five entertaining and informative content areas: Arts & Entertainment, Food (Cooking Kits, Cookbooks, CD-ROMs, Cookware), Health & Wellness (Herbal Products, Health Books), Business, and Community. Additional revenue streams originate from consulting services and on-line servicing.

3.3 Current Position

Some of the products or services are supplier-driven in which Channel A has access to the available resources first and then construct content to attract watchers to shop through its website. On the other hand, other products or services are customer-driven with information conducted from consumer surveys and market research. Channel A then solicits suppliers for products and services that match customers' preferences.

4. Strategic Sourcing Methodology

Finding the optimal strategic sourcing problems is difficult due to the overwhelming number of issues involved. In order to isolate a near optimal solution for strategic sourcing problems, we must be able to bound and focus the problem. With this in mind, we developed a three-phase methodology for bounding, focusing and isolating strategic sourcing decisions: formulation, evaluation and appraisal. This methodology is a general one, which can be used to guide Channel A in its journey into its global strategic sourcing.

4.1 Project Approach

In the problem formulation, three studies were conducted to structure our framework based on uncertainties, competitive factors and bargaining power. First, we performed a preliminary study on the competitive advantage of Channel A in the Internet commerce industry by using the framework suggested by M.E. Porter. Second, we used Decision Hierarchy to provide us a conceptual framework to focus on the strategy aspect. Third, a decision diagram was used to provide us with a clear big picture that identifies the major uncertainties in our decisions.

After the formulation phase, our main project approach was centered on the decision analysis tree. Given the key uncertainties such as the market demand, market share and cost structure of Channel A, we constructed a Decision Tree to find the optimal supplier relationship model based on the profitability of each prospect. Since cost structure is one of the key factors in determining the optimal supplier relationship, an EOQ model was constructed to further refine this uncertainty.

In our appraisal phase, both quantitative sensitivity analysis and qualitative appraisal were conducted to come up with the most attractive supplier relationship model with a given range of market share.

4.2 Implementation

Finally, after Channel A has adopted a supplier relationship model, we provide them with the following outputs:

- what the optimal quantity of products Channel A should order
- how often Channel A should place an order to increase service quality

5. Formulation Phase

5.1 Porter Model

To evaluate Channel A's market position, we performed a preliminary study on the competitive advantage of Channel A in the Internet commerce industry. With Porter's Model, we examined the interaction among the five forces: buyers, suppliers, rivalries, substitutes and potential entrants.

5.1.1 Competitive Analysis

Despite the high industry growth rate in Internet commerce, there is currently no direct competitors posing a threat to Channel A. High product differences exist within Internet commerce, where different companies focus on different market niches. In today's market, the leading Internet commerce categories include hardware, software, travel and entertainment. There are no other companies similar to Channel A, where the core business is selling Asian products and services online. However, low exit barriers and low corporate stakes may induce the existing Internet commerce companies to switch to Channel A's line of business.

5.1.2 Entry Barriers

Entry barriers for selling Asian products through Internet commerce are low given the absence of government policy, low capital requirement, low switching costs and high availability of access to distribution. Companies can initiate business by simply setting up a web-site, with extremely low cost. In order to raise entry barriers for potential competitors, it is important for Channel A

to create strong brand identity. Brand identity attracts audiences to visit the site and induce customer loyalty, which is a crucial factor in determining business growth.

5.1.3 Threat of Substitution

The threat of substitution is high. Alternative purchasing channels available to Channel A's customers are mail order stores, import houses, television shopping networks, and shops in Chinatown. The buyer's propensity to substitute is high and the relative price performance of the substitutes would possibly be a determinant in causing these buyers to switch to substitutes.

5.1.4 Buyer's Bargaining Power

Low buyer concentration, combined with low buyer volume diminishes the bargaining power of the buyers. Channel A's customers are mostly affluent, more concerned about the quality of the products and not very price sensitive.

5.1.5 Supplier's Bargaining Power

Due to the uniqueness of the products, high differentiation of inputs and low presence of substitute inputs limit the number of available suppliers for Channel A. Since Channel A's volume is low compared to total purchases in the industry, suppliers have high bargaining power. In addition, threat of forward integration exists when suppliers can simply construct a web-site to distribute their products directly to the customers.

5.2 Decision Hierarchy

Decision hierarchy (shown in Appendix A) provides us with a conceptual framework to define our problem statement. We identified three levels of decisions: policy, strategy and tactics. By focusing our efforts on evaluating the sourcing strategy of Channel A, we gained insights on the criteria that govern our sourcing methodology.

5.3 Identification of Issues

5.3.1 Product lines for study

Channel A is currently focusing on obtaining unique items from a vendor in Taiwan who sells replicated art works and collectibles. Channel A wants to distribute these products to the Asian

watchers. They are paintings, vase and pottery. We focused on identifying the optimal sourcing strategy relationship between Channel A and this Taiwanese vendor for each product line.

5.3.4 Important supplier criteria

A list of supplier criteria is needed to evaluate potential suppliers. These criteria are cultural values, currency risk, handling of logistics, availability of supporting organizations, freight options, customs and duties issues. Please see appendix C for full detail of all the criteria.

5.4 Definition of Potential Supplier Models

In order to determine the optimal supplier relationship, in which Channel A should adopt, we developed a list of criteria to define the four Supplier Relationship Models. The following table summarizes our findings.

TABLE 1. SUPPLIER RELATIONSHIP MODEL

Criteria	Direct Shipment	Container Shipment	Taiwan Consignment	Warehouse Third Party Logistic*
Who takes inventory (warehouse cost)	Taiwan Vendors	Channel A	Taiwan Vendors	Third Party Logistic Company (TPL) in US
Custom cost	Taiwan Vendors	Channel A	Taiwan Vendors	By TPL in US
Shipping Cost	Taiwan Vendors	Channel A	Taiwan Vendors	By TPL in US
Foreign exchange Risk	No	Yes	Yes	No
Min. order Qty	No	Yes	Yes	No
Revenues**	Commission	customers	customers	customers

* Third Party Logistic model exists when market size reaches a set level.

** Price is constant (given by market, Manufacturer Suggested Retail Price)

6. Evaluation Phase

6.1 Qualitative Analysis of the 4 Supplier Relationship Models

1. Direct Shipment from Taiwan vendors



Figure 1

Under this model, Taiwanese vendors directly fulfill the orders and ship the products to customers once the orders are received through Channel A. Channel A acts as a marketing

channel for Taiwanese vendors in the United States and receives commissions on a per order basis.

Advantages:

- A low-risk model in terms of cost since Channel A is not responsible for costs such as shipments, customs and inventory warehousing and exchange rate risk.
- Order volume is flexible since Channel A is not required to hold inventory.

Disadvantages:

- Due to low order volume, Channel A is not able to obtain favorable contract structure and terms with the vendors.
- Channel A’s revenue is based on commissions, resulting in lower profit margin compared to other models.
- The lack of business interactions with customers causes potential threat of forward integration from the vendors to Channel A.

II. Container Shipment

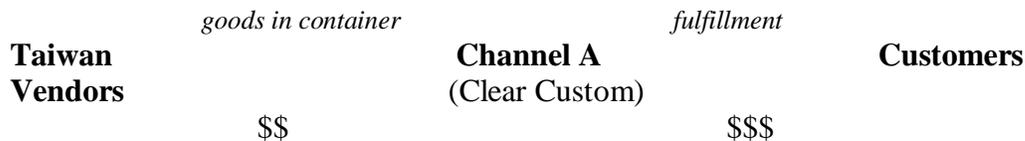


Figure 2

Channel A acts as a sales and distribution channel by ordering a batch of products from the vendors. These items are then loaded into containers by the Taiwanese vendors. Channel A is only responsible for clearing customs, handling shipments in U.S. and fulfilling customers’ orders. In turn, it receives payments directly from customers.

Advantages:

- Channel A handles customers directly; therefore, eliminating the threat of forward integration from its suppliers.
- Channel A provides quality customer service under high market demand due to higher product availability and shorter turnaround time.

Disadvantages:

- Channel A is subjected to higher risk because it is responsible for inventory costs, custom costs, shipping costs as well as exchange rate risk. This creates a burden, especially when the market demand is low.
- Channel A needs to handle customs, shipments and warehouse arrangements which requires time and manpower.

III. Taiwan Consignment



Figure 3

Taiwanese vendors allocate a designated volume of goods for Channel A to distribute to its customers. They then take care of shipping, customs duties and warehouse costs. Channel A does not need to pay for the costs of the items until it receives orders from the customers. Once the order is fulfilled, Channel A receives direct payment from the customers.

Advantages:

- Channel A is exposed to lower risk in this model since Taiwanese vendors are responsible for shipping, customs duties and warehouse costs. In addition, less capital is tied in the inventory because Channel A only pays for the items when customers place an order.
- Channel A has a reliable supply of goods with an allocated volume of products, thus ensuring high customer service.
- Good business relationship with its vendors is required for Channel A to secure its products supply from its vendors.
- Channel A handles fulfillment to avoid forward integration from its vendors.

Disadvantages:

- Since Taiwanese vendors take most of the risk in this model, only a limited choice of suppliers is available, resulting in a narrower product mix.
- In order to offset the high risk it has taken, Taiwanese vendors may charge Channel A a premium. As a result, Channel A is required to have sufficient order quantity to negotiate for lower costs of goods.

IV. Third Party Logistics

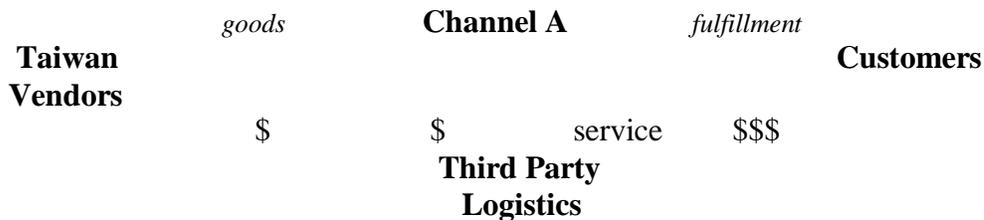


Figure 4

Under this model, Channel A negotiates with a third party logistics company within U.S. to assist in handling shipping and customs. The third party logistics company charges Channel A for the services provided and it receives direct payment from the customers for the products.

Advantages:

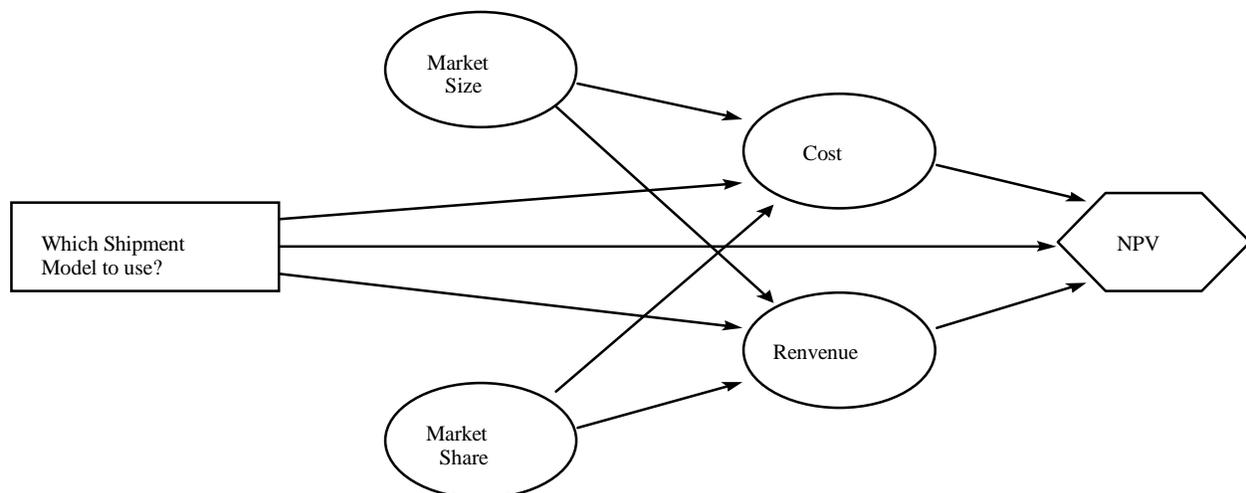
- Channel A saves time and manpower by passing on the shipping and handling to a third party.

Disadvantages:

- This model only exists when the market size is large enough for the third party logistics to take advantage of cost efficiency due to high volume orders.

6.2 Strategic Sourcing Decision Tree

Figure 2 Decision Diagram for Shipment Model



To illustrate the application of the methodology we developed, we constructed a decision tree to find the optimal supplier relationship model for Channel A in the Asian arts collectibles industry. The decision made was based on the net present value of the expected profits per year.

$$\text{Profits} = \text{Quantity demanded by Channel A} * \text{Market Price} - \text{Costs}$$

Initially, the decision was supposed to rest on the lifetime of the existence of the model so that cash flows for future years should be projected to calculate the net present value. However, the market demand for Asian art collectibles has been constant for recent years; therefore, the market size for Asian replicas should stay approximately the same. By further assuming that the costs of each model and market price of the products will increase linearly per year by the same inflation

rate, a decision analysis based on a one-year profit analysis and changing market share are well justified.

The general scheme of the analysis is shown in Fig 1 above. The profit associated with each alternative was described in terms of the market price of the product, the market demand of Channel A and its operating capital costs.

6.3 Economic Order Quantity Model

With the container and consignment models, Channel A has to hold inventory and this incurs costs. We employed the EOQ model, which takes in the quantity demand, costs of holding inventory, fixed order costs as inputs and generates the optimal order size and the frequency of order as outputs. From the optimal order size (Q^*), we are able to calculate the average inventory costs for each of these models.

Inventory Management Objectives

- High customer service
- Minimum holding costs

Inventory Management Inputs

- Quantity Demand Mean and Standard Deviation
- Data obtained from Channel A's estimates.

Costs associated with quantity of items stocked (Variable with quantity of items)

- *Item costs* - product, transportation, customs duties, insurance.
- *Carrying costs* - capital, storage, risks of damage, obsolescence, and deterioration.

Costs associated with placing an order (Fixed and independent of item quantities)

- Purchase order administration, customs bond, customs broker fees.

The costs involved are obtained from research conducted by calling up U.S. Customs, customs brokers and logistics companies.

Inventory Management Outputs

- How much to order at one time (Q^*)
- When to place an order (T^*)
- How much safety stock levels to guard against fluctuating demand (ss)
- Optimal re-order point after inventory is depleted (ROP)
- Average capital tied in inventory

The EOQ model minimizes the total average costs and the optimal quantity to order that balances carrying costs (variable) with order costs (fixed). For a detailed explanation of the methodology, please refer to Appendix E.

$$\text{Total Cost} = \text{Avg. capital tied in inventory} + \text{costs of goods sold}$$

The total cost is then factored into the Decision Analysis tree as an input to compare the profitability of each model.

6.4 Exchange Rate Risk Analysis

Channel A needs to take account of exchange rate risk when it has to make payments to suppliers in Taiwanese currency. The four models that we evaluated do not have this complication, but the following analysis provides a risk-adjusted dollar value for Channel A to use in valuing contact terms with suppliers in the event that it needs to pay in foreign currency.

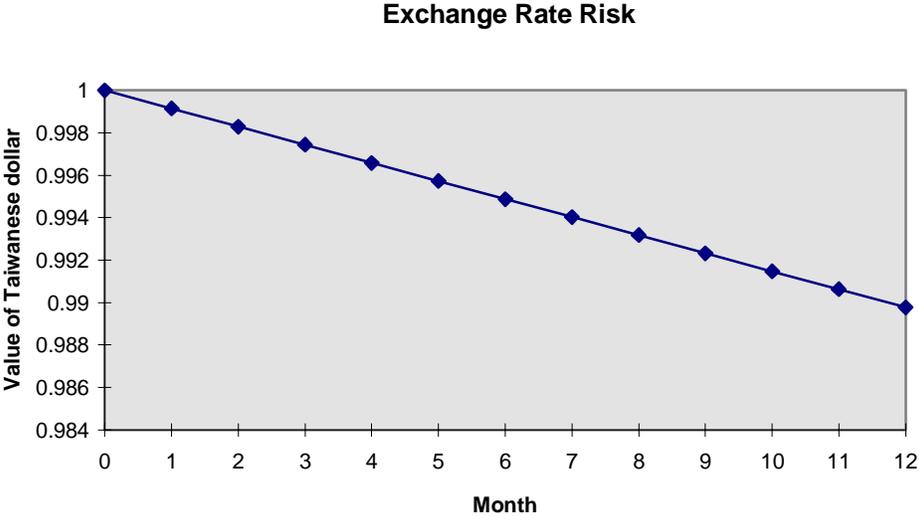


Figure 3. Evaluation of Exchange Rate risk in Taiwanese dollar in a one year period

The above figure illustrates that the value of Taiwanese dollar decreases with time. This suggests that longer payment term for Channel A to pay the suppliers not only enables Channel A to manage cash easier but also implies that it is paying a smaller risk-adjusted value.

7.2 Sensitivity analysis on market demand of Channel A

Even though the market size of the Asian cultural art reproduction industry has remained flat for recent years, the market share of Channel A can fluctuate. Customers can purchase these products directly from Asia through mail order or during Asian cultural and arts exhibitions. As a result, to capture the stochastic nature of the market channel characteristics, a possibly changing market share for Channel A, sensitivity analysis was performed to determine the optimal supplier relationship model for a given market share.

7.3 Strategic Scenario

In the Third Party Logistics (TPL) existence scenario, the logistics service provider offers a variety of services custom designed for its clients, ranging from warehousing, product delivery and fleet management to order fulfillment and inventory management. Currently, the market for Asian art replicas is relatively small, resulting in a low demand volume. Thus, it is not worthwhile for TPL companies to consolidate the logistics and customs services, as the low volume would not justify the demand for such services. However, if the market for such products goes above certain levels, Third Party Logistic companies would be able to act as a common source for consolidation of logistics and customs services.

8. Results

The result of the analysis calculates the profits that would be generated from each of the different supplier relationship alternative. The alternative that generates the most profit according to our analysis is the one we recommend. However, profit generated from different models is a function of market share. As a result, we recommend Channel A to select the supplier model (which maximizes profit) corresponding to the market shares it can earn. The following paragraphs summarize the results for the three product lines that we studied.

8.1 Paintings

Assumptions

- Market size. In our analysis, we assume the market size is a probability distribution of the following:



- Average Unit Price = \$50.
- Cost of Goods

	Direct Shipment	Container Shipment	Taiwan Consignment	Third Party Logistics in US
cost of goods	\$30	\$20	\$20 - \$26	\$26

• **Annual Minimum Order Quantity**

Container Shipment : 500 units

Taiwan Consignment : 150 units

Recommended Alternatives:

Recommended Supplier Relationship Models

Market Shares	Small Market Size	Market Size > 3,000 units per year
5% to 10%	Direct Shipment	Third Party Logistic
10 % to 80%	Taiwan Consignment	Taiwan Consignment
80 % to 100%	Container Shipment	Container Shipment

8.2 Pottery

Assumptions

• **Market Size**

The probability distribution for the market size of Vase is as follows:



* Third party logistic company exists when market size exceeds 500 units.

- **Average Unit Price** = \$120
- **Cost of Goods**

	Direct Shipment	Container Shipment	Taiwan Consignment	Third Party Logistics in US
Cost of goods	\$37.5	\$25	\$31.30	\$35

- **Annual Minimum Order Quantity**

Container Shipment : 300 units

Taiwan Consignment : 150 units

Recommended Supplier Relationship Models

Market Shares	Small Market Size	Market Size > 1,300 units per year
0% to 15%	Direct Shipment	Third Party Logistic
15 % to 35%	Taiwan Consignment	Taiwan Consignment
35% to 100%	Container Shipment	Container Shipment

8.3 Vase

Assumptions

- **Market Size**

The probability for the market size of

probability



* Third party logistic exists when market size exceeds 500 units.

- **Average Unit Price** = \$150
- **Cost of Goods**

	Direct Shipment	Container Shipment	Taiwan Consignment	Third Party Logistics in US
cost of goods	\$66	\$48	\$40	\$56

- **Annual Minimum Order Quantity**

Container Shipment : 100 units

Taiwan Consignment : 100 units

Recommended Alternatives:

Recommended Supplier Relationship Models

Market Shares	Small Market Size	Market Size > 1,300 units per year
0% to 20%	Direct Shipment	Third Party Logistic
20 % to 45%	Taiwan Consignment	Taiwan Consignment
45% to 100%	Container Shipment	Container Shipment

8.4 Discussion of Results

When Channel A's market share is small, the Direct Shipment model is optimal. This is because it is difficult for other models to achieve cost efficiency with a small order size. If the total market size is large enough to support the TPL model, then TPL will replace Direct Shipment as the optimal model.

However, when Channel A's market share increases, Taiwan Consignment becomes the optimal model for Channel A to adopt. The larger order purchase from its increasing market share allows Channel A to negotiate better pricing with the vendors.

When Channel A is able to capture the majority of the market shares, it is the best for Channel A to adopt the Container Shipment model. The large order quantity under this favorable condition allows Channel A to achieve cost efficiency. Channel A can enjoy larger profit margins under this model by arranging shipment, custom and warehouse by itself without relying on a third party which charges it with higher cost.

9. Implementation Phase

9.1 Inventory Management

After obtaining the optimal model to use, the implementation phase would involve the actual logistics of implementing the model. If the optimal models turn out to be container or the consignment models, then Channel A would use the output derived from the EOQ model to order the optimal quantities at the optimal order frequency. The following tables illustrate Channel A's implementation steps for the models if they turn out to be optimal for Channel A's current situation.

Optimal Order Parameters

The important parameters that Channel A should consider are:

- Q* - Optimal order quantity per order.
- N* - Optimal number of orders Channel A should place in a year.
- Avg. Inventory Cost - Amount of capital Channel A should set aside in a year to cover inventory holding costs.

Demand (Paintings)	250	500	625	1000	1250	2500	5000
<i>Container</i>							
Q* (minimum = 500)	500	552	617	781	873	1235	1746
N*	0.5	0.9	1.0	1.3	1.4	2.0	2.9
Average Inventory Costs	\$5,133	\$5,669	\$6,339	\$8,018	\$8,964	\$12,677	\$17,928
<i>TW Consignment</i>							
Q* (minimum = 150)	329	465	520	658	735	1124	1590
N*	0.8	1.1	1.2	1.5	1.7	2.2	3.1
Average Inventory Costs	\$3,947	\$5,582	\$6,240	\$7,894	\$8,825	\$11,243	\$15,900

Demand (Vase)	125	200	250	500	1000	1250	2500
<i>Container</i>							
Q* (minimum =100)	100	100	101	142	201	225	319
N*	1.3	2.0	2.5	3.5	5.0	5.5	7.8
Average Inventory Costs	\$3,130	\$3,130	\$3,153	\$4,459	\$6,305	\$7,050	\$9,970
<i>TW Consignment</i>							
Q* (minimum =100)	100	100	100	100	130	146	206
N*	1.3	2.0	2.5	5.0	7.7	8.6	12.1
Average Inventory Costs	\$2,400	\$2,400	\$2,400	\$2,400	\$3,131	\$4,951	\$4,951

Demand (Pot)	50	125	200	250	500	1000	1250	2500
<i>Container</i>								
Q* (minimum = 300)	300	300	300.0	300	300.0	300.0	315.7	446.4
N*	0.2	0.4	0.7	0.8	1.7	3.3	4.0	5.6
Average Inventory Costs	\$ 5,494	\$ 5,494	\$ 5,494	\$ 5,494	\$ 5,494	\$ 5,494	\$ 5,781	\$ 8,175
<i>TW Consignment</i>								
Q* (minimum = 150)	150	150	150	150	150	178	199	281
N*	0.3	0.8	1.3	1.7	3.3	5.6	6.3	8.9
Average Inventory Costs	\$ 2,344	\$ 2,344	\$ 2,344	\$ 2,344	\$ 2,344	\$ 2,778	\$ 3,106	\$ 4,392

Re-order Point Recommendations

The following tables represent the safety stock levels and corresponding re-order points for inventory management.

Re-order Point Levels	Painting Container	Vase Container	Pots Container	Painting Consignment	Vase Consignment	Pots Consignment
Mean Demand	520	364	312	520	364	312
SD of Demand	208	145.6	124.8	208	145.6	124.8
Lead Time L	0.057692	0.057692	0.057692	0.23077	0.23077	0.23077
Q (optimal order quantity)	463	122	1581	467	127	164
Uncertain Demand Re-order Pt.	379	265	227	488	342	293

9.2 Payoff Matrix / Game Theory

We applied game theory to assess the threat of forward as well as backward integration by Channel A and its suppliers in Asia. We evaluated the relative positional advantage and credibility of the threat to forward / backward integrate. For instance, Channel A's suppliers might decide to skip the middleman and tackle the distribution of their products into U.S. themselves (forward integration). This threat can be analyzed by looking at the suppliers' competence in carrying out the distribution capabilities. On the other hand, Channel A might threaten to retaliate by sourcing the product through another vendor. Alternatively, Channel A might consider backward integrating into the supply chain by manufacturing the product itself. However, building a new relationship with other vendors or setting up a manufacturing facility and logistics take a considerable amount of time and money.

Renegade

Supplier's Action

Channel A's action

	<i>Status Quo</i>		<i>Channel A Backward Integrate</i>	
<i>Status Quo</i>	1	(20, 10)	3	(25, 5)
<i>Vendor Forward Integrate</i>	2	(10, 20)	4	(15, 15)

Note: (x,y): The x-entry in the boxes represents the payoff of Channel A's action. The y-entry in the boxes represents the payoff of Vendor's action.

In choosing suppliers, Channel A is exposing the suppliers' products and brand name into the U.S. market. This strengthens the bargaining power of suppliers and increases the possibility of forward integration by the suppliers. By forward integrating into the U.S. market, the renegade supplier will be able to capture profits away from Channel A (Payoff 2) and it is in its best interests to do so. On the other hand, Channel A also has first mover's advantage to backward integrate into the supply chain by manufacturing the item themselves (Payoff 3) and it is also its best interests to do so. However, any of the two actions above would provoke retaliation from the other party and the likely result would be the scenario outlined in Payoff 4.

To reduce the likelihood of such confrontations and to strengthen Channel A's bargaining position, we think that the following points should be noted when choosing a potential product and supplier. Channel A should note the following points.

- 1) Use Channel A's proprietary brand name/trademark to maintain individual brand name awareness and protect prior investments (e.g. marketing) in its brand name.

- 2) Negotiate a contract-permitting Channel A to be the only authorized distributor of the product in the U.S. market.
- 3) Avoid direct shipment models where the suppliers will have access to proprietary end customer data (names, addresses and purchase characteristics of customers). Access to such data may result in the supplier eliminating Channel A altogether in the supply chain.

10. Conclusion

Establishing and sustaining a strategic sourcing relationship demands honest communication, careful planning and the alignment of vision between Channel A and its global suppliers. High level of flexibility is required for this relationship to function over the long haul. We hope our global strategic sourcing methodology will provide the necessary guideline to enable Channel A to establish strategic sourcing relationships with its strategic partners. Ultimately, such relationships may provide not only higher quality business processes, but also a key resource for helping Channel A achieve breakthrough strategies that move them closer to their business goals.

11. Lessons Learned

Lesson 1: Framing

Good framing of a project is the key to success. Good problem framing reduces resources wasted significantly and points the project in the correct direction. Framing begins by reviewing the course's requirements and expectations to determine how the project will work within the constructs of the course. One of our biggest problems was deciding on how our project, developing a global sourcing methodology, fits within the expectations of the course. Once this is accomplished, the details of a project will begin to take form by identifying project objectives, documenting the needs and agreeing on the definition. Decision diagram is very useful in identifying the major uncertainties of the problem and helps us focus our research. No research should be done until this is done. In early stages of our project, due to lack of project focus, significant time was wasted on researching unnecessary topics.

Lesson 2: Use EESOR tools as a means to the end.

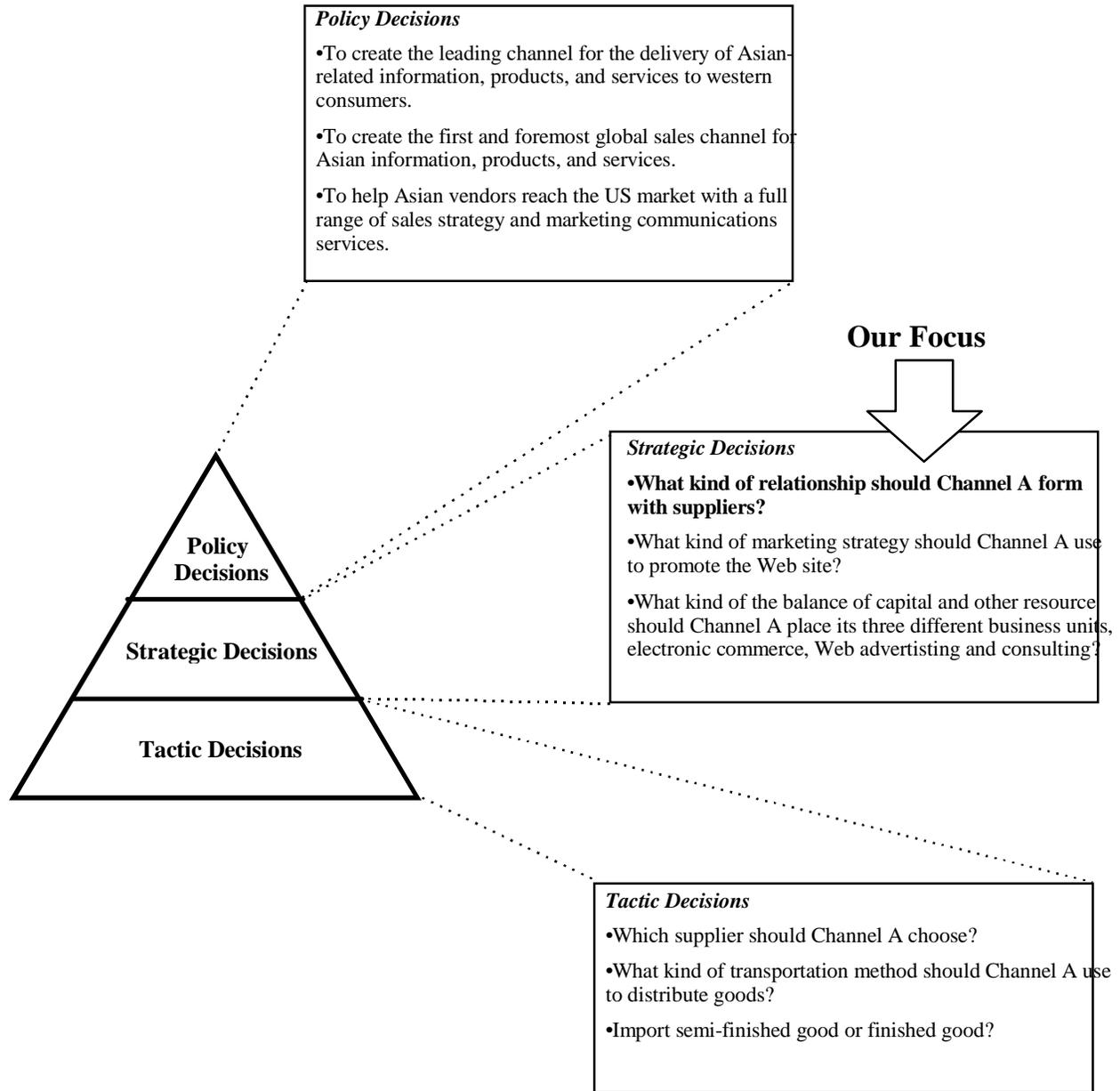
EESOR should only be used when it provides value in understanding or solving the problem. During the course of our project, we have a hard time trying to apply everything we have learnt

to the problem. We find that we have to improvise on what we learn, and not just applying the tools blindly. In strategic sourcing, some of the issues are very hard to quantify and therefore hard to apply EESOR analytical tools. We believe some of the qualitative analysis are more appropriate in addressing the problem. Some of the tools are like, Porter's 5 Forces models and strategic scenario.

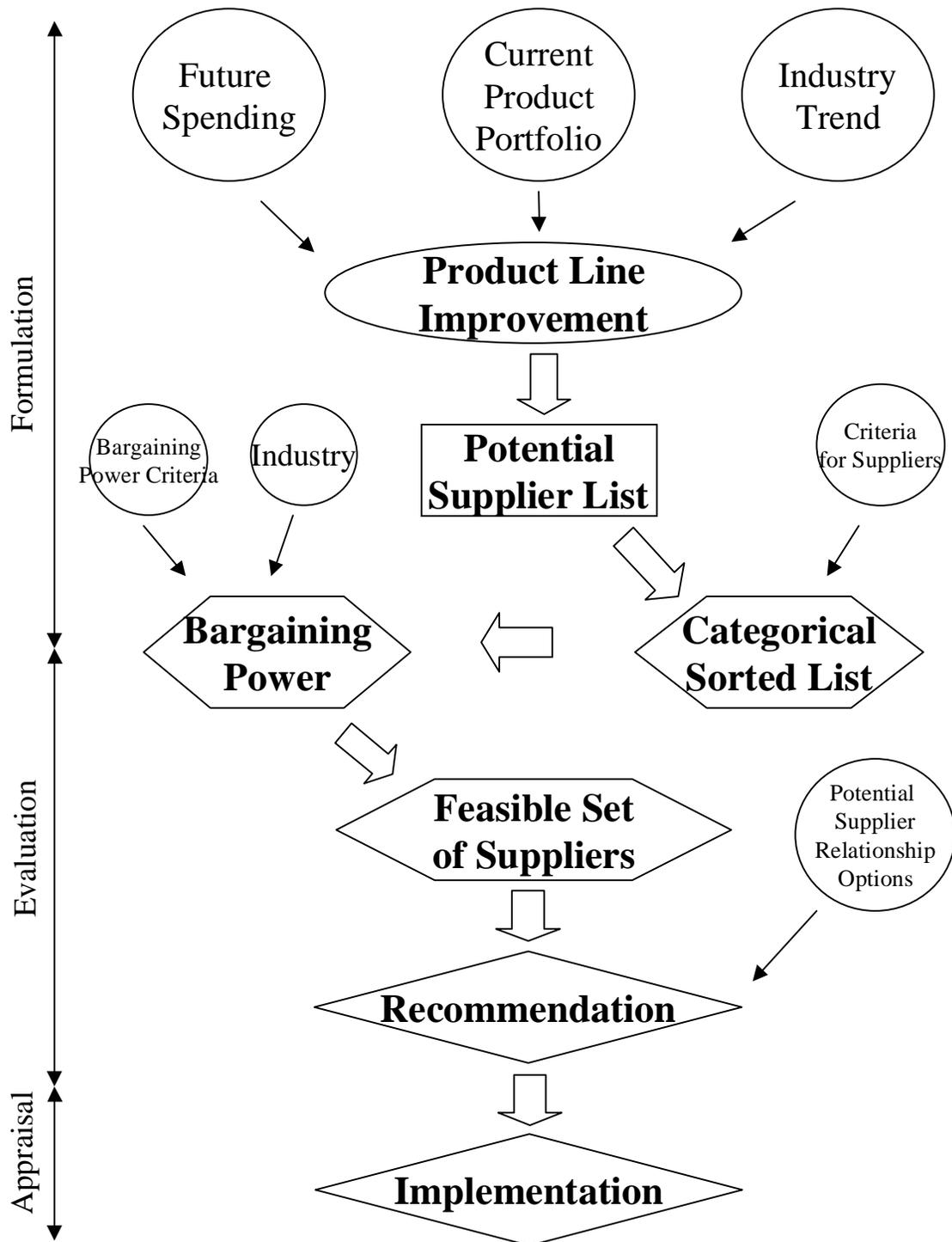
Lesson 3: Project planning and structuring

Project planning is one of the areas where a penny of forethought pays dividends in dollars down the road. At the start of a project, in addition to framing the project, it is beneficial to understand how long and how much resource will likely take to complete the project. In our project, the single most common mistake made is underestimating the time required to complete a task. Often, there was also a considerable amount of effort required to integrate the work of all the team members. Developing an accurate project structure is key to forming an accurate estimate of cost and delivery. Without a project structure, the work is a series of unrelated tasks which provides little sense of achievement and no feeling of advancement. If the team has no grasp of how individual tasks fit together towards an understood goal, then the work will seem pointless and they will only feel frustration.

Appendix A: Decision Hierarchy Diagram



Appendix B: Methodology Flowchart



Appendix C: Decision Tree for Vase

Average unit price		\$150		Channel A Demand Revenue				Cost
Assume Risk Neutral				High Market Share	0.00	2500 \$	375,000.00	\$ 165,000.00
				Med. Market Share	0.75	1250 \$	187,500.00	\$ 82,500.00
				Low Market Share	0.25	500 \$	75,000.00	\$ 33,000.00
High market size				89250				
Direct Shipment				High Market Share	0.25	1000 \$	150,000.00	\$ 66,000.00
				Med. Market Share	0.75	500 \$	75,000.00	\$ 33,000.00
				Low Market Share	0.25	200 \$	30,000.00	\$ 13,200.00
Med. market size				54206.25	56700			
Low market size				High Market Share	0.25	250 \$	37,500.00	\$ 16,500.00
				Med. Market Share	0.75	125 \$	18,750.00	\$ 8,250.00
				Low Market Share	0.25	50 \$	7,500.00	\$ 3,300.00
High market size				14175				
Taiwan Consignment				High Market Share	0.25	2500 \$	375,000.00	\$ 110,650.00
				Med. Market Share	0.75	1250 \$	187,500.00	\$ 65,650.00
				Low Market Share	0.25	500 \$	75,000.00	\$ 35,650.00
High market size				167312.5				
Med. market size				High Market Share	0.25	1000 \$	150,000.00	\$ 55,650.00
				Med. Market Share	0.75	500 \$	75,000.00	\$ 35,650.00
				Low Market Share	0.25	200 \$	30,000.00	\$ 14,260.00
Med. market size				73665.78	57035			
Low market size				High Market Share	0.25	250 \$	37,500.00	\$ 17,825.00
				Med. Market Share	0.75	125 \$	18,750.00	\$ 8,912.50
				Low Market Share	0.25	50 \$	7,500.00	\$ 3,565.00
High market size				13280.63				
Container Shipment				High Market Share	0.25	2500 \$	375,000.00	\$ 180,000.00
				Med. Market Share	0.75	1250 \$	187,500.00	\$ 180,000.00
				Low Market Share	0.25	500 \$	75,000.00	\$ 90,000.00
High market size				50625				
Med. market size				High Market Share	0.25	1000 \$	150,000.00	\$ 36,000.00
				Med. Market Share	0.75	500 \$	75,000.00	\$ 14,400.00
				Low Market Share	0.25	200 \$	30,000.00	\$ 14,400.00
Med. market size				54871.88	77850			
Low market size				High Market Share	0.25	250 \$	37,500.00	\$ 18,000.00
				Med. Market Share	0.75	125 \$	18,750.00	\$ 9,000.00
				Low Market Share	0.25	50 \$	7,500.00	\$ 3,600.00
High market size				13162.5				
Third Party Logistic in US				High Market Share	0.25	2500 \$	375,000.00	\$ 140,000.00
				Med. Market Share	0.75	1250 \$	187,500.00	\$ 70,000.00
				Low Market Share	0.25	500 \$	75,000.00	\$ 28,000.00
High market size				146875				
Med. market size				High Market Share	0.25	1000 \$	150,000.00	\$ 56,000.00
				Med. Market Share	0.75	500 \$	75,000.00	\$ 28,000.00
				Low Market Share	0.25	200 \$	30,000.00	\$ 11,200.00
Med. market size				69765.63	58750			
Low market size				High Market Share	0.25	250 \$	37,500.00	\$ 14,000.00
				Med. Market Share	0.75	125 \$	18,750.00	\$ 7,000.00
				Low Market Share	0.25	50 \$	7,500.00	\$ 2,800.00
High market size				14687.5				
Total Value				73665.78125				

Appendix D: Criteria in Formulation

Cultural Value

- The book, *Culture's Consequences, International Difference in Work Related Values*, by Geert Hofstede provide fundamental dimensions along which cultural values are measured. This book names work-related values and makes numerical measurement of the importance of these values in several countries. The characteristics are Power Distance, Uncertainty Avoidance, Individualism, Masculinity. In addition to the four characteristics identified by Hofstede, modern researcher also identify two other characteristics: Need for Harmony and Face that are also crucial.

Power Distance

- Power difference is a measure of the inequality of power and influence within a society. A high score indicates that there are major differences in power and influence between the more powerful and the less powerful. The difference may or may not make the subordinate unhappy or rebellious.
- Displays of power, either personal power or the buyer's power over the seller, will be more or less appropriate depending on the country. In most Asian countries, the customer has higher status and can use that status easily. There will be a strong tendency for sellers to want to meet the buyer's request.

Uncertainty Avoidance

- This is a measure of how uncomfortable a society is with uncertainty. A high score indicates a strong discomfort and a low score indicates a low discomfort. Signs of high uncertainty avoidance include a high degree of rules and rituals, generally developed as a method of warding off the fears of uncertainty. People in countries with high uncertainty avoidance will not respond well to sudden surprises, either in negotiations or in scheduling. Expect detailed and meticulous planning.

Individualism

- Individualism indicates the balance between the needs and wants of individuals and those of the larger group in a society.

Currency Issues

- With increased ease of international commerce, the necessity to exchange currencies remains one of the most intractable problems. Currencies strengthen and weaken with respect to each other. The impact of a weaker dollar on buyers is that imported goods get more expensive. If the dollar strengthens, the opposite happens.
- If the price of a product is set in one currency, the user of the other currency is taking on the “exchange risk.” The main reason that a buyer agree to take on a exchange risk is to get a lower initial price.

Currency Hedging

- Mechanism for currency hedging includes: Forward Contracts, Futures contracts, currency options, risk sharing and escape clauses.

Logistics

- In order to be successful in global supply chain management, a thorough understanding of Logistics is required. This understanding is required to communicate logistics issues with experts, to have a sense of what you can and cannot do and to have a good idea of what various services cost.

Support Organizations

- There are organizations along the way to coordinate a lot of the logistics steps, at a cost that most people accept as reasonable.

Freight Forwarders

- Freight forwarders provide a variety of services. The main ones are to arrange sea or air transport and to generate the shipping documentation. They also pick up goods at the supplier’s factory and deliver the goods to the port. They ascend shipping details to the receiver of the freight, giving flight numbers or ship names and arrival dates. Once goods have cleared customs in the United States, they notify the buyer to pick them up. Some forwarders can also deliver the goods from the port of export to the buyer.

Customs Brokers

- Customer Brokers provide advice on customs classification, fill out the forms necessary to clear goods through customs, pay duties for the importer, and notify the importer that the goods are available.

Freight Options

- The two main options from international freight are Airfreight and Ocean freight.

Air Freight

- Airfreight is best for light, small and valuable goods. If volume is large enough, Air freight is negotiable and confidential between the freight forwarder, buyer, and shipper. The price range which most large shippers will fall are:
 - Japan to U.S. West Coast: \$4-\$6 per kilogram (2.2 pounds).
 - Other Asian Location to the U.S. West Coast: \$2-\$5 per kilogram

Cost may also be based on physical volume rather than weight. A light, bulky product takes up space on an airplane that could generate revenue. Carriers have devised a formula for “volumetric weight.” The above prices are good for a kilogram of weight or 6,000 cubic centimeters of volume, whichever costs more. Thus, a one kilogram product that is 12,000 cubic centimeters in volume would be charged as if it weighed two kilograms.

The transit time ranges from zero to two days. One day is typical. In most cases, goods picked up from the supplier will be on the plane on the same day, or sometimes the next day. Once in a plane, the goods will be in a major U.S. airport the same calendar day. They will clear customs the next day and be available for pickup.

Ocean Freight

Most ocean freight travels in freight containers that also function as trailers for trucks. The containers are loaded at the supplier's warehouse and trucked to a seaport. The container is loaded at the supplier and trucked to a seaport, where the container is lifted off its wheels and put into a container vessel. At

the receiving port, it is put back on wheels and trucked to its destination. A container can also go directly onto a railcar.

Ocean freight containers come in two lengths: 20 feet and 40 feet. Width is 8 feet, and there are three heights: 8 feet, 8.5 feet, and 9.5 feet. If a shipment is too small to have its own container and too heavy to go by air, the shipment can be ship by “less than container full” (LCL). A consolidator would out goods with others’ into a container, so that the goods still travel by container, not loose in a ship’s sort hold. There are delays on both ends for loading and unloading from the container.

Ocean freight costs are complex. There will be a list of prices covering export port charges, import port charges, currency adjustments, and fuel adjustments as well as the carriage itself. The total cost to move a 40-foot container from port to port and deliver to U.S. customs is approximately:

- Japan to U.S. West Coast: \$3,000-\$4,000
- Singapore to U.S West Coast: \$4,000-\$5,000

This cost applies regardless of how full the container is. A 20-foot container costs approximately 70% percent as much as a 40-foot container.

Typical transit times are as follows:

- Japan to Oakland: 12 days
- Singapore to Oakland: 20 days

Customs

All goods entering the United States are subject to inspection by the U.S. Customs Services. They enforce customs laws and related laws having to do with import quotas for certain goods. While goods are subject to inspection, U.S. customs usually does not inspect them, provided the importer has a good record of following laws and regulation.

Both the U.S Customs Service and the customs broker will charge you for entering goods into the United States. The U.S Customs charges a fee based on the value of the goods. It is currently 0.19 percent. There is a minimum charge of \$21 and a maximum charge of \$400 per entry. This addition to any duties that you must pay. In addition, for goods arriving by ocean freight, the Custom Service

will collect a “Harbor Maintenance” fee of 0.125 percent of the value of the goods. The money they collect is earmarked for port improvements, such as dredging.

The broker will charge you a negotiated fee per entry. An “entry” is all the goods that arrive on one waybill (a logistics term meaning “a list of goods and shipping instructions”). In the case of air freight, this is call a “house air waybill” or HAWB. There is usually a higher charge for the first line item entered on the waybill and lower charges for successive line items. A typical fee structure might be \$75 for the first item and \$25 for each additional item.

Duties

In order to determine a duty rate, four characteristics of an item are consider:

- What is it?
- What do you use it in?
- Where was it made?
- Does it have U.S content?

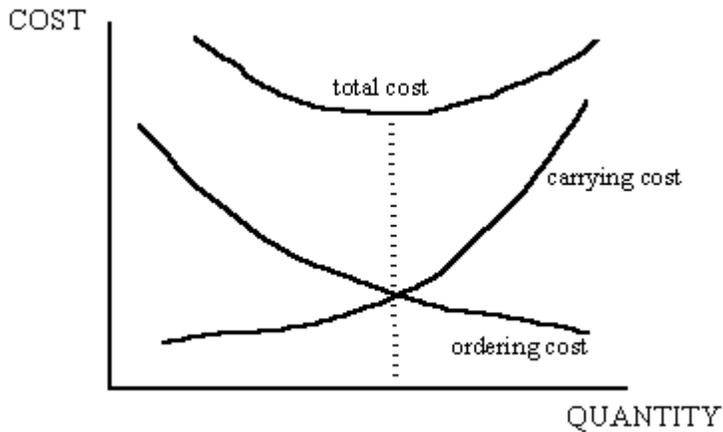
Duty rate determination start with the first question. In 1991, the United States joined the rest of the industrial world by adopting the “Harmonized Tariff Schedule.” All countries now classify products identically for at least the first four digits of an eight-digit classification system.

Products	Customs Duties Assessed
Painting	0 %
Vase	6.5 %
Pot	6.5 %

APPENDIX E: Inventory Management

Economic Order Quantity (EOQ) Model

Inventory model that tries to balance between fixed costs of ordering and variable holding (carrying) costs. From the model, the optimal order quantity and the frequency of order is derived by minimizing average total costs.



Inputs

Item Costs

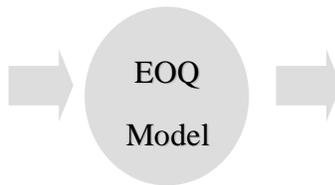
- Product
- Shipping
- Customs Duties

Carrying Cost (Variable)

- Warehouse
- Interest on Capital

Order Cost (Fixed)

- Purchase Order Admin
- Customs Brokers Costs



Outputs

When to Order?

How much to order?

Definition of EOQ Model Variables

Q = units per order

Q* = optimum order quantity

D = annual demand in units

S = setup or ordering cost/order

H = holding cost/unit/time

EOQ Model Formulas

Annual setup cost = $(D/Q)(S)$

Annual holding cost = $(Q/2)(H)$

$$\text{Total Cost} = \frac{D}{Q} * S + \frac{Q}{2} * H$$

Minimize Total Cost

subject to $Q \geq 0$

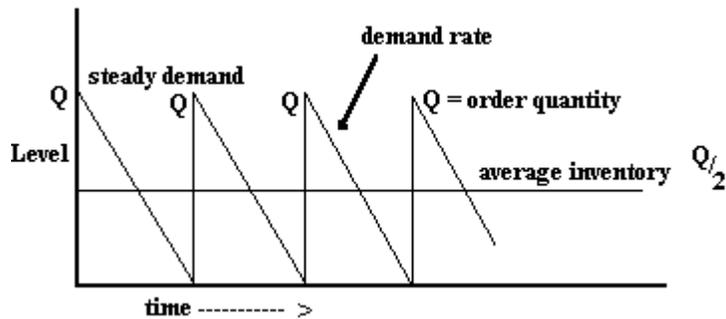
Q* when setup = holding cost

$$Q^* = \sqrt{\frac{2DS}{H}}$$

Model Refinement - (Q, R) Model with Continuous Review

Under deterministic demand, when the inventory level drops down to the re-order point, another new order of size Q^* is made.

$$\text{Base ROP} = (D/W)(L)$$



However, when demand is *stochastic*, it is optimal to keep a safety stock to guard against fluctuating demand.

ss = Safety Stock

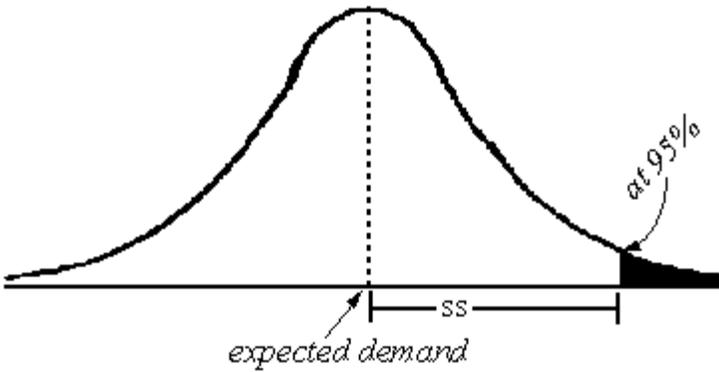
Safety Stock Calculation & Service Level Requirements

We may forecast an expected demand but orders may be more or less than expected. So we need to carry extra, safety stock to provide a reasonable service level. An assumption of normally distributed demand is also made.

Method to Determine Safety Stock

1. Track historical sales to find:
2. mean
3. standard deviation
4. establish % service level
5. find Z-score from distribution table
6. $ss = (Z\text{-score}) (std\ dev)$

Areas of the Standard Normal Distribution



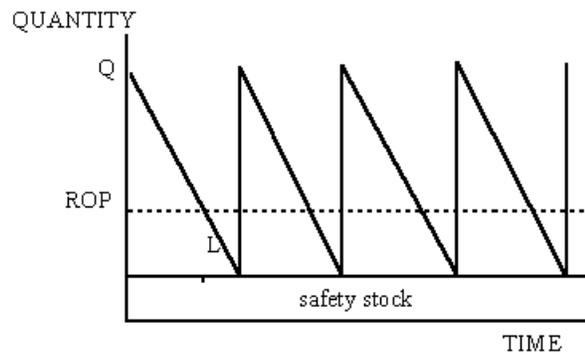
The standard normal graph is used to convert service level (probability level) to a z-value.

$$ss = z * \sigma$$

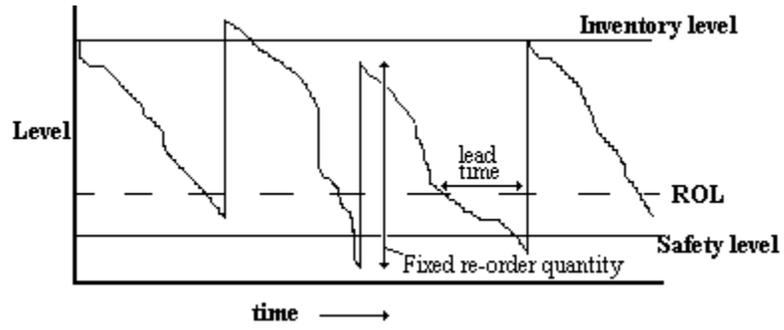
Re-order Point taking into account demand uncertainty:

$$\text{Modified ROP} = (D/W)(L) + ss$$

Inventory Level Graph in Theory with deterministic outflow



Inventory Level Graph with stochastic outflow



APPENDIX F: EXCHANGE RATE RISK ANALYSIS

Goal: To evaluate the unit exchange rate risk as a function of time.

If we are to receive one dollar in the Taiwanese currency one year from now, what is the present value of that dollar. One way we can calculating the present value is by generating the one year discount rate and then discount the dollar back to the present. However, this methodology ignores the exchange rate risk. The correct present value of the one Taiwanese is the one year discount rate times the exchange rate risk times he one dollar

Method: Develop exchange rate model using binomial tree

- Obtain parameters (u , d , p) from historical data. “ p ” is the probability that the exchange rate will increase by “ u ” percent in the next period. “ $1-p$ ” is the probability that the exchange rate will decrease by “ d ” percent in the next period. Evaluating u ' and d ' in a multi-period setting will result in a lattice structure.
- Develop multi-period exchange rate model using u and d . The resulting structure will be a lattice.
- Develop multi-period probability model using p . The resulting structure will be a lattice
- Calculate expected exchange rate for each period of interest by multiplying the probability lattice with the exchange rate lattice and summing the same each period.