

FINAL REPORT

Project Title:

**Simulation Model to Analyze the Impact of Outsourcing
on the Performance of the Furniture Supply Chain**

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1. Introduction

With more outsourcing to Asia, the supply chain for US furniture companies are becoming longer. However, US customers expect a high variety for their furniture as well as short delivery times. Due to these factors, furniture companies that want to succeed in an industry witnessing dramatic changes need to have efficient logistics management to have a competitive advantage. To make their logistics network more efficient, companies need to choose the right supply chain model, promote cooperation with their partners in the supply chain, and adopt new technologies for better decision making and management.

1.1. The Upholstered Furniture Industry in the United State

Since late 1990's, the furniture industry in the US quickly shifted much of its production to Asia. Major furniture manufacturers either shut down their plants or reduced their production in the US. For example, La-Z-Boy Inc., the second-largest furniture manufacturer in the US with \$2.1 billion in annual sales, has shut down much of its US production and moved to China (Chavez, 2007). Major US furniture companies now focus on brand management and logistics management. Furniture retailers are seeking direct outsourcing overseas. Furniture factories in Asia are also seeking direct US business. In other words, the whole furniture supply chain, in a global scope, is experiencing a dramatic change. To survive and develop in this dynamic environment, all players need to define, develop, and maintain their competitiveness via tuning their supply chain.

In 2006, US consumers spent \$83,920 million on residential furniture and bedding, which represented a 6.2% increase from 2005. Table 1 summarizes the shipments of wood and upholstered furniture in the US.

	2005 (Million)	2006 (Million)	% Change
Wood: Domestic	\$13,141	\$13,484	2.6%
Wood: Imports	\$10,491	\$10,872	3.6%
Upholstered: Domestic	\$11,700	\$12,260	4.8%
Upholstered: Imports	\$2,304	\$2,606	13.1%
Upholstered: Imports from China	\$1,100	\$1,600	45.5%

Table 1. Shipments of wood and upholstered furniture in the US (Epperson, 2007)

US upholstered furniture imports from China has grown on average 56% a year over the last decade. It is expected that the growth of upholstery imports from China will continue, especially for fabric upholstered furniture. The biggest upholstered furniture manufacturing cluster in the US, which has about 200 companies and 25,000 employees, is located in Northeast Mississippi. Most of them receive supplies from Asia, mainly China and Vietnam. A typical shipment from Asia to a furniture company located in Northeast Mississippi is illustrated in Figure 1. Three transportation modes are involved in the shipment: ocean, railway, and highway. After arriving at Long Beach by ocean,

containers with furniture material, parts, or assemblies are shipped to Memphis by rail and then go to the companies by trucks.

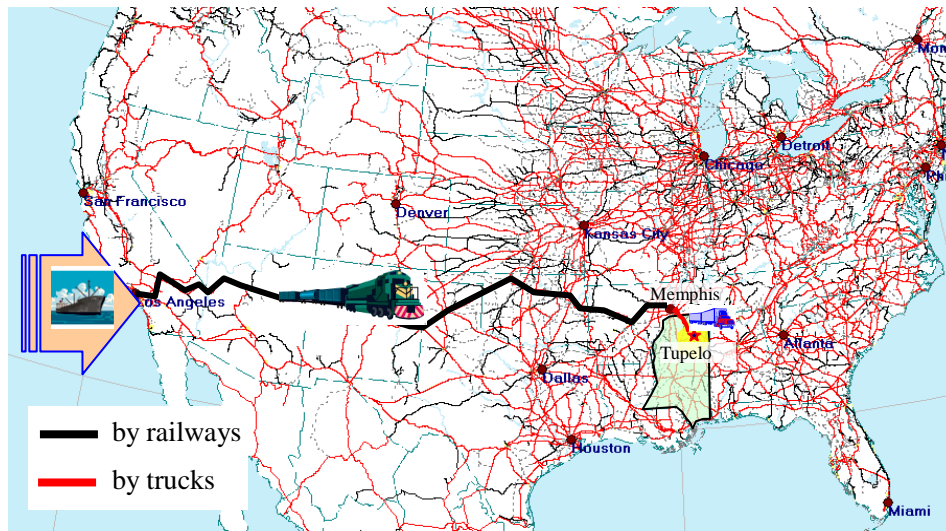


Figure 1. A Sample Shipment from Overseas to a Furniture Company Located in Northeast Mississippi.

1.2. Logistics: A Key Issue in the Competition

As shown in Table 1 above, imports have a large share in the furniture market in the US and this share is growing. There are three major reasons why US furniture companies have been losing their market to imports in the past 15 years.

1. The globalization forces have exposed US furniture companies to global competition (Schuler and Beuhlmann, 2003).
2. Containerized shipping technology significantly has reduced the global shipping costs (Schuler and Beuhlmann, 2003).
3. Production of furniture is labor intensive, and the labor cost in the US is much higher compared to many developing countries.

Based on Table 1, the percentage of import upholstered furniture is smaller compared to the percentage of case goods (wood furniture). The underlying reasons are primarily the different requirements on delivery time due to the degree of customization and the different logistics costs. Customers are typically not given many options with wooden furniture. US furniture companies can order a large batch of standard wooden furniture without facing a big waste in their inventory. The orders from customers are mainly satisfied from on-hand inventory so that the delivery times are short. In contrast, customers often can choose different colors or fabrics on their upholstered furniture. The variety of colors and fabrics is very high. Holding a large inventory for all varieties is not only cost prohibitive but also risky because it is very difficult to forecast customers' demand. At the same time, customers are not willing to wait months to receive their orders. They are typically willing to wait several days or weeks, which can not be met in most cases by a direct shipment from Asia now. Therefore, US furniture companies have

to finalize the upholstered furniture production. Furthermore, upholstered furniture such as bulky sofas and stuffed chairs cannot be shipped as cheaply as case goods. This is why case goods manufacturing in the US has been hit hardest by Chinese competition in the last decade. However, imports of upholstered furniture has also started to increase in recent years because of significant reductions in transportation lead times due to new adopted business models and technologies adopted in global furniture logistics.

Though the overall US furniture industry is in trouble, Ashley Furniture Inc. has grown from No. 4 in sales to No. 1 among all US furniture companies over the last six years. During the same period, other furniture companies closed 280 plants (about 33% of the total production capacity) in the US. Ashley recently hired about 10,000 employees, which means they tripled their employment compared to 1998. Their success was driven by two factors, *globalization* and excellent *supply chain management* (*i.e. logistics management*). Ashley furniture was among the first US furniture manufacturers to begin importing. Compared to 2002, imports from China, which provides 80% of Ashley imports, were nearly tripled in 2006. Ashley imported three containers of fabric, textiles etc. in 2002, but 3,487 containers in 2006. With this volume of imports, Ashley can still take about a week to deliver to customers compared to a three-week lead time for most other furniture companies. The short delivery time indicates they have a very good supply chain management. In fact, Ashley is listed along with IBM, Cisco, Canada Tire and others as one of “supply chain icons” by Gilmore (2006) because it manages a long global supply chain like a just-in-time one. From the success story of Ashley, it can be learned that logistics management is a key issue in the competition among upholstered furniture companies. This fact has been well proven by Wal-Mart’s success in the retailing industry and Dell’s success in the computer industry.

1.3. Logistics Management Challenges in the Upholstered Furniture Industry

The whole economy is moving in the direction of customized products. Baby boomers, in their 40s and 50s now, have more purchasing powers than the rest of the society in the US and always pursue to be unique, including having unique furniture. In the computer industry, Dell succeeded because they allowed their customers to specify their computers and provided a fast delivery. Ikea is growing because it is providing designed furniture to its customer. US upholstered furniture companies just recently realized that competitiveness can be improved by providing customized products for different markets. Mid-priced upholstery maker Southern Furniture has recently launched a “customer-order program” to have a major shift from “factory-designed” to “have-it-your-way” fabrics (Evans, 2007). The company expects a jump in their sales in excess of 25% by providing more specialization and differentiation to their customers. Having a short lead time while keeping cost low is critical to be successful. It requires an efficient logistics network by adopting right business models and new technologies. Another example of a Mississippi company that has been successful in the furniture business assembles furniture for big resorts and hotel chains, such as Disney and Marriott. The company provides customized designs and assembles the furniture that goes in these 4 and 5 star hotels. The material used in their furniture comes mainly from China. They have been profitable and have been able to grow because of the following reasons: (a) they offer customized designs to

a profitable market; (b) lead time is not of a big concern as the customers make orders well in advance; (c) they use outsourcing to their advantage as they purchase all their materials from China.

Four supply chain models for furniture imports from China to the US, illustrated in Figure 2, were discussed by Bryson et al. (2003)

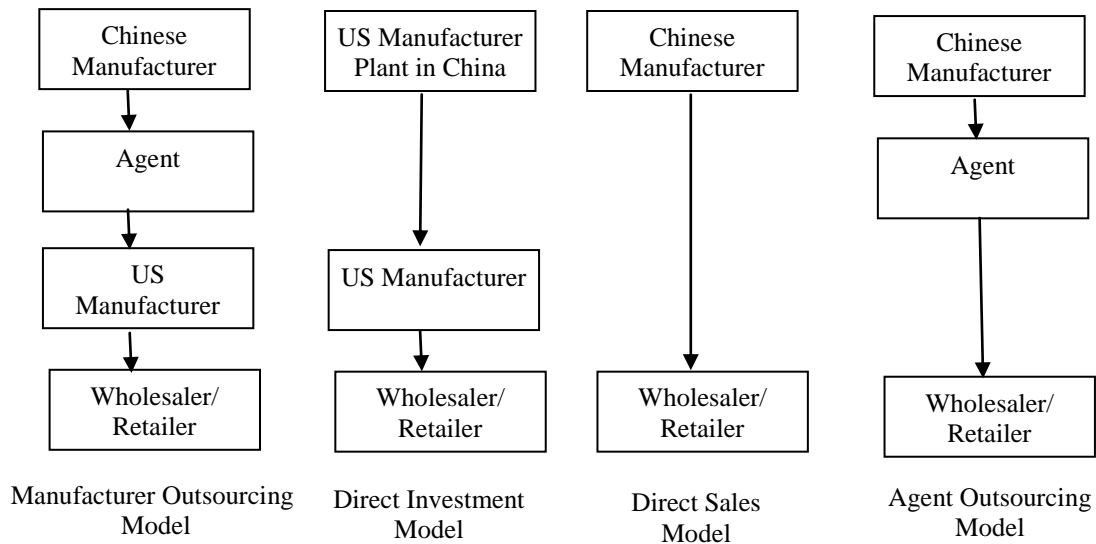


Figure 2. Supply Chain Models for Furniture Imports from China to the US

In the *manufacturer outsourcing model*, US manufacturers outsource parts, assembly, or final products from China through agents but still keep some production capacity domestically. Most upholstery manufacturers in Mississippi follow this model because customers want to enjoy a large variety without having to wait too much. Many big furniture companies, such as Ashley or La-Z-Boy, have built their own production capacity in China and follow the *direct investment model*. Ashley's plant in Kunshang, China employs about 5,000 workers and covers an area of about 1.2 million square feet. The plant is still expanding. Big retail chains such as Wal-Mart and Pier 1, follow the *direct sales model* and have established the direct channels to obtain furniture products from Chinese manufacturers. However, many small and local furniture stores go through agents to receive furniture from China following the *agent outsourcing model*. The existence of agents in the first and fourth models is because of the following two reasons: a small volume cannot justify the overhead costs of direct contact with Chinese manufacturers and a small demand can cause large logistics cost. In our survey of the furniture industry in Mississippi, several furniture companies said that they have to place an order four months in advance if they want a container load of raw materials directly from China. Though the price is low, the companies interviewed mentioned three problems: 1) the order delivery could be even later than promised which results in additional in-transit inventory; 2) because they are small companies they don not have special equipment and expertise to unload containers, and unloading a container is dangerous and costly for them; and 3) it is difficult to predict demand four months in advance. Therefore, they usually go through an agent in Georgia which has higher prices.

The companies typically call the agent two weeks in advance with about three truck loads of shipment. The agent operates a warehouse to hold inventory to provide a short lead time to its customers. An international furniture trade agent, which could be a third party logistics provider (3PL), consolidates the demands from small customers so that they can fill containers easily, reduce the variability of demand over time, and improve inventory turnout rates. Shipping furniture from overseas to the US in full containers can reduce logistic costs by up to 20% (Terry, 2007). However, only the largest furniture retailers and manufacturers can handle orders at the container volume. With the consolidation, agents and 3PLs have enough volume to efficiently deal with containers. It is well known in the inventory theory that consolidated demands enjoy smaller variability. As shown by the example of the small furniture manufacturers in Mississippi, having a container load supply means huge inventories and therefore a very low inventory turnout rate. Based on the experience from other industries such as the automotive and computer industries, high inventory usually mean inefficiency. The success of Toyota was driven by their Just-in-Time system and their continuous effort to reduce the inventory. During its rapid expansion, Dell enjoyed higher inventory turnout rates than HP and Gateway. Globe Express Services, a 3PL carrier specializing in US-Asian trade, operates warehouses in Asia and the US. Different Chinese suppliers can deliver to their Asian warehouses. They mix loads to fill containers and ship containers to the warehouse in the US. Many small US furniture companies can then enjoy container-level prices for their orders. With this operation, West Coast orders can typically be filled in less than 2 weeks. The supply chain model a furniture company should adopt depends on the size, competitive strategy, and customer delivery requirements of the company. No matter which business model is used, a key success factor for a supply chain is the cooperation among parties along the supply chain, including information sharing and planning coordination.

One big issue in furniture logistics is dealing with returns, which account for as much as 20 to 25 percent of sales (Terry 2007). There are two ways to reduce returns, increasing the product quality and reducing damage during shipment. The quality of furniture from Asia has significantly improved in the recent years (Bryson et al. 2003). Moving furniture through the supply chain more efficiently with better packaging and minimum handling are the keys to reduce the costly reverse flow of goods (Terry 2007). Though high technologies have been widely used in other industries to improve productivity, the furniture manufacturing and logistics management have been slow in adopting new technologies. Furniture companies have to invest more on new technologies in order to succeed or even survive in such an industry facing a dramatic change. Bar codes should be used for tracking in order to get accurate information on the amount and location of parts and products. Enterprise resource planning softwares, such as SAP, should be used for manufacturing and logistics planning to have better demand forecasting, inventory management, and logistics network design and operations. Along the supply chain, different parties, including manufacturers, logistics companies, agents, wholesalers, and retailers, need to use electronic data exchange technologies to share information in a more accurate and timely way. Better information sharing can help to reduce the lead time and help each party to make better decisions.

2. Literature Review

It is reported that the growth of furniture and home furnishing retailer sales value in the United States exceeded \$100 billion in 2003, and kept increasing to \$123 billion in 2007 (U.S. Census Bureau 2008). However, domestically produced furniture among these retailer sales has declined by more than \$5 billion between 2000 and 2003. An increasing share of furniture imports from other countries, especially Asian countries, fills the gap between domestic consumption and production. The increased competition of foreign furniture manufacturers resulted in a loss of about 34,700 workers in the wood furniture industry in the United States since 2000 (Buehlmann et al. 2003). The loss of business and job opportunities is due to the influx of foreign-made products that are priced well below products made domestically (Nwagbara et al. 2002, Aeppel 2003, Anonymous 2004a).

In furniture manufacturing, typically 40% of the total manufacturing cost is the labor cost (Whelan and Maklari 2002). This was the main reason why furniture manufacturers moved from New England to Michigan, and then to Indiana, North Carolina, and Mississippi (Raymond 2004). To reduce manufacturing labor costs companies are now moving to places like China to take advantage of the low labor costs. It is reported that the wages in China are about 16 times lower compared to U.S. wages (ILO 2006). In addition, the Chinese to U.S. currency exchange rate is fixed at an artificially low level, thus favoring Chinese goods in the U.S. market. To stay competitive, the American wood furniture manufacturers use some of the following strategies: semi-customized products, fast order fulfillment, overseas manufacturing, or outsourcing to foreign manufacturers. (Raymond 2002). The value of outsourcing depends on transportation costs, delivery time, and market uncertainty in the future (Nembhard, et al. 2003). In the automobile, computer, and apparel industries, international outsourcing was considerably expanded through the last decades of the twentieth century (Taylor, 1997; Dornier et al. 1998). This growth in globalization has motivated a lot of academic interest in global supply chain design and outsourcing management.

A supply chain design problem comprises the decisions regarding the number of location of production facilities, the amount of capacity at each facility, the assignment of each market region to one or more locations, and supplier selection for sub-assemblies, components and materials (Chopra and Meindl, 2004). Global supply chain design includes an additional selection of international manufacturing sources, whether company-owned or external suppliers. Foreign factories can benefit from tariff and trade concessions, low cost direct labor, capital subsidies, and reduced logistics costs (Ferdows, 1997). However, many articles state that global supply chains are more difficult to manage compared to domestic supply chains (Wood et al., 2002; MacCarthy and Atthirawong, 2003). Substantial geographical distances in global supply chains not only results in higher transportation costs, but forces complicated decisions in inventory policies because of tradeoffs between inventory cost and increased lead-time. Furthermore, unique risks including variability and uncertainty in currency exchange rates, economic and political instability, and changes in the regulatory environment have

significant impact on companies' market performance (Dornier et al., 1998). A literature review for the model-based supply chain design problem, including both internal manufacturing and external supplier locations, is conducted for examining ongoing and emerging issues in globalization production (Meixell and Gargeya 2005).

Product outsourcing is recognized as a way to gain flexibility for competitive advantage (Nembhard et al. 2003). A financial model to assess the option value of product outsourcing is developed in this article. Decision makers can use this valuation methodology to choose the appropriate outsourcing strategy, which is demonstrated by an example from apparel manufacturing industry. A Monte Carlo simulation model was conducted to show the long-term value of outsourcing under dynamic market conditions. Nembhard et al. (2003) concluded that outsourcing is not always better than in-house production, but has some possibilities to be favorable. Jin (2005) conducted a survey, with 113 US apparel manufacturers responding, to show that companies producing large sales volumes of fashion-oriented apparels tend to significantly source globally. On the other hand, companies with small sales volumes with a focus on basic items mostly source domestically. Based on this empirical study, it was concluded that global versus domestic sourcing apparel firms are not significantly different in terms of market performances. Finding a firm's optimal share of outsourcing is an emerging topic of interest. In some articles, outsourcing topics are analyzed by using contract theoretical approach complemented with strategic organizational production mode research (Grossman and Hart 1986). Grossman and Helpman (2002) developed a model to exhibit the tradeoff between in-house production and outsourcing. In-house production represents a more standard form of production with higher input costs for components. However, outsourced production has to overcome search frictions and contractual imperfections.

3. Simulation Model

In section 1 we provided a detailed background on the current state of the furniture industry. In section 2 we gave a review of the general outsourcing literature along with examples from the furniture industry. In this section we will provide a description of the simulation model that is developed to illustrate the supply chain structure of a typical furniture manufacturer in Mississippi. The simulation model allows managers of furniture companies to estimate the impact of various decisions related to outsourcing on the performance of the supply chain. The model is used to perform “what-if” analyses. For example, the decision makers are able to adjust parameters such as defect rate, lead time distribution, demand distribution, and costs (inventory holding, production, transportation) to estimate their impact on supply chain performance measures. The performance measures that are captured by the model are order fill rate, lost sales, response time, inventory turn rate, and total cost. The results of “what-if” analysis (given in section 4) can help furniture manufacturers, component suppliers, and retailers compete more effectively in the national and international marketplace. Figure 3 gives an overview of the model components and how they relate to one another. Figure 4 shows a snapshot of the model.

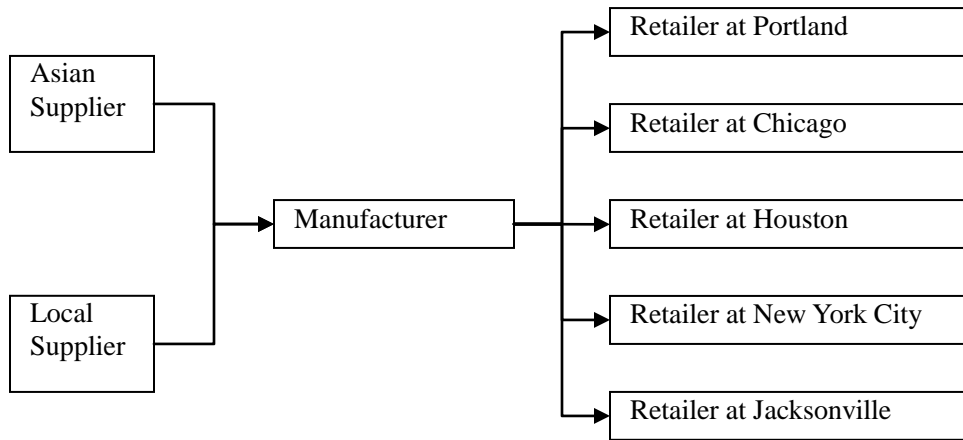


Figure 3. Simulation Model Structure

3.1. Suppliers in our simulation model

There are two types of suppliers: An Asian supplier and a local supplier. Asian supplier offers a lower price but longer lead-times and higher damage rates. On the other hand, the local supplier offers a higher price but guarantees a short lead-time with no damage. Input information for the two types of suppliers is estimated based on the feedback collected from furniture companies that we visited. Table 2 shows the current model settings on unit price, lead-time, and damage rates of the Asian and Local suppliers.

	Unit price	Lead-time (weeks)	Damage rate
Asian supplier	\$5	T(12,16,24)	10%
Local supplier	\$7	1	0

Table 2. Model settings on parameters of suppliers (T denotes a triangular distribution)

Lead-time of Asian supplier is divided into five components in the current simulation model.

- Transportation time on the sea (from the Asian supplier to Long Beach): 10 weeks;
- Waiting time at the import point of Long Beach, CA: T(0, 3, 8) weeks;
- Transportation time to Memphis via Railroad: 13 days
- Waiting time at Memphis load-unload station: T(0, 1, 4) weeks;
- Transportation time to the manufacturer at Tupelo, MS: 1 day.

Lead-time of Local supplier is assumed to be constant at 1 week as long as there is inventory at the local supplier. It is assumed that the local supplier is using a (Q,R) inventory policy. The inventory at the local supplier is replenished at the beginning of each month to a certain level Q (capacity of local supplier). The local supplier continuously keeps track of its inventory. When the inventory level drops to R (the reorder point) the local supplier requests a new shipment of size Q. If the local supplier goes out of stock before the next replenishment, retailers' orders waiting more than one week are considered as lost sales. In the current version of the simulation model, capacity

of local supplier is set to a large number to make sure that there are no lost sales. However, we also analyzed other scenarios in which the local supplier has a limited capacity. The results of these different scenarios are presented in section 4. All these settings are flexible such that a specific furniture manufacturer can use their input numbers and run the model to analyze their supply chain performance.

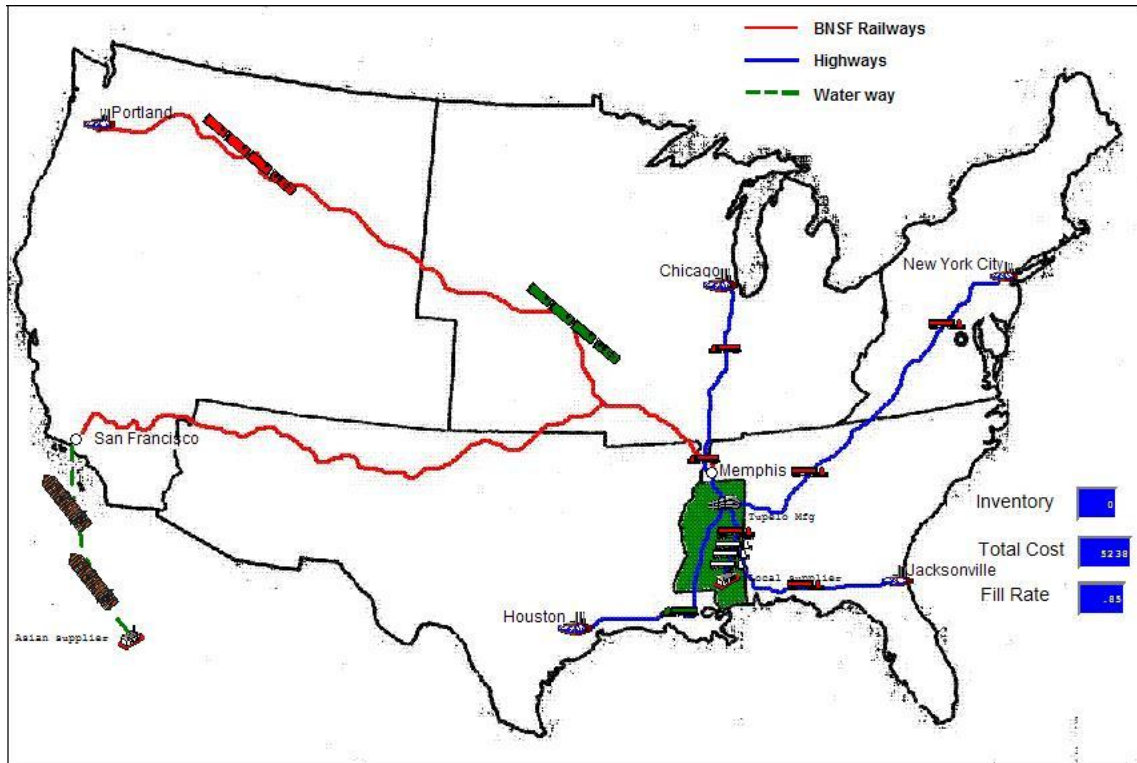


Figure 4. A Snapshot of the Simulation Model

3.2. The manufacturer in our simulation model

In the current model, there is an integrated furniture manufacturer located in Tupelo, MS. To simplify the model, the manufacturer is assumed to produce only one type of finished product which requires only one type of raw material (e.g. plywood). To reduce costs of buying raw materials, the manufacturer would prefer to order everything from the Asian supplier since the Asian supplier offers a much cheaper unit price. Based on our survey of several Mississippi furniture companies, they usually keep one month's worth of inventories and order a certain amount of raw materials from Asian supplier every month. In the model, we use the same setting while we set the ordering amount equal to the total demand received in the previous four-week period.

To study the impact of outsourcing on the manufacturer's purchasing cost, we run different scenarios under which the manufacturer would order part of the required raw material from the Asian supplier and buy the rest from local supplier. In these scenarios, when the manufacturer is out of stock (due to late arrivals or damaged items from the Asian supplier) it is assumed that the manufacturer places weekly orders from the local supplier.

Since the total lead-time for an order from the Asian supplier varies significantly between 12 weeks to 24 weeks, it is very possible that the manufacturer goes out of stock time to time. When there are not enough inventories to fulfill demands from retailers, the manufacturer orders the backlog amount from the local supplier and would be able to ship the delayed order 1 week later.

3.3. Retailers in our simulation model

In the current simulation model, we have five aggregated retailers distributed all over the US. Weekly demands from each retailer follow the same normal distribution $N(10, 2)$. It is assumed that the manufacturer schedules each retailer's delivery on a fixed day every week as shown in Table 3.

Manufacturer	Retailer-Portland	Monday
Manufacturer	Retailer-New York city	Tuesday
Manufacturer	Retailer-Chicago	Wednesday
Manufacturer	Retailer-Jacksonville	Thursday
Manufacturer	Retailer-Houston	Friday

Table 3. Delivery Schedule

All orders from a retailer during one week are aggregated on the delivery day. The manufacturer promises a 2-week lead-time if there are enough inventories to fill the order. The moving time along the path-network in the simulation is not the true travel time but the total lead-time from receiving the order to delivery. If there is not enough inventory, then the manufacturer places an order from the local supplier and receives it one week later. Table 4 shows the color coding for transportation entities in the simulation model.

Truck Entity Color Code	Description
Green	On-time delivery of finished product to a retailer
Red	Delayed delivery of finished product a retailer
White	Delivery of raw wood material to the manufacturer

Table 4. Color Coding for Transportation Entities

3.4. The arrival process in our simulation model

Once the simulation starts, the manufacturer has one month's worth of inventory on hand. This current on-hand inventory may be because of an order that the manufacturer requested from the Asian supplier. So, four pre-scheduled order arrivals are created in the simulation because the average lead-time is set to be 4 months (16 weeks). Since there is no historical demand data for these pre-scheduled orders, all the amounts are set to an average four-week demand of 200 units. Once the simulation starts, the manufacturer places an order from the Asian supplier every four weeks. The ordering amount is equal to the total demand of the previous four weeks except for the first order, which is set to

200 units (i.e. same as the pre-scheduled arrivals). Since we set one-year warm-up period in the simulation, these initial starting conditions will not significantly affect the final statistics.

3.5. The performance measure in our simulation model

Six performance measurements are collected in our current simulation model.

- *Inventory*: inventory level of raw materials at the manufacturer;
- *Backlog*: backlog level of retailers' orders at the manufacturer;
- *Purchasing costs*: total cost the manufacturer spends to buy all raw materials;
- *Fill rate*: percentage of retailer orders that are filled on time;
- *Inventory holding cost*: calculated as a product of the average inventory level, an interest rate of 20%, and the unit cost of raw material from Asian supplier at the end of the simulation;
- *Backlog penalty cost*: calculated as a product of the average backlog level, a penalty rate of 30%, and the unit cost of raw material from Asian supplier at the end of the simulation.

The first four measurements are tracked dynamically during the simulation. The last two are collected at the end of the simulation.

4. Experimental Results

As discussed in the previous sections, we used our model to simulate the supply chain of a furniture manufacturer under different scenarios. The parameters that we change in our simulation are the unit price of the materials purchased from the Asian supplier, the capacity of the local supplier, the percentage of demand supplied from the Asian supplier, and the time the retailers are willing to wait for an order.

In our base scenario, as can be seen from Table 2 above, the unit price of the Asian supplier is \$5. However, we change this value from \$2 to \$7 in increments of \$1. The first column in Tables 5-18 (given in the Appendix) show the unit price used in that particular scenario. The capacity of the local supplier in the base scenario is 120 but this value varies between 40 and 200 in increments of 40. The second column in Tables 5-18 show the capacity of the local supplier used in each scenario. The percentage of demand supplied from the Asian supplier varies from 0% to 100% in increments of 10%. The first row in Tables 5-18 show the percentage used for each scenario. The results in Tables 5-12 correspond to the scenarios in which the assumption is that the retailers are willing to wait as long as it takes for the manufacturer to ship the items. That is why the numbers in Table 7 are all zeros. In other words, since the retailers are waiting for items to be shipped there is no "lost sales." However, in Tables 12-18 the assumption is that the retailers are willing to wait a maximum of one week for items. If the order is not fulfilled within a week then the retailers go to a different manufacturer. Therefore, the numbers in Table 14 show the value of lost sales. As can be seen from Table 14, as the capacity of the local supplier decreases the value of lost sales increases. It can also be seen from Table 14

that as the percentage of demand requested from overseas supplier decreases the value of lost sales increases.

Results from Tables 11 and 18 also provide interesting insights about the demand fill rates for various scenarios. One can see that the fill rate values are relatively higher in Table 18 compared to Table 11. This can be explained by the fact that the results in Table 18 correspond to the scenarios in which the retailers are willing to wait at most one week to receive their orders. Therefore, more of the demand is filled from inventory but if the demand cannot be met within a week then it is lost. Figure 5, 6, and 7 show how the profit of the manufacturer changes as the amount of demand outsourced changes. For example in Figure 5 the assumption is that the local supplier has a high capacity. Therefore, the demand can easily be met from the local supplier possible at a higher cost. From Figure 5 we can conclude that \$6 is the breakeven point. In other words, if the Asian supplier offers a unit price below \$6 then it seems like all of the demand should be outsourced. However, this is not necessarily the case when the capacity of the local supplier is lower.

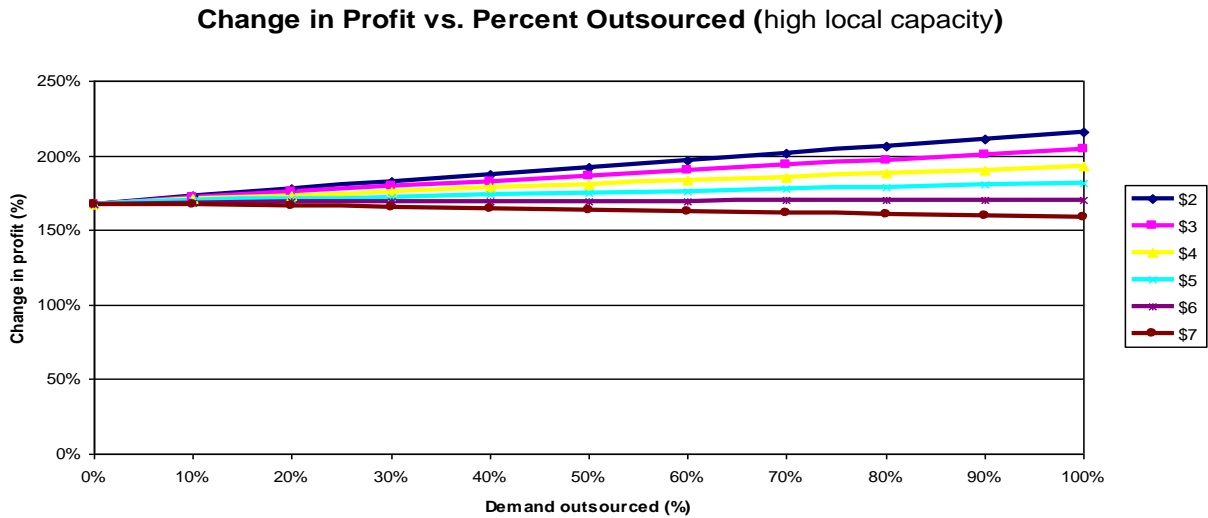


Figure 5. Change in profit as outsourcing percentage changes when local capacity is high

From Figure 6, we can see that if the unit price of the Asian supplier is \$7 then it makes sense to outsource up to 40% of the demand. Beyond 40% the profit of the manufacturer slightly decreases. If the unit price of the Asian supplier is \$2 then one can potentially outsource all of the demand. However, as can be seen from Figure 6, the increase in profit beyond the 40% mark is not as significant as the gain in profit up to the 40% mark.

Figure 7 provides a graph of the impact of outsourcing on profit when the capacity at the local supplier is low. In this case, it can be seen that the best decision for the furniture manufacturer would be to outsource about 80% of its demand and rely on the local supplier to satisfy the remaining 20% of the total demand.

Change in Profit vs. Percent Outsourced (avg. local capacity)

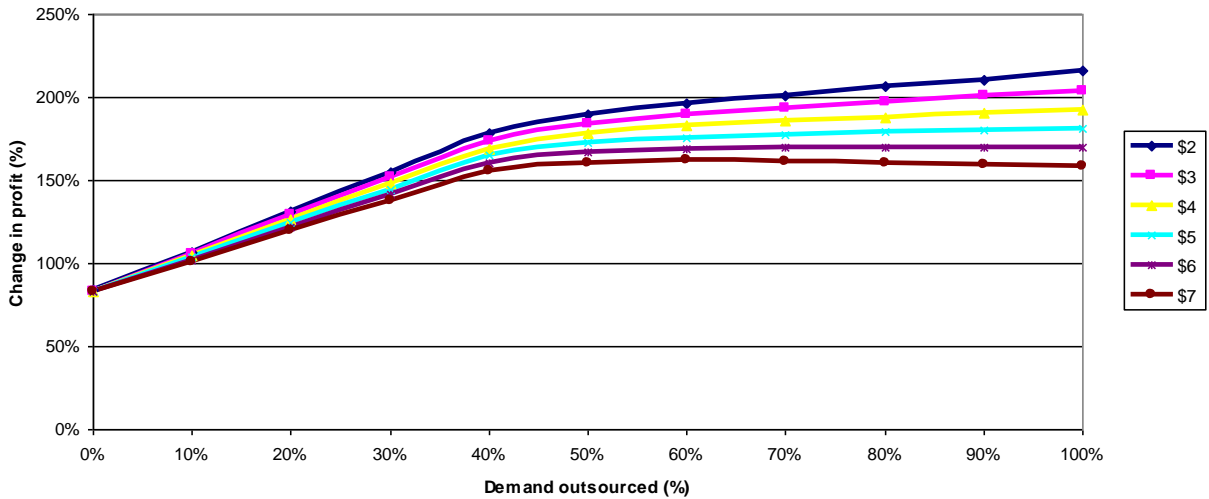


Figure 6. Change in profit as outsourcing percentage changes when local capacity is medium

Change in Profit vs. Percent Outsourced (low local capacity)

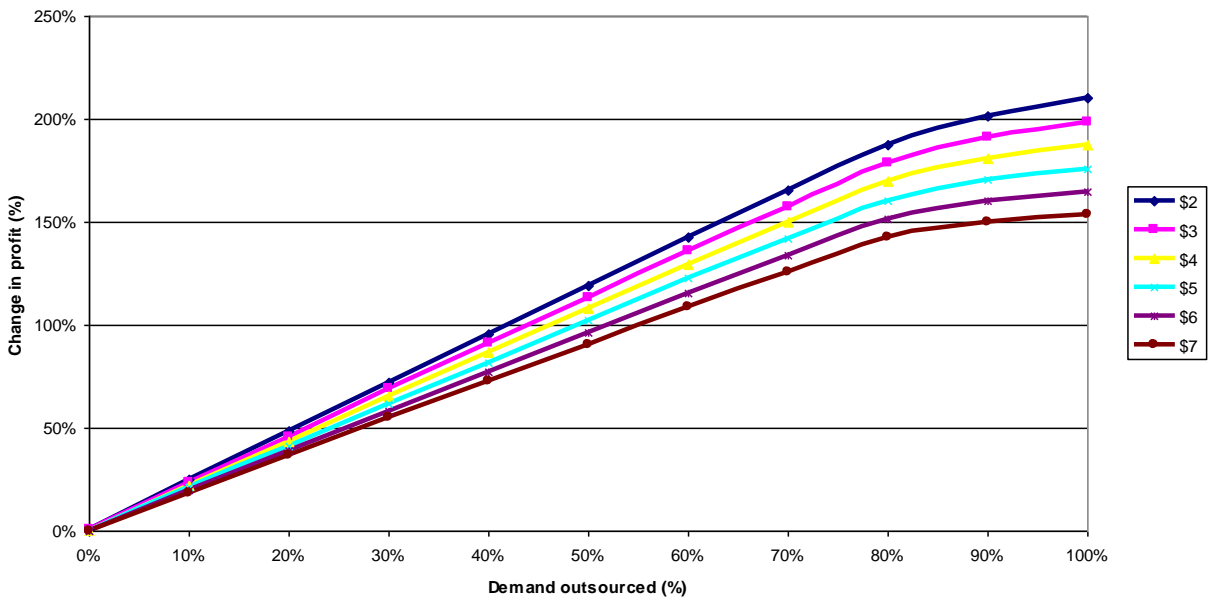


Figure 7. Change in profit as outsourcing percentage changes when local capacity is low

5. Conclusion

Based on the analysis of our simulation results we can derive a number of conclusions. It is clear from the Tables provided in the Appendix and the Figures in section 4 that outsourcing all of the business may not be the best option because it may lead to reduction of capacity locally. Outsourcing decisions may also be affected by product type. In general, it makes sense to outsource labor intensive, slow moving and easy to transport items.

The models developed in this study allow furniture manufacturers to calculate a breakeven point at which outsourcing becomes an attractive option for their business. It also allows performing what-if type of analyses.

Our study also demonstrates that simulation is a powerful tool if provided with the right input data. Simulation allows for incorporating interactions among decision variables and problem parameters, as well as for incorporating uncertainties with input data. These are features that a spreadsheet-based would not capture. These features allow building a more realistic model.

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Appendix: Tables of Results

Table 5: ANNUAL TRANSPORTATION AND PURCHASING COSTS												
Overseas unit price	Local Capacity	Percent Demand Supplied from Overseas										
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%
\$2	200	\$7,216.41	\$8,309.01	\$9,394.61	\$10,492.11	\$11,587.51	\$12,654.91	\$13,744.01	\$14,826.11	\$15,919.83	\$17,011.48	\$18,169.38
	160	\$7,245.11	\$8,330.71	\$9,414.21	\$10,505.41	\$11,604.31	\$12,689.51	\$13,789.56	\$14,917.30	\$15,704.69	\$15,216.97	\$14,699.86
	120	\$7,303.21	\$8,393.28	\$9,463.44	\$10,551.92	\$11,694.07	\$12,858.26	\$13,120.62	\$12,611.20	\$12,094.09	\$11,567.87	\$11,059.86
	80	\$7,313.71	\$8,464.72	\$9,627.89	\$10,803.32	\$10,506.45	\$10,005.43	\$9,488.32	\$8,964.20	\$8,426.09	\$7,856.47	\$7,339.36
	40	\$7,581.11	\$8,355.49	\$7,818.08	\$7,271.56	\$6,756.55	\$6,221.18	\$5,708.22	\$5,189.71	\$4,673.64	\$4,156.82	\$3,640.00
\$3	200	\$9,800.51	\$10,634.70	\$11,461.89	\$12,300.98	\$13,137.97	\$13,946.96	\$14,777.66	\$15,601.35	\$16,436.65	\$17,269.89	\$18,169.38
	160	\$9,829.21	\$10,656.40	\$11,481.49	\$12,314.28	\$13,154.77	\$13,981.56	\$14,823.20	\$15,692.53	\$16,221.51	\$15,475.38	\$14,699.86
	120	\$9,887.31	\$10,718.98	\$11,530.72	\$12,360.79	\$13,244.54	\$14,150.32	\$14,154.26	\$13,386.44	\$12,610.91	\$11,826.28	\$11,059.86
	80	\$9,897.81	\$10,790.42	\$11,695.17	\$12,612.20	\$12,056.91	\$11,297.49	\$10,521.96	\$9,739.44	\$8,942.91	\$8,114.88	\$7,339.36
	40	\$10,165.21	\$10,681.19	\$9,985.36	\$9,080.44	\$8,307.01	\$7,513.23	\$6,741.86	\$5,964.94	\$5,190.46	\$4,415.23	\$3,640.00
\$4	200	\$12,384.62	\$12,960.40	\$13,529.18	\$14,109.86	\$14,688.44	\$15,239.02	\$15,811.30	\$16,376.58	\$16,953.47	\$17,528.30	\$18,169.38
	160	\$12,413.32	\$12,982.10	\$13,548.78	\$14,123.16	\$14,705.24	\$15,273.61	\$15,856.84	\$16,467.76	\$16,738.33	\$15,733.79	\$14,699.86
	120	\$12,471.42	\$13,044.67	\$13,598.00	\$14,169.66	\$14,795.00	\$15,442.37	\$15,187.90	\$14,161.67	\$13,127.73	\$12,084.69	\$11,059.86
	80	\$12,481.92	\$13,116.11	\$13,762.45	\$14,421.07	\$13,607.37	\$12,589.54	\$11,555.60	\$10,514.67	\$9,459.73	\$8,373.29	\$7,339.36
	40	\$12,749.32	\$13,006.88	\$11,952.65	\$10,889.31	\$9,857.47	\$8,805.28	\$7,775.50	\$6,740.17	\$5,707.28	\$4,673.64	\$3,640.00
\$5	200	\$14,968.72	\$15,286.09	\$15,596.46	\$15,918.73	\$16,238.90	\$16,531.07	\$16,844.94	\$17,151.81	\$17,470.29	\$17,786.71	\$18,169.38
	160	\$14,997.42	\$15,307.79	\$15,616.06	\$15,932.03	\$16,255.70	\$16,565.67	\$16,890.48	\$17,242.99	\$17,255.15	\$15,992.21	\$14,699.86
	120	\$15,055.52	\$15,370.36	\$15,665.29	\$15,978.54	\$16,345.46	\$16,734.42	\$16,221.54	\$14,936.90	\$13,644.55	\$12,343.11	\$11,059.86
	80	\$15,066.02	\$15,441.80	\$15,829.74	\$16,229.94	\$15,157.84	\$13,881.59	\$12,589.24	\$11,289.90	\$9,976.55	\$8,631.71	\$7,339.36
	40	\$15,333.42	\$15,332.58	\$14,019.93	\$12,698.18	\$11,407.94	\$10,097.33	\$8,809.14	\$7,515.40	\$6,224.10	\$4,932.05	\$3,640.00
\$6	200	\$17,552.83	\$17,611.79	\$17,663.74	\$17,727.60	\$17,789.36	\$17,823.12	\$17,878.58	\$17,927.04	\$17,987.12	\$18,045.12	\$18,169.38
	160	\$17,581.53	\$17,633.49	\$17,683.34	\$17,740.90	\$17,806.16	\$17,857.72	\$17,924.13	\$18,018.23	\$17,771.97	\$16,250.62	\$14,699.86
	120	\$17,639.63	\$17,696.06	\$17,732.57	\$17,787.41	\$17,895.92	\$18,026.47	\$17,255.19	\$15,712.13	\$14,161.37	\$12,601.52	\$11,059.86
	80	\$17,650.13	\$17,767.50	\$17,897.02	\$18,038.82	\$16,708.30	\$15,173.64	\$13,622.89	\$12,065.13	\$10,493.37	\$8,890.12	\$7,339.36
	40	\$17,917.53	\$17,658.27	\$16,087.21	\$14,507.06	\$12,958.40	\$11,389.39	\$9,842.78	\$8,290.63	\$6,740.93	\$5,190.46	\$3,640.00
\$7	200	\$20,136.93	\$19,937.48	\$19,731.03	\$19,536.48	\$19,339.83	\$19,115.17	\$18,912.22	\$18,702.27	\$18,503.94	\$18,303.53	\$18,169.38
	160	\$20,165.63	\$19,959.18	\$19,750.63	\$19,549.78	\$19,356.63	\$19,149.77	\$18,957.77	\$18,793.46	\$18,288.79	\$16,509.03	\$14,699.86
	120	\$20,223.73	\$20,021.75	\$19,799.85	\$19,596.28	\$19,446.39	\$19,318.52	\$18,288.83	\$16,487.36	\$14,678.19	\$12,859.93	\$11,059.86
	80	\$20,234.23	\$20,093.19	\$19,964.30	\$19,847.69	\$18,258.76	\$16,465.69	\$14,656.53	\$12,840.36	\$11,010.19	\$9,148.53	\$7,339.36
	40	\$20,501.63	\$19,983.96	\$18,154.50	\$16,315.93	\$14,508.86	\$12,681.44	\$10,876.43	\$9,065.86	\$7,257.75	\$5,448.87	\$3,640.00

Table 6: ANNUAL INVENTORY HOLDING AND BACKLOG COSTS												holding cost rate = 20%	
Overseas unit price	Local Capacity	Percent Demand Supplied from Overseas											
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%	
\$2	200	\$61.27	\$55.57	\$49.39	\$42.92	\$37.14	\$31.75	\$26.46	\$21.06	\$16.15	\$11.73	\$32.67	
	160	\$60.92	\$55.26	\$49.08	\$42.85	\$37.12	\$31.47	\$25.70	\$19.38	\$78.57	\$344.62	\$609.87	
	120	\$60.81	\$54.88	\$48.30	\$41.64	\$34.59	\$26.56	\$169.41	\$429.01	\$696.58	\$967.24	\$1,235.76	
	80	\$58.42	\$51.51	\$41.94	\$52.86	\$257.65	\$519.28	\$786.11	\$1,056.47	\$1,325.44	\$1,596.59	\$1,866.74	
	40	\$50.46	\$119.00	\$344.83	\$607.06	\$877.74	\$1,147.61	\$1,417.46	\$1,686.84	\$1,957.25	\$2,230.08	\$2,499.32	
\$3	200	\$91.90	\$83.35	\$74.08	\$64.37	\$55.70	\$47.63	\$39.69	\$31.59	\$24.23	\$17.60	\$49.00	
	160	\$91.97	\$82.88	\$73.61	\$64.28	\$55.67	\$47.21	\$38.56	\$28.57	\$13.98	\$516.94	\$914.80	
	120	\$91.22	\$82.32	\$72.44	\$62.46	\$51.88	\$39.85	\$254.11	\$643.39	\$1,044.10	\$1,450.85	\$1,853.64	
	80	\$87.62	\$77.27	\$62.92	\$79.28	\$386.48	\$778.91	\$1,179.16	\$1,584.71	\$1,988.16	\$2,394.89	\$2,800.12	
	40	\$75.68	\$178.49	\$517.25	\$910.60	\$1,316.62	\$1,721.32	\$2,126.19	\$2,530.21	\$2,947.89	\$3,345.11	\$3,748.99	
\$4	200	\$122.54	\$111.14	\$98.78	\$85.83	\$74.27	\$63.50	\$52.92	\$42.12	\$32.30	\$23.46	\$65.34	
	160	\$122.63	\$110.51	\$98.15	\$85.70	\$74.23	\$62.94	\$51.41	\$38.10	\$18.64	\$689.25	\$1,219.74	
	120	\$121.62	\$109.76	\$96.59	\$83.28	\$69.18	\$53.13	\$338.82	\$858.02	\$1,392.21	\$1,934.47	\$2,471.52	
	80	\$116.83	\$103.02	\$83.89	\$105.71	\$515.30	\$1,038.55	\$1,572.22	\$2,112.94	\$2,650.86	\$3,193.18	\$3,733.49	
	40	\$100.91	\$237.99	\$689.66	\$1,214.13	\$1,755.49	\$2,295.09	\$2,834.92	\$3,373.67	\$3,914.50	\$4,460.15	\$4,998.65	
\$5	200	\$153.17	\$138.92	\$123.47	\$107.29	\$92.84	\$79.38	\$66.15	\$52.65	\$40.38	\$29.33	\$81.67	
	160	\$153.29	\$138.14	\$122.69	\$107.13	\$92.79	\$78.68	\$64.26	\$47.62	\$23.30	\$861.56	\$1,524.67	
	120	\$152.03	\$137.20	\$120.74	\$104.10	\$86.47	\$66.41	\$423.52	\$1,072.53	\$1,740.26	\$2,418.09	\$3,089.40	
	80	\$146.04	\$128.78	\$104.86	\$132.14	\$644.13	\$1,298.19	\$1,965.27	\$2,641.18	\$3,313.60	\$3,991.48	\$4,669.05	
	40	\$126.14	\$297.49	\$862.08	\$1,517.66	\$2,194.36	\$2,868.86	\$3,543.65	\$4,215.49	\$4,893.13	\$5,575.19	\$6,248.31	
\$6	200	\$183.80	\$166.70	\$148.16	\$128.75	\$111.41	\$95.26	\$79.38	\$63.18	\$48.46	\$35.20	\$98.00	
	160	\$183.95	\$165.77	\$147.23	\$128.56	\$111.35	\$94.42	\$77.11	\$57.14	\$27.96	\$1,033.87	\$1,829.60	
	120	\$182.44	\$164.64	\$144.89	\$124.92	\$103.76	\$79.69	\$508.22	\$1,287.04	\$2,089.75	\$2,901.71	\$3,707.28	
	80	\$175.25	\$154.54	\$125.83	\$158.57	\$772.96	\$1,557.83	\$2,358.32	\$3,169.42	\$3,976.32	\$4,789.78	\$5,600.23	
	40	\$151.37	\$356.99	\$1,034.50	\$1,821.19	\$2,633.23	\$3,442.63	\$4,252.38	\$5,058.59	\$5,871.78	\$6,690.23	\$7,497.97	
\$7	200	\$214.44	\$194.49	\$172.86	\$150.21	\$129.98	\$111.13	\$92.61	\$73.71	\$56.53	\$41.06	\$114.34	
	160	\$214.61	\$193.40	\$171.77	\$149.98	\$129.91	\$110.15	\$89.96	\$66.67	\$32.62	\$1,206.18	\$2,134.54	
	120	\$212.84	\$192.08	\$169.04	\$145.74	\$121.06	\$92.97	\$592.93	\$1,501.54	\$2,438.04	\$3,385.33	\$4,325.16	
	80	\$204.46	\$180.29	\$146.80	\$185.00	\$901.78	\$1,817.47	\$2,751.38	\$3,697.65	\$4,639.04	\$5,588.07	\$6,533.60	
	40	\$176.60	\$416.49	\$1,206.91	\$2,124.72	\$3,072.10	\$4,016.40	\$4,961.11	\$5,901.69	\$6,850.38	\$7,805.27	\$8,747.63	

Table 7: ANNUAL LOST SALES COSTS												I = 1.00	sales price= \$13
Overseas unit price	Local Capacity	Percent Demand Supplied from Overseas											
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%	
\$2	200	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	160	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	120	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	80	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
\$3	200	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	160	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	120	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	80	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
\$4	200	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	160	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	120	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	80	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
\$5	200	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	160	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	120	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	80	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
\$6	200	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	160	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	120	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	80	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
\$7	200	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	160	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	120	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	80	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
	40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

Table 8: TOTAL ANNUAL COST

Overseas unit price	Local Capacity	Percent Demand Supplied from Overseas										
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%
\$2	200	\$7,281.85	\$8,368.75	\$9,447.78	\$10,538.11	\$11,627.29	\$12,688.81	\$13,772.14	\$14,848.31	\$15,936.81	\$17,023.74	\$18,227.89
	160	\$7,310.25	\$8,390.20	\$9,467.11	\$10,551.35	\$11,644.09	\$12,723.29	\$13,817.27	\$14,938.92	\$15,860.22	\$15,904.55	\$15,918.23
	120	\$7,368.39	\$8,452.67	\$9,515.91	\$10,597.24	\$11,732.65	\$12,894.92	\$13,457.56	\$13,467.58	\$13,485.75	\$13,500.92	\$13,530.28
	80	\$7,377.24	\$8,522.29	\$9,679.26	\$10,899.78	\$11,019.64	\$11,041.87	\$11,058.66	\$11,075.43	\$11,075.35	\$11,048.25	\$11,071.50
	40	\$7,655.96	\$8,589.69	\$8,505.24	\$8,483.38	\$8,509.97	\$8,514.53	\$8,541.44	\$8,562.02	\$8,587.00	\$8,616.05	\$8,637.83
\$3	200	\$9,898.66	\$10,724.32	\$11,541.65	\$12,369.99	\$13,197.65	\$13,997.82	\$14,819.86	\$15,634.66	\$16,462.11	\$17,288.28	\$18,257.14
	160	\$9,927.52	\$10,745.63	\$11,560.84	\$12,383.19	\$13,214.44	\$14,032.22	\$14,864.77	\$15,723.96	\$16,247.06	\$16,506.74	\$16,527.42
	120	\$9,985.08	\$10,808.07	\$11,609.43	\$12,428.77	\$13,302.41	\$14,205.31	\$14,659.66	\$14,670.75	\$14,696.85	\$14,725.86	\$14,765.50
	80	\$9,993.10	\$10,876.77	\$11,772.22	\$12,756.88	\$12,826.69	\$12,852.16	\$12,877.47	\$12,906.29	\$12,916.79	\$12,902.56	\$12,937.56
	40	\$10,277.48	\$11,032.50	\$11,016.10	\$10,898.18	\$10,937.15	\$10,953.07	\$10,991.69	\$11,023.31	\$11,084.53	\$11,104.07	\$11,136.74
\$4	200	\$12,515.49	\$13,079.89	\$13,635.52	\$14,201.87	\$14,768.01	\$15,306.83	\$15,867.56	\$16,420.99	\$16,987.42	\$17,552.82	\$18,286.40
	160	\$12,544.40	\$13,101.08	\$13,654.58	\$14,215.04	\$14,784.80	\$15,341.16	\$15,912.26	\$16,509.66	\$16,772.39	\$17,108.94	\$17,136.60
	120	\$12,601.78	\$13,163.45	\$13,702.94	\$14,260.30	\$14,872.16	\$15,515.69	\$15,861.77	\$15,874.43	\$15,909.14	\$15,950.79	\$16,000.71
	80	\$12,608.98	\$13,231.25	\$13,865.19	\$14,613.98	\$14,633.75	\$14,662.43	\$14,696.28	\$14,737.13	\$14,758.21	\$14,756.86	\$14,803.63
	40	\$12,899.02	\$13,475.29	\$13,326.97	\$13,312.96	\$13,364.32	\$13,391.73	\$13,441.94	\$13,484.79	\$13,534.01	\$13,592.10	\$13,635.66
\$5	200	\$15,132.31	\$15,435.45	\$15,729.39	\$16,033.74	\$16,338.36	\$16,615.83	\$16,915.27	\$17,207.32	\$17,512.73	\$17,817.36	\$18,315.65
	160	\$15,161.27	\$15,456.51	\$15,748.31	\$16,046.88	\$16,355.15	\$16,650.11	\$16,959.76	\$17,295.37	\$17,297.73	\$17,711.15	\$17,745.79
	120	\$15,218.47	\$15,518.84	\$15,796.47	\$16,091.84	\$16,441.91	\$16,826.07	\$17,063.88	\$17,077.85	\$17,121.31	\$17,175.74	\$17,235.92
	80	\$15,224.84	\$15,585.72	\$15,958.16	\$16,471.08	\$16,440.81	\$16,472.70	\$16,515.09	\$16,567.98	\$16,599.69	\$16,611.17	\$16,671.89
	40	\$15,520.54	\$15,918.09	\$15,737.83	\$15,727.74	\$15,791.50	\$15,830.39	\$15,892.19	\$15,942.97	\$16,007.51	\$16,080.12	\$16,134.57
\$6	200	\$17,749.14	\$17,791.02	\$17,823.26	\$17,865.61	\$17,908.71	\$17,924.83	\$17,962.98	\$17,993.65	\$18,038.05	\$18,081.90	\$18,344.90
	160	\$17,778.15	\$17,811.95	\$17,842.04	\$17,878.72	\$17,925.50	\$17,959.05	\$18,007.27	\$18,081.09	\$17,823.07	\$18,313.35	\$18,354.98
	120	\$17,835.17	\$17,874.24	\$17,889.99	\$17,923.37	\$18,011.66	\$18,136.45	\$18,266.00	\$18,281.27	\$18,336.36	\$18,400.68	\$18,471.13
	80	\$17,840.71	\$17,940.20	\$18,051.12	\$18,328.19	\$18,247.86	\$18,282.97	\$18,333.91	\$18,398.83	\$18,441.14	\$18,465.47	\$18,535.77
	40	\$18,142.07	\$18,360.88	\$18,148.69	\$18,142.53	\$18,218.67	\$18,269.06	\$18,342.44	\$18,403.71	\$18,481.07	\$18,568.14	\$18,633.48
\$7	200	\$20,365.96	\$20,146.58	\$19,917.13	\$19,697.49	\$19,479.07	\$19,233.83	\$19,010.68	\$18,779.98	\$18,563.36	\$18,346.44	\$18,374.16
	160	\$20,395.02	\$20,167.39	\$19,935.78	\$19,710.57	\$19,495.86	\$19,267.99	\$19,054.76	\$18,866.79	\$18,348.40	\$18,915.55	\$18,964.16
	120	\$20,451.86	\$20,229.62	\$19,983.50	\$19,754.90	\$19,581.42	\$19,446.83	\$19,468.11	\$19,484.69	\$19,549.01	\$19,625.61	\$19,706.34
	80	\$20,456.58	\$20,294.68	\$20,144.09	\$20,185.29	\$20,054.92	\$20,093.24	\$20,152.72	\$20,229.67	\$20,282.59	\$20,319.77	\$20,401.84
	40	\$20,763.60	\$20,803.67	\$20,559.56	\$20,557.31	\$20,645.84	\$20,707.72	\$20,792.70	\$20,864.46	\$20,954.52	\$21,056.17	\$21,132.40

Table 9: TOTAL ANNUAL REVENUE													sales price = \$13.00	
Overseas unit price	Local Capacity	Percent Demand Supplied from Overseas												
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%		
\$2	200	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,703.41
	160	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,890.61	\$33,103.07	\$30,135.82	\$27,045.20	
	120	\$33,874.75	\$33,874.75	\$33,889.96	\$33,902.83	\$33,931.69	\$34,095.36	\$32,333.73	\$29,450.46	\$26,386.10	\$23,344.10	\$20,295.47		
	80	\$33,924.02	\$33,938.06	\$34,037.51	\$34,517.99	\$31,788.90	\$28,776.28	\$25,720.37	\$22,668.23	\$19,615.05	\$16,589.04	\$13,549.90		
	40	\$34,329.23	\$34,071.57	\$31,137.08	\$28,104.18	\$25,032.02	\$22,000.81	\$18,945.03	\$15,897.57	\$12,875.46	\$9,820.46	\$6,755.97		
\$3	200	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,759.57
	160	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,890.61	\$33,104.63	\$30,135.82	\$27,039.35	
	120	\$33,874.75	\$33,874.75	\$33,889.96	\$33,902.83	\$33,931.69	\$34,095.36	\$32,333.73	\$29,450.46	\$26,405.08	\$23,344.10	\$20,267.13		
	80	\$33,924.02	\$33,938.06	\$34,037.51	\$34,517.99	\$31,788.90	\$28,776.28	\$25,720.37	\$22,668.23	\$19,591.52	\$16,589.04	\$13,526.50		
	40	\$34,329.23	\$34,071.57	\$31,137.08	\$28,104.18	\$25,032.02	\$22,000.81	\$18,945.03	\$15,897.57	\$12,833.99	\$9,820.46	\$6,755.97		
\$4	200	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,759.57
	160	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,890.61	\$33,104.63	\$30,135.82	\$27,039.35	
	120	\$33,874.75	\$33,874.75	\$33,889.96	\$33,902.83	\$33,931.69	\$34,095.36	\$32,333.73	\$29,450.46	\$26,405.08	\$23,344.10	\$20,267.13		
	80	\$33,924.02	\$33,938.06	\$34,037.51	\$34,517.99	\$31,788.90	\$28,776.28	\$25,720.37	\$22,668.23	\$19,591.52	\$16,589.04	\$13,526.50		
	40	\$34,329.23	\$34,071.57	\$31,137.08	\$28,104.18	\$25,032.02	\$22,000.81	\$18,945.03	\$15,897.57	\$12,833.99	\$9,820.46	\$6,755.97		
\$5	200	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,759.57
	160	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,890.61	\$33,104.63	\$30,135.82	\$27,039.35	
	120	\$33,874.75	\$33,874.75	\$33,889.96	\$33,902.83	\$33,931.69	\$34,095.36	\$32,333.73	\$29,450.46	\$26,405.08	\$23,344.10	\$20,267.13		
	80	\$33,924.02	\$33,938.06	\$34,037.51	\$34,517.99	\$31,788.90	\$28,776.28	\$25,720.37	\$22,668.23	\$19,591.52	\$16,589.04	\$13,526.50		
	40	\$34,329.23	\$34,071.57	\$31,137.08	\$28,104.18	\$25,032.02	\$22,000.81	\$18,945.03	\$15,897.57	\$12,833.99	\$9,820.46	\$6,755.97		
\$6	200	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,759.57
	160	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,890.61	\$33,104.63	\$30,135.82	\$27,039.35	
	120	\$33,874.75	\$33,874.75	\$33,889.96	\$33,902.83	\$33,931.69	\$34,095.36	\$32,333.73	\$29,450.46	\$26,405.08	\$23,344.10	\$20,267.13		
	80	\$33,924.02	\$33,938.06	\$34,037.51	\$34,517.99	\$31,788.90	\$28,776.28	\$25,720.37	\$22,668.23	\$19,591.52	\$16,589.04	\$13,526.50		
	40	\$34,329.23	\$34,071.57	\$31,137.08	\$28,104.18	\$25,032.02	\$22,000.81	\$18,945.03	\$15,897.57	\$12,833.99	\$9,820.46	\$6,755.97		
\$7	200	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,759.57
	160	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,890.61	\$33,104.63	\$30,135.82	\$27,039.35	
	120	\$33,874.75	\$33,874.75	\$33,889.96	\$33,902.83	\$33,931.69	\$34,095.36	\$32,333.73	\$29,450.46	\$26,405.08	\$23,344.10	\$20,267.13		
	80	\$33,924.02	\$33,938.06	\$34,037.51	\$34,517.99	\$31,788.90	\$28,776.28	\$25,720.37	\$22,668.23	\$19,591.52	\$16,589.04	\$13,526.50		
	40	\$34,329.23	\$34,071.57	\$31,137.08	\$28,104.18	\$25,032.02	\$22,000.81	\$18,945.03	\$15,897.57	\$12,833.99	\$9,820.46	\$6,755.97		

Table 10: TOTAL ANNUAL PROFIT

Overseas unit price	Local Capacity	Percent Demand Supplied from Overseas										
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%
\$2	200	26580.55	25493.65	24429.83	23339.50	22250.32	21188.80	20105.47	19029.30	17940.80	16853.87	15475.52
	160	26552.15	25472.20	24410.50	23326.26	22233.52	21154.32	20060.34	18951.69	17242.85	14231.27	11126.97
	120	26506.36	25422.08	24374.05	23305.59	22199.04	21200.44	18876.17	15982.88	12900.35	9843.18	6765.19
	80	26546.78	25415.77	24358.25	23618.21	20769.26	17734.41	14661.71	11592.80	8539.70	5540.79	2478.40
	40	26673.27	25481.88	22631.84	19620.80	16522.05	13486.28	10403.59	7335.55	4288.46	1204.41	-1881.86
\$3	200	23963.74	23138.08	22335.96	21507.62	20679.96	19879.79	19057.75	18242.95	17415.50	16589.33	15502.43
	160	23934.88	23116.77	22316.77	21494.42	20663.17	19845.39	19012.84	18166.65	16857.57	13629.08	10511.93
	120	23889.67	23066.68	22280.53	21474.06	20629.28	19890.05	17674.07	14779.71	11708.23	8618.24	5501.63
	80	23930.92	23061.29	22265.29	21761.11	18962.21	15924.12	12842.90	9761.94	6674.73	3686.48	588.94
	40	24051.75	23039.07	20120.98	17206.00	14094.87	11047.74	7953.34	4874.26	1749.46	-1283.61	-4380.77
\$4	200	21346.91	20782.51	20242.09	19675.74	19109.60	18570.78	18010.05	17456.62	16890.19	16324.79	15473.17
	160	21318.00	20761.32	20223.03	19662.57	19092.81	18536.45	17965.35	17380.95	16332.24	13026.88	9902.75
	120	21272.97	20711.30	20187.02	19642.53	19059.53	18579.67	16471.96	13576.03	10495.94	7393.31	4266.42
	80	21315.04	20706.81	20172.32	19904.01	17155.15	14113.85	11024.09	7931.10	4833.31	1832.18	-1277.13
	40	21430.21	20596.28	17810.11	14791.22	11667.70	8609.08	5503.09	2412.78	-700.02	-3771.64	-6879.69
\$5	200	18730.09	18426.95	18148.22	17843.87	17539.25	17261.78	16962.34	16670.29	16364.88	16060.25	15443.92
	160	18701.13	18405.89	18129.30	17830.73	17522.46	17227.50	16917.85	16595.24	15806.90	12424.67	9293.56
	120	18656.28	18355.91	18093.49	17810.99	17489.78	17269.29	15269.85	12372.61	9283.77	6168.36	3031.21
	80	18699.18	18352.34	18079.35	18046.91	15348.09	12303.58	9205.28	6100.25	2991.83	-22.13	-3145.39
	40	18808.69	18153.48	15399.25	12376.44	9240.52	6170.42	3052.84	-45.40	-3173.52	-6259.66	-9378.60
\$6	200	16113.26	16071.38	16054.35	16012.00	15968.90	15952.78	15914.63	15883.96	15839.56	15795.71	15414.67
	160	16084.25	16050.45	16035.57	15998.89	15952.11	15918.56	15870.34	15809.52	15281.56	11822.47	8684.37
	120	16039.58	16000.51	15999.97	15979.46	15920.03	15958.91	14067.73	11169.19	8068.72	4943.42	1796.00
	80	16083.31	15997.86	15986.39	16189.80	13541.04	10493.31	7386.46	4269.40	1150.38	-1876.43	-5009.27
	40	16187.16	15710.69	12988.39	9961.65	6813.35	3731.75	602.59	-2506.14	-5647.08	-8747.68	-11877.51
\$7	200	13496.44	13715.82	13960.48	14180.12	14398.54	14643.78	14866.93	15097.63	15314.25	15531.17	15385.41
	160	13467.38	13695.01	13941.83	14167.04	14381.75	14609.62	14822.85	15023.82	14756.23	11220.27	8075.19
	120	13422.89	13645.13	13906.46	14147.93	14350.27	14648.53	12865.62	9965.77	6856.07	3718.49	560.79
	80	13467.44	13643.38	13893.42	14332.70	11733.98	8683.04	5567.65	2438.56	-691.07	-3730.73	-6875.34
	40	13565.63	13267.90	10577.52	7546.87	4386.18	1293.09	-1847.67	-4966.89	-8120.53	-11235.71	-14376.43

Table 11: DEMAND FILL RATE												
Overseas unit price	Local Capacity	Percent Demand Supplied from Overseas										
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%
\$2	200	0.88	0.88	0.89	0.91	0.91	0.92	0.94	0.95	0.96	0.97	0.79
	160	0.88	0.88	0.89	0.90	0.91	0.92	0.92	0.91	0.22	0.05	0.03
	120	0.88	0.87	0.88	0.89	0.88	0.74	0.11	0.03	0.01	0.01	0.00
	80	0.86	0.84	0.78	0.43	0.05	0.01	0.01	0.00	0.00	0.00	0.00
	40	0.60	0.12	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
\$3	200	0.88	0.88	0.89	0.91	0.91	0.92	0.94	0.95	0.96	0.97	0.79
	160	0.88	0.88	0.89	0.90	0.91	0.92	0.92	0.91	0.22	0.05	0.03
	120	0.88	0.87	0.88	0.89	0.88	0.74	0.11	0.03	0.01	0.01	0.00
	80	0.86	0.84	0.78	0.43	0.05	0.01	0.01	0.00	0.00	0.00	0.00
	40	0.60	0.12	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
\$4	200	0.88	0.88	0.89	0.91	0.91	0.92	0.94	0.95	0.96	0.97	0.79
	160	0.88	0.88	0.89	0.90	0.91	0.92	0.92	0.91	0.22	0.05	0.03
	120	0.88	0.87	0.88	0.89	0.88	0.74	0.11	0.03	0.01	0.01	0.00
	80	0.86	0.84	0.78	0.43	0.05	0.01	0.01	0.00	0.00	0.00	0.00
	40	0.60	0.12	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
\$5	200	0.88	0.88	0.89	0.91	0.91	0.92	0.94	0.95	0.96	0.97	0.79
	160	0.88	0.88	0.89	0.90	0.91	0.92	0.92	0.91	0.22	0.05	0.03
	120	0.88	0.87	0.88	0.89	0.88	0.74	0.11	0.03	0.01	0.01	0.00
	80	0.86	0.84	0.78	0.43	0.05	0.01	0.01	0.00	0.00	0.00	0.00
	40	0.60	0.12	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
\$6	200	0.88	0.88	0.89	0.91	0.91	0.92	0.94	0.95	0.96	0.97	0.79
	160	0.88	0.88	0.89	0.90	0.91	0.92	0.92	0.91	0.22	0.05	0.03
	120	0.88	0.87	0.88	0.89	0.88	0.74	0.11	0.03	0.01	0.01	0.00
	80	0.86	0.84	0.78	0.43	0.05	0.01	0.01	0.00	0.00	0.00	0.00
	40	0.60	0.12	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
\$7	200	0.88	0.88	0.89	0.91	0.91	0.92	0.94	0.95	0.96	0.97	0.79
	160	0.88	0.88	0.89	0.90	0.91	0.92	0.92	0.91	0.22	0.05	0.03
	120	0.88	0.87	0.88	0.89	0.88	0.74	0.11	0.03	0.01	0.01	0.00
	80	0.86	0.84	0.78	0.43	0.05	0.01	0.01	0.00	0.00	0.00	0.00
	40	0.60	0.12	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 12: ANNUAL TRANSPORTATION AND PURCHASING COSTS

Overseas unit price	Local Capacity	Percent Demand Supplied from Overseas										
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%
\$2	200	\$7,217.11	\$8,306.91	\$9,394.61	\$10,480.91	\$11,574.21	\$12,656.31	\$13,746.81	\$14,826.11	\$15,919.83	\$17,011.48	\$18,118.63
	160	\$7,215.71	\$8,304.81	\$9,389.71	\$10,479.51	\$11,568.61	\$12,661.51	\$13,745.46	\$14,850.08	\$15,626.36	\$15,177.77	\$14,698.46
	120	\$7,218.51	\$8,305.08	\$9,369.34	\$10,458.82	\$11,522.49	\$12,479.55	\$12,982.47	\$12,560.10	\$12,056.99	\$11,558.07	\$11,059.86
	80	\$7,161.81	\$8,230.13	\$9,134.95	\$9,989.91	\$10,340.03	\$9,886.43	\$9,429.52	\$8,920.10	\$8,412.09	\$7,867.67	\$7,342.16
	40	\$6,669.01	\$7,413.39	\$7,748.81	\$7,262.46	\$6,753.75	\$6,247.78	\$5,704.43	\$5,186.50	\$4,670.90	\$4,156.82	\$3,640.00
\$3	200	\$9,801.21	\$10,632.60	\$11,461.89	\$12,289.78	\$13,124.67	\$13,948.36	\$14,780.46	\$15,601.35	\$16,436.65	\$17,269.89	\$18,118.63
	160	\$9,799.81	\$10,630.50	\$11,456.99	\$12,288.38	\$13,119.07	\$13,953.56	\$14,779.10	\$15,625.31	\$16,143.18	\$15,436.18	\$14,698.46
	120	\$9,802.61	\$10,630.78	\$11,436.62	\$12,267.69	\$13,072.95	\$13,771.61	\$14,016.11	\$13,335.34	\$12,573.81	\$11,816.48	\$11,059.86
	80	\$9,745.91	\$10,555.83	\$11,202.24	\$11,798.78	\$11,890.49	\$11,178.49	\$10,463.16	\$9,695.34	\$8,928.91	\$8,126.08	\$7,342.16
	40	\$9,253.11	\$9,739.09	\$9,816.09	\$9,071.34	\$8,304.21	\$7,539.83	\$6,738.07	\$5,961.73	\$5,187.72	\$4,415.23	\$3,640.00
\$4	200	\$12,385.32	\$12,958.30	\$13,529.18	\$14,098.66	\$14,675.14	\$15,240.42	\$15,814.10	\$16,376.58	\$16,953.47	\$17,528.30	\$18,118.63
	160	\$12,383.92	\$12,956.20	\$13,524.28	\$14,097.26	\$14,669.54	\$15,245.61	\$15,812.74	\$16,400.55	\$16,660.00	\$15,694.59	\$14,698.46
	120	\$12,386.72	\$12,956.47	\$13,503.91	\$14,076.56	\$14,623.42	\$15,063.66	\$15,049.76	\$14,110.57	\$13,090.63	\$12,074.89	\$11,059.86
	80	\$12,330.02	\$12,881.52	\$13,269.52	\$13,607.65	\$13,440.96	\$12,470.54	\$11,496.80	\$10,470.57	\$9,445.73	\$8,384.49	\$7,342.16
	40	\$11,837.22	\$12,064.78	\$11,883.38	\$10,880.21	\$9,854.67	\$8,831.89	\$7,771.71	\$6,736.97	\$5,704.54	\$4,673.64	\$3,640.00
\$5	200	\$14,969.42	\$15,283.99	\$15,596.46	\$15,907.53	\$16,225.60	\$16,532.47	\$16,847.74	\$17,151.81	\$17,470.29	\$17,786.71	\$18,118.63
	160	\$14,968.02	\$15,281.89	\$15,591.56	\$15,906.13	\$16,220.00	\$16,537.67	\$16,846.38	\$17,175.78	\$17,176.82	\$15,953.01	\$14,698.46
	120	\$14,970.82	\$15,282.16	\$15,571.19	\$15,885.44	\$16,173.88	\$16,355.71	\$16,083.40	\$14,885.80	\$13,607.45	\$12,333.31	\$11,059.86
	80	\$14,914.12	\$15,207.21	\$15,336.80	\$15,416.53	\$14,991.42	\$13,762.59	\$12,530.44	\$11,245.80	\$9,962.55	\$8,642.91	\$7,342.16
	40	\$14,421.32	\$14,390.47	\$13,950.66	\$12,689.08	\$11,405.14	\$10,123.94	\$8,805.35	\$7,512.20	\$6,221.36	\$4,932.05	\$3,640.00
\$6	200	\$17,553.53	\$17,609.69	\$17,663.74	\$17,716.40	\$17,776.06	\$17,824.52	\$17,881.38	\$17,927.04	\$17,987.12	\$18,045.12	\$18,118.63
	160	\$17,552.13	\$17,607.59	\$17,658.84	\$17,715.00	\$17,770.46	\$17,829.72	\$17,880.03	\$17,951.01	\$17,693.65	\$16,211.42	\$14,698.46
	120	\$17,554.93	\$17,607.86	\$17,638.47	\$17,694.31	\$17,724.34	\$17,647.76	\$17,117.04	\$15,661.03	\$14,124.27	\$12,591.72	\$11,059.86
	80	\$17,498.23	\$17,532.91	\$17,404.09	\$17,225.40	\$16,541.88	\$15,054.64	\$13,564.09	\$12,021.03	\$10,479.37	\$8,901.32	\$7,342.16
	40	\$17,005.43	\$16,716.17	\$16,017.94	\$14,497.96	\$12,995.60	\$11,415.99	\$9,838.99	\$8,287.43	\$6,738.19	\$5,190.46	\$3,640.00
\$7	200	\$20,137.63	\$19,935.38	\$19,731.03	\$19,525.28	\$19,326.53	\$19,116.57	\$18,915.02	\$18,702.27	\$18,503.94	\$18,303.53	\$18,118.63
	160	\$20,136.23	\$19,933.28	\$19,726.13	\$19,523.88	\$19,320.93	\$19,121.77	\$18,913.67	\$18,726.24	\$18,210.47	\$16,469.83	\$14,698.46
	120	\$20,139.03	\$19,933.55	\$19,705.76	\$19,503.18	\$19,274.80	\$18,939.82	\$18,150.68	\$16,436.26	\$14,641.09	\$12,850.13	\$11,059.86
	80	\$20,082.33	\$19,858.60	\$19,471.37	\$19,034.27	\$18,092.35	\$16,346.69	\$14,597.73	\$12,796.26	\$10,996.19	\$9,159.73	\$7,342.16
	40	\$19,589.53	\$19,041.86	\$18,085.23	\$16,306.83	\$14,506.06	\$12,708.04	\$10,872.63	\$9,062.66	\$7,255.01	\$5,448.87	\$3,640.00

Table 13: ANNUAL INVENTORY HOLDING AND BACKLOG COSTS

Overseas unit price	Local Capacity	Percent Demand Supplied from Overseas										
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%
\$2	200	\$61.27	\$55.57	\$49.38	\$43.16	\$37.39	\$31.71	\$26.44	\$21.06	\$16.15	\$11.73	\$10.43
	160	\$61.28	\$55.19	\$48.80	\$43.13	\$37.34	\$31.74	\$25.99	\$19.80	\$15.11	\$19.98	\$24.94
	120	\$61.29	\$55.53	\$49.05	\$42.19	\$35.68	\$29.03	\$21.37	\$22.52	\$24.81	\$27.19	\$33.45
	80	\$59.21	\$52.48	\$45.16	\$37.64	\$29.61	\$26.97	\$27.83	\$29.31	\$32.34	\$34.16	\$41.47
	40	\$54.70	\$47.90	\$39.16	\$33.44	\$31.07	\$31.29	\$32.71	\$34.71	\$37.20	\$39.06	\$46.48
\$3	200	\$91.90	\$83.36	\$74.08	\$64.75	\$56.09	\$47.57	\$39.67	\$31.60	\$24.23	\$17.60	\$15.64
	160	\$91.93	\$82.78	\$73.19	\$64.69	\$56.01	\$47.60	\$38.98	\$29.71	\$22.66	\$29.98	\$37.42
	120	\$91.93	\$83.29	\$73.58	\$63.29	\$53.53	\$43.55	\$32.05	\$33.79	\$37.22	\$40.79	\$50.17
	80	\$88.81	\$78.71	\$67.73	\$56.45	\$44.42	\$40.46	\$41.74	\$43.97	\$48.50	\$51.24	\$62.20
	40	\$82.04	\$71.85	\$58.75	\$50.17	\$46.60	\$46.94	\$49.09	\$52.06	\$55.81	\$58.59	\$69.72
\$4	200	\$122.54	\$111.14	\$98.77	\$86.33	\$74.78	\$63.42	\$52.89	\$42.13	\$32.30	\$23.46	\$20.86
	160	\$122.57	\$110.38	\$97.59	\$86.26	\$74.68	\$63.47	\$51.98	\$39.61	\$30.22	\$39.97	\$49.89
	120	\$122.58	\$111.06	\$98.10	\$84.38	\$71.37	\$58.06	\$42.74	\$45.05	\$49.62	\$54.38	\$66.90
	80	\$118.42	\$104.95	\$90.31	\$75.27	\$59.22	\$53.94	\$56.07	\$58.62	\$64.67	\$68.32	\$82.94
	40	\$109.39	\$95.80	\$78.33	\$66.89	\$62.14	\$62.58	\$65.45	\$69.42	\$74.41	\$78.12	\$92.96
\$5	200	\$153.17	\$138.93	\$123.46	\$107.91	\$93.48	\$79.28	\$66.11	\$52.66	\$40.38	\$29.33	\$26.07
	160	\$153.21	\$137.97	\$121.99	\$107.82	\$93.35	\$79.34	\$64.97	\$49.51	\$37.77	\$49.96	\$62.36
	120	\$153.22	\$138.82	\$122.63	\$105.48	\$89.21	\$72.58	\$53.42	\$56.31	\$62.03	\$67.98	\$83.62
	80	\$148.02	\$131.19	\$112.89	\$94.09	\$74.03	\$67.43	\$69.57	\$73.28	\$80.84	\$85.40	\$103.67
	40	\$136.74	\$119.75	\$97.91	\$83.61	\$77.67	\$78.23	\$81.81	\$86.77	\$93.01	\$97.65	\$116.20
\$6	200	\$183.80	\$166.72	\$148.15	\$129.49	\$112.18	\$95.14	\$79.33	\$63.19	\$48.46	\$35.20	\$31.28
	160	\$183.85	\$165.56	\$146.39	\$129.38	\$112.02	\$95.21	\$77.96	\$59.41	\$45.32	\$59.95	\$74.83
	120	\$183.86	\$166.58	\$147.16	\$126.58	\$107.05	\$87.10	\$64.10	\$67.57	\$74.44	\$81.58	\$100.34
	80	\$177.62	\$157.43	\$135.47	\$112.91	\$88.84	\$80.92	\$83.48	\$87.94	\$97.01	\$102.48	\$124.40
	40	\$164.09	\$143.70	\$117.49	\$100.33	\$93.20	\$93.88	\$98.17	\$104.12	\$111.61	\$117.18	\$139.44
\$7	200	\$214.44	\$194.50	\$172.84	\$151.07	\$130.87	\$110.99	\$92.55	\$73.72	\$56.53	\$41.06	\$36.50
	160	\$214.49	\$193.16	\$170.79	\$150.95	\$130.69	\$111.08	\$95.75	\$69.31	\$52.88	\$69.94	\$87.30
	120	\$214.51	\$194.35	\$171.68	\$147.67	\$124.89	\$101.61	\$73.58	\$78.83	\$86.84	\$95.17	\$117.07
	80	\$207.23	\$183.67	\$158.05	\$131.73	\$103.64	\$94.40	\$97.40	\$102.59	\$113.18	\$119.56	\$145.14
	40	\$191.44	\$167.65	\$137.07	\$117.05	\$109.05	\$109.52	\$114.53	\$121.81	\$130.21	\$136.71	\$162.68

Table 14: ANNUAL LOST SALES COSTS												I = 0.20	sales price= \$13
Overseas unit price	Local Capacity	Percent Demand Supplied from Overseas											
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%	
\$2	200	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$13.00
	160	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2.60	\$2.60	\$11.18	\$116.48	\$699.40	\$1,276.08	
	120	\$0.00	\$2.60	\$4.68	\$7.54	\$18.98	\$87.10	\$275.86	\$842.14	\$1,424.02	\$2,018.90	\$2,592.98	
	80	\$9.88	\$18.46	\$83.20	\$168.74	\$440.18	\$984.36	\$1,532.18	\$2,132.52	\$2,718.56	\$3,295.01	\$3,879.46	
	40	\$181.48	\$306.80	\$577.98	\$1,123.20	\$1,668.68	\$2,254.98	\$2,843.36	\$3,417.44	\$4,005.82	\$4,581.72	\$5,191.68	
\$3	200	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$13.00	
	160	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2.60	\$2.60	\$11.18	\$116.48	\$699.40	\$1,276.08	
	120	\$0.00	\$2.60	\$4.68	\$7.54	\$18.98	\$87.10	\$275.86	\$842.14	\$1,424.02	\$2,018.90	\$2,592.98	
	80	\$9.88	\$18.46	\$83.20	\$168.74	\$440.18	\$984.36	\$1,532.18	\$2,132.52	\$2,718.56	\$3,295.01	\$3,879.46	
	40	\$181.48	\$306.80	\$577.98	\$1,123.20	\$1,668.68	\$2,254.98	\$2,843.36	\$3,417.44	\$4,005.82	\$4,581.72	\$5,191.68	
\$4	200	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$13.00	
	160	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2.60	\$2.60	\$11.18	\$116.48	\$699.40	\$1,276.08	
	120	\$0.00	\$2.60	\$4.68	\$7.54	\$18.98	\$87.10	\$275.86	\$842.14	\$1,424.02	\$2,018.90	\$2,592.98	
	80	\$9.88	\$18.46	\$83.20	\$168.74	\$440.18	\$984.36	\$1,532.18	\$2,132.52	\$2,718.56	\$3,295.01	\$3,879.46	
	40	\$181.48	\$306.80	\$577.98	\$1,123.20	\$1,668.68	\$2,254.98	\$2,843.36	\$3,417.44	\$4,005.82	\$4,581.72	\$5,191.68	
\$5	200	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$13.00	
	160	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2.60	\$2.60	\$11.18	\$116.48	\$699.40	\$1,276.08	
	120	\$0.00	\$2.60	\$4.68	\$7.54	\$18.98	\$87.10	\$275.86	\$842.14	\$1,424.02	\$2,018.90	\$2,592.98	
	80	\$9.88	\$18.46	\$83.20	\$168.74	\$440.18	\$984.36	\$1,532.18	\$2,132.52	\$2,718.56	\$3,295.01	\$3,879.46	
	40	\$181.48	\$306.80	\$577.98	\$1,123.20	\$1,668.68	\$2,254.98	\$2,843.36	\$3,417.44	\$4,005.82	\$4,581.72	\$5,191.68	
\$6	200	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$13.00	
	160	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2.60	\$2.60	\$11.18	\$116.48	\$699.40	\$1,276.08	
	120	\$0.00	\$2.60	\$4.68	\$7.54	\$18.98	\$87.10	\$275.86	\$842.14	\$1,424.02	\$2,018.90	\$2,592.98	
	80	\$9.88	\$18.46	\$83.20	\$168.74	\$440.18	\$984.36	\$1,532.18	\$2,132.52	\$2,718.56	\$3,295.01	\$3,879.46	
	40	\$181.48	\$306.80	\$577.98	\$1,123.20	\$1,668.68	\$2,254.98	\$2,843.36	\$3,417.44	\$4,005.82	\$4,581.72	\$5,191.68	
\$7	200	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$13.00	
	160	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$2.60	\$2.60	\$11.18	\$116.48	\$699.40	\$1,276.08	
	120	\$0.00	\$2.60	\$4.68	\$7.54	\$18.98	\$87.10	\$275.86	\$842.14	\$1,424.02	\$2,018.90	\$2,592.98	
	80	\$9.88	\$18.46	\$83.20	\$168.74	\$440.18	\$984.36	\$1,532.18	\$2,132.52	\$2,718.56	\$3,295.01	\$3,879.46	
	40	\$181.48	\$306.80	\$577.98	\$1,123.20	\$1,668.68	\$2,254.98	\$2,843.36	\$3,417.44	\$4,005.82	\$4,581.72	\$5,191.68	

Table 15: TOTAL ANNUAL COST

Overseas unit price	Local Capacity	Percent Demand Supplied from Overseas										
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%
\$2	200	\$7,278.38	\$8,362.48	\$9,443.99	\$10,524.07	\$11,611.60	\$12,688.02	\$13,773.25	\$14,847.17	\$15,935.98	\$17,023.21	\$18,142.06
	160	\$7,276.99	\$8,360.00	\$9,438.51	\$10,522.64	\$11,605.95	\$12,695.85	\$13,774.05	\$14,881.06	\$15,757.95	\$15,897.15	\$15,999.48
	120	\$7,279.80	\$8,363.21	\$9,423.07	\$10,508.55	\$11,577.15	\$12,595.68	\$13,279.70	\$13,424.76	\$13,505.82	\$13,604.16	\$13,686.29
	80	\$7,230.90	\$8,301.07	\$9,263.31	\$10,196.29	\$10,809.82	\$10,897.76	\$10,989.53	\$11,081.93	\$11,162.99	\$11,196.84	\$11,263.09
	40	\$6,905.19	\$7,768.09	\$8,365.95	\$8,419.10	\$8,453.50	\$8,534.05	\$8,580.50	\$8,638.65	\$8,713.92	\$8,777.60	\$8,878.16
\$3	200	\$9,893.11	\$10,715.96	\$11,535.97	\$12,354.53	\$13,180.76	\$13,995.93	\$14,820.13	\$15,632.95	\$16,460.88	\$17,287.49	\$18,147.27
	160	\$9,891.74	\$10,713.28	\$11,530.18	\$12,353.07	\$13,175.08	\$14,003.76	\$14,820.68	\$15,666.20	\$16,282.32	\$16,165.56	\$16,011.96
	120	\$9,894.54	\$10,716.67	\$11,514.88	\$12,338.52	\$13,145.46	\$13,902.26	\$14,324.02	\$14,211.27	\$14,035.05	\$13,876.17	\$13,703.01
	80	\$9,844.60	\$10,653.00	\$11,353.17	\$12,023.97	\$12,375.09	\$12,203.31	\$12,037.08	\$11,871.83	\$11,695.97	\$11,472.33	\$11,283.82
	40	\$9,516.63	\$10,117.74	\$10,452.82	\$10,244.71	\$10,019.49	\$9,841.75	\$9,630.52	\$9,431.23	\$9,249.35	\$9,055.54	\$8,901.40
\$4	200	\$12,507.86	\$13,069.44	\$13,627.95	\$14,184.99	\$14,749.92	\$15,303.84	\$15,866.99	\$16,418.71	\$16,985.77	\$17,551.76	\$18,152.49
	160	\$12,506.49	\$13,066.58	\$13,621.87	\$14,183.52	\$14,744.22	\$15,311.68	\$15,867.32	\$16,451.34	\$16,806.70	\$16,433.96	\$16,024.43
	120	\$12,509.30	\$13,070.13	\$13,606.69	\$14,168.48	\$14,713.77	\$15,208.82	\$15,368.36	\$14,997.76	\$14,564.27	\$14,148.17	\$13,719.74
	80	\$12,458.32	\$13,004.93	\$13,443.03	\$13,851.66	\$13,940.36	\$13,508.84	\$13,085.05	\$12,661.71	\$12,228.96	\$11,747.82	\$11,304.56
	40	\$12,128.09	\$12,467.38	\$12,539.69	\$12,070.30	\$11,585.49	\$11,149.45	\$10,680.52	\$10,223.83	\$9,784.77	\$9,333.48	\$8,924.64
\$5	200	\$15,122.59	\$15,422.92	\$15,719.92	\$16,015.44	\$16,319.08	\$16,611.75	\$16,913.85	\$17,204.47	\$17,510.67	\$17,816.04	\$18,157.70
	160	\$15,121.23	\$15,419.86	\$15,713.55	\$16,013.95	\$16,313.35	\$16,619.61	\$16,913.95	\$17,236.47	\$17,331.07	\$16,702.37	\$16,036.90
	120	\$15,124.04	\$15,423.58	\$15,698.50	\$15,998.46	\$16,282.07	\$16,515.39	\$16,412.68	\$15,784.25	\$15,093.50	\$14,420.19	\$13,736.46
	80	\$15,072.02	\$15,356.86	\$15,532.89	\$15,679.36	\$15,505.63	\$14,814.38	\$14,132.19	\$13,451.60	\$12,761.95	\$12,023.32	\$11,325.29
	40	\$14,739.54	\$14,817.02	\$14,626.55	\$13,895.89	\$13,151.49	\$12,457.15	\$11,730.52	\$11,016.41	\$10,320.19	\$9,611.42	\$8,947.88
\$6	200	\$17,737.33	\$17,776.41	\$17,811.89	\$17,845.89	\$17,888.24	\$17,919.66	\$17,960.71	\$17,990.23	\$18,035.58	\$18,080.32	\$18,162.91
	160	\$17,735.98	\$17,773.15	\$17,805.23	\$17,844.38	\$17,882.48	\$17,927.53	\$17,960.59	\$18,021.60	\$17,855.45	\$16,970.77	\$16,049.37
	120	\$17,738.79	\$17,777.04	\$17,790.31	\$17,828.43	\$17,850.37	\$17,821.96	\$17,457.00	\$16,570.74	\$15,622.73	\$14,692.20	\$13,753.18
	80	\$17,685.73	\$17,708.80	\$17,622.76	\$17,507.05	\$17,070.90	\$16,119.92	\$15,179.75	\$14,241.49	\$13,294.94	\$12,298.81	\$11,346.02
	40	\$17,351.00	\$17,166.67	\$16,713.41	\$15,721.49	\$14,757.48	\$13,764.85	\$12,780.52	\$11,808.99	\$10,855.62	\$9,889.36	\$8,971.12
\$7	200	\$20,352.07	\$20,129.88	\$19,903.87	\$19,676.35	\$19,457.40	\$19,227.56	\$19,007.57	\$18,775.99	\$18,560.47	\$18,344.59	\$18,168.13
	160	\$20,350.72	\$20,126.44	\$19,896.92	\$19,674.83	\$19,451.62	\$19,235.45	\$19,012.02	\$18,806.73	\$18,379.83	\$17,239.17	\$16,061.84
	120	\$20,353.54	\$20,130.50	\$19,882.12	\$19,658.39	\$19,418.67	\$19,128.53	\$18,500.12	\$17,357.23	\$16,151.95	\$14,964.20	\$13,769.91
	80	\$20,299.44	\$20,060.73	\$19,712.62	\$19,334.74	\$18,636.17	\$17,425.45	\$16,227.31	\$15,031.37	\$13,827.93	\$12,574.30	\$11,366.76
	40	\$19,962.45	\$19,516.31	\$18,800.28	\$17,547.08	\$16,283.79	\$15,072.54	\$13,830.52	\$12,601.91	\$11,391.04	\$10,167.30	\$8,994.36

Table 16: TOTAL ANNUAL REVENUE													sales price = \$13.00	
Overseas unit price	Local Capacity	Percent Demand Supplied from Overseas												
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%		
\$2	200	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,759.57
	160	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,863.31	\$33,863.31	\$33,830.94	\$33,104.63	\$30,053.14	\$27,039.35	\$27,039.35	
	120	\$33,874.75	\$33,860.58	\$33,864.87	\$33,863.44	\$33,802.08	\$33,471.36	\$32,393.27	\$29,424.46	\$26,405.08	\$23,298.99	\$20,267.13	\$20,267.13	
	80	\$33,872.02	\$33,826.13	\$33,492.16	\$33,043.53	\$31,596.11	\$28,716.35	\$25,676.30	\$22,669.66	\$19,591.52	\$16,588.78	\$13,526.50	\$13,526.50	
	40	\$32,969.56	\$32,309.94	\$30,881.11	\$27,989.26	\$25,020.58	\$21,951.41	\$18,941.65	\$15,919.67	\$12,833.99	\$9,793.03	\$6,755.97	\$6,755.97	
\$3	200	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,759.57
	160	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,863.31	\$33,863.31	\$33,830.94	\$33,104.63	\$30,053.14	\$27,039.35	\$27,039.35	
	120	\$33,874.75	\$33,860.58	\$33,864.87	\$33,863.44	\$33,802.08	\$33,471.36	\$32,393.27	\$29,424.46	\$26,405.08	\$23,298.99	\$20,267.13	\$20,267.13	
	80	\$33,872.02	\$33,826.13	\$33,492.16	\$33,043.53	\$31,596.11	\$28,716.35	\$25,676.30	\$22,669.66	\$19,591.52	\$16,588.78	\$13,526.50	\$13,526.50	
	40	\$32,969.56	\$32,309.94	\$30,881.11	\$27,989.26	\$25,020.58	\$21,951.41	\$18,941.65	\$15,919.67	\$12,833.99	\$9,793.03	\$6,755.97	\$6,755.97	
\$4	200	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,759.57
	160	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,863.31	\$33,863.31	\$33,830.94	\$33,104.63	\$30,053.14	\$27,039.35	\$27,039.35	
	120	\$33,874.75	\$33,860.58	\$33,864.87	\$33,863.44	\$33,802.08	\$33,471.36	\$32,393.27	\$29,424.46	\$26,405.08	\$23,298.99	\$20,267.13	\$20,267.13	
	80	\$33,872.02	\$33,826.13	\$33,492.16	\$33,043.53	\$31,596.11	\$28,716.35	\$25,676.30	\$22,669.66	\$19,591.52	\$16,588.78	\$13,526.50	\$13,526.50	
	40	\$32,969.56	\$32,309.94	\$30,881.11	\$27,989.26	\$25,020.58	\$21,951.41	\$18,941.65	\$15,919.67	\$12,833.99	\$9,793.03	\$6,755.97	\$6,755.97	
\$5	200	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,759.57
	160	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,863.31	\$33,863.31	\$33,830.94	\$33,104.63	\$30,053.14	\$27,039.35	\$27,039.35	
	120	\$33,874.75	\$33,860.58	\$33,864.87	\$33,863.44	\$33,802.08	\$33,471.36	\$32,393.27	\$29,424.46	\$26,405.08	\$23,298.99	\$20,267.13	\$20,267.13	
	80	\$33,872.02	\$33,826.13	\$33,492.16	\$33,043.53	\$31,596.11	\$28,716.35	\$25,676.30	\$22,669.66	\$19,591.52	\$16,588.78	\$13,526.50	\$13,526.50	
	40	\$32,969.56	\$32,309.94	\$30,881.11	\$27,989.26	\$25,020.58	\$21,951.41	\$18,941.65	\$15,919.67	\$12,833.99	\$9,793.03	\$6,755.97	\$6,755.97	
\$6	200	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,759.57
	160	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,863.31	\$33,863.31	\$33,830.94	\$33,104.63	\$30,053.14	\$27,039.35	\$27,039.35	
	120	\$33,874.75	\$33,860.58	\$33,864.87	\$33,863.44	\$33,802.08	\$33,471.36	\$32,393.27	\$29,424.46	\$26,405.08	\$23,298.99	\$20,267.13	\$20,267.13	
	80	\$33,872.02	\$33,826.13	\$33,492.16	\$33,043.53	\$31,596.11	\$28,716.35	\$25,676.30	\$22,669.66	\$19,591.52	\$16,588.78	\$13,526.50	\$13,526.50	
	40	\$32,969.56	\$32,309.94	\$30,881.11	\$27,989.26	\$25,020.58	\$21,951.41	\$18,941.65	\$15,919.67	\$12,833.99	\$9,793.03	\$6,755.97	\$6,755.97	
\$7	200	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,877.61	\$33,759.57
	160	\$33,862.40	\$33,862.40	\$33,877.61	\$33,877.61	\$33,877.61	\$33,863.31	\$33,863.31	\$33,830.94	\$33,104.63	\$30,053.14	\$27,039.35	\$27,039.35	
	120	\$33,874.75	\$33,860.58	\$33,864.87	\$33,863.44	\$33,802.08	\$33,471.36	\$32,393.27	\$29,424.46	\$26,405.08	\$23,298.99	\$20,267.13	\$20,267.13	
	80	\$33,872.02	\$33,826.13	\$33,492.16	\$33,043.53	\$31,596.11	\$28,716.35	\$25,676.30	\$22,669.66	\$19,591.52	\$16,588.78	\$13,526.50	\$13,526.50	
	40	\$32,969.56	\$32,309.94	\$30,881.11	\$27,989.26	\$25,020.58	\$21,951.41	\$18,941.65	\$15,919.67	\$12,833.99	\$9,793.03	\$6,755.97	\$6,755.97	

Table 17: TOTAL ANNUAL PROFIT												
Overseas unit price	Local Capacity	Percent Demand Supplied from Overseas										
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%
\$2	200	26584.02	25499.92	24433.62	23353.54	22266.01	21189.59	20104.36	19030.44	17941.63	16854.40	15617.51
	160	26585.41	25502.40	24439.10	23354.97	22271.66	21167.46	20089.26	18949.88	17346.68	14155.99	11039.87
	120	26594.95	25497.37	24441.80	23354.89	22224.93	20875.68	19113.57	15999.70	12899.26	9694.83	6580.84
	80	26641.12	25525.06	24228.85	22847.24	20786.29	17818.59	14686.77	11587.73	8428.53	5391.94	2263.41
	40	26064.37	24541.85	22515.16	19570.16	16567.08	13417.36	10361.15	7281.02	4120.07	1015.43	-2122.19
\$3	200	23969.29	23146.44	22341.64	21523.08	20696.85	19881.68	19057.48	18244.66	17416.73	16590.12	15612.30
	160	23970.66	23149.12	22347.43	21524.54	20702.53	19859.55	19042.63	18164.74	16822.31	13887.58	11027.39
	120	23980.21	23143.91	22349.99	21524.92	20656.62	19569.10	18069.25	15213.19	12370.03	9422.82	6564.12
	80	24027.42	23173.13	22138.99	21019.56	19221.02	16513.04	13639.22	10797.83	7895.55	5116.45	2242.68
	40	23452.93	22192.20	20428.29	17744.55	15001.09	12109.66	9311.13	6488.44	3584.64	737.49	-2145.43
\$4	200	21354.54	20792.96	20249.66	19692.62	19127.69	18573.77	18010.62	17458.90	16891.84	16325.85	15607.08
	160	21355.91	20795.82	20255.74	19694.09	19133.39	18551.63	17995.99	17379.60	16297.93	13619.18	11014.92
	120	21365.45	20790.45	20258.18	19694.96	19088.31	18262.54	17024.91	14426.70	11840.81	9150.82	6547.39
	80	21413.70	20821.20	20049.13	19191.87	17655.75	15207.51	12591.25	10007.95	7362.56	4840.96	2221.94
	40	20841.47	19842.56	18341.42	15918.96	13435.09	10801.96	8261.13	5695.84	3049.22	459.55	-2168.67
\$5	200	18739.81	18439.48	18157.69	17862.17	17558.53	17265.86	16963.76	16673.14	16366.94	16061.57	15601.87
	160	18741.17	18442.54	18164.06	17863.66	17564.26	17243.70	16949.36	16594.47	15773.56	13350.77	11002.45
	120	18750.71	18437.00	18166.37	17864.98	17520.01	16955.97	15980.59	13640.21	11311.58	8878.80	6530.67
	80	18800.00	18469.27	17959.27	17364.17	16090.48	13901.97	11544.11	9218.06	6829.57	4565.46	2201.21
	40	18230.02	17492.92	16254.56	14093.37	11869.09	9494.26	7211.13	4903.26	2513.80	181.61	-2191.91
\$6	200	16125.07	16085.99	16065.72	16031.72	15989.37	15957.95	15916.90	15887.38	15842.03	15797.29	15596.66
	160	16126.42	16089.25	16072.38	16033.23	15995.13	15935.78	15902.72	15809.34	15249.18	13082.37	10989.98
	120	16135.96	16083.54	16074.56	16035.01	15951.71	15649.40	14936.27	12853.72	10782.35	8606.79	6513.95
	80	16186.29	16117.33	15869.40	15536.48	14525.21	12596.43	10496.55	8428.17	6296.58	4289.97	2180.48
	40	15618.56	15143.27	14167.70	12267.77	10263.10	8186.56	6161.13	4110.68	1978.37	-96.33	-2215.15
\$7	200	13510.33	13732.52	13973.74	14201.26	14420.21	14650.05	14870.04	15101.62	15317.14	15533.02	15591.44
	160	13511.68	13735.96	13980.69	14202.78	14425.99	14627.86	14851.29	15024.21	14724.80	12813.97	10977.51
	120	13521.21	13730.08	13982.75	14205.05	14383.41	14342.83	13893.15	12067.23	10253.13	8334.79	6497.22
	80	13572.58	13765.40	13779.54	13708.79	12959.94	11290.90	9448.99	7638.29	5763.59	4014.48	2159.74
	40	13007.11	12793.63	12080.83	10442.18	8736.79	6878.87	5111.13	3317.76	1442.95	-374.27	-2238.39

Table 18: DEMAND FILL RATE

Overseas unit price	Local Capacity	Percent Demand Supplied from Overseas										
		100%	90%	80%	70%	60%	50%	40%	30%	20%	10%	0%
\$2	200	0.88	0.88	0.89	0.91	0.91	0.92	0.93	0.95	0.96	0.97	0.84
	160	0.88	0.88	0.89	0.91	0.91	0.92	0.93	0.92	0.73	0.60	0.54
	120	0.88	0.90	0.89	0.90	0.90	0.88	0.74	0.56	0.47	0.41	0.34
	80	0.87	0.86	0.86	0.85	0.74	0.58	0.45	0.37	0.28	0.23	0.18
	40	0.84	0.82	0.76	0.64	0.51	0.40	0.30	0.22	0.15	0.12	0.09
\$3	200	0.88	0.88	0.89	0.91	0.91	0.92	0.93	0.95	0.96	0.97	0.84
	160	0.88	0.88	0.89	0.91	0.91	0.92	0.93	0.92	0.73	0.60	0.54
	120	0.88	0.88	0.89	0.90	0.90	0.88	0.74	0.56	0.47	0.41	0.34
	80	0.87	0.86	0.86	0.85	0.74	0.58	0.45	0.37	0.28	0.23	0.18
	40	0.84	0.82	0.76	0.64	0.51	0.40	0.30	0.22	0.15	0.12	0.09
\$4	200	0.88	0.88	0.89	0.91	0.91	0.92	0.93	0.95	0.96	0.97	0.84
	160	0.88	0.88	0.89	0.91	0.91	0.92	0.93	0.92	0.73	0.60	0.54
	120	0.88	0.88	0.89	0.90	0.90	0.88	0.74	0.56	0.47	0.41	0.34
	80	0.87	0.86	0.86	0.85	0.74	0.58	0.45	0.37	0.28	0.23	0.18
	40	0.84	0.82	0.76	0.64	0.51	0.40	0.30	0.22	0.15	0.12	0.09
\$5	200	0.88	0.88	0.89	0.91	0.91	0.92	0.93	0.95	0.96	0.97	0.84
	160	0.88	0.88	0.89	0.91	0.91	0.92	0.93	0.92	0.73	0.60	0.54
	120	0.88	0.88	0.89	0.90	0.90	0.88	0.74	0.56	0.47	0.41	0.34
	80	0.87	0.86	0.86	0.85	0.74	0.58	0.45	0.37	0.28	0.23	0.18
	40	0.84	0.82	0.76	0.64	0.51	0.40	0.30	0.22	0.15	0.12	0.09
\$6	200	0.88	0.88	0.89	0.91	0.91	0.92	0.93	0.95	0.96	0.97	0.84
	160	0.88	0.88	0.89	0.91	0.91	0.92	0.93	0.92	0.73	0.60	0.54
	120	0.88	0.88	0.89	0.90	0.90	0.88	0.74	0.56	0.47	0.41	0.34
	80	0.87	0.86	0.86	0.85	0.74	0.58	0.45	0.37	0.28	0.23	0.18
	40	0.84	0.82	0.76	0.64	0.51	0.40	0.30	0.22	0.15	0.12	0.09
\$7	200	0.88	0.88	0.89	0.91	0.91	0.92	0.93	0.95	0.96	0.97	0.84
	160	0.88	0.88	0.89	0.91	0.91	0.92	0.93	0.92	0.73	0.60	0.54
	120	0.88	0.86	0.89	0.90	0.90	0.88	0.74	0.56	0.47	0.41	0.34
	80	0.87	0.86	0.86	0.85	0.74	0.58	0.45	0.37	0.28	0.23	0.18
	40	0.84	0.82	0.76	0.64	0.51	0.40	0.30	0.22	0.15	0.12	0.09