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LONG WANG SHA TAN KU COMPANY (DRAGON KING SHORTS COMPANY)

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On April 10, 2009, Ming Chen, chief operating officer (COO) of Long Wang Sha Tan Ku Company[1] (Dragon King), a boardshorts manufacturer based in Shanghai, China, sat in his office reviewing the data he planned to present to the company's chief executive officer (CEO), Wei Lin. In three days, Chen was expected to present a plan to improve Dragon King's profitability through adjustments to the company's operations.

As he reviewed the data, Chen thought there were at least three possible paths to increased profitability that he needed to investigate. First, he wanted to review how production was scheduled between the company's two manufacturing facilities. Second, since Dragon King operated at capacity during busy times, he thought that it might be beneficial for the company to expand capacity in one of its manufacturing facilities. Finally, Chen wondered whether some price adjustments could help out Dragon King's supply chain and increase contribution.

HISTORY OF BOARDSHORTS[2]

Boardshorts are a style of swimwear that has been popularized by the surfing industry. They were originally designed for wear by surfboard riders, but evolved into a fashionable piece of everyday clothing worn by women and men of all ages. Following an enormous growth in popularity, surf companies were quick to add new styles to their range of products. Boardshorts were normally longer than regular shorts, often had a baggy appearance and were also designed to be quick-drying, durable, flexible and lightweight. Since boardshorts first appeared in the late 1960s, significant quality improvements had been made through the use of new materials and technology, as well as with the incorporation of new design features.

[1] *The English translation is Dragon King Shorts Company.*
[2] *http://en.wikipedia.org/wiki/Board_shorts, http://mensboardshorts.com.au/history-of-boardshorts accessed April 27, 2009.*

LONG WANG SHA TAN KU COMPANY

Dragon King was a successful, family-run boardshorts manufacturer with its head office in Shanghai, China. The company manufactured premium boardshorts for more than 14 brands, including popular surf companies, such as Billabong and Quiksilver. Production volumes had been steadily increasing in recent years, with the company producing over 18 million units in 2008. Since the company's establishment in 1972, Dragon King believed the following core values were central to its success:

1. The manufacture of high-quality boardshorts, that
2. Meet or exceed customer expectations while
3. Creating ongoing business partnerships with our customers.

Demand and Customers

The demand for boardshorts was seasonal, with much higher sales during the spring and summer months. Specialty surf shops and sporting goods stores only sold boardshorts during the spring and summer months and switched to snowboard and skiing merchandise throughout the winter. Swimwear and department stores stocked boardshorts all year, replenishing inventory less often in the fall and winter months due to lower sales. Boardshorts sold to customers located in the northern hemisphere were primarily manufactured during the period between January and July, with peak production taking place between March and May. For southern hemisphere customers, where the seasons are reversed, manufacturing took place between August and February.

More than 90 per cent of Dragon King's sales were generated by its nine top customers from North America, Europe and Australia. The demand from each customer, represented by monthly shipment quantity, was different for each month of the year (see Exhibit 1). Customers 1 and 2 were department stores with outlets in both North America and Europe; customers 3 to 8 were specialty surf and sporting goods retailers in North America; customer 9 was a specialty surf retailer in Australia, and customer 10 represented all other customers.

Boardshorts Manufacturing

The manufacture of boardshorts was a straightforward process involving cutting the fabric to the pattern pieces and then sewing the pieces together. Sewing was the bottleneck process that limited production at Dragon King. The sewing process was labor-intensive and required highly skilled operators to stitch consistently durable, high-strength seams. Many of these seams required triple stitching in fairly tight patterns, further justifying the high skill requirement. Experienced sewing operators had become scarce in the towns and cities surrounding Shanghai as a number of apparel manufacturers requiring workers with similar skills had established production facilities in this location. Dragon King made a major effort every year to hire the most skilled operators during the peak production months when efficiency was vital.

The time required to sew a pair of boardshorts was expressed in standard allowed minutes (SAM), a standard measure for the apparel industry. Each pair of boardshorts was characterized by a set of standardized seams. The standard time required for a skilled operator to sew each seam of designated type and length was established, and hence, the SAM of sewing each pair of boardshorts could be calculated. Different styles of boardshorts had different SAM values, adjusted for the degree of difficulty related to the particular design as well as the total seam length. SAM was used to measure the demand and capacity of

production at Dragon King when modified for product and production process differences. Order quantities and the average SAM for each customer could be estimated from previous sales data (see Exhibit 2.)

Production Facilities

Dragon King had two manufacturing facilities near Shanghai, one in Wuxi, China (WX), and the other in Wuhu, China (WH). There were 2,600 and 1,550 sewing machines in WX and WH respectively. In addition, different availability and skill levels of sewing operators meant that the capacity of the two factories was different (see Exhibits 3a and 3b).

The variable cost of production in WH was lower than that in WX, while the transportation cost was lower for WX as it was closer to the port (see Exhibit 4). Some customers required their orders to be manufactured in only one of Dragon King's factories, as these customers had not given factory approval for both plants (see Exhibit 5). In order to cover set-up and design costs, the minimum production quantity for each customer in the WX and WH factories were set as 200,000 and 100,000 pieces respectively.

ISSUES

Demand Exceeds Capacity During Peak Seasons

To maintain long-term business relationships with its customers, Dragon King attempted to fill all customer orders and deliver on time. The sales revenue had been increasing every year, but customer demand for the past few years had been greater than production capacity during the peak season of February to June.

Airfreight Cost

It was extremely difficult to outsource the production of boardshorts, given the high skill and experience required of operators capable of producing quality products. Thus, when demand exceeded capacity, products that were late for scheduled shipment were air freighted at extra cost to avoid late delivery to customers. Airfreight costs were high relative to the variable cost of production (see Exhibit 6), so when capacity fell short of demand for consecutive months during the peak season, these costs had a significant impact on bottom line profits. In addition, even when promptly delivered, sending products by airfreight was not considered good service as it forced customers to collect partial orders from multiple locations, resulting in additional cost and inconvenience.

PREPARING FOR THE MEETING

After spending the last few weeks collecting data and speaking with other Dragon King managers, Ming Chen knew the three key questions he needed to answer before meeting with Lin. Chen believed these answers would illustrate how Dragon King could improve profitability in 2010.

1. **How should customers' orders be allocated between the two factories in order to reduce the airfreight cost and maximize the contribution?**

Typically, orders were split between the WX and WH factories according to the number of sewing machines at each (roughly a 2:1 ratio), with the exception of orders from customers who required their product to be produced exclusively at only one factory. Chen was unsure whether this strategy lead to the best use of capacity.

2. **Should Dragon King invest in 400 extra sewing machines in the WH factory in order to increase production capacity?**

The WH factory had sufficient floor space for 400 additional sewing machines. The investment would increase capacity, thereby reducing airfreight costs. However, the new investment would increase the depreciation expense and possibly the labour costs associated with hiring additional sewing operators. Chen had to decide whether the investment should be made, and show how it would influence total contribution.

Chen's assumptions:
- Depreciation cost of the new sewing machines would be $2,835 for the first year (see Exhibit 7).
- Availability and skill level of the sewing operators would remain unchanged.

3. **Could offering an "Early Bird Discount" increase contribution?**

Chen was aware that many products currently had to be air freighted during the peak season. He wondered whether the situation could be alleviated with an "Early Bird Discount," where a certain discount was offered to customers if they agreed to move some of their April and May orders into December and January. Furthermore, if the strategy worked, Chen wondered how much of a discount he could offer without negatively affecting contribution. Chen felt customers would expect at least a one per cent discount to compensate for carrying the extra inventory over the four-month period.

CONCLUSION

Chen finished his third coffee of the morning as he reviewed the data and notes he had collected in preparation for his pending meeting with Lin. He had anticipated the necessary information to start his analysis. All Chen knew for sure was that Lin was expecting answers.

Exhibit 1

ESTIMATED MONTHLY SHIPMENT QUANTITY (%)

Estimated Shipment Requirements Based on Previous Data (Monthly Percentage)													
Customer	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1	4.0%	4.0%	6.5%	8.0%	12.5%	13.0%	14.0%	12.0%	10.0%	6.0%	5.0%	5.0%	100%
2	4.0%	4.0%	5.0%	8.0%	12.0%	14.0%	13.0%	12.0%	10.0%	7.0%	6.0%	5.0%	100%
3				8.0%	15.0%	20.0%	20.0%	20.0%	10.0%	7.0%			100%
4				10.0%	10.0%	15.0%	20.0%	20.0%	15.0%	10.0%			100%
5				10.0%	15.0%	20.0%	17.5%	15.0%	12.5%	10.0%			100%
6			5.0%	7.5%	15.0%	15.0%	20.0%	15.0%	12.5%	10.0%			100%
7			5.0%	7.5%	12.5%	15.0%	17.5%	15.0%	12.5%	10.0%	5.0%		100%
8			4.0%	10.0%	15.0%	18.0%	16.0%	15.0%	10.0%	7.0%	5.0%		100%
9	20.0%	20.0%	20.0%	10.0%	5.0%						10.0%	15.0%	100%
10	3.0%	2.0%	5.0%	8.0%	13.0%	14.0%	16.0%	15.0%	8.0%	7.0%	5.0%	4.0%	100%

Note: Customer 10 represents all customers excluding the top 9, and the figures represent the average of those customers.

Exhibit 2

CUSTOMER ORDERS (OCTOBER 2009 TO SEPTEMBER 2010)

Customer	Estimated Order Qty (pcs.)	Average SAM per Piece	Revenue / 1,000 SAM (CNY ¥)	Average Price/Piece
1	3,345,000	23	¥ 1,010	¥ 23.23
2	2,745,000	22	¥ 1,005	¥ 22.11
3	2,115,000	24	¥ 1,020	¥ 24.48
4	2,070,000	24	¥ 1,020	¥ 24.48
5	2,025,000	25	¥ 1,030	¥ 25.75
6	1,890,000	23	¥ 1,020	¥ 23.46
7	1,695,000	24	¥ 1,025	¥ 24.60
8	1,535,000	26	¥ 1,040	¥ 27.04
9	1,280,000	25	¥ 1,030	¥ 25.75
10	1,055,000	24	¥ 990	¥ 23.76

¥1 was approximately $0.182 in April 2009.

Exhibit 3a

ESTIMATED PRODUCTION CAPACITY (OCT '09 TO SEP '10)

Month	Number of working days	Wuxi Factory		Wuhu Factory	
		Sewing Operator Occupancy Rate	Efficiency	Sewing Operator Occupancy Rate	Efficiency
Oct	26	80%	90%	80%	89%
Nov	24	80%	90%	80%	89%
Dec	26	80%	90%	80%	89%
Jan	24	90%	94%	90%	94%
Feb	23	98%	98%	98%	97%
Mar	26	98%	98%	98%	97%
Apr	25	98%	98%	98%	97%
May	25	98%	98%	98%	97%
Jun	25	98%	98%	98%	97%
Jul	26	95%	94%	95%	94%
Aug	25	90%	90%	90%	89%
Sep	25	80%	90%	80%	89%

Exhibit 3b

CAPACITY CALCULATION

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Number of Working Days	26	24	26	24	23	26	25	25	25	26	25	25	300
Minutes per Day (10hrs*60mins)	600	600	600	600	600	600	600	600	600	600	600	600	
WX Factory	*Number of Sewing Machines*			*2,600*									
Sewing Operator Occupancy Rate	80%	80%	80%	90%	98%	98%	98%	98%	98%	95%	90%	80%	
Sewing Operators	2,080	2,080	2,080	2,340	2,548	2,548	2,548	2,548	2,548	2,470	2,340	2,080	
Efficiency	90%	90%	90%	94%	98%	98%	98%	98%	98%	94%	90%	90%	
Sewing Capacity ('000 SAM)	29,203	26,957	29,203	31,674	34,459	38,954	37,456	37,456	37,456	36,220	31,590	28,080	398,707
WH Factory	*Number of Sewing Machines*			*1,550*									
Sewing Operator Occupancy Rate	80%	80%	80%	90%	98%	98%	98%	98%	98%	95%	90%	80%	
Sewing Operators	1,240	1,240	1,240	1,395	1,519	1,519	1,519	1,519	1,519	1,473	1,395	1,240	
Efficiency	89%	89%	89%	94%	97%	97%	97%	97%	97%	94%	89%	89%	
Sewing Capacity ('000 SAM)	17,216	15,892	17,216	18,883	20,333	22,986	22,101	22,101	22,101	21,593	18,623	16,554	235,600

Exhibit 4

VARIABLE COST

Variable cost	WX	WH
Materials Cost / 1,000 SAM	450	450
Other Production Cost / 1,000 SAM	222	174
Sewing Cost /1,000 SAM	185	145
Transportation Cost / 1,000 SAM	20	40
Total Variable Cost / 1,000 SAM	**877**	**809**

Exhibit 5

PRODUCTION RESTRICTIONS

Customer	WX	WH
1	Y	Y
2	Y	Y
3	N	Y
4	Y	Y
5	Y	Y
6	Y	Y
7	Y	N
8	Y	N
9	N	Y
10	Y	Y

Exhibit 6

AIR FREIGHT COST

Air Freight Cost	
Air Freight / piece	¥ 7.25
Average SAM / piece	23.8
Air Freight / 1,000 SAM	**¥ 305**

*Note: Weighted Average SAM/piece for current customers is 23.8. (CNY ¥ 7.25 / 23.8 SAM * 1,000 = CNY ¥ 305 / 1,000 SAM)*

Exhibit 7

COST CALCULATION FOR 400 NEW SEWING MACHINES IN WH

Extra 400 Sewing Machines in WH	**Units**	**CNY ¥ '000**	
		Cost	**Total**
Sewing Machine Cost	400	32	12,800
Electircal & Mechanical Fitting	1	200	200
Extra Air Conditioning Cost	1	500	500
Total Expenditure			**13,500**

Machine Life (years)	10
Residual Value 10%	1,280

Depreciation	1st yr	2nd yr	3rd yr	4th yr	5th yr	6th yr	7th yr	8th yr	9th yr	10th yr
	2,835	2,240	1,769	1,398	1,104	872	689	544	430	340