THE WORLD'S COMPUTING SOLUTION

MARKET PLACE SIMULATION

SUPPLY CHAIN MANAGEMENT

JCT: Task 1

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Tortuga held more than adequate funds each quarter to achieve production capacity goals. However, without the investment of shareholders it would have been quite difficult. For example, if you look at Tortuga's income statement you will see there was a negative net income in 2 out of 4 quarters. The negative income was due to two major factors, future investment activities and inadequate expansion of production facilities to meet demand.

During quarter two Tortuga neglected to expand its manufacturing plant. This oversight was especially detrimental. While the sales force and popularity of Tortuga products were growing in popularity there was no way to supply the over whelming demand. Therefore, potential buyers were forced to turn to competitor solutions decreasing not only Tortuga's potential profit but also prospective future customer loyalty revenue. Needed expansion of the manufacturing plant could have been picked up on while reviewing quarter two's: Sales –Total" report and utilizing the pro-forma statements to visually see and forecast the amount Tortuga could afford to invest in expanding its manufacturing capacity.

Figure 2: "Quarter 4 Sales Total"

Quarter 4: Sales - Total							
Brand	Net Demand	Lost Sales Due to Stock Outs	Number of Units Sold	Sales Revenue	Rebates	Cost of Goods Sold	Gross Margin
Speedy Trutle 2	0	0	0	0	0	0	0
Turtle Pocket	0	0	0	0	0	0	0
Speedy Turtle 3	4,697	2257	2,440	6,344,000	122,000	4,448,309	1,773,691
Turtle Pocket 2	4,688	2253	2,435	7,792,000	121,750	4,439,939	3,230,311
Total	**9,385**	**4,510**	**4,875**	**14,136,000**	**243,750**	**8,888,248**	**5,004,002**

To make up for the insufficient inventory, Tortuga invested heavily during the 3rd and 4th quarters, increasing manufacturing capacity by 50 units and 25 units respectively. However, Tortuga could not have predicted the extreme demand their computers would have during the 3rd & 4th quarters. Figure 2 "Quarter 4 Sales Total" shows the amount of "Lost Sales Due to Stock Outs" as 4,510 units. In retrospect, Tortuga should have invested more heavily in manufacturing capacity. Nevertheless, despite not having the manufacturing capacity needed to meet demand Tortuga performed admirably in the 4th quarter by netting $2.5 million. Also Tortuga was able to stay within its goals of making a sustainable profit within the first year, being the leading computer supplier and running a lean operating environment.

Just in Time, an inventory control theory that allows companies to keep fewer inventories on hand by ordering the stock they need just when they need, as opposed to keeping large amounts of stock on hand. In this model companies like Tortuga are able to eliminate many of the costs of large warehouses, depreciation of goods and wages. As Tortuga grows its manufacturing plant the ability to make more product than is demanded also grows. Producing to many units over consumer demand is costly and harmful to potential future growth. The following is one way Tortuga can apply Just in Time Strategies in to its operating procedures:

"Just in Time" at Tortuga

In basic terms Just in Time inventory control at Tortuga starts where periodic elements are obtained to produce each unit in a computer and continues to the shelf where the computer will be sold. Every Tortuga supplier must be on board with a Just in Time strategy. It also helps to teach each supplier the importance to running a lean strategy, which is keeping costs low as to offer amazing products at an affordable price. Not to mention being a supplier of the top computer retailer offers its benefits of job stability as well. At first Just in Time may seem complex and daunting. But, Just in Time inventory control at Tortuga can be as simple as counting how many units are still on the shelves, calculating how fast they are going off the shelf and comparing that to how long it will take you to get a new unit from element to your shelf. For example, lets say you know that it takes 10 days from production to shelf placement to receive new inventory for the Tortuga line of computers. If you have 110 units left of Tortuga's "Pocket Turtle 2" at your store location and they are leaving at an average rate of 10 units per a day you know an order must be placed no later than tomorrow or the risk of running out and losing sales due to stock outages could very much be real. Below is the scenario in equation form:

Equation Form:

- Units left / Average amount of units leaving per a day = Days left to "out of stock"
- 110 units / 10 units leaving a day = 11 days left until out of stock

Each company varies on when it is decided prudent to order new stock. However, the main fact remains, all companies, including Tortuga, can save ample amount of overhead costs by applying Just in Time strategies. It is important to note that Tortuga was extremely lean in its operations; perhaps way to lean. As shown above Tortuga lost much profit because it was not able to keep up with demand. Forecasting and calculating present and future demand and having the ability to produce your good or service are critical components to success when applying Just in Time strategies to a business model. One that Tortuga will have to work on to continue being successful in the future.

A lean operation is similar to Just in Time strategies. However, lean manufacturing takes the idea of ordering a good only when you need it to the next level. Businessdictionary.com describes lean manufacturing as follows: "Doing more with less by employing 'lean thinking.' Lean manufacturing involves never ending efforts to eliminate or reduce 'muda' (Japanese for waste or any activity that consumes resources without adding value) in design, manufacturing, distribution, and customer service processes" (Bussiness Dictionary).

Tortuga can begin building a lean organization by: implementing JIT (Just in Time) strategies to reduce inventory as discussed above, decreasing traveling distances eliminating many space requirements and waste, and giving responsibility to even the lowest employee which invites the worker to be challenged, have job fulfillment

and produce better products. For example, an open management philosophy at Tortuga can help each employee understand what he/she contributes and costs the company. Such a viewpoint can help the employee know how they can improve and allows them to receive job satisfaction by tangibly seeing how there change has aided the growth of Tortuga. Employees that receive more job satisfaction are more likely to go the extra mile and find ways to better their sector: i.e. Customer Service representatives need to have decision making power to solve problems arise (within certain guide lines) and not have to wait around for management approval. If employees at Tortuga are given guidance and responsibility they will arise to the occasion giving them a sense of ownership within Tortuga and the result will be a more optimistic and successful working environment. Such an environment typically results in better recruits, higher sales and better products.

Running a lean operation is Tortuga's most important strategy. In the scenario, running lean depended on three major factors: effective use of budgets, employee pro-forma statements to forecast future quarters and utilizing market research. Designing a computer that met the needs of a target market and out beat the competition would have been impossible without market research. Tortuga's first home computer "Speedy Turtle" performed admirably in the 2nd quarter beating out the competition by over 200 units sold. By this regard alone you would think that "Speedy Turtle" must have been the computer of choice by consumers. However, this was not the case. Through market research Tortuga found that consumers preferred a competitor's computer, the "Creative Worker", to the "Speedy Turtle" and was being closely followed by Olympus's home computer "Apollo".

So what really set Tortuga apart if it was not their superior computers design? By looking further into the market research, Tortuga discovered they were one of two computer manufactures that offered rebates during the 2nd quarter. Tortuga's success was attributed to holding the lowest market price and rebates. Through understanding what really happened and what worked for competitors Tortuga was able to redesign their home computer to better contend with rivals and meet the needs of their target markets.

Another way Tortuga can better contend in the computer market is by having "work cells" instead of the traditional "assembly or straight-line" method. "A work cell reorganizes people and machines that would ordinarily be dispersed in various departments into a group so that they can focus on making a single product or a group of related products" (Render, 2013, p. 356). In other words, work cells take a manufacturing process from a step-by-step process and make it into one seamlessly smooth following process. In essence you would be able to put raw materials into the beginning machine in a circuit and at the end of the circuit a whole computer that is packaged comes out. Often such work cells are put in a "U" shape to improve communication between employees working on the circuit.

According to Barry Render, work cells have "at least five advantages over assembly lines and process facilities: (1) because tasks are grouped, inspection is immediate;

(2) fewer workers are needed; (3) workers can reach more of the work area; (4) the work area can be more efficiently balanced; and (5) communication is enhanced" (Render, 2013, pp. 356-357). When considering work cells over traditional methods of manufacturing it is important to recognize that Tortuga must be able to identify product families in manufacturing and keep them separate and contained from each other, have highly trained and empowered employees, and the ability to test each cell station to insure quality control. Applying work cells at Tortuga manufacturing plants, though a heavy up front cost, would carry highly favorable cost cutting benefits in a short period of time. The likelihood of implementing a work cell manufacturing process at Tortuga would be very high especially if the company continues in its current growth in demand.

While Tortuga grows it will be necessary for Tortuga to have specific continuous improvement programs. Such programs are like the Just in Time inventory control that was spoken about above. While this program is excellent for nearly eliminating inventory costs it needs to be constantly tended and modified to meet Tortuga and it's suppliers' needs. Also, employee empowerment and improvement program is crucial to success. For example, when a problem arises at Tortuga employees can be trained to take care of it; customer service staff can be authorized to give gifts to customers unhappy with some aspect of Tortuga, whether it is service, product or company policy. This type of training does not have to be limited to customer service staff. The point is to continually train your staff to put the customer first and retain and gain consumer trust. A third way that Tortuga could continually improve its manufacturing facility is by placing statistical controls and flow chart analyses making it easy to identify, see and fix problems whether they be inventory control, human resource management, machinery usage and quality control or cost effectiveness control.

If these programs could have been implemented into Tortuga's manufacturing facility throughout the simulation it would have been easier to see the need to expand manufacturing plants to keep up with demand. Also, Tortuga would have been able identify common problems and complaints the first year and train its employees how to solve those issues. And, through statistical controls and flow charts areas of improvement and cost reduction could have been identified (i.e. salaries, benefits, customer service, manufacturing systems) The first idea that should have been implanted into Tortuga's culture is "continuous improvement". Meaning that everything can and should be improved trying to reach the end result, which is perfection.

Income Statement				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
'Gross Profit				
' Revenues	0	3,148,200	4,416,000	14,136,000
'- Rebates	0	55,250	81,250	243,750
'- Cost of Goods Sold	0	1,928,428	3,162,471	8,888,248
'= Gross Profit	**0**	**1,164,522**	**1,172,279**	**5,004,002**
'Expenses				
' Research and Development	120,000	0	60,000	120,000
'+ Advertising	0	159,142	184,434	189,170
'+ Sales Force Expense	0	195,562	364,737	536,785
'+ Sales Office Expense	470,000	480,000	570,000	450,000
'+ Marketing Research	0	15,000	15,000	15,000
'+ Shipping	0	43,532	59,266	142,725
'+ Inventory Holding Costs	0	0	0	0
'+ Excess Capacity Cost	0	0	0	0
'+ Depreciation	0	25,000	25,000	70,833
'= Total Expenses	**590,000**	**918,236**	**1,278,437**	**1,524,513**
' Operating Profit	**-590,000**	**246,286**	**-106,158**	**3,479,489**
'Miscellaneous Income and Expenses				
'+ Other Income	0	0	0	0
'- Other Expenses	0	0	0	0
'= Earnings Before Interest and Taxes	**-590,000**	**246,286**	**-106,158**	**3,479,489**
'+ Interest Income	4,500	0	0	0
'- Interest Charges	0	0	0	0
'= Income Before Taxes	**-585,500**	**246,286**	**-106,158**	**3,479,489**
'- Loss Carry Forward	0	246,286	0	445,371
'= Taxable Income	**0**	**0**	**0**	**3,034,118**
'- Income Taxes	0	0	0	910,235
'= Net Income	**-585,500**	**246,286**	**-106,157**	**2,569,254**
'Earnings per Share	-29	8	-3	64

Cumulative industry results for last four quarters ending in quarter: 4				
	Minimum	Maximum	Average	Tortuga
Total Overall	0	916.17	13.61	26.18
Financial Performance	-60.18	266.3	10.66	36.35
Market Performance	0	0.7	0.11	0.35
Marketing Effectiveness	0	0.82	0.23	0.79
Investment in Future	0	298,149.15	298.82	1.46
Wealth	-1.5	6.34	0.48	1.53
Human Resource Management	0	0.81	0.24	0.75
Asset Management	0	2.36	0.38	1.55
Manufacturing Productivity	0	1	0.26	1
Financial Risk	0	1	0.31	1

Balance Sheet				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Current Assets				
' Cash	514,500	2,085,786	1,904,629	3,944,715
'+ 3 Month Certificate of Deposit	300,000	0	0	0
'+ Finished Goods Inventory	0	0	0	0
Long Term Assets				
'+ Net Fixed Assets	600,000	575,000	1,650,000	2,179,167
'= Total	**1,414,500**	**2,660,786**	**3,554,629**	**6,123,882**
Debt				
'+ Emergency Loan	0	0	0	0
Equity				
'+ Common Stock	2,000,000	3,000,000	4,000,000	4,000,000
'+ Retained Earnings	-585,500	-339,214	-445,371	2,123,882
'= Total	**1,414,500**	**2,660,786**	**3,554,629**	**6,123,882**

Cash Flow				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
' Beginning Cash Balance	0	514,500	2,085,786	1,904,629
'Receipts and Disbursements from Operating Activities				
' Revenues	0	3,148,200	4,416,000	14,136,000
'- Rebates	0	55,250	81,250	243,750
'- Production	0	1,928,428	3,162,471	8,888,248
'- Research and Development	120,000	0	60,000	120,000
'- Advertising	0	159,142	184,434	189,170
'- Sales Force Expense	0	195,562	364,737	536,785
'- Sales Office Expense	470,000	480,000	570,000	450,000
'- Marketing Research	0	15,000	15,000	15,000
'- Shipping	0	43,532	59,266	142,725
'- Inventory Holding Costs	0	0	0	0
'- Excess Capacity Cost	0	0	0	0
'- Income Taxes	0	0	0	910,235
'+ Interest Income	4,500	0	0	0
'- Interest Charges	0	0	0	0
'+ Other Income	0	0	0	0
'- Other Expenses	0	0	0	0
'= Net Operating Cash Flow	**-585,500**	**271,286**	**-81,158**	**2,640,087**
'Investing Activities				
' Fixed Plant Capacity	600,000	0	1,100,000	600,000
'= Total Investing Activities	**600,000**	**0**	**1,100,000**	**600,000**
'Financing Activities				
' Increase in Common Stock	2,000,000	1,000,000	1,000,000	0
'+ Borrow Emergency Loan	0	0	0	0
'- Repay Emergency Loan	0	0	0	0
'- Deposit 3 Month Certificate	300,000	0	0	0
'+ Withdraw 3 Month Certificate	0	300,000	0	0
'= Total Financing Activities	**1,700,000**	**1,300,000**	**1,000,000**	**0**
' Cash Balance, End of Period	**514,500**	**2,085,786**	**1,904,629**	**3,944,715**

References

Bussiness Dictionary. (n.d.). *Lean Manufacturing*. Retrieved August 28, 2013, from BusinessDictionary.com: http://www.businessdictionary.com/definition/lean-manufacturing.html

Render, J. H. (2013). *Operations Management 10th edition.* Pearson Addison Wesley.