Final Report

Desatek

Group 16

Weekly Meeting Time: Tuesdays at 3:00 PM

Weekly Meeting Location: Science and Engineering Library

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Executive Summary

Overview: Build from project design & development in CSE171A to create a business supply chain model and strategy in order to create a comprehensive model of the development and release of the Deseat smart car seat.

Vision Statement

We envision a world where child care equipment is seamlessly connected through innovation to assist parents and childcare providers with the necessary tools to ensure maximum safety and comfort for millions of children across the US.

Integration from Prior Phases

The first stage of this portion of the project was to integrate previous data from the product development and design phase.

Phase One

In this phase, organizational structure and business model was created to support supply chain infrastructure. We determined the supply chain strategy, and early high level structure of four key drivers for the supply chain. Critical results from this phase were that Desatek's supply chain is expected to be significantly more responsive than efficient. The Supply Chain needs to have the ability to react to large changes in quantity demanded, short lead times for orders, and a wide variety of customized features for our product. We are not competing for cost-efficiency but rather product differentiation and uniqueness so it is more important for the SC to deliver exactly what the customer asked for as opposed to the cheapest seat on the market.

Phase Two

In the second phase, we further refined supply chain strategy, designed a "beer game" for the product, and estimated historical demand for the product using the life-cycle model, market segmentation analysis, and cash flow analysis. Among the most critical values of this phase were the expected sales volume average of 322,616 units/year for the first six years.

Phase Three

During the third phase, we performed demand forecasting by hand for the product, which was later redone using our integrated software. Cycle Inventory was performed in which we determined several different strategies: No, simple, or tailored aggregation. Based on our

models, we determined the cycle inventory by year six would be 4967 units**.** This is to say that this is the amount of goods that the seller would have to satisfy sales orders. Our number of shipments per year during this phase would be 82.35 , and the optimal lot size is 9933 *units* , respectively.

Phase Four

Phase Four integrated both facilities and transportation into our supply chain models. During this stage, we ran comprehensive simulations using software application, allowing the creation of various scenarios. We then developed management guidelines and further reinforced high level strategies for each key driver. We determined through software automation that winters provided the best and most accurate results Among the most important values, we determined the average weekly mean demand would be 5519 units, the safety stock would be 988 units, giving us a fill rate of 99%.

Introduction

Throughout this phase one we learned the importance of ensuring that all of the work we put into our Deseat product during CSE171A was accurate and ready to be implemented into a supply chain network. We had to adjust our financial model to reflect the market that we chose to work with so that our historical and forecasted demand would align with our profits in later phases of the project. We learned how important it was for the business model and our competitive strategy to be in agreement with the supply chain strategy that we would come to develop. The structure of the four key drivers needed to be executed using tools we developed last quarter, which further emphasized the importance of planning for the future phases.

In Phase Two, we gained a better understanding of how our supply chain would be implemented as we moved away from the planning stage. We needed to establish a method for determining historical demand data that we would use for the reminder of the project and ensure that the research and logic we used was reputable and reasonable enough for our high level product. Once we established a plan and a process, we moved onto our software automation development. About half of our group focused on learning how to use visual basic software and gained an understanding of how it would relate to our supply chain. Together, we developed a process for incorporating the software into our project so that we could begin its development in the next phase.

Phase Three builds off of Phase two, mainly because we implemented our strategy for predicting demand and used several methods to determine the best method for our specific product and or specific set of demand data. We also were able to develop our software automation program by this time which allowed us to check our work to further justify which method was the most optimal to use for the remainder of the project. This phase, above all else, taught us the importance of using multiple methods for each step to ensure that we check our work to the greatest degree possible. In this phase we also used some other big tech companies for reference on inventory management. This allowed us to compare our strategy to currently successful companies of similar size and ensure that our strategy was aligned with theirs.

The final phase allowed us to bring everything from the previous phases together. We referred to our supply chain strategy that we developed in the first phase of the project and finalized the details of all four of our key drivers then strategies, developed, and implemented the process for combining all of the drivers together to create our completed network. There were several things that we needed to fix and adjust so that when we simulated our network, everything ran smoothly. We then tried to develop some ways to use our software automation program- the information driver- to assist with aspects of the network other than demand forecasting. We completed this phase by establishing a set of guidelines for perhaps a new CEO to use in maintaining the supply chain for our product. This final step allowed us to work out any discrepancies and better understand how the network operates.

Project Planning

STEP 1: DEFINE

- Develop an appropriate business model for the supply chain of the product, update supply chain infrastructure.
- Develop overall supply chain strategy for Deseat, clearly state and outline logic and basis for the said strategy.
- Design the high-level structure for 4 key drivers of the Supply Chain.
- The product life-cycle model
- Cash-flow analysis from last quarter
- Best method from demand forecasting analysis
- Determine values for Lot size, shipment frequency and cycle inventory for years 4-6
- Compare to the Software Automated version of these values and draw conclusions
- Link modules to visual basic
- Facilities and Transportation Network - Implement the two new drivers into your supply chain strategy- Facilities and Transportation
- Simulation results
- Supply Chain Drivers and Guidelines - Review high level strategies from Phase 1 and 2 and integrate them with with the detailed implementations of each driver
- User Manual - Create a user's manual for the supply chain and software module and include management guidelines for the product

STEP 2: PLAN THE APPROACH

- Information:
    - Lecture notes from CSE 171A
    - Lecture notes from CSE 171B
        - Product life-cycle
        - Supply Chain Drivers
        - Market Segmentation
        - Cash-flow analysis
        - Transportation Network
        - Demand Forecasting
        - Cycle Inventory
        - Safety Inventory
    - Team project from CSE 171A
    - Preliminary Project Proposal Review
    - Project Phase 1 Review
    - Project Phase 2 Review
    - Project Phase 3 Review

    - Expertise in programming and product design for courses such as CSE 14, CSE 15, CSE 180/182, and CSE 171A
- Assumptions:
    - We will be assuming the role of project managers at Desatek developing the design and management of the supply chain for the DeSeat.
- Plan:
    - Set a time to meet up with group members
    - Integrate results from phase one through phase four
    - Develop a design for Facilities and Transportation Network
    - Create a user manual
    - Use visual basic and Excel to help automate a strategy for inventory management
    - Align and integrate your high-level strategies with the detailed implementations of each driver

STEP 3: EXECUTE

Phase 1:

Business Model for DeSeat's Supply Chain

- Our general strategy for DeSeat's supply chain is to market it as a unique product that is market wide.
    - **Unique** in the sense that no other product has as many technological safety features.
    - Market wide in the sense that every parent will be able to make use of every feature that is in our product.

- Unlike a technology company such as Apple where a large portion of their demand is immediately following the release, our product does not follow the same demand cycle.
    - We want to capture a percentage of the market share of all new car seats sold in the United States.
    - We find that 75% of parents buy their newborn a brand new car seat four weeks before the mother's due date.
    - Furthermore, we see from our data (refer to demand forecasting) that in general, baby births per month in the United States remain very consistent.

- Because our demand will remain relatively consistent throughout the product life cycle, we will want to make our supply chain as efficient as possible.
    - We will want to make sure that our inventory numbers are never greater than the possible babies born per month while factoring in our market share.

Supply Chain Strategy

Performance:

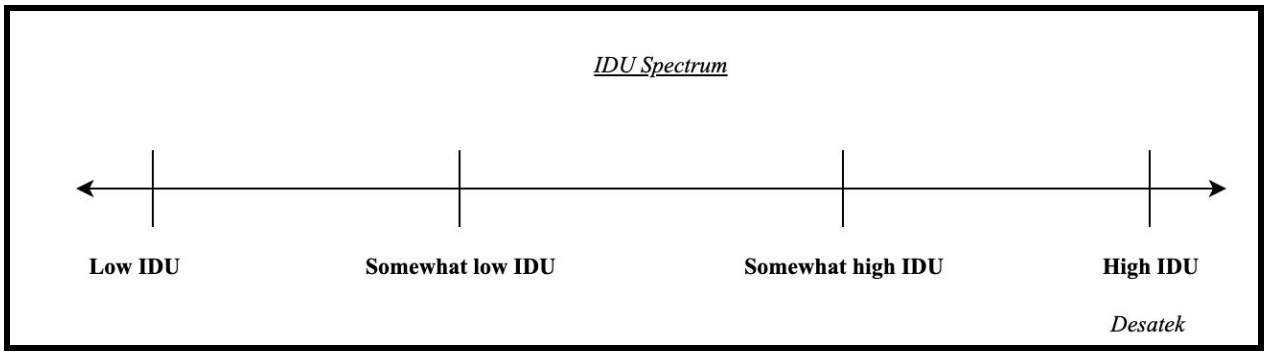
- The performance of Desatek's supply chain is expected to be significantly more responsive than efficient. The Supply Chain needs to have the ability to react to large changes in quantity demanded, short lead times for orders, and a wide variety of customized features for our product. We are not competing for cost-efficiently but rather product differentiation and uniqueness so it is more important for the SC to deliver exactly what the customer asked for as opposed to the cheapest seat on the market.

Implied Demand Uncertainty (IDU):

- At the beginning of the product's life cycle, we can expect a high level of demand uncertainty being that this is a type of disruptive technology that may initially apply to a smaller group of consumers before it gains popularity to appeal to a wider variety. As the product's life cycle moves into maturity, we can expect a lower implied demand uncertainty and a more regular cycle of incoming orders.

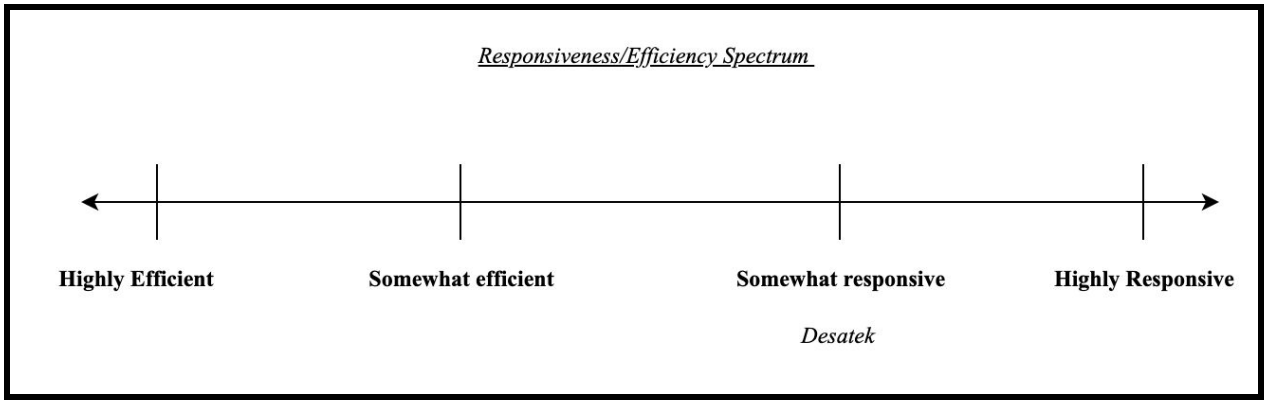
Sub-step 1:

a) Understand customer needs
b) Determine where the product lies in its market life-cycle
c) Determine the IDU for the product, and place it on the IDU spectrum



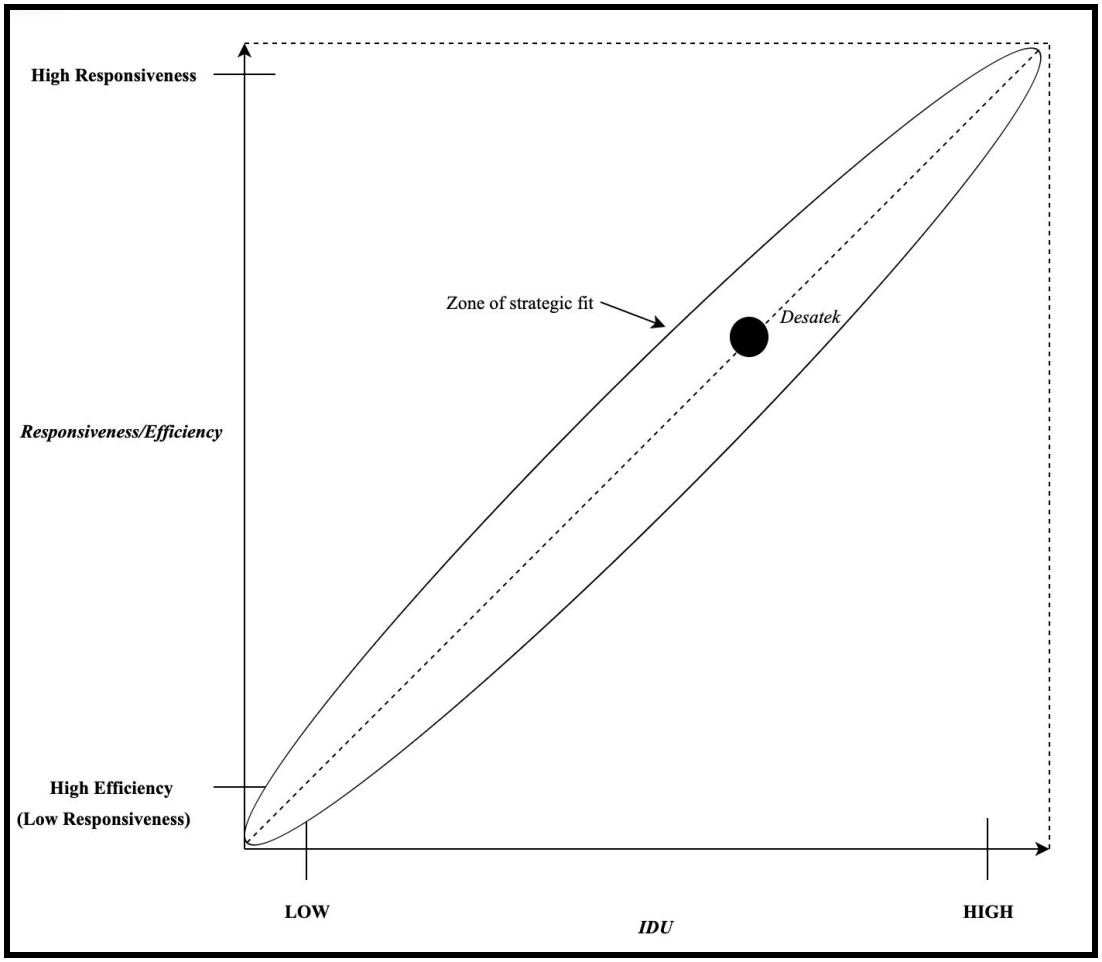
Sub-step 2:

a) For the given product, establish the corresponding competitive strategy
b) Determine the tradeoff between responsiveness and efficiency for the product based on competitive strategy
c) Map the responsiveness/efficiency trade-off onto a responsiveness/efficiency spectrum.

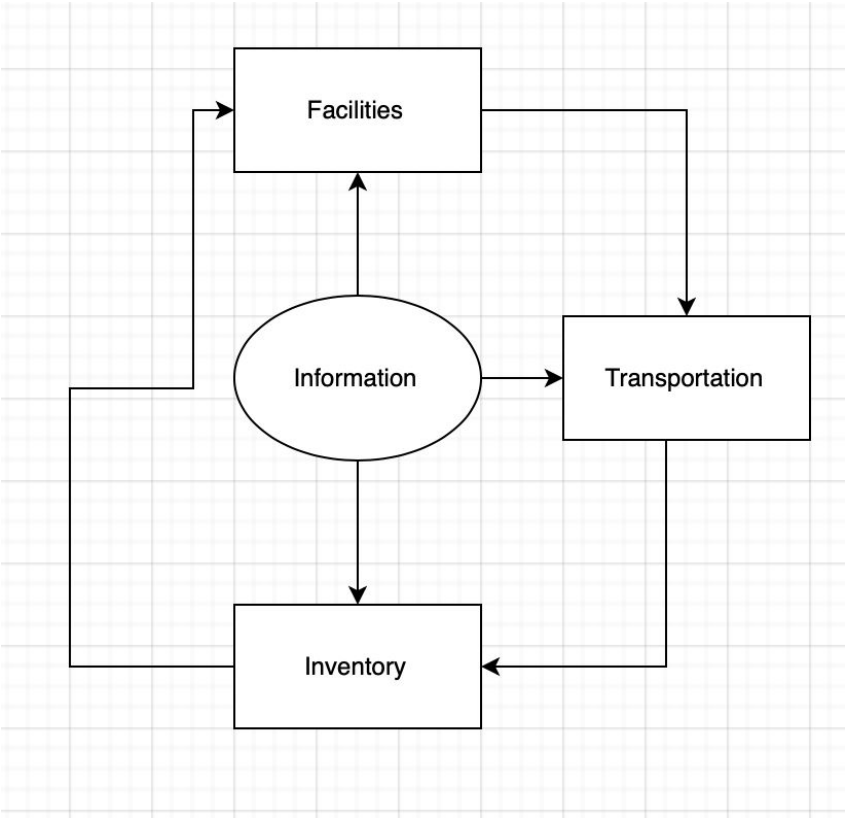


Sub-step 3:

a) Create a 2-D space
   i) IDU spectrum is the x-axis
   ii) Responsiveness/Efficiency is the y-axis
b) Define a zone of strategic fit in this 2-D space.
c) Map the SC strategy for the product inside the zone of strategic fit.



4 Key Drivers of the Supply Chain



Facilities:
Somewhat responsive supply chain: responds to inventory and customer specification when building each tailored new product. Flexible production and manufacturing for the car seat depending on user needs and requests.

Inventory:
Low storage inventory for responsive supply chain: parts and components of the car seats ready for easy manufacturing of car seats. Inventory remains fluid and car seats are rapidly dispatched to customers.

Transportation:
Critical aspect of operation due to somewhat responsive supply chain: rapid transportation of crude materials and parts for rapid construction of user requested car seats, rapid transportation of completed car seats to inventory. Car seats must be manufactured quickly due to the nature of children outgrowing car seats quickly.

Information:
Maintenance of necessary inventory to maintain lower costs and maximize production of car seats. Strong communication platform between Transportation, Inventory, and Facilities.

Phase 2:

(1) The product life-cycle model
(2) The market segmentation analysis
(3) Cash-flow analysis

Process for estimating Historical Demand for Deseat®

Part 1: Research demand for similar products to determine an appropriate product life cycle for the DeSeat and its various product lines

Part 2: Research demand data for similar companies to better understand the yearly trend for demand of similar products and determine a realistic series of historical demand data for the product.

Part 3: Map out the financial life cycle of the product using the financial analysis model from CSE 171A

Part 4: Consider all five forecasting strategies to choose the best one

Part 5: Determine which method is the best to use for the Deseat and explain reasoning.

Part 1: Research demand for similar products to determine an appropriate product life cycle for the DeSeat and its various product lines

In America, just over 4 million babies are born each year. According to consumerreports.com, a life cycle for a baby car seat is roughly 6 years (unrefined) and the market for baby products is dominated by five or six main companies (Britax, Gracco, Cybex, Chicco, etc) - all of which would not be able compete with the differentiated product that we will be introducing to the market. As a result, we would expect for about 10% of market share to be Desatek products at the peak of our products life cycle- which would be roughly 3 years into manufacturing. While nearly 4 million babies are born each year only about 75% (3 million) of these children receive a brand new baby seat. Retaining 10% market share over these 3 million products would roughly equate to manufacturing 300,000 baby seats each year assuming that our product successfully hits the market. After the three years that it takes to reach our peak production levels, we will then begin to introduce our two other product lines and begin their respective life cycles.

Part 2: Research demand data for similar companies to better understand the yearly trend for demand of similar products and determine a realistic series of historical demand data for the product.

In order to pin down accurate information demand data on baby seats, we looked into birth rates by month for the United States. CBS had some statistics that followed monthly birth rates for the last five years and the results can be seen in the table below on the left . According to most parenting tips, parents should and do buy car seats roughly 1 month before their babies are born.

Taking into account that only 75% of new babies receive new car seats, we determined the approximate demand data for the car seat market.

Part 3: Map out the financial life cycle of the product using the financial analysis model from CSE 171A

In order to finalize these numbers and apply them to the rest of the project, we have updated our financial analysis from CSE 171A to reflect the demand that we have derived. The model now consists of 6 years worth of data (24 quarters) as opposed to our original 3. The biggest change in our cash flow analysis is controlling for the fact that we most likely will not be selling the same number of products over each year and that the demand will start much smaller and increase over time. Most of the other values (developmental cost, marketing, ramp-up, etc.) have remained the same. We are simply adjusting the sales and production volume. Over the first 6 years, we had an average sales volume of about **322,616 units/year** so this is the number that we are using for the cash flow analysis

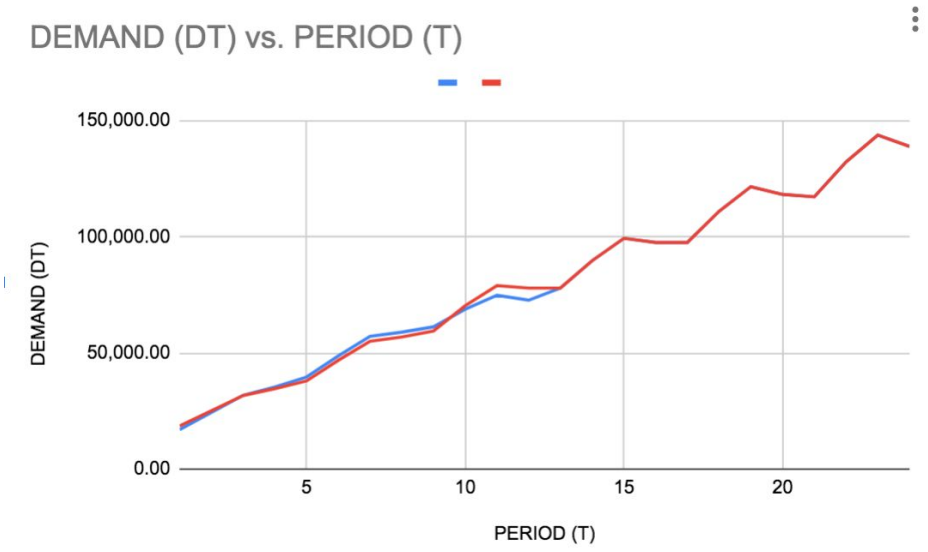
	A	B
1	**SCENARIO INPUT PARAMETERS**	
2	Sales & Production Volume (avg units/year)	322,000
3	Development Cost (total $)	28,000,000
4	Unit Price ($/unit)	300
5	Unit Productions Cost ($/unit)	180
6	Ramp-up cost (total $)	40,000,000
7	Marketing & support cost ($/year)	1,000,000
8	Annual Discount Factor (%)	10

A	B	C	D	E	F	G	H	I	J	K	L	M
Base Case												
	Year 1				Year 2				Year 3			
period	1	2	3	4	5	6	7	8	9	10	11	12
($ values in thousands)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Development Cost	-$7,000	-$7,000	-$7,000	-$7,000								
Ramp-Up cost				-$20,000	-$20,000							
Marketing and Support cost					-$250	-$250	-$250	-$250	-$250	-$250	-$250	-$250
Production Cost						-$14,490	-$14,490	-$14,490	-$14,490	-$14,490	-$14,490	-$14,490
Production volume						80,500	80,500	80,500	80,500	80,500	80,500	80,500
Unit production cost						$180	$180	$180	$180	$180	$180	$180
Sales Revenue						$24,150	$24,150	$24,150	$24,150	$24,150	$24,150	$24,150
Sales Volume						80,500	80,500	80,500	80,500	80,500	80,500	80,500
Unit Price						$300	$300	$300	$300	$300	$300	$300
Period Cash Flow	-$7,000	-$7,000	-$7,000	-$27,000	-$20,250	$9,410	$9,410	$9,410	$9,410	$9,410	$9,410	$9,410
PV Year 1, r = 10%	-$7,000	-$6,829	-$6,663	-$25,072	-$18,346	$8,317	$8,114	$7,916	$7,723	$7,535	$7,351	$7,172
Project NVP, $	**$17,199**											
all units in thousands,												

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Base Case												
2		Year 1				Year 2				Year 3			
3	period	1	2	3	4	5	6	7	8	9	10	11	12
4	($ values in thousands)	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
5													
6	Development Cost	-$7,000	-$7,000	-$7,000	-$7,000								
7	Ramp-Up cost				-$20,000	-$20,000							
8	Marketing and Support cost					-$250	-$250	-$250	-$250	-$250	-$250	-$250	-$250
9	Production Cost						-$14,490	-$14,490	-$14,490	-$14,490	-$14,490	-$14,490	-$14,490
10	Production volume						80,500	80,500	80,500	80,500	80,500	80,500	80,500
11	Unit production cost						$180	$180	$180	$180	$180	$180	$180
12	Sales Revenue						$24,150	$24,150	$24,150	$24,150	$24,150	$24,150	$24,150
13	Sales Volume						80,500	80,500	80,500	80,500	80,500	80,500	80,500
14	Unit Price						$300	$300	$300	$300	$300	$300	$300
15													
16	Period Cash Flow	-$7,000	-$7,000	-$7,000	-$27,000	-$20,250	$9,410	$9,410	$9,410	$9,410	$9,410	$9,410	$9,410
17	PV Year 1, r = 10%	-$7,000	-$6,829	-$6,663	-$25,072	-$18,346	$8,317	$8,114	$7,916	$7,723	$7,535	$7,351	$7,172
18													
19	Project NVP, $	**$17,199**											
20	all units in thousands,												

Part 4: Best forecasting strategy.

Winter's technique is the first one that controls for trend, seasonality and level together and we spent some time manipulating the smoothing constants to get as close as we could to a relatively accurate prediction for future demand. The tracking signal remains below 6.0 so we can verify that this has accurately predicted our historical data and we have decided that it is reliable for future data. Below is a chart of how well this predicts our demand.



Part 5: Determine which method is the best to use for the Deseat and explain reasoning.

We've concluded that Winter's technique is the most accurate for determining forecasted demand data for our product. This is mainly because the technique requires control for trend, leve, and seasonality which are all factors in our demand. The chart from Part 4 shows that the

trachnique is relatively accurate so we have chosen to move forward with this. We are still using the average yearly demand value of about 322,000 units per year in the first 6 year.

Phase 3:

Cycle Inventory:

- In order to align our cycle inventory with our supply chain network, we will be computing our cycle inventory for the cycle between the distribution center and our retail facilities.
- We used the demand values from our visual basic software automation and obtained the following values for the predicted years of demand from the Static method. This was the method that yielded the most accurate results according to our software automation. The values for Static and Winter were extremely close with Static being slightly more accurate based on historical data.
    - Year 4 demand: **349,952**
    - Year 5 demand: **434,147**
    - Year 6 demand: **518,342**
- **We used the same values for shipment costs, holding cost, and unit cost and we have before.**
    - **S = $1,500**
    - **h =10%**
    - **C = $180**
- Below are the values of cycle inventory given the data from our software automation:

***

YEAR 4:

Data:

- Annual Demand (D) = 349,552 units
- Shipment Cost (S) = $1500
- Unit Cost (C) = $180
- Holding Cost (h) = 10%

In order to find the cycle inventory (CI), we must first find the optimal lot size:

$$Optimal\ Lot\ Size\ Q_L* = \sqrt{\frac{2DS}{hC}} = \sqrt{\frac{2(1{,}500)(349{,}552)}{(0.1)(180)}} = 7188\ products\ per\ shipment$$

To find shipment frequency (n) , we will take the demand and divide it by optimal lot size:

$$Shipment\ Frequency = \frac{D}{Q_L*} = \frac{349{,}552}{7188} = 43.13\ shipments\ per\ year$$

Now that we have an optimal lot size of 25.52 , we can compute our cycle inventory using the following product.

$$Cycle\ Inventory = \frac{Q_L*}{2} = \frac{7188}{2} = 3594\ units$$

Based on our calculations, our resulting cycle inventory for year 4 is **3594 units.**

***

YEAR 5:

Data:

- Annual Demand (D) = 434,147units
- Shipment Cost (S) = $1500
- Unit Cost (C) = $180
- Holding Cost (h) = 10%

In order to find the cycle inventory (CI), we must first find the optimal lot size:

$$Optimal\ Lot\ Size\ Q_L* = \sqrt{\frac{2DS}{hC}} = \sqrt{\frac{2(1{,}500)(434{,}147)}{(0.1)(180)}} = 8502\ products\ per\ shipment$$

To find shipment frequency (n) , we will take the demand and divide it by optimal lot size:

$$Shipment\ Frequency = \frac{D}{Q_L*} = \frac{434{,}147}{8502} = 60.33\ shipments\ per\ year$$

Now that we have an optimal lot size of 25.52 , we can compute our cycle inventory using the following product.

$$Cycle\ Inventory = \frac{Q_L*}{2} = \frac{8502}{2} = 4,251\ units$$

Based on our calculations, our resulting cycle inventory for year 5 is **4,251 units.**

***

YEAR 6:

Data:

- Annual Demand (D) = 518,342 units
- Shipment Cost (S) = $1500
- Unit Cost (C) = $180
- Holding Cost (h) = 10%

In order to find the cycle inventory (CI), we must first find the optimal lot size:

$$Optimal\ Lot\ Size\ Q_L* = \sqrt{\frac{2DS}{hC}} = \sqrt{\frac{2(1{,}500)(518{,}342)}{(0.1)(180)}} = 9933\ products\ per\ shipment$$

To find shipment frequency (n) , we will take the demand and divide it by optimal lot size:

$$Shipment\ Frequency = \frac{D}{Q_L*} = \frac{518{,}342}{9933} = 82.35\ shipments\ per\ year$$

Now that we have an optimal lot size of 25.52 , we can compute our cycle inventory using the following product.

$$Cycle\ Inventory = \frac{Q_L*}{2} = \frac{9933}{2} = 4967\ units$$

Based on our calculations, our resulting cycle inventory for year 6 is **4967 units.**

Result:

- Based on our calculations, our resulting cycle inventory is **4967 units for year 6.** This is to say that this is the amount of goods that the seller would have to satisfy sales orders. This will be the portion of an inventory that we cycle through to satisfy regular sales orders.
- Since every order contains the same product, the order frequency n is the same for all products.

Compare to the Software Automated version of these values and draw conclusion:

- The cycle inventory for our product's supply chain is incredibly important because it accounts for the different and necessary stages that all of our products will existi in over the course of our supply chain. It makes sense that as we produce more baby seats over the years that our cycle inventory increases because we are sending out more products, holding more products and delivering more products. This would suggest that we are spending more money on the supply chain however we expect to be selling more products and making more of a profit so this should adjust correctly. When developing our software automation program on a visual basis we determined that the static method was the best to use for forecasting future demand and later our cycle inventory. Because we used the static method which did not require any smoothing constants or controlling for trend and seasonality, we found that our values for cycle inventory were very linear. In fact, the program predicted very similar values for each year that we forecasted. When computing the actual values we found that they were different and more accurate.

Phase 4:

SCM Integration:
Facilities and Transportation Network

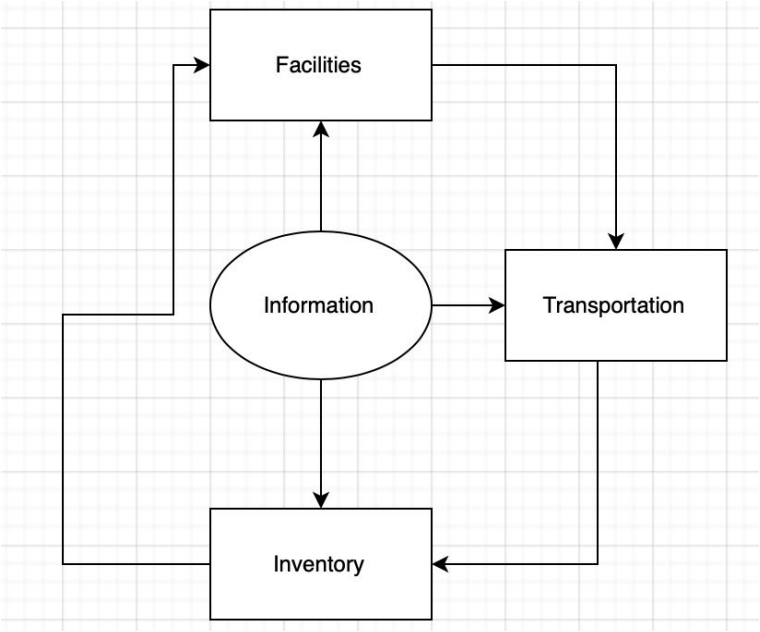
Process for implementing Drivers :

Part 1: *Use diagrams to explain the implementation of facilities and transportation into the supply chain*

Part 2*: Explain the significance of the facilities and how they will be implemented into Deseat's SC strategy*

Part 3: *Explain the significance of the transportation and how it will be implemented into Deseat's SC strategy*

Part 1: Use diagrams to explain the implementation of facilities and transportation into the supply chain

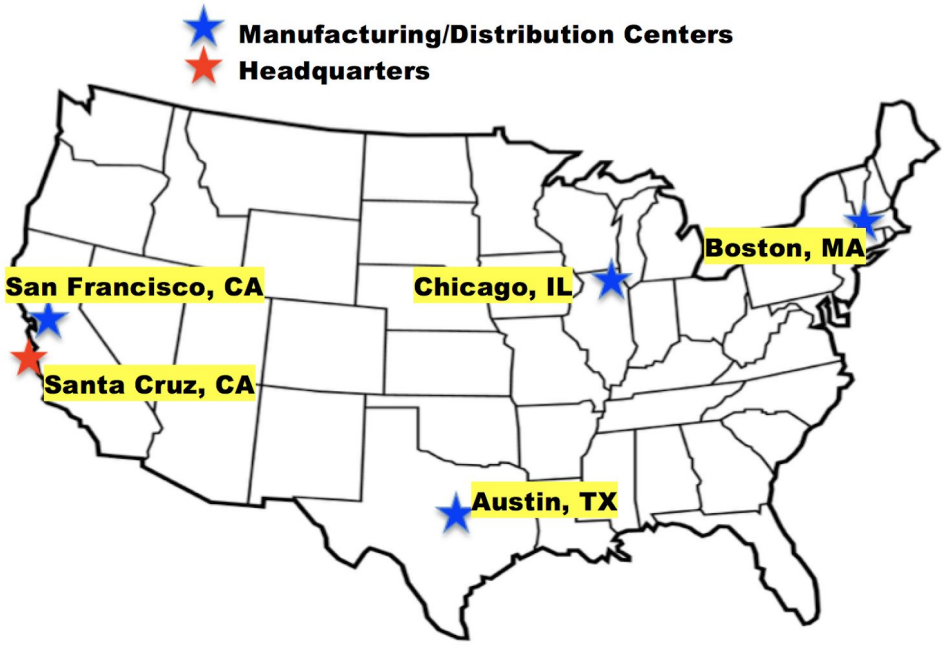


In order to fully bring the project together we must make sure we have a clear understanding of how all of the parts of the project come together. In the later parts of this phase, we will specifically establish the facilities and transportation drivers so that the information driver that we have been working on through the Visual Basic software automation can be applied to everything. We established the specifics of our inventory driver by determining the appropriate amount of safety inventory and cycle inventory in Phases 2 and 3 so we have effectively combined all of are drivers and in this phase we will be combining them so that they are all consistent with our product;s supply chain as the diagram above depicts.

Part 2: Explain the significance of the facilities and how they will be implemented into Deseat's SC strategy

- Facilities:
    - Somewhat responsive supply chain: responds to inventory and customer specification when building each tailored new product. Flexible production and manufacturing for the car seat depending on user needs and requests.

For Desatek, our goal is to supply and ship products around the country and obtain a 10% national market share in the baby product industry by the end of 6 years. Given that our headquarters will be in Santa Cruz, we will need to ensure that we have large manufacturing facilities in various parts of the country so that we can maintain our responsive and effective strategy that we are striving for in our supply chain. Below is a map of the various locations that we expect to have by the end of 6 years.



Each facility will be a combination of a manufacturing plant and a distribution center that will be used to assemble the final products. The facilities will receive raw materials from supplier warehouses and once they are completely manufactured, they will be shipped out via the distribution center of the plant. These distribution centers will be responsible for managing demand via our software automation system and sending the baby seats to customers in their assigned part of the country

- San Francisco: west
- Austin: south
- Chicago: mid-west

- Boston: east

Any discrepancy with geographical location will be sorted out by the headquarters and all sales and production will be processed remotely through the headquarters facility in Santa Cruz

<u>Part 3:</u> Explain the significance of the transportation and how it will be implemented into Deseat's SC strategy

- Transportation:
    - Critical aspect of operation due to somewhat responsive supply chain: rapid transportation of crude materials and parts for rapid construction of user requested car seats, rapid transportation of completed car seats to inventory. Car seats must be manufactured quickly due to the nature of children outgrowing car seats quickly.

With facilities to cover the larger part of the continental US we expect to use ground transportation mainly for delivering and supplying our products to customers. We plan to execute the shipping directly given that our few distribution centers will be supplying full truckloads of baby seats in order to minimize transportation costs. After reading more about transportation options we realize that we will either need more distribution facilities or we will need to implement a retailer to our supply chain. Given that the cost of transportation is less than the cost of operating a new facility we've chosen to incorporate retailers into our supply chain network. This strategy mainly works because there is no need for aggregation in our supply chain strategy and with few distribution centers we plan on sending out full lot sizes. This may require us to increase the sales cost of our products but we will update our financial model later in this phase.

Simulation Results

<u>Process for simulation:</u>

Part 1: *Create a base case model for Deseat's supply chain using the Supply Chain Network created in Phase II*

Part 2*: Create and implement the model for 2 scenarios*

Part 3: *Draw conclusions*

Desatek Supply Chain Management System
Control Panel

Demand Forecasting

Step 1:

Enter Demand Data and Parameters | Select Method | View Method | View Graphs

Clear Step 1

Results Analysis (Choose or Compute)

Compute Best Method | Manually Compute Chosen Method

Best Method	Static	
Year 4 Demand	349952	Units
Year 5 Demand	434147	Units
Year 6 Demand	518342	Units

Inventory Management

Step 2:

Select Method: Winter's

Holding %	10%
Per Unit Cost	180
Shipping Cost	1500
CSL	85%
Lead Time (Weeks)	2

Compute Inventory

Clear Step 2

Year 4		
Category	**Value**	**Units**
EOQ	7188.1	Seats
Number of shipments/year	43.129	Shipments
Cycle inventory	3594	
Cycle inventory holding cost	64693	
Replenishment cycle time	8.4631	
Average flow time	4.2315	

Year 5		
Category	**Value**	**Units**
EOQ	8603.7	Seats
Number of shipments/year	52	Shipments
Cycle inventory	3594	
Cycle inventory holding cost	64693	
Replenishment cycle time	8.4631	
Average flow time	2.9536	

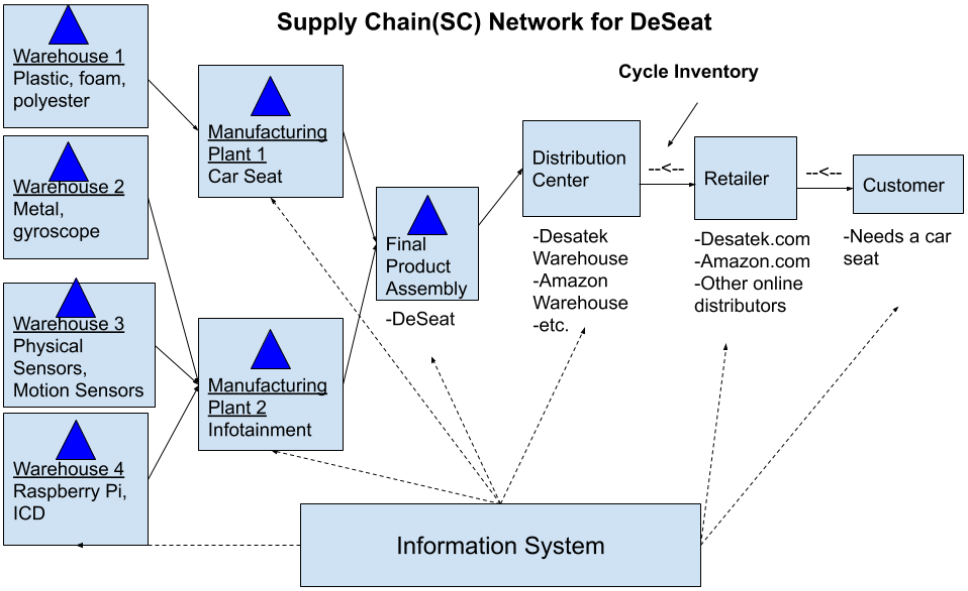
Year 6		
Category	**Value**	**Units**
EOQ	9932.8	Seats
Number of shipments/year	59.597	Shipments
Cycle inventory	3594	
Cycle inventory holding cost	64693	
Replenishment cycle time	8.4631	
Average flow time	2.216	

Weekly Demand Statistics	
Standard Dev	674
Mean	5519

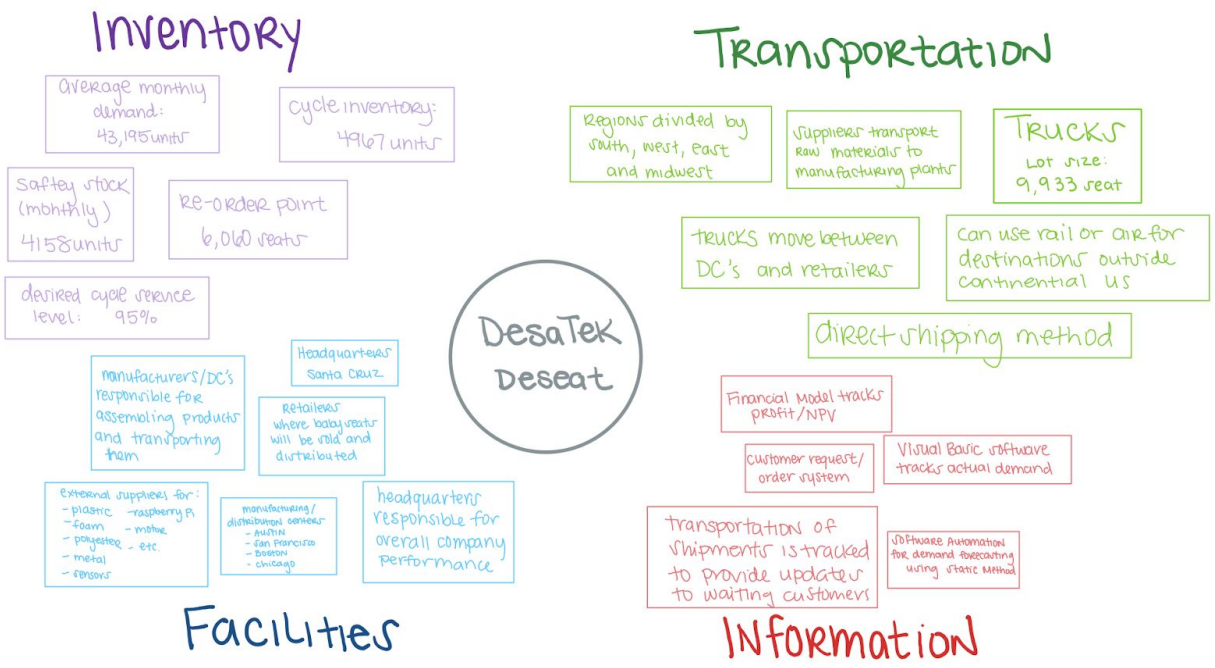
Lead Time Supply Statistics	
Lead Time Demand	11038
Lead time SD	954
Safety Stock	988
ESC	74
Fill Rate	99%

- Quick demo results

<u>Part 1:</u> Create a base case model for Deseat's supply chain using the Supply Chain Network created in Phase II



Above is the diagram we created to represent our supply chain network back in Phase II. We anticipated separate facilities for each of the steps of our supply chain. After performing a more in-depth analysis on our supply chain's needs we've changed some aspects of the network. Below is a redefined diagram that explained the implementation of each of the drivers in our SC.



Supply Chain Drivers and Guidelines

Review high level strategies from Phase 1 and 2 and integrate them with the detailed implementations of each driver

Process for integration:

Part 1: *Review high level strategies from Phase 1 and 2.*

Part 2*: Integrate them with the detailed implementations of each driver.*

Part 3: *Draw conclusions.*

Information is data or analysis regarding inventory, facilities, and transportation; and the management and coordination of the information and data. One high level strategy is to be significantly more responsive than efficient. The SC needs to have the ability to react to large changes in quantity demanded, short lead times for orders, and a wide variety of customized features for our product. Desatek is not competing for cost-efficiently but rather product differentiation and uniqueness so it is more important for the SC to deliver exactly what the customer asked for as opposed to the cheapest seat on the market.

Inventory is composed of all raw materials, work in process, and finished goods within a supply chain. Changing inventory policies can significantly impact the supply chain's efficiency and responsiveness. The form, location, and quantity of inventory allow a supply chain to range from being very low cost to very responsive. In order to align the supply chain strategy with Desatek's competitive strategy, the firm may implement a strategy for its inventory encompassing centralized locations. Incorporating this strategy for its inventory would allow Desatek's supply chain to lower cost but at the expense of responsiveness.

Facilities are the actual physical locations in the supply chain network where products are stored, manufactured or assembled. Factors such as the role, location, capacity, and flexibility of facilities have a significant impact on Desatek's supply chain performance. One high level supply chain strategy Desatek's facilities may implement is manufacturing or storing their product in one location. By centralizing the location of these facilities, cost reduction would come at the expense of responsiveness, but efficiency would be improved. Additionally, centralizing the facilities would enable Desatek to gain economies of scale.

Transportation is the movement of inventory from one facility to another. Critical aspect of operation due to somewhat responsive supply chain: rapid transportation of crude materials and parts for rapid construction of user requested car seats, rapid transportation of completed car seats to inventory. Car seats must be manufactured quickly due to the nature of children outgrowing car seats quickly. One high level supply chain strategy Desatek's transportation may implement is having their transportation go hand-in-hand with a strong utilization of inventory aggregation. In this strategy, Desatek can ship all of their car seats from just a few facilities. Although this does cause an increase in transportation costs, it brings far more benefits than it does cons, as Desatek is saving much more money on storage costs by having fewer storage facilities.

Results:

- To conclude, our high level strategies implemented from Phase 1 and 2, integrated with the detailed implementations of each driver, where our information regards inventory, facilities, and transportation, keeping our supply chain significantly more responsive than efficient. In order to align the supply chain strategy with Desatek's competitive strategy, the firm may implement a strategy for its inventory encompassing centralized locations. Desatek's facilities may implement is manufacturing or storing their product in one location, which goes hand-in-hand with Desatek's transportation, where Desatek can ship all of their car seats from just a few facilities. Although this does cause an increase in transportation costs, it brings far more benefits than it does cons, as Desatek is saving

much more money on storage costs by having fewer storage facilities. Desatek is not competing for cost-efficiently but rather product differentiation and uniqueness so it is more important for the SC to deliver exactly what the customer asked for as opposed to the cheapest seat on the market.

User Manual (Sample)

USER MANUAL FOR SOFTWARE MODULE

DESATEK

Table of Contents

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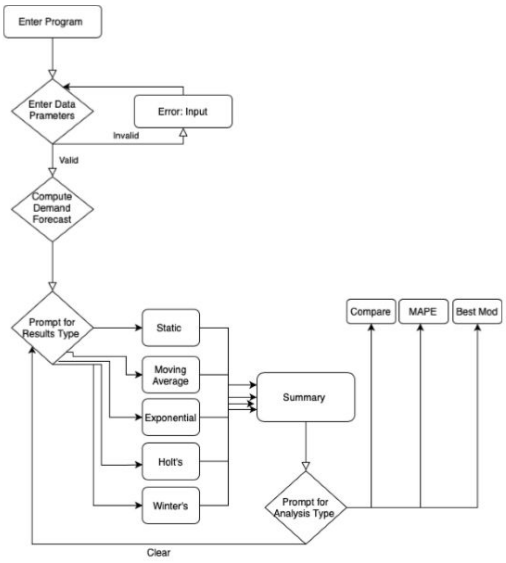
Step 1: Forecasting



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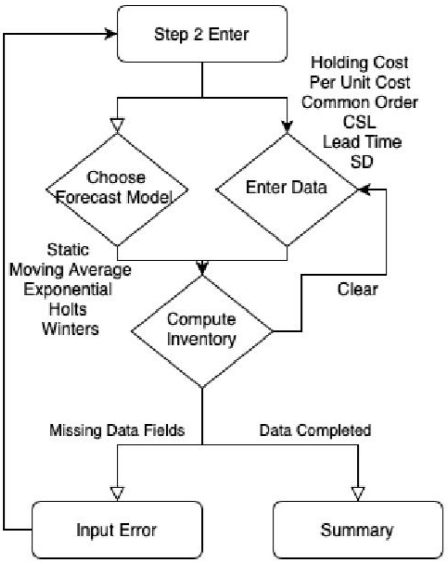
Step 2: Inventory



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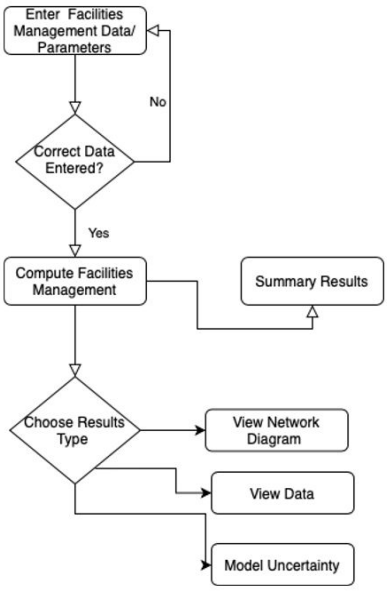
Step 3: Facilities



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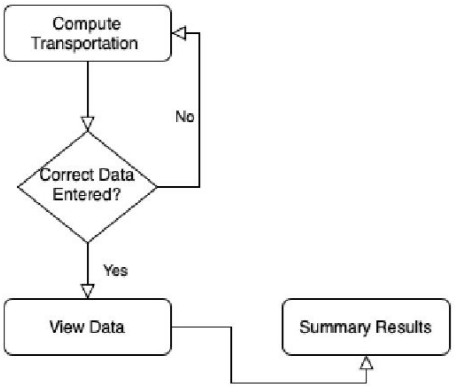
Step 4: Transportation



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Using Step 1: Forecasting

1. Enter Data Parameters
2. Compute Demand Forecast
3. Choose Results Type
   a. Static
   b. Moving Average
   c. Exponential
   d. Holt
   e. Winters
4. Choose Analysis Type
   a. Compare
   b. MAPE
   c. Best Model

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Fig. 1: Method Selection Screen

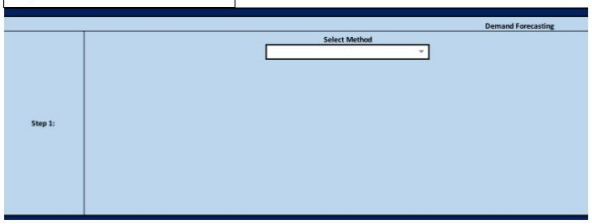
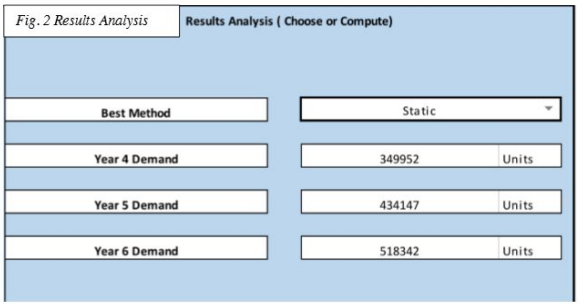


Fig. 2 Results Analysis



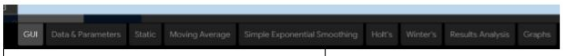


Fig. 3: Data and Information Toolbar

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Using Step 2: Inventory

1. Enter Data Parameters
2. Choose Forecasting Model
   a. Static
   b. Moving Average
   c. Exponential
   d. Holt
   e. Winters
3. Compute Inventory
4. Obtain Summary

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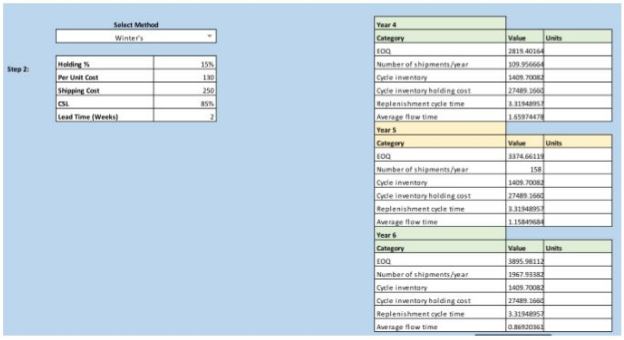
Fig. 3: Method Selection and



Weekly Demand Statistics	
Standard Dev	674
Mean	5519

Lead Time Supply Statistics	
Lead Time Demand	11038
Lead time SD	954
Safety Stock	988
ESC	74
Fill Rate	99%

Step 4-Check work:

- Is the work correct in every detail?
  Methodology:
    - Reviewed work for structural errors
    - Reviewed work for technical errors
    - Verified citations and sources
    - Checked for grammar and presentation errors
- Are our assumptions reasonable?
  Methodology:
    - Reviewed cohesiveness between sections
    - Made sure sections are logically linked and built on one another
    - Compared expected results with actual results
- Do the results make sense?
    - The results make sense and are correct in every way as our information and data are from reliable sources. Results made sense in regards to our objective for this project.

Step 5-Learn

We have learned the significance of project planning and following a plan according to its components. We have solidified our understanding of the process for performing supply chain management. As a team, we determined Desatek's strategy, planning, and operations, as well as the importance of demand forecasting and the four key drivers (inventory, facilities, transportation, information system).

Project Activity Sheets

CSE 171B/270B Project			
Subject: Preliminary Project Proposal			
Team #: Group 16		Date: 1/8/20	
Start time: 7:00 PM	End time: 7:45 PM	Duration: 0:45	
Members present: All members present			
Members absent: None absent			
Agenda			
1. Develop a Time Phased Plan			
2. Review conceptual design for product and update anything necessary			
3. Begin devleoping supply chain network design			
Team work & team problem-solving during meeting			
Deliverables/tasks	Clear,concise , description of work done	Participants	next steps
Time Phased Plan	create a gantt chart that will be updated throughut the quarter	All members	Adjust after meeting
Update conceptual design	reassess and determine most optimal conceptual design and add anything we did not incorporate last quarter	Manik, Rahotham, Loren, Johnny	Done
SC network design	review class notes and determine competitive stratefy, supply chain strategy, and supply chian configuration	Maggie, Virgil, Tim	Done
Meeting summary & lessons learned			
1. In this meeting we reviewed our project from last quarter			
2. We developed a plan for our supply chain based on what we've learned in class so far			
Plan for completion of work on current phase			
1. Make any corrections needed after meeting with TAs			
2. use more processes			

CSE 171B/270B Project

Subject: Phase I

Team #: Group 16	Date: 1/23/20	
Start time: 3:00 PM	End time: 4:15 PM	Duration: 1:15

Members present: All members present

Members absent: None absent

Agenda

1. Organize the Structure of Desatek's Supply Chain by relating it to Competivie Strategy fro CSE 171A
2. Plan High Level Structure for Key Drivers
3. Develop a plan for determining historical demand data for the Deseat
4. Plan for Software automation Deelopment

Team work & team problem-solving during meeting

Deliverables/tasks	Clear,concise , description of work done	Participants	next steps
Develope SC Strategy	organize our SC startegy based on class notes	All members	Adjust throughout project
Key drivers	determine a strategy for each of the four key drivers using class notes and textbook descriptions. determine what is most reasobable for a product like ours	Manik, Johnny	Adjust throughout project
determine historical data	reseached different info on baby products to determine logical numbers for monthly historical demand	Loren, Rahotham,	Done
plan software automation	learn visual basic	Tim, Virgil, Maggie	Continue throughout project

Meeting summary & lessons learned

1. we worked together to develop a strategy for each task and then divided up the tasks for completion
2. We developed a plan for our supply chain based on what we've learned in class so far

Plan for completion of work on current phase

1. Make any corrections needed after meeting with TAs
2. collaborate more with other members of the group

CSE 171B/270B Project

Subject: Phase II

Team #: Group 16	Date: 2/3/20	
Start time: 7:00 PM	End time: 7:45 PM	Duration: 0:45

Members present: All members present (digitally)

Members absent: None absent

Agenda

1. Play MIT Beer Game
2. Finalize SC strategy
3. Estimate Historical Demand
4. Continue work on Software automation

Team work & team problem-solving during meeting

Deliverables/tasks	Clear,concise , description of work done	Participants	next steps
Beer Game	play and document game	All members	Done
SC Strategy	finalized how the 4 drivers will function and the ending structure of the supply chain	All members	Done
Demand Data	Estabished with actual values for 3 years of historical demand	Johnny, Rahotham, Manik, Loren	Done
Software Automation	Continue to develop Visual Basic Software	Maggie, Virgil, Tim	Continue into next phases

Meeting summary & lessons learned

1. In this meeting we continued work from last phase and got our project ready for demand forecasting
2. We developed a plan for our supply chain strategy and finalized it

Plan for completion of work on current phase

1. Make any corrections needed after meeting with TAs
2. draw more conclusions

CSE 171B/270B Project

Subject: Phase III

Team #: Group 16	Date: 2/19/20	
Start time: 1:00 PM	End time: 2:00 PM	Duration: 1:00

Members present: All members present (digitally)

Members absent: None absent

Agenda

1. Demand Forecasting
2. Cycle Inventory
3. Benchmarking
4. Visual Basic

Team work & team problem-solving during meeting

Deliverables/tasks	Clear,concise , description of work done	Participants	next steps
Demand Forecasting	used all 5 techniques to forecast 3 years of demand	Loren, Manik	Done
Cycle Invenotry	used formulas from lecture and the textbook to create a cycle invenotry for our invenotry management driver	Loren, Manik	Continue into next phases
Benchmarking	compared the SC strategy to Plantronics and drew conclusions	Rahotham, Johnny	Done
Software Automation	compared Visual Basic Software to forecasting techniques to choose the best technique for our product	Maggie, Virgil, Tim	Continue into next phases

Meeting summary & lessons learned

1. we checked our work with multiple members of the group using multiple methods
2. We began work on our invenotry management

Plan for completion of work on current phase

1. collaborate more
2. make more processes
3. draw more conclusions

CSE 171B/270B Project

Subject: Phase IV

Team #: Group 16	Date: 3/2/20	
Start time: 7:00 PM	End time: 7:45 PM	Duration: 0:45
Members present: All members present (digitally)		
Members absent: None absent		

Agenda

1. Facilities and Transportation
2. Incorporate Drivers into Software Automation
3. Simulation of Supply Chain
4. Management Guideling/User's Manual

Team work & team problem-solving during meeting

Deliverables/tasks	Clear,concise , description of work done	Participants	next steps
facilities and transporation	used all 5 techniques to forecast 3 years of demand	Virgil, Maggie	Done
Connection of drivers to VB	tried to develope a way to incporporate facilities and transporation into the VB information system	Tim	Done
Simulation of SC	compared the SC strategy to Plantronics and drew conclusions	Rahotham, Johnny	Done
Management Guidelines	explained how to use the drivers so that someone else would be able to implement and maintain it	Manik, Loren	Done

Meeting summary & lessons learned

1. we finished creating a supply chain network!
2. we aligned our strategy to what we came up with in phase 1

Plan for completion of work on current phase

1. go over all phases and make sure they are in alignment with out final strategy
2. begin work on project report
3. make sure there is a process for everything and that we have drawn conclusions on all of our findings

CSE 171B/270B Project

Subject: Final Report

Team #: Group 16	Date: 3/17/20	
Start time: 3:00 PM	End time: 7:45 PM	Duration: 4:45
Members present: All members present		
Members absent: None absent		
Agenda		
1. Develop the final report		
2. Do individual contributions		

Team work & team problem-solving during meeting

Deliverables/tasks	Clear,concise , description of work done	Participants	next steps
Develop Final Report	Create a clear outline of what needs to be done, as a group break down project phase by phase	All members	None
Do individual contributions	These will be done on everyone's own time	All members	Done by March 19

Meeting summary & lessons learned

1. We were able to finish the final report after going through all the past phases and summarizing our results.
2. We developed a plan for our supply chain based on what we've learned in class so far

Plan for completion of work on current phase

1. Each person needs to fill out their individual contributions pages.

Team Member Contribution Write Ups

Loren Roundtree

Most of the work that I carried out over the course of this project was related to the inventory driver component of our Supply Chain network. In the early stages of the project it was my responsibility in the group to determine a logical approach for establishing demand value that we would later translate to inventory and use for inventory management. I started by doing some research on the baby products industry in the United States, focusing initially on the market size so that I could get a better understanding of a reasonable market share size that our company could reasonably achieve after approximately five or six years. Once I had a good idea of the market share, I looked further into the customer base that we would be targeting to understand sales volume for car seats and ultimately demand. Based on the demand values, both historical and forecasted, I then evolved to working on the inventory management aspects of the project. This included determining what were appropriate values for in-transit inventory, safety inventory, cycle inventory, etc. Working alongside my group members who developed the Visual Basic Software, I was able to check my work as well as assist with establishing demand values and inventory values that would be optimal to use for the remainder of the project. Towards the end of the quarter, I worked briefly on the facility and transportation drivers simply to gain a better understanding of how all four drivers interconnected to create the supply chain from start to finish. My contributions were important and significant because without accurate values for inventory for several reasons. Accurately determining inventory values could mean the difference between the company potentially losing money unnecessarily due to excessive holding costs, or accurately mapping out when products will be sold. Furthermore it's important because of customer loyalty and accurately calculated values could lead to losing money because of low customer loyalty if the product is constantly out of stock. All in all, I've learned a lot from this project and this course and hope that i can take the material that I've learned and apply it to my own professional life in the future.

Magdalena Ortiz Fischer

Throughout the quarter, my priority was directed at completing the backlog notes and commentary suggestions given in team meetings. This varied throughout each of the phases but one of the continuous notes was to explicitly state the significance of each result, data point, graph, or plan. As the project phases progressed, we started to realize the significance of not only learning from each result but also stating why it was relevant. Our team learned this quarter that the point of the project was less about completing each given task as assigned but rather a thorough learning process on supply chain management that required constant reflection. Another large part of the backlog was that our team needed to pay a greater attention to detail. I used my skills often scanning and ensuring that each section was accurate and followed all the additional guidelines from class. Having the task of expressing the purpose and significance of those sections forced me to better understand everyone's work and then share that knowledge with the rest of the team below. I also assisted my teammates in outlining the process of each part of their contributions, since that was a frequent note we received. Oftentimes we would outline a process in a paragraph above the task, but as we quickly learned, that was not intuitive to the reader of our binder. Instead, we had to still include that paragraph, but also include an additional step by step process outline, as done in every example shown in class. Learning that we had to make our processes more recognizable in that way was a growing curve, but in the end helped every teammate know exactly how a part of data was collected because it was explicitly drawn out and said. The rest of my contributions to the team varied throughout the phases on an as needed basis. Whenever a teammate said they needed help with a section, I was quick to jump on and assist, to better understand each phase for myself. In the end I believe the main life lessons I learned is there is no point to solving a problem if your initial process is not clearly written out (to the point that someone knowing nothing about SCM would still understand) and also something of greater knowledge is learned from it, then there is no point to doing it in the first place. Hopefully these tools will prove to be useful in future endeavors and I am very grateful for all the incredible work and talent shown by each of our team members.

Thipbadee "Tim" Tantivilaisin

Throughout the quarter, I would work with Manik to create the time phase plan to ensure the completion of most of our tasks. While doing this, we would discuss as a team how we would approach each task together. In phase 1 I worked with the team on the development of the business model and the supply chain infrastructure for our product. I tried to ensure that there would be cohesion between the business model, supply chain infrastructure and supply chain strategy. Because our product's competitive strategy was differentiation, we had to have a supply chain strategy and supply chain infrastructure reflect it. In phase 2, the group as a whole played the beer game, and we took what we learned from that and applied it to our own supply chain strategy. This is where the start of my main contribution to the project. While Virgil and Maggie worked on the overall layout and features that would be included into the software automation in addition to the user manual, I was programming the Visual Basic and getting help from the team as necessary. I would assist Loren and the rest of the group in manually computing the demand forecasting, cycle inventory, and safety inventory and I would take these assumptions and program it into the Visual Basic Excel document. I made it so that the VB would calculate demand forecasting for every method for the next three years given three years of data. I would then use the best forecasting method calculated by minimizing the mean squared error (which was the winter's method) to calculate the cycle inventory and the safety inventory for the product. This was particularly difficult to connect the two different aspects of the supply chain together. However, after comparing the numbers to make sure that they were the same as the ones that we computed by hand, I knew that it had been implemented correctly. Once I was able to do this, we were finally able to scale up our supply chain and automate most if not all of the numbers in relation to the demand forecasting, cycle inventory, and safety inventory. The same was done for the last supply chain driver as well.

Johnny Nguyen

Throughout the quarter, my roles and contributions were varied for each Phase. At the start of our project in CSE 171B, I defined the flows in the supply chain and designed our preliminary supply chain network from warehouses, to manufacturing plants, to our product assembly, to distribution centers, and retail facilities. As we moved forward in the quarter to design and manage the supply chain for our product, I contributed towards defining the responsiveness and efficiency of our product, where we found that our goal at Desatek is to provide a somewhat high responsive and a somewhat low efficient supply chain network, while providing the highest quality. Once that was defined, as well as our position as high on the IDU spectrum, I then created a respective actionable time-phased plan emphasizing our safety inventory. I have learned more about safety inventory and the logical ways to calculate the recommended amount. Safety inventory is a good way to keep up with demand and responsiveness. Moving forward, after our demand was forecasted, I went on to compute our cycle inventories, which I aligned with our supply chain network to include units from each stage of our supply chain. Reaching towards the end of our project, I went back and reviewed the high level strategies from Phase 1 and 2 and integrated them with the detailed implementations of each driver. I found that the SC needs to have the ability to react to large changes in quantity demanded, short lead times for orders, and a wide variety of customized features for our product. I have solidified my understanding of the process for performing supply chain management. I have recognized that there are three main parts: strategy, planning, and operations, as well as the importance of demand forecasting and the four key drivers. I have learned more about pricing in a supply chain, including the basic production capacity trade-off that exists between committing to an order from a lower-price buyer or waiting for a higher-price buyer to arrive later on. I believe that the work contributed in this project is correct in every detail, as the resources I have used to conduct this problem is reliable. I made sure to understand every aspect of design/analysis. Additionally, I have checked my work for errors and believe my numbers are correct. Through the completion of this research and design project, I have learned more about supply chain management and the aspect involving it. I have learned about business strategies, goals, as well as the attractiveness of the industry. Our results from what I have learned make sense seem feasible in a real business climate.

Rahotham Bharanidharan

In the preliminary project proposal, I contributed by working on aligning the conceptual design from last quarter and integrating with our company goals for this quarter. This entailed a thorough explanation of the chosen design concept, function analysis system technique diagram to illustrate our core and supporting technology elements, and clear identification of the major subsystems of our design concept. For the phase one of our project, I contributed by working on creating and implementing a process to obtain credible demand data for our product. With our given baby car seat market I outlined a process which would determine user groups from relevant markets, analyze similar markets for similar products, obtain customer data for the general market, work with sales data for similar products, and make use of software/methods such as visual basic in excel for demand forecasting and automation. In the second phase of our project, I collaborated closely with Johnny, Virgil, and Maggie on the MIT Beer Game. We used an online implementation of the game to display our results visually on the phase two report. I worked on identifying the main differences between our own supply chain and the supply chain presented to us in the beer game to determine that the number of suppliers and manufactures were significantly higher for our company which meant there will be higher complexity between actors. The beer game made me consider changes to the distribution part of our supply chain network and I made the decision in collaboration with our company to have our own form of online distribution to help in cost reduction for transportation of our products to distribution centers. For the third phase of our project, I worked to determine the best aggregation strategy for our product supply chain based on historical and predicted demand while considering no aggregation, simple aggregation, and tailored aggregation. My work precisely involved the comparison of our cycle inventory values to our software automated version. I collaborated with my group members to draw a conclusion and determined that our actual values were more accurate than our automated values. In the fourth phase and the final report of our project, I collaborated with my group members and aided in developing the integration of high-level strategies to our supply chain. I used results from phase one and phase two as a reference to fine tune the execution of each driver. I also made sure that our integration aligned with our competitive strategy to reduce any internal supply chain errors. Our result was a highly

responsive supply chain, but we sacrificed our efficiency to accommodate any spikes in product demand. Spikes in product demand was a reasonable assumption made by me because our company offers a highly unique and differentiated product in the baby car seat industry.

Virgil Neyroud

Throughout the quarter, I wore several hats during different project phases. One of my most principal roles was assisting in the development of the software aspect of the project. In order to facilitate the creation of such a software, it was critical that we made the proper designs and made sure the software would fulfil expected requirements. In order to ensure that design requirements were met, I designed frameworks and UML diagrams that we then used to build the software in VB and played an instrumental role in making sure that the software development was in line with the work we were doing in the respective phase during each step of the project. When we were able to fully deploy the software, I worked closely with group members such as Loren to ensure data accuracy and cohesiveness between work "done by hand" and the newly computed data and simulations. At times, this resulted in difficult project decisions of which type of models and data to use, in which I often led the discussion within the group. Upon the completion of the software aspect, I designed a user manual so that the software would be accessible to users outside the project and so that other persons not involved in the software development could run simulations as needed. Another critical role I played was that I was a central actor in the compilation of project phases; that is to say that I ensured that the phases were cohesive between one another, both from a physical (printing and presenting) and data (content and material) standpoint. This meant that I would work often with different subgroups of the project to verify calculations and mitigate disagreements between the data. At many times, I led backlog efforts with Magdelena to ensure that our previous phases were up to date and in line with the class requirements. This included working on bits of each of the project phases as needed with the help of teammates, as well as at time "calling out" areas that needed to be reworked or were not in line with the objective of the project. One hat I wore that most surprised me with its usefulness was to be in charge of setting up the beer game for the team. By leading this activity, I was able to better understand both the workings of the supply chain and how to communicate with the team, due to the complexity of organizing such an activity with a large group. Most importantly, it gave me firsthand experience with the "bullwhip" effect and the importance of not only communication between actors in a supply chain, but also between the project group. I played a central role within the group in organizing meetings and leading discussions throughout both this quarter and the previous one. Though I worked on many

different pieces of the project, some of my most important work included helping design the business model of the supply chain and ensuring throughout the project that we maintained consistency with our strategies. At times, this required restructuring of material such as our whole supply chain infrastructure, which was sometimes met with resistance.

Manik Wason

Throughout the quarter, I collaborated with different group members in executing various deliverables. In the project's preliminary proposal, I began by working with Tim to design a time-phased project plan detailing a schedule for the various sub-tasks. After discussing with teammates and deciding the supply chain strategy based on Desatek's competitive strategy, I developed the supply chain's IDU spectrum. The beginning stage of Desatek's product's life cycle would result in a high IDU due to its disruptive-technology like nature which was expected to decline throughout the product's maturity. After the placement on the high IDU section of the IDU scale, the supply chain's intended performance was defined. After characterizing a product differentiation focus rather than a cost-efficiency, the supply chain's strategy was defined with it being necessary to have the ability to react to short lead time and large changes in quantity demanded. After establishing the competitive strategy with a focus of being significantly more responsive than efficient, I placed the product on the somewhat-responsive segment of the responsiveness and efficiency scale. After creating the IDU spectrum and responsiveness and efficiency scale with a thorough analysis with team members, I was able to determine the positioning of the product in the zone of strategic fit. Integrating the supply chain's responsiveness with the implied uncertainty in the zone of strategic fit was key in characterizing inventory, facilities, transportation, and information systems for the supply chain's network. After integrating phase one strategies into phase two, the team's execution and analysis of the MIT beer game demonstrated the importance of communication in a supply chain. Focus on backlog consisted of refining and aligning supply chain strategy with the various supply chain drivers. In phase three of the project, I worked with Maggie to identify Desatek's source of competitive advantage and its ability to respond to inventory and customer specifications. Transitioning to phase four, I worked on reviewing inventory, facilities, transportation, and information systems and integrating a high-level strategy for each supply chain driver. Integrating the high-level strategy for each driver reinforced our supply chain's focus on being more responsive than efficient and aligned with competitive strategy. The various phases throughout the project demonstrated the importance of communication between different aspects of a supply chain. Continuous review was crucial to refining the various phases' backlog and integrating alignment among the various aspects of Desatek's supply chain.

Conclusion & Lessons Learned

Conclusion

Through this quarter, our team has learned more about the Baby Car Seat industry and its supply chain management. We have learned about business strategies, goals, as well as the attractiveness of the industry, and how all of these aspects need to be in alignment in order for us to succeed. We have learned more about forecasting including certain types of adaptive forecasting methods. As a team, we have further developed our knowledge of Excel and can now create a demand forecast. Overall, we have learned more about safety inventory and the logical ways to calculate how to always meet customer demand even if it exceeds our forecast. We have solidified our understanding of the process for performing supply chain management. As a team, we recognized that there are three main parts: strategy, planning, and operations, as well as the importance of demand forecasting and the four key drivers (inventory, facilities, transportation, information system). We discussed more about pricing in a supply chain, including the basic production capacity trade-off that exists between committing to an order from a lower-price buyer or waiting for a higher-price buyer to arrive later on. Additionally, our group has overall gained a vast amount of understanding in the importance of developing a non-trivial task-based plan. We have learned the proper steps and timing needed to perform specific tasks in the real world in a timely and high quality manner. Overall, our team has learned a lot from this project and hope that we can take the material that we have learned throughout CSE 171A and 171B and apply it to our own professions in life.

Lessons Learned

As seen in the beer game, communication is a critical aspect of the supply chain. What we discovered throughout the process of the project was the critical importance of communication seeping into each activity and between the group. Often, much of the discrepancies during meetings were due to inadequate communication and not enough concrete meetings between the group, which was obvious to the professor who was guiding our project. When we developed a methodological approach to our meetings and interaction between the group as delineated in the course, we were able to ask the important questions and better derive

critical values of the project. Another critical lesson of this course was how to come about deriving information without explicit guidelines as we would see in traditional courses. As stated before, one of the most important aspects of deriving consistent information is to communicate with the group about objectives and methodologies to come to a consensus of the process. Beyond this, we discovered it was important to make many models, and try many things, then delineate important information using structured problem solving and brainstorming methods. Finally, throughout the course we learned a comprehensive step by step process for product management from the design phases to the implementation of the supply chain. Thanks to clearly organized project phases and accompanying SPSPs, they will be both useful and quick to return to should this kind of project be necessary in our future careers.