

HBSP Global Supply Chain Simulation Debrief

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Debrief Questions

Design & Forecasting

- How did you decide which options to choose?
- How did you arrive at your forecasts?

Production

- How did you decide which supplier(s) to use?
- How did you determine the order quantities and timing?
- Was it worth the extra \$1 million for 3 month instead of 4 month lead time for the far supplier?
- Was it worth the extra \$1 million for extra capacity (40 vs. 35) for the close supplier?
- How often did you use \$2M change orders? Why?
- Did you buy \$2M market information? Why or why not?

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Design Room

Submit

Estimated Model Demand
Without Options, Monthly Units in thousands

	Andrei	Aya	Lorenzo	Claire	Byron	Ruth	Consensus
Model A	63	54	64	59	64	56	63
Model B	36	18	38	28	38	22	33

Estimated Monthly Impact of Selected options on Demand
in thousands, impact the same for both models

Option	Impact (thousands)
Andrei	10
Aya	-10
Lorenzo	10
Claire	-10
Byron	-10
Ruth	10

Estimated Impact of Selected Options on Per-Unit Profit
in US dollars

	Price	Cost	Profit
Base Model A	\$200	\$130	\$70
Model A w/ options	\$240	\$165	\$75
Base Model B	\$240	\$150	\$90
Model B w/ options	\$280	\$185	\$95

Product Options
Estimated Demand Forecast
with and without options, in thousands a month

Team	Without Options	With Options
Andrei	63	63
Aya	54	54
Lorenzo	64	64
Claire	59	59
Byron	64	64
Ruth	56	56
Consensus	63	63

Average: 60 Standard Dev. 4
Without Options: 60
With Options: 59

View Discussion

Andrei
The third option is stylish covers. My research indicates that this option will slightly decrease sales.

Aya
Andrei, style matters in mobile phones. They can serve as a status symbol, and the high end market demands style.

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Forecasting Room

Submit

Congratulations, the design options for the two mobile phone lines have been specified. You will now have to predict the total demand for each product line.

Your forecasting team members have come up with a consensus for what they believe demand will be for the mobile phone lines.

However, the board of your company is interested in your personal estimates as well.

The numbers you will forecast after entering the forecasting room will not affect your production schedule, but they will help you later as you determine where and how to source your products.

Unit Data with Options as Chosen
costs are an estimate from the lowest-cost contract manufacturer

	Model A	Model B
Unit Price	\$240.00	\$280.00
Unit Cost	\$165.00	\$185.00
Unit Profit	\$75.00	\$95.00
Markdown Price*	\$148.50	\$55.50
Monthly Holding Cost	\$4.80	\$5.60

*at the end of the year, all models left in stock will be sold to a consolidator at this price

Model A: Monthly Estimated Demand May–December
in thousands per month

Average: 59 Standard Dev: 11

Team	Estimated Demand (k/month)
Andrei	63
Aya	54
Lorenzo	64
Claire	59
Byron	64
Ruth	56
Consensus	62

Model B: Monthly Estimated Demand May–December
in thousands per month

This is your forecast for what monthly demand will be each month from May through December. There is no demand expected from January through April.

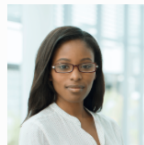
Model A k/month
Model B k/month

SUPPLIER		UNITS / MONTH		BEGIN PRODUCTION												
<input type="checkbox"/>	FarFarAway	A	<input type="text" value="0"/> k	B	<input type="text" value="0"/> k	Select A Month										
PRODUCTION HISTORY <i>in thousands per month</i>												UNIT COST	LEAD TIME	CAPACITY	SETUP COSTS	
A	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	A \$165	4 mo	60k	\$1m
B	0	0	0	0	0	0	0	0	0	0	0	0	B \$185			
SUPPLIER		UNITS / MONTH		BEGIN PRODUCTION												
<input type="checkbox"/>	FarAway	A	<input type="text" value="0"/> k	B	<input type="text" value="0"/> k	Select A Month										
PRODUCTION HISTORY <i>in thousands per month</i>												UNIT COST	LEAD TIME	CAPACITY	SETUP COSTS	
A	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	A \$165	3 mo	60k	\$2m
B	0	0	0	0	0	0	0	0	0	0	0	0	B \$185			
SUPPLIER		UNITS / MONTH		BEGIN PRODUCTION												
<input type="checkbox"/>	PrettyClose	A	<input type="text" value="0"/> k	B	<input type="text" value="0"/> k	Select A Month										
PRODUCTION HISTORY <i>in thousands per month</i>												UNIT COST	LEAD TIME	CAPACITY	SETUP COSTS	
A	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	A \$175	0 mo	35k	\$1m
B	0	0	0	0	0	0	0	0	0	0	0	0	B \$195			
SUPPLIER		UNITS / MONTH		BEGIN PRODUCTION												
<input type="checkbox"/>	VeryClose	A	<input type="text" value="0"/> k	B	<input type="text" value="0"/> k	Select A Month										
PRODUCTION HISTORY <i>in thousands per month</i>												UNIT COST	LEAD TIME	CAPACITY	SETUP COSTS	
A	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	A \$175	0 mo	40k	\$2m
B	0	0	0	0	0	0	0	0	0	0	0	0	B \$195			

The Board



Mia



Carla



Ankit



Matheo



Adele

- How did you perform?
- What was each Board member looking for?

Board Votes Results

Team	Year 1	Year 2	Year 3	Year 4	Total	Rank
Joris Van Elsen	2	4	4	4	14	1
Mohit Datar	4	2	2	5	13	2
Pieter Wiebe De Vries	2	2	4	5	13	2
Patricia De Muynck	3	2	4	4	13	2
Veerle Limbos	4	2	3	4	13	2
Stan Sherfinski	1	3	4	5	13	2
Alliaksandr Savanovich	2	3	3	4	12	7
Axel Vandevenne	3	3	2	4	12	7
Maxim Titov	3	3	2	4	12	7
Denis Marfutin	1	3	3	5	12	7
Easwar Ranganathan	3	3	2	4	12	7
Marcin Fic	4	1	3	4	12	7
Sander Ripmeester	2	4	3	3	12	7
Renaat De Vos	2	3	2	5	12	7
Sven Ameye	1	3	4	4	12	7
Dmitry Novgorodov	2	1	4	4	11	16
Christophe Dekersgieter	1	4	2	4	11	16
John Smalley	1	3	3	4	11	16
Pablo Murillo	2	2	3	4	11	16
Rik Snoeckx	2	2	3	4	11	16
Alexander Krupchik	2	2	2	5	11	16
Inna Marenkova	2	3	3	3	11	16
Angelica Bojorquez	0	3	3	5	11	16
Bart Hennes	0	3	3	5	11	16
Will Wright	2	3	2	3	10	25
Viacheslav Son	3	1	2	4	10	25
David Doom	1	2	2	5	10	25
Manav Jain	0	3	2	5	10	25
Ben Spilger	1	3	2	4	10	25
Stephanie Langerock	1	3	2	4	10	25
Alexis Vroman	1	2	2	4	9	31
Kate Scott	1	1	3	4	9	31
Victor Titov	1	2	1	4	8	33
David Eggermann	1	2	1	4	8	33
Alla Mishakova	2	2	2	1	7	35
Anna Vlasovskikh	2	1	2	1	6	36
Denis Saveljev	1	1	1	3	6	36
Benjamin Stevenson	1	1	2	2	6	36
Emerson Jimenez	0	1	1	4	6	36
Leen Govaerts	2	2	2	0	6	36
Avg	1.7	2.4	2.5	3.9	10.4	
Min	0	1	1	0	6	
Max	4	4	4	5	14	

Profits Results

Team	Year 1	Year 2	Year 3	Year 4	Total	Rank
Denis Marfutin	\$ 42,234	\$ 50,553	\$ 44,270	\$ 50,948	\$ 188,005	1
Axel Vandevenne	\$ 47,777	\$ 48,262	\$ 41,879	\$ 48,828	\$ 186,746	2
David Eggermann	\$ 46,951	\$ 48,434	\$ 43,306	\$ 47,972	\$ 186,663	3
Pieter Wiebe De Vries	\$ 45,863	\$ 47,342	\$ 44,393	\$ 48,960	\$ 186,559	4
Bart Hennes	\$ 43,947	\$ 45,798	\$ 43,704	\$ 51,904	\$ 185,353	5
Mohit Datar	\$ 44,983	\$ 45,197	\$ 43,043	\$ 50,310	\$ 183,534	6
Joris Van Elsen	\$ 46,289	\$ 49,323	\$ 39,337	\$ 48,428	\$ 183,377	7
Angelica Bojorquez	\$ 42,810	\$ 46,655	\$ 46,031	\$ 47,287	\$ 182,782	8
Patricia De Muynck	\$ 45,359	\$ 47,206	\$ 37,853	\$ 52,255	\$ 182,672	9
Sander Ripmeester	\$ 40,260	\$ 45,338	\$ 44,327	\$ 49,474	\$ 179,399	10
Sven Ameye	\$ 48,236	\$ 42,900	\$ 41,485	\$ 46,193	\$ 178,814	11
Marcin Fic	\$ 42,668	\$ 41,580	\$ 42,309	\$ 52,102	\$ 178,659	12
Christophe Dekersgieter	\$ 50,566	\$ 38,116	\$ 40,903	\$ 48,727	\$ 178,312	13
Anna Vlasovskikh	\$ 45,860	\$ 42,333	\$ 42,091	\$ 47,799	\$ 178,083	14
Will Wright	\$ 46,373	\$ 46,833	\$ 37,890	\$ 46,880	\$ 177,976	15
Easwar Ranganathan	\$ 46,226	\$ 39,017	\$ 41,462	\$ 50,418	\$ 177,122	16
Veerle Limbos	\$ 42,668	\$ 40,474	\$ 41,506	\$ 50,765	\$ 175,412	17
Maxim Titov	\$ 47,217	\$ 45,504	\$ 34,638	\$ 46,428	\$ 173,787	18
Rik Snoeckx	\$ 40,300	\$ 44,378	\$ 40,992	\$ 48,058	\$ 173,728	19
Alliaksandr Savanovich	\$ 48,650	\$ 36,513	\$ 38,033	\$ 49,966	\$ 173,162	20
Ben Spilger	\$ 45,729	\$ 42,365	\$ 38,766	\$ 45,855	\$ 172,715	21
Alexander Krupchik	\$ 49,068	\$ 40,722	\$ 39,836	\$ 42,263	\$ 171,889	22
John Smalley	\$ 44,945	\$ 45,568	\$ 40,710	\$ 40,505	\$ 171,728	23
Victor Titov	\$ 45,911	\$ 38,602	\$ 42,648	\$ 44,488	\$ 171,649	24
Manav Jain	\$ 47,663	\$ 41,771	\$ 37,601	\$ 42,784	\$ 169,820	25
Inna Marenkova	\$ 68,585	\$ 42,845	\$ 24,380	\$ 33,871	\$ 169,681	26
Alexis Vroman	\$ 43,607	\$ 40,854	\$ 38,814	\$ 43,645	\$ 166,920	27
Emerson Jimenez	\$ 43,786	\$ 41,277	\$ 40,835	\$ 40,910	\$ 166,807	28
Kate Scott	\$ 44,863	\$ 42,829	\$ 34,296	\$ 42,752	\$ 164,740	29
Stephanie Langerock	\$ 46,529	\$ 36,865	\$ 35,558	\$ 43,491	\$ 162,444	30
Stan Sherfinski	\$ 43,552	\$ 40,018	\$ 35,391	\$ 40,254	\$ 159,216	31
Alla Mishakova	\$ 42,479	\$ 36,490	\$ 34,805	\$ 44,981	\$ 158,756	32
Renaat De Vos	\$ 36,748	\$ 40,423	\$ 41,036	\$ 39,188	\$ 157,396	33
David Doom	\$ 48,791	\$ 42,183	\$ 25,275	\$ 38,888	\$ 155,137	34
Pablo Murillo	\$ 38,696	\$ 37,006	\$ 35,842	\$ 43,311	\$ 154,855	35
Viacheslav Son	\$ 38,797	\$ 42,692	\$ 29,717	\$ 42,630	\$ 153,836	36
Benjamin Stevenson	\$ 46,071	\$ 39,978	\$ 28,971	\$ 34,670	\$ 149,690	37
Denis Saveljev	\$ 38,204	\$ 26,557	\$ 42,882	\$ 39,977	\$ 147,620	38
Leen Govaerts	\$ 39,866	\$ 30,344	\$ 35,603	\$ 39,244	\$ 145,058	39
Dmitry Novgorodov	\$ 36,051	\$ 31,580	\$ 36,880	\$ 26,738	\$ 131,249	40
Avg	\$ 44,879	\$ 41,818	\$ 38,732	\$ 44,854	\$ 170,284	
Min	\$ 36,051	\$ 26,557	\$ 24,380	\$ 26,738		
Max	\$ 68,585	\$ 50,553	\$ 46,031	\$ 52,255		

Combined Results: Weighted Average of Standardized Profit and Votes

Weights				67%		33%		
Team	Profit	Rank	Votes	Rank	Z Profit	Z Votes	Score	Rank
Pieter Wiebe De Vries	\$ 186,559	4	13	2	1.22	1.14	1.20	1
Joris Van Elsen	\$ 183,377	7	14	1	0.98	1.59	1.18	2
Denis Marfutin	\$ 188,005	1	12	7	1.33	0.70	1.12	3
Axel Vandevenne	\$ 186,746	2	12	7	1.24	0.70	1.06	4
Mohit Datar	\$ 183,534	6	13	2	1.00	1.14	1.04	5
Patricia De Muynck	\$ 182,672	9	13	2	0.93	1.14	1.00	6
Bart Hennes	\$ 185,353	5	11	16	1.13	0.26	0.84	7
Angelica Bojorquez	\$ 182,782	8	11	16	0.94	0.26	0.71	8
Sander Ripmeester	\$ 179,399	10	12	7	0.69	0.70	0.69	9
Sven Ameye	\$ 178,814	11	12	7	0.64	0.70	0.66	10
Marcin Fic	\$ 178,659	12	12	7	0.63	0.70	0.65	11
Veerle Limbos	\$ 175,412	17	13	2	0.39	1.14	0.64	12
Easwar Ranganathan	\$ 177,122	16	12	7	0.51	0.70	0.58	13
Christophe Dekersgieter	\$ 178,312	13	11	16	0.60	0.26	0.49	14
David Eggermann	\$ 186,663	3	8	33	1.23	-1.08	0.47	15
Maxim Titov	\$ 173,787	18	12	7	0.26	0.70	0.41	16
Aliaksandr Savanovich	\$ 173,162	20	12	7	0.22	0.70	0.38	17
Will Wright	\$ 177,976	15	10	25	0.58	-0.19	0.33	18
Rik Snoeckx	\$ 173,728	19	11	16	0.26	0.26	0.26	19
Alexander Krupchik	\$ 171,889	22	11	16	0.12	0.26	0.17	20
John Smalley	\$ 171,728	23	11	16	0.11	0.26	0.16	21
Ben Spilger	\$ 172,715	21	10	25	0.18	-0.19	0.06	22
Inna Marenkova	\$ 169,681	26	11	16	-0.05	0.26	0.05	23
Manav Jain	\$ 169,820	25	10	25	-0.03	-0.19	-0.09	24
Stan Sherfinski	\$ 159,216	31	13	2	-0.83	1.14	-0.18	25
Anna Vlasovskikh	\$ 178,083	14	6	36	0.59	-1.96	-0.26	26
Victor Titov	\$ 171,649	24	8	33	0.10	-1.08	-0.29	27
Alexis Vroman	\$ 166,920	27	9	31	-0.25	-0.63	-0.38	28
Reaat De Vos	\$ 157,396	33	12	7	-0.97	0.70	-0.42	29
Stephanie Langerock	\$ 162,444	30	10	25	-0.59	-0.19	-0.46	30
Kate Scott	\$ 164,740	29	9	31	-0.42	-0.63	-0.49	31
Pablo Murillo	\$ 154,855	35	11	16	-1.16	0.26	-0.69	32
Emerson Jimenez	\$ 166,807	28	6	36	-0.26	-1.96	-0.82	33
David Doom	\$ 155,137	34	10	25	-1.14	-0.19	-0.83	34
Viacheslav Son	\$ 153,836	36	10	25	-1.24	-0.19	-0.89	35
Alla Mishakova	\$ 158,756	32	7	35	-0.87	-1.52	-1.08	36
Benjamin Stevenson	\$ 149,690	37	6	36	-1.55	-1.96	-1.69	37
Denis Savelyev	\$ 147,620	38	6	36	-1.70	-1.96	-1.79	38
Dmitry Novgorodov	\$ 131,249	40	11	16	-2.93	0.26	-1.88	39
Leen Govaerts	\$ 145,058	39	6	36	-1.90	-1.96	-1.92	40
Mean	\$ 170,284							
Standard Deviation	\$ 13,305			10.4				2.3

Takeaways

- Accurate forecasts
 - Gather more data, especially individual forecasts
 - Capture the standard deviation of the individual forecasts
 - A small amount of pre-launch information or actual demand can really improve forecasts
- Responsive supply
 - Structurally aim to shorten lead times and increase reactive capacity
 - Consider which products to produce with speculative/reactive capacity
- Appropriate inventory*
 - There are incentives to produce more or less than the forecast
 - Critical Ratio based on the cost of being under/over (e.g. stockout/markdown cost) provides intuition for when to overproduce/underproduce, and by how much
 - Critical Ratio can also be used to set appropriate service levels for periodic review inventory policies

*WARNING: These principles come from the “newsvendor problem,” which cannot be fully applied to determine the “optimal” inventory in the simulation since key assumptions are not realized: e.g. ability carry inventory and issue change orders throughout the year, capacity constraints, supplier lead times. The intuition from the newsvendor problem – using the underage/overage costs to set inventory targets – can be broadly applied to optimize inventory and be very close to “optimal.” Email me if you would like to know more about the full theory.

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Further Reading

Janice H. Hammond, Ananth Raman. "Sport Obermeyer Ltd." Harvard Business School Case (No. 9-695-022), August 15, 2006.

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