Obsolescence Reduction Through Product Segmentation

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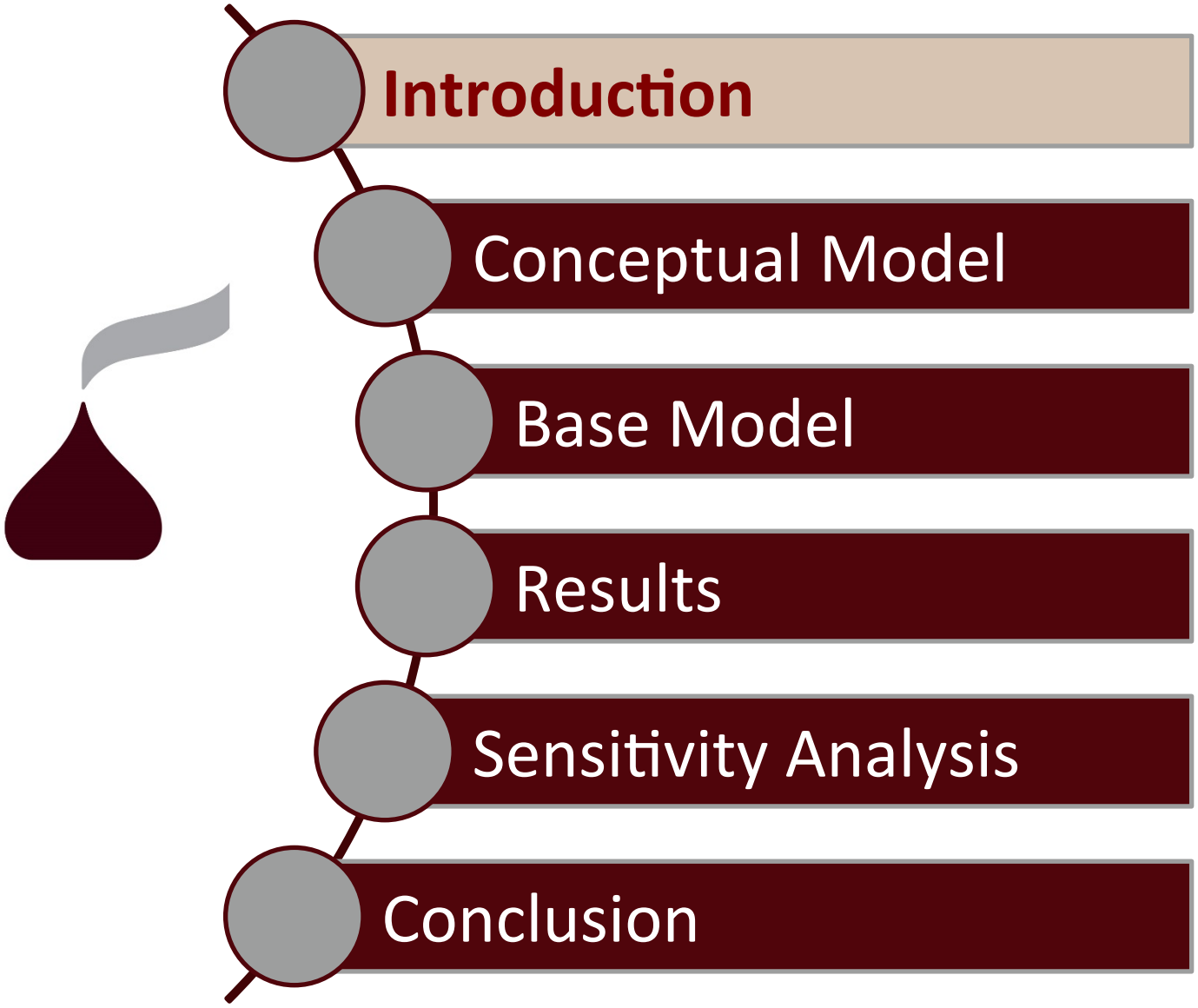
MIT SCM Research FEST

May 19, 2016

MIT Supply Chain MANAGEMENT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Problem Statement

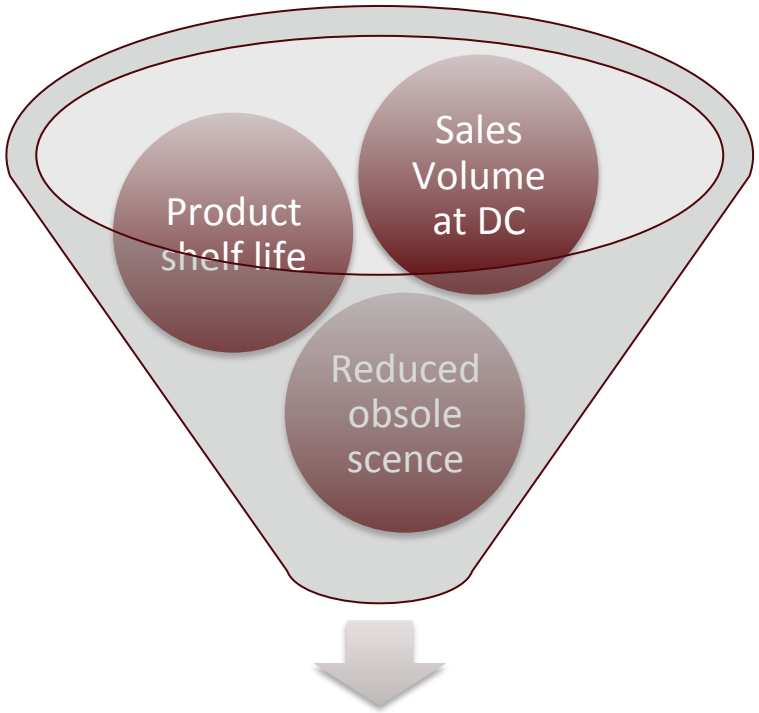
Current Strategy

No Customer Orders Differentiation

Obsolescence

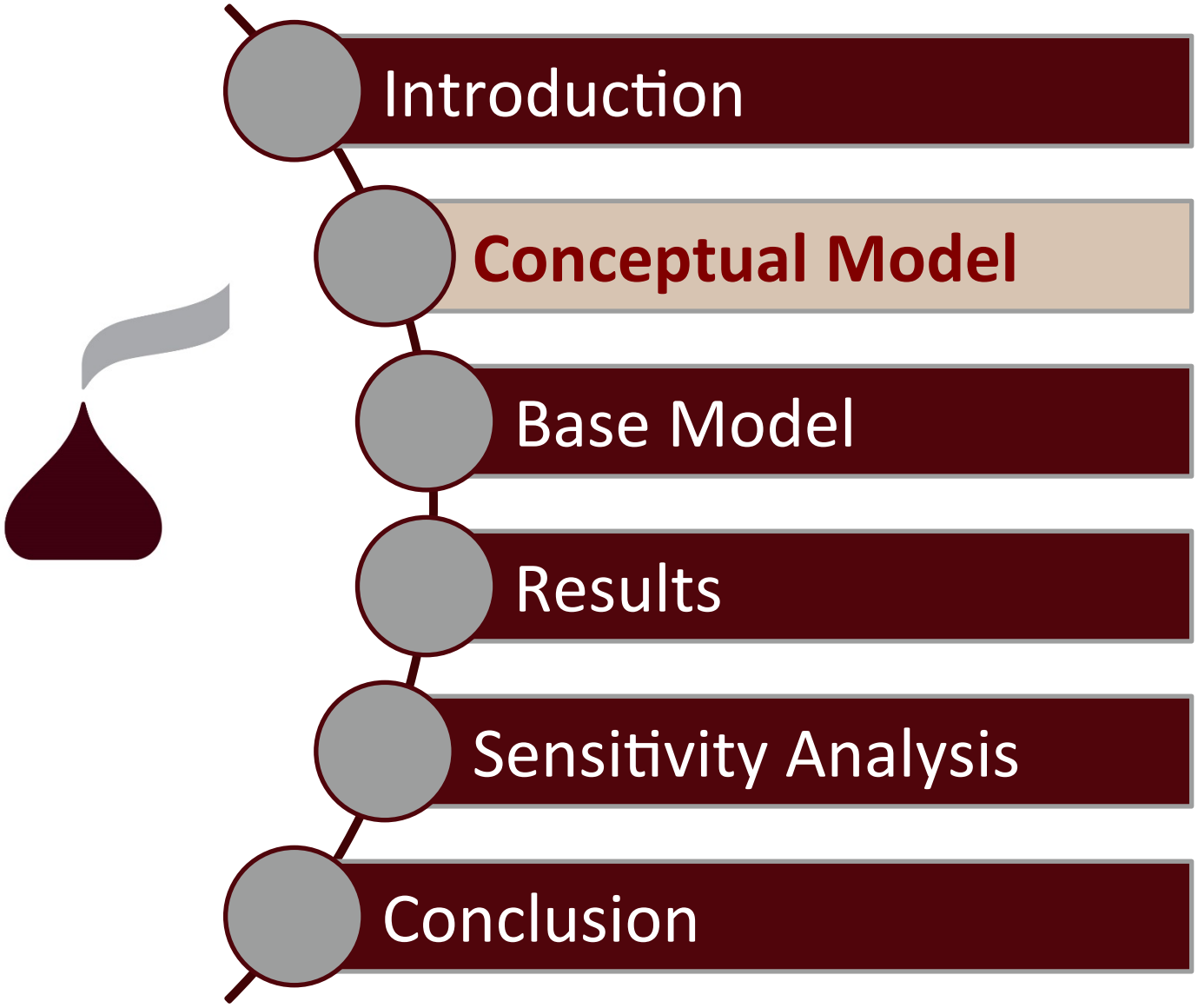
Objectives

New Picking Strategy



2-Cluster Model

Evaluate its impact & Compare against FIFO only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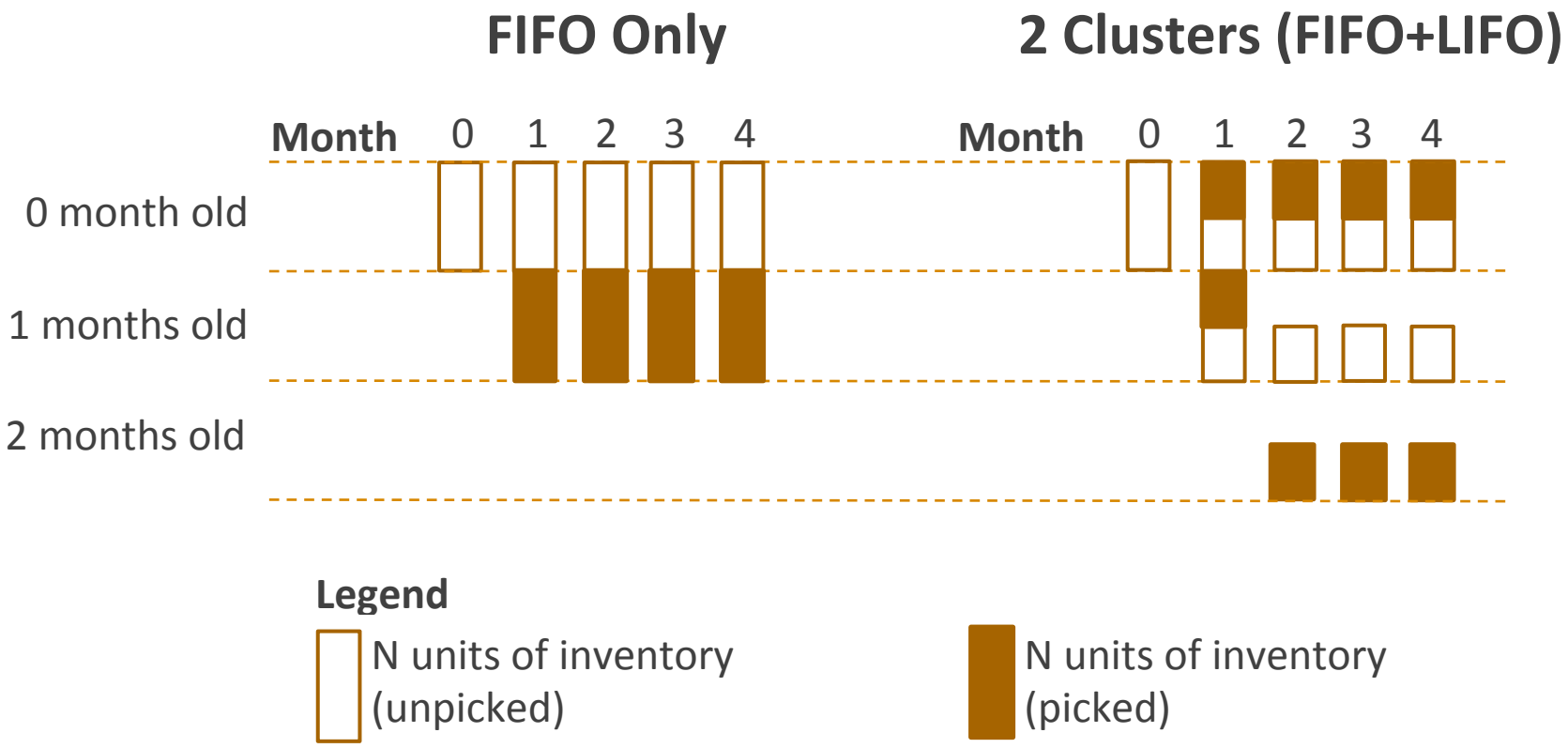
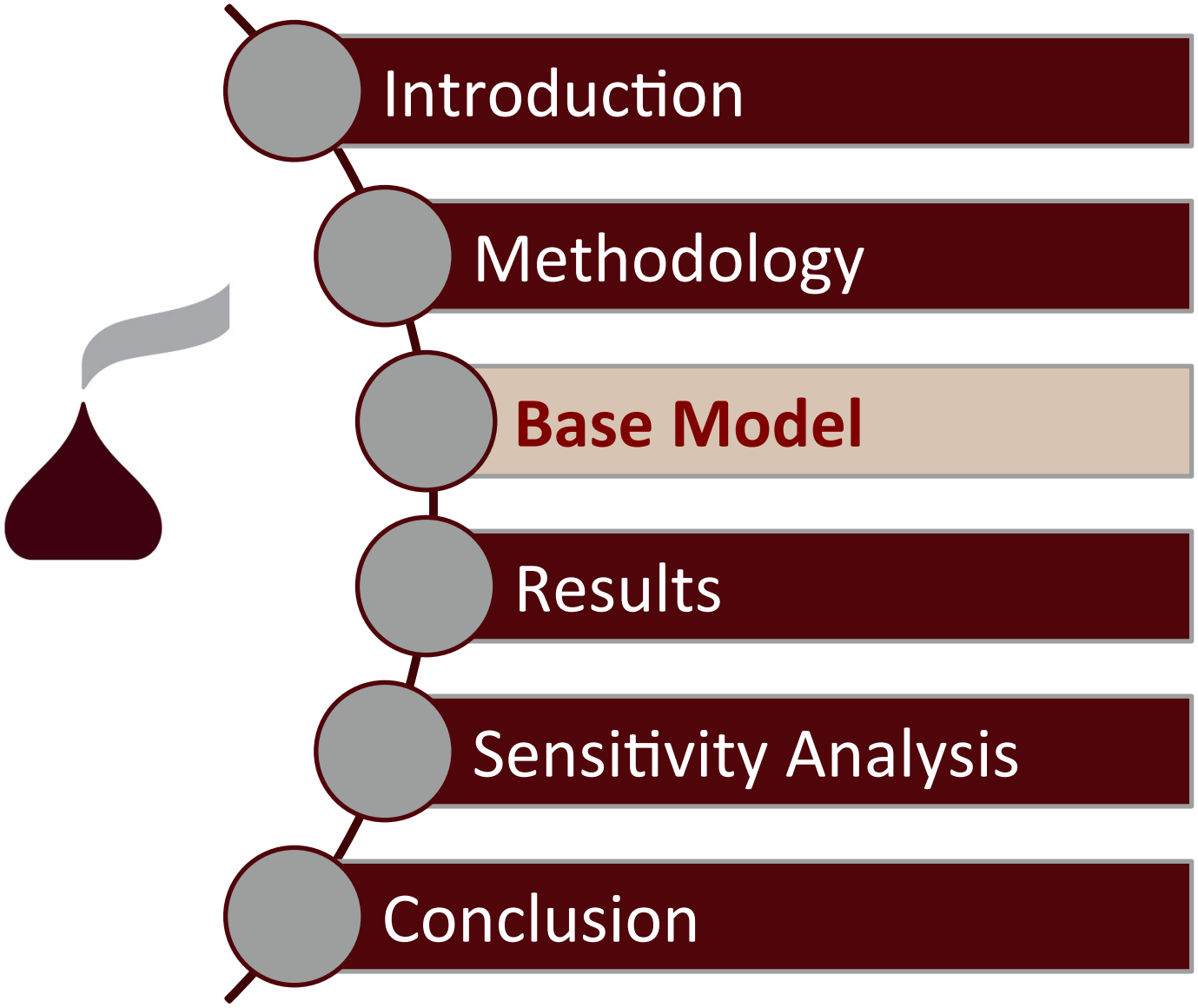
Conceptual Model

Production Rate: **N** units/month
Ordering Quantity: **N/2** units/month (fast-movers)
N/2 units/month (slow-movers)

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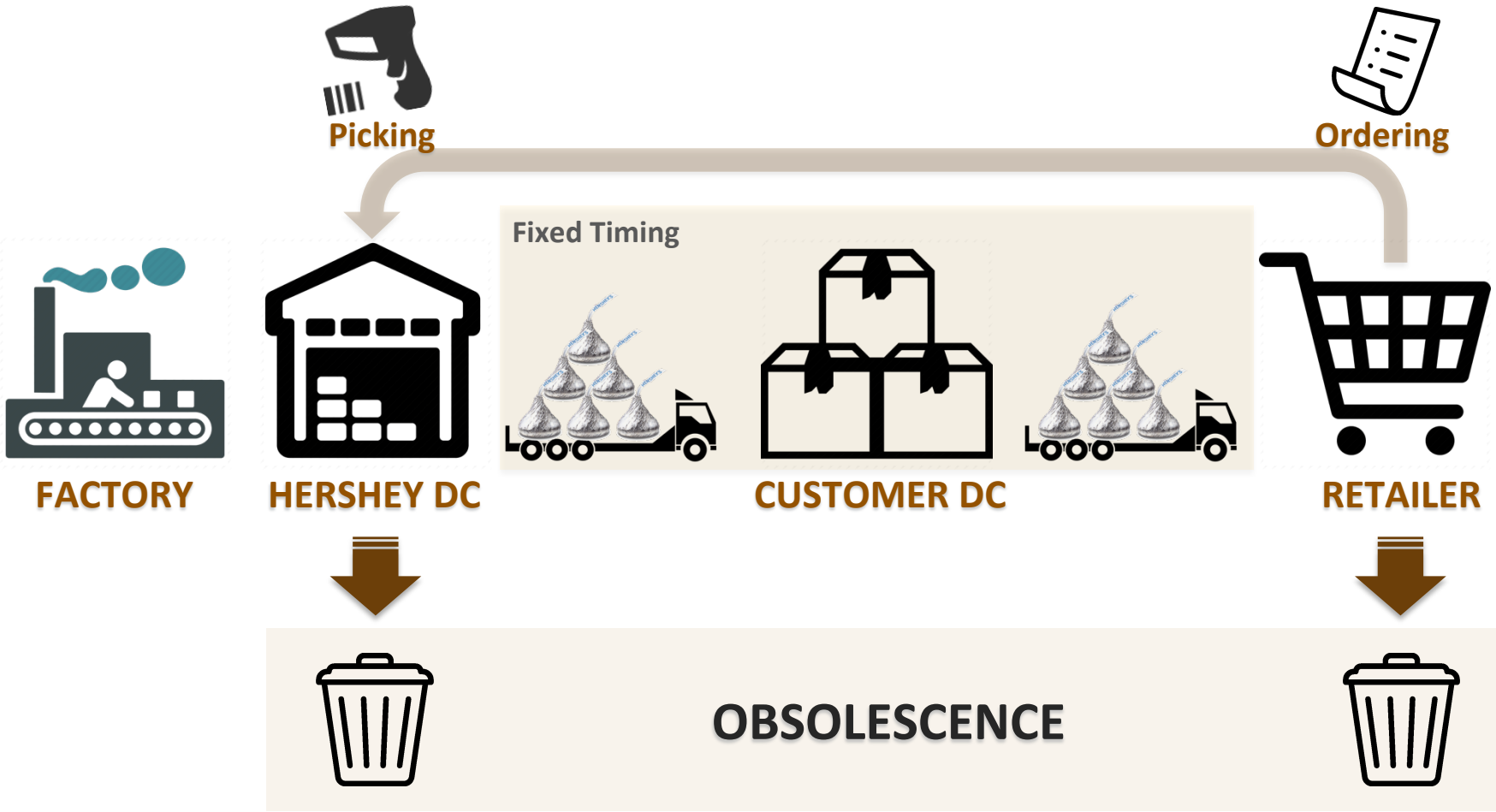
Base Model


Picking
Ordering
Fixed Timing
FACTORY
HERSHEY DC
CUSTOMER DC
RETAILER
OBSOLESCENCE

Base Model


Picking
Ordering
Fixed Timing
FACTORY
HERSHEY DC
CUSTOMER DC
RETAILER
OBSOLESCENCE

Base Model

Production

- [Base Model] Constant monthly production rate at 15k units

Picking

Ordering

HERSHEY DC

CUSTOMER DC

RETAILER

OBSOLESCENCE

Base Model

Picking

- Pick only items can be accepted by retailers
- [Base Model] Monthly ordering quantity is U(12k, 17k)

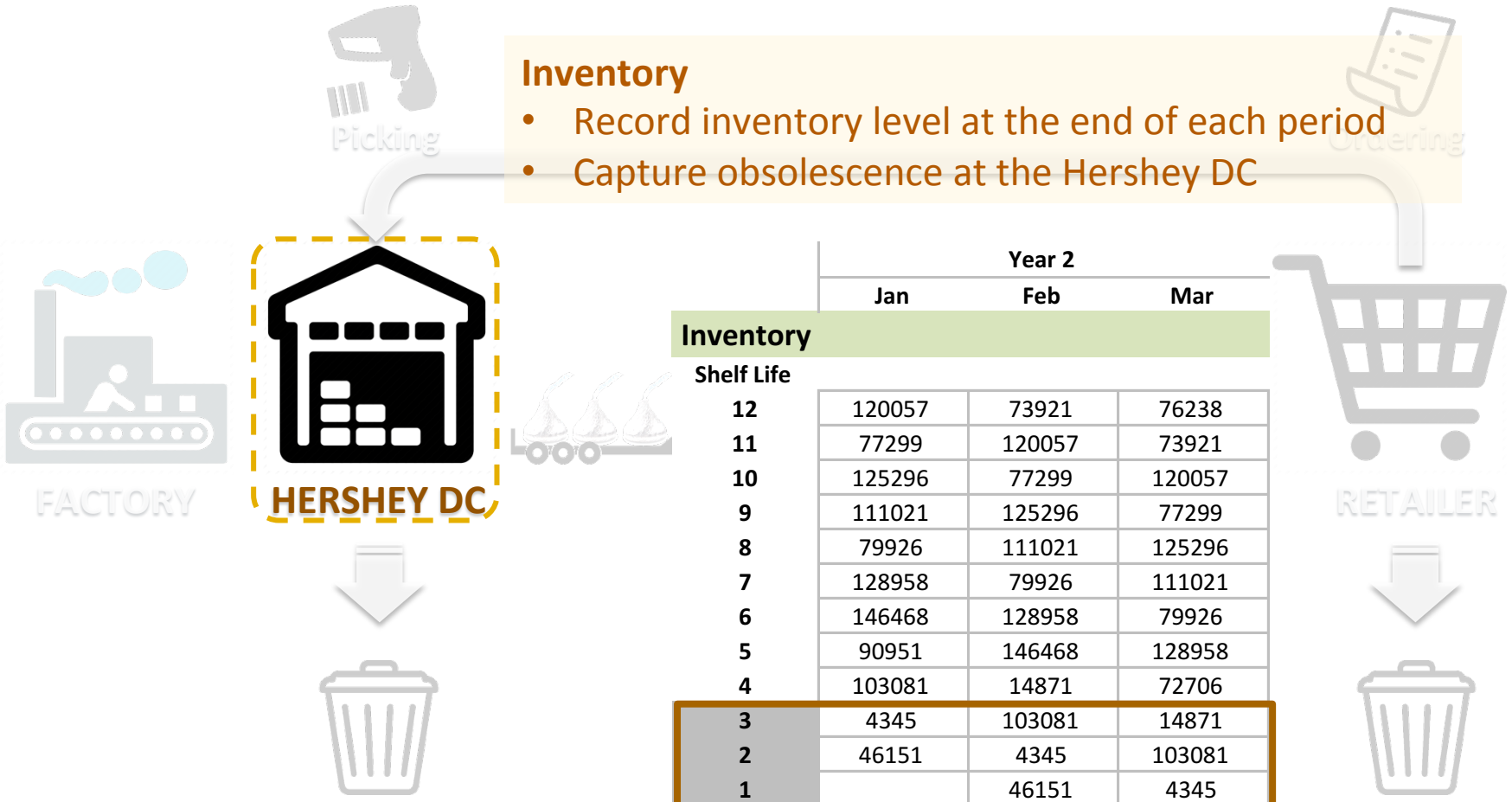
FIFO Only

	Year 2		
	Jan	Feb	Mar
Picking			
Shelf Life			
12			
11			
10			
9			
8			
7			
6			
5	37769		91769
4	119371	20462	64913
3			
2			
1			
0			

2 Clusters

	Year 2		
	Jan	Feb	Mar
Picking			
Shelf Life			
12	78570	10231	78341
11			
10			
9			
8			
7			
6			
5			
4	78570	10231	78341
3			
2			
1			
0			

Base Model



Inventory

- Record inventory level at the end of each period
- Capture obsolescence at the Hershey DC

	Year 2		
	Jan	Feb	Mar
Inventory			
Shelf Life			
12	120057	73921	76238
11	77299	120057	73921
10	125296	77299	120057
9	111021	125296	77299
8	79926	111021	125296
7	128958	79926	111021
6	146468	128958	79926
5	90951	146468	128958
4	103081	14871	72706
3	4345	103081	14871
2	46151	4345	103081
1		46151	4345
0			46151
Expired			

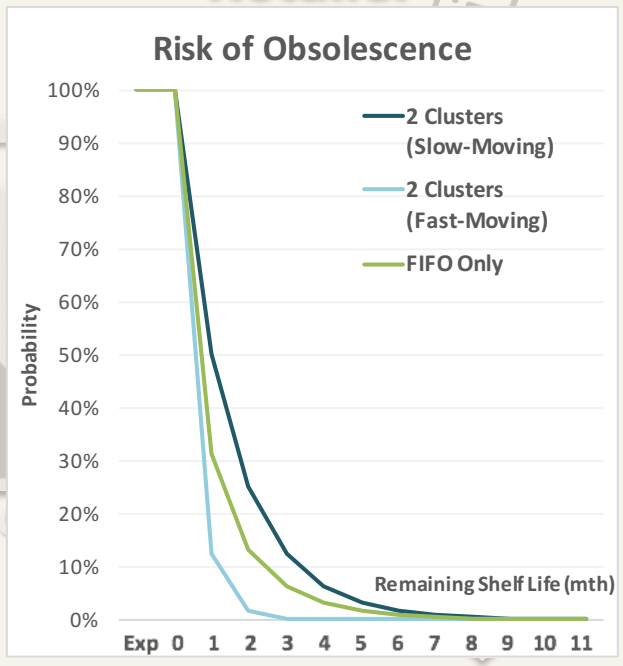
OBSOLESCENCE!

Base Model

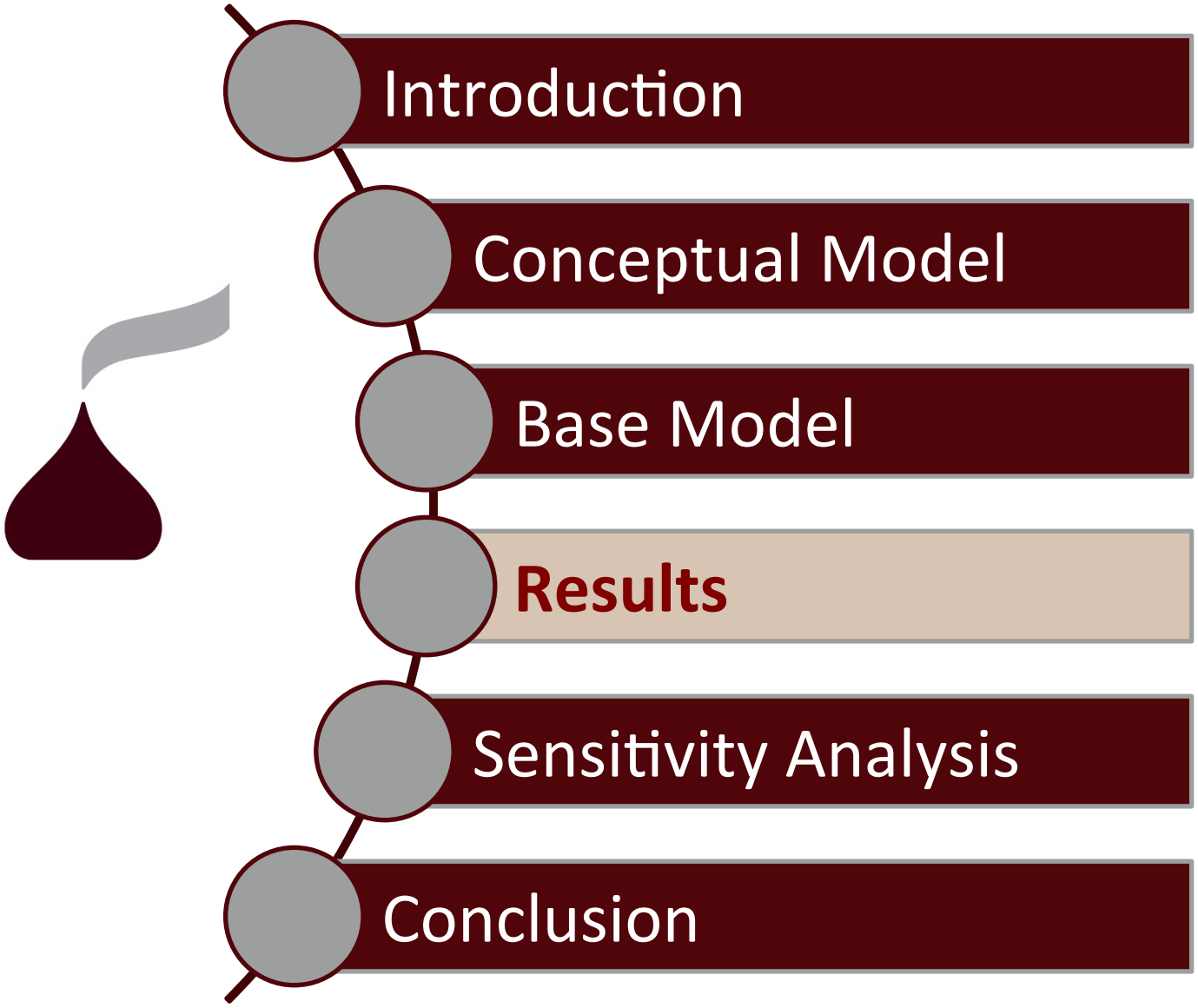
Hershey DC

	Year 2		
	Jan	Feb	Mar
Inventory			
Shelf Life	**13**	**14**	**15**
12	120057	73921	76238
11	77299	120057	73921
10	125296	77299	120057
9	111021	125296	77299
8	79926	111021	125296
7	128958	79926	111021
6	146468	128958	79926
5	90951	146468	128958
4	103081	14871	72706
3	4345	103081	14871
2	46151	4345	103081
1		46151	4345
0			46151
Expired			

Retailer



OBSOLESCENCE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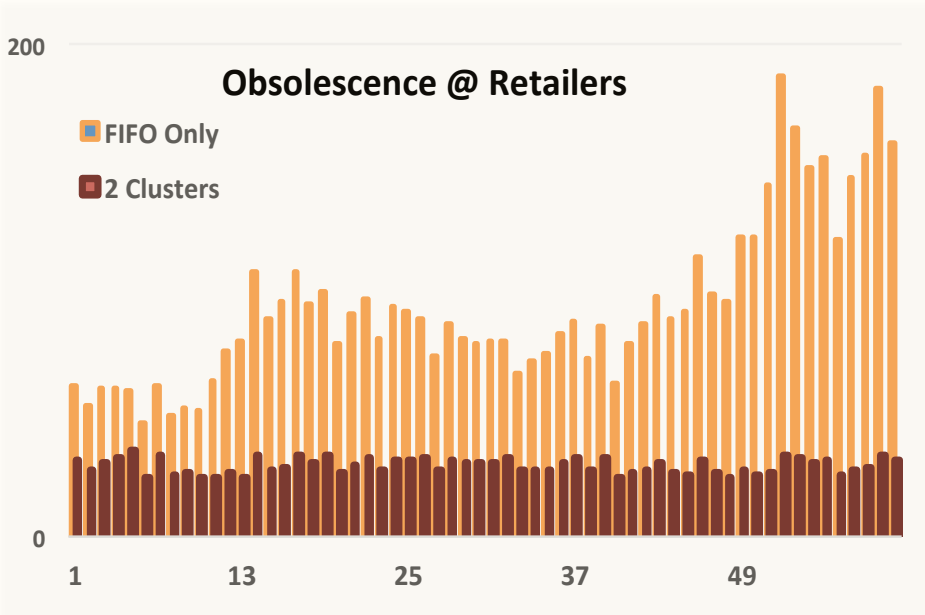
What happens when 20% is ordered by slow movers and 80% by fast movers?

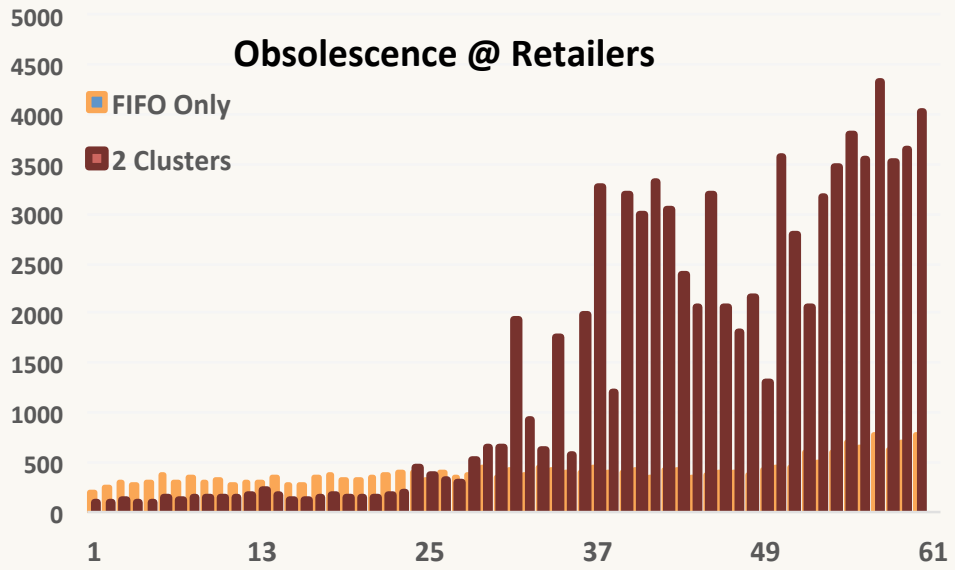
		Jan	Feb	Mar
Picking				
	Shelf Life	49	50	51
	12	28898	30415	31330
	11			
	10	47179	44718	43821
	9	68415	76942	75500
	8			
	7			
	0			
Inventory				
	Shelf Life	49	50	51
	12	121102	119585	118670
	11	120218	121102	119585
	10	76942	75500	71280
	9			
	0			
	Expired			



- Older products picked faster
- Enough Remaining Shelf life at Retailers

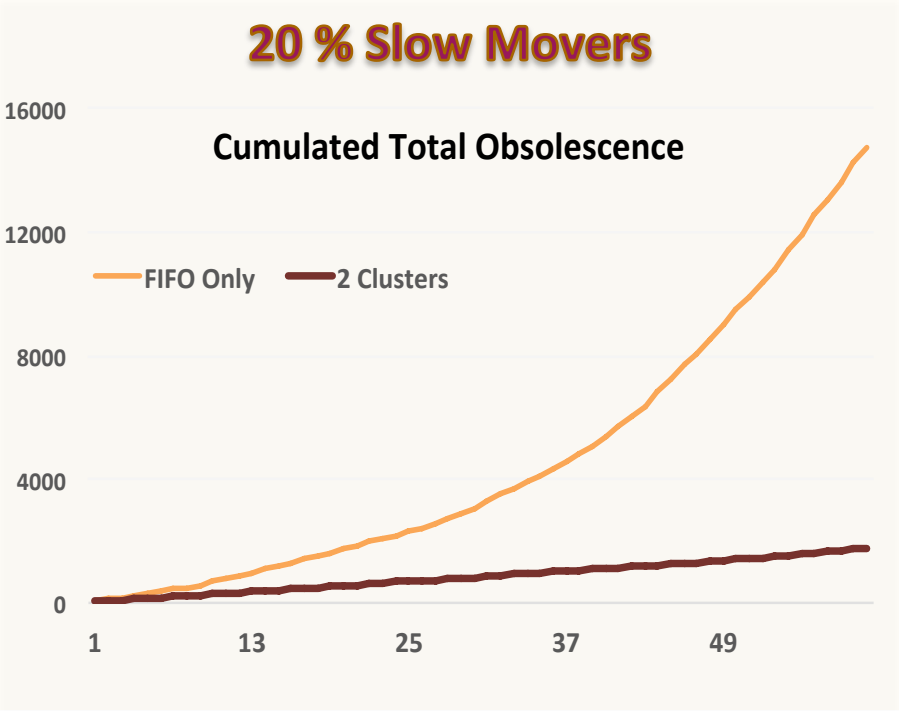
What happens when 20% is ordered by fast movers and 80% by slow movers?

	Jan	Feb	Mar
Picking			
Shelf Life	**49**	**50**	**51**
12	115314	113658	118806
11	0	0	0
10	0	0	0
9	0	0	0
8	0	0	0
7	0	0	0
6	0	0	0
5	0	0	0
4	28829	28415	29702
3	0	0	0
2	0	0	0
1	0	0	0
0	0	0	0
Inventory			
Shelf Life	**49**	**50**	**51**
12	34686	36342	31194
11	53214	34686	36342
10	25684	53214	34686
9	36730	25684	53214
8	29145	36730	25684
7	46042	29145	36730
6	39812	46042	29145
5	29946	39812	46042
4	8755	1531	10110
3	0	8755	1531
2	17411	0	8755
1	9206	17411	0
0	15271	9206	17411
Expired	209447	224718	233923

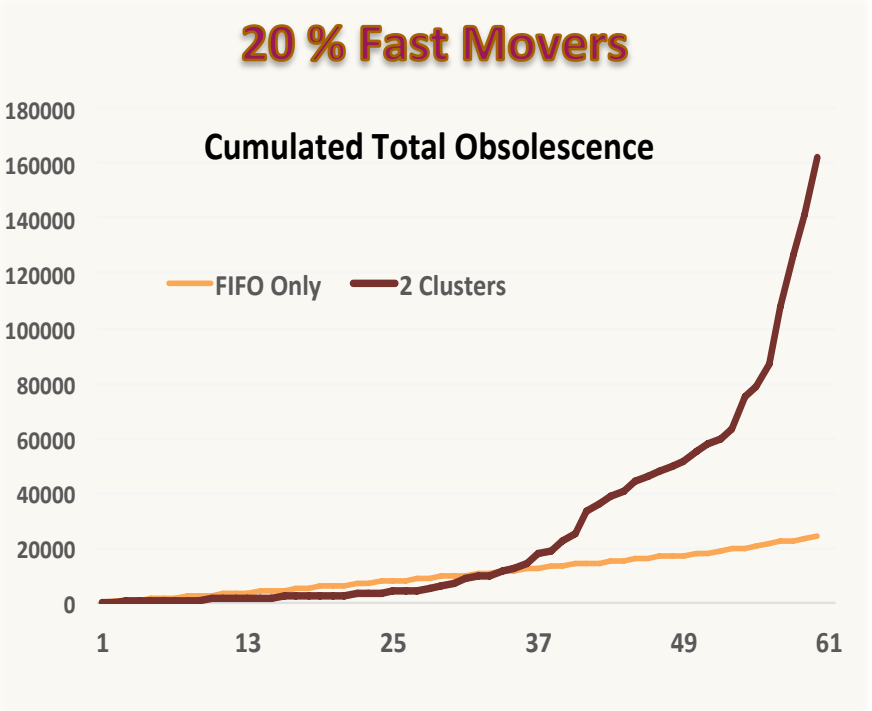


- Slow-movers dominate
- Obsolescence from fast-moving retailers ↑

Inventory and Picking Tables for 2 Cluster Model



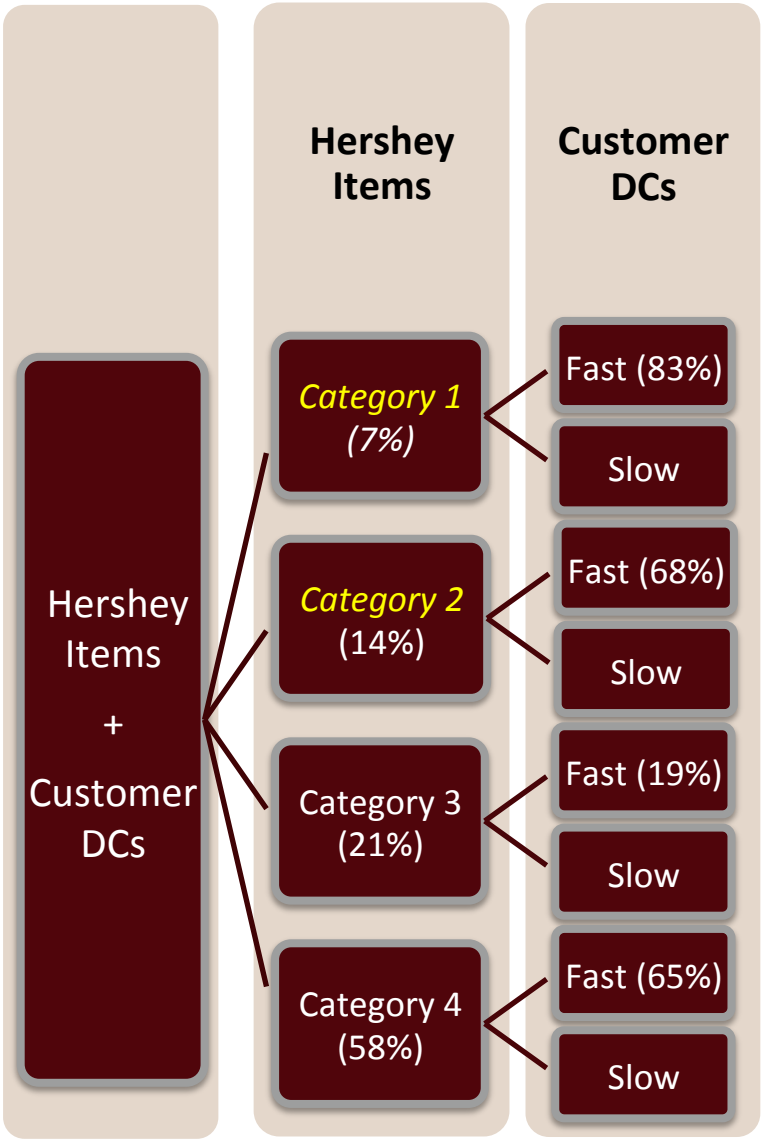
Lower Overall Obsolescence



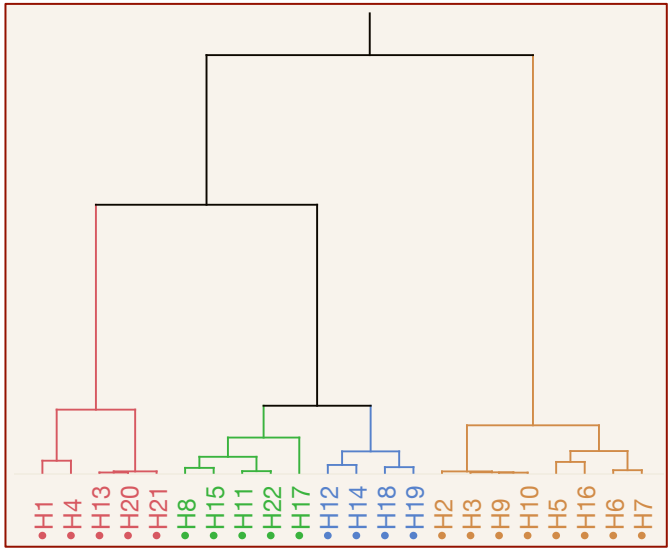
Higher Overall Obsolescence

Results

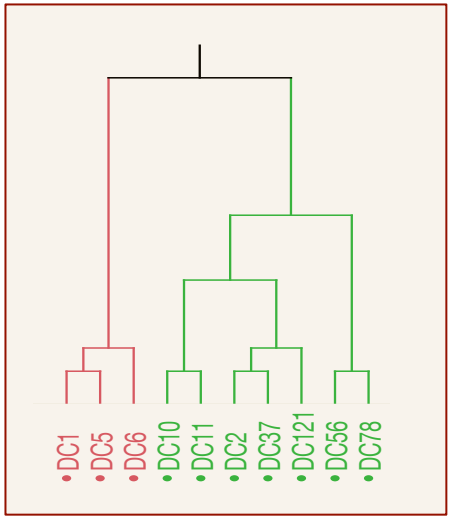
Clustering Model

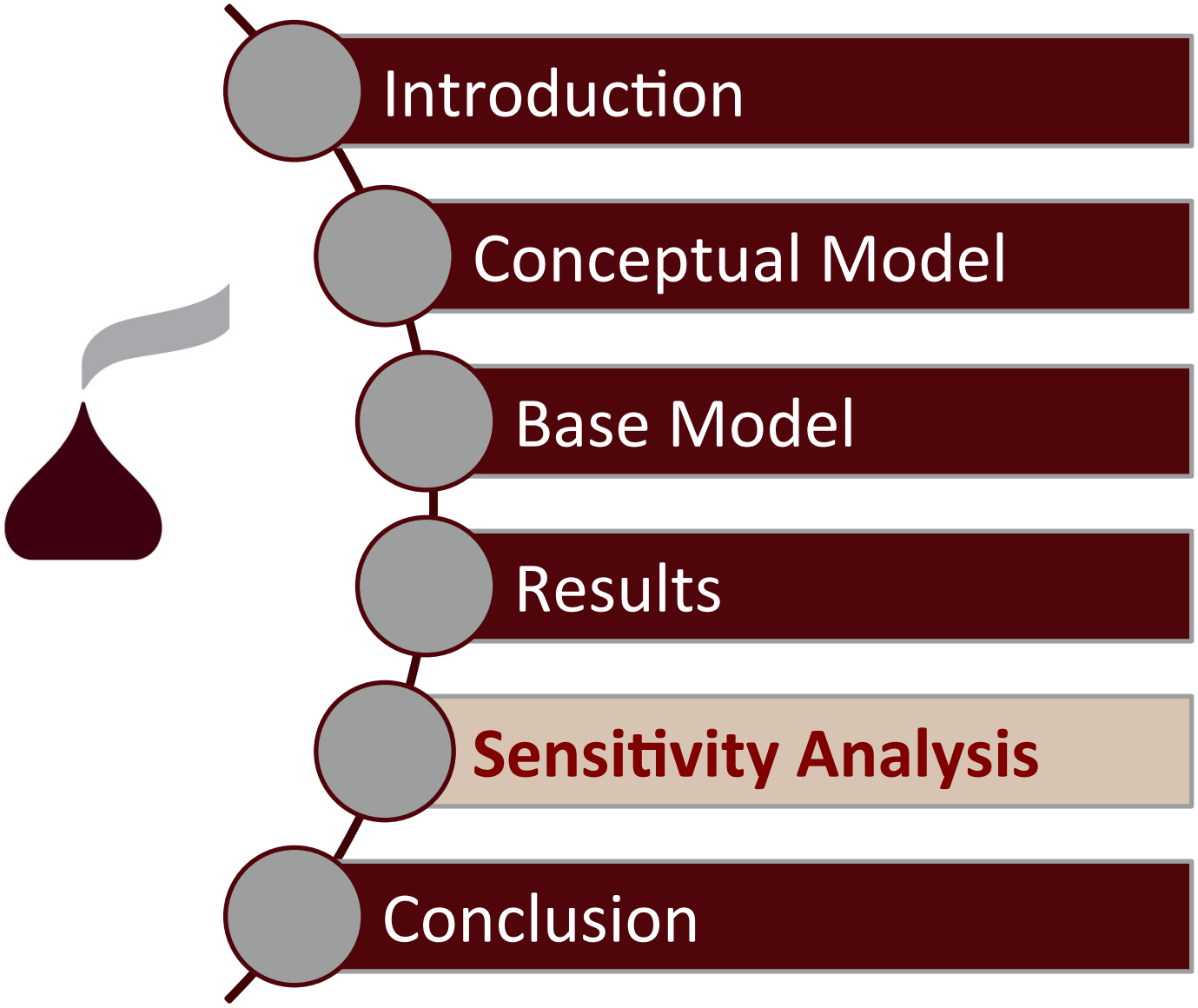


Hershey Items



Customer DCs

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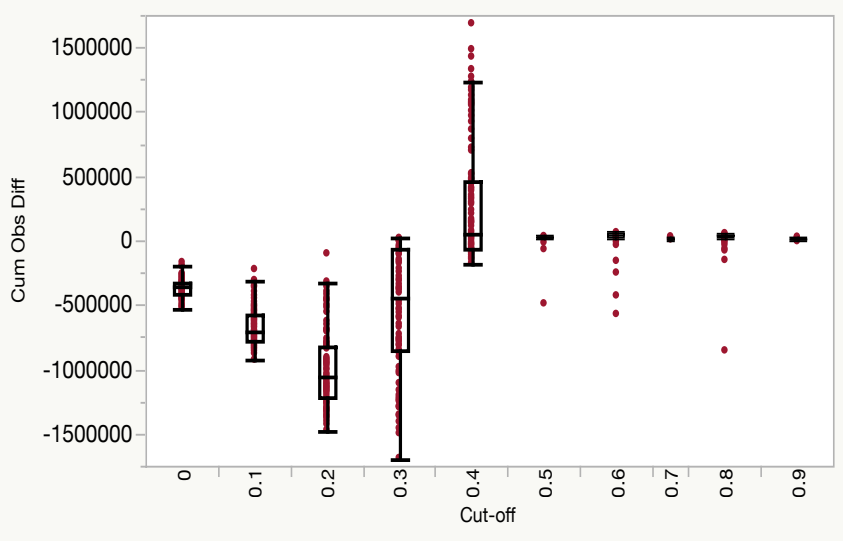
Sensitivity Analysis

- ✓ *What happens on running the simulation model n times?*
- ✓ *Are the results replicated every time for different cut off values?*
- ✓ *For Triangular distribution of Orders? For different Obsolescence cut at retailers' end?*

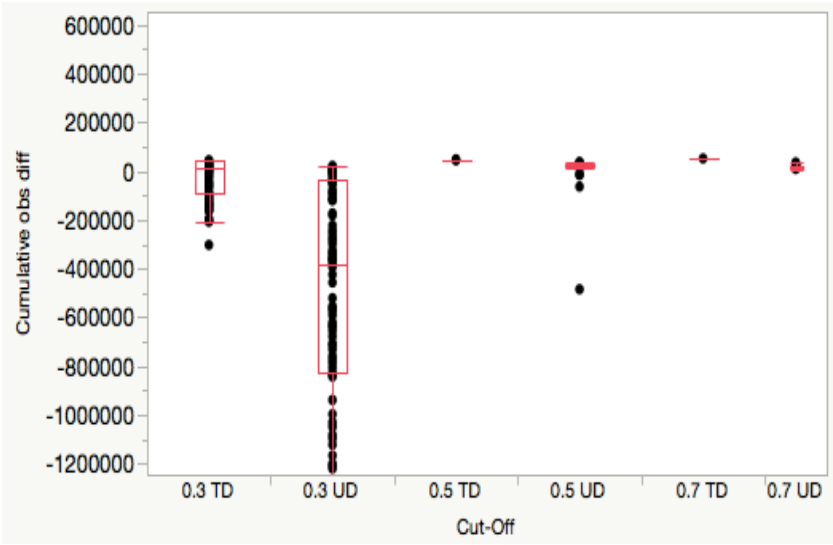
Sensitivity Analysis

Varying Cluster Cut-offs

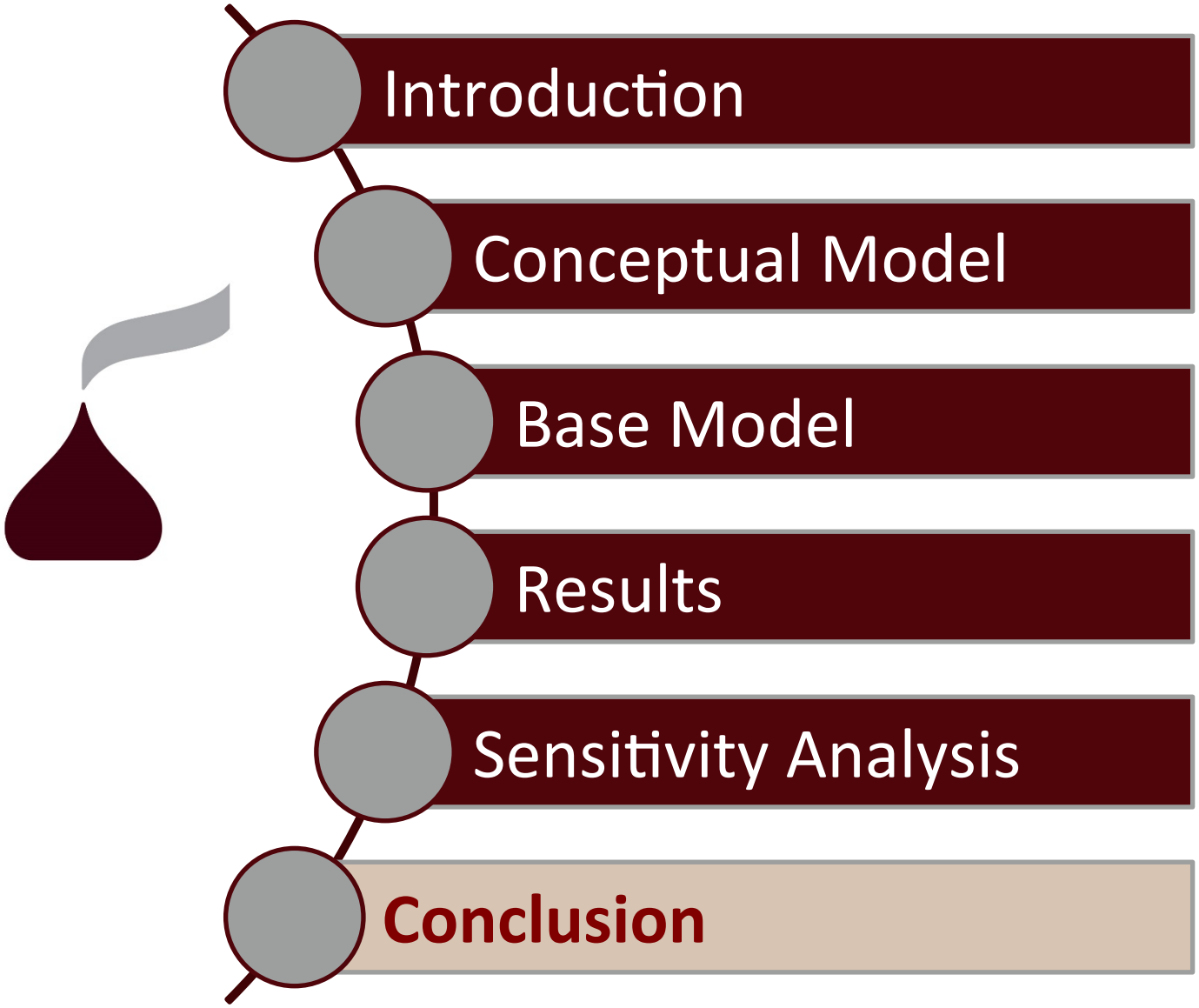


- Cluster cut at 0: Fully LIFO
- Lower the volume of fast moving DCs, Lower the cumulative obsolescence
- Cluster cut < 0.5, 2 cluster model: not beneficial

Triangular Dist of Orders



- Mode = Production Capacity
- Scatter is more in base model in all cluster cut combinations
- Lesser variability in orders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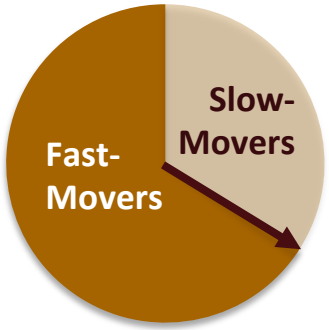
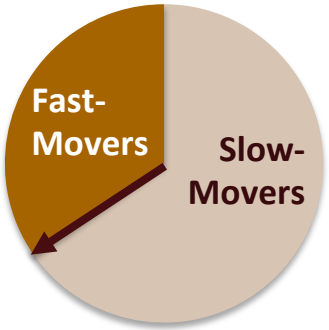
Conclusion

- Recommendation

2 Clusters



FIFO Only



- Production rate
- Demand pattern
- Lead time in supply chain
- Retailer's risk of obsolescence
- ……

- Future Scope
  - ➢ Promotion / Markdown
  - ➢ Cost reduction / Profit optimization

Questions?