

Tackling Volatility and Mitigating Risk in the Polyolefins Value Chain

4th ICIS World Polyolefins Conference, March 2015 Robert Peels



Lots of Volatility in Polyolefins...

- Business Cycles & Oscillations
- Petchem Cycle = Capex wave
- Lehman Wave Active Destocking
- Capacity limitations
- Run-Aways

But today we will focus on..

Seasonality

Speculation

- Cracker mass balance shift / shale gas
- Feedstock price
- Volatile End markets





Understanding THE BULLWHIP





Bullwhip Definition

Demand variation upstream is higher than downstream.







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Inventories : too high, too low, wrong, obsolete. High working capital; stock outs; lost sales; loss of MS, factory stop	Capacity : under-utilization; sold-out; timing of expansions, capex cycle, recruitment
Inefficiency: rush orders,	Prices: cyclicity;
airlifting; firefighting; loss of	purchasing at high prices;
focus	reporting, targets



The Bullwhip cannot be stopped...

But the Bullwhip risks can be mitigated if you can forecast it

- Stocks Lower Safety stocks; lower warehousing cost
- **Sales** No stock-outs & no loss of market share; Fewer rush orders. More satisfied customers. Price increase monitoring
- **Production** Avoid peak production; smoother operation; lower labor cost. Timing of expansions
- **Communication** Easier approval procedures Capex. Comfortable Investor Relations.



You are not alone....

Steel Semiconductors • Oil Automotive • Labor • Housing

Bullwhip is real, but difficult to study for academics because of lack of data. Coordinator Contact: hans.ehm@infineon.com

Horizon 2020 Factory of the Future (FoF) Bullwhip Project Proposal





Infineon	Infineon Technologies AG	DE
Turn Technane Universität Vänchen	TUM	DE
MangoGem	MangoGem SA	BE
() Inchainge	Inchainge BV	NL
flostock	Flostock BV	NL
SUPPLY CHAIN	Integrated Supply Chain	UK



To reduce the Bullwhip in supply chains by innovatively combining technology, processes and people.

Flostock is proud to be part of a European Consortium to fight the Bullwhip in Semiconductors. European funding has been applied.



Literature on bullwhip causes

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- Demand signal processing; forecasting error; policy adaptation
- Rationing and shortage gaming, panic, allocation
- Lead time; high safety stocks
- Order batching
- Price fluctuations; promotions; forward buying



The new cause of the Bullwhip

Reactive Stocking Behavior

+ Stock Depth

© Flostock



These principles will be explained. The words have been coined by Flostock/

You may wonder why Flostock found these principle. It started in 2008. When the water drops, the rocks become visible

Project Royal DSM – Eindhoven University













TUe Technische Universiteit Eindhoven University of Technology

Inventory Dynamics and the Bullwhip Effect

- PhD Maxi Udenio, Eindhoven University of Technology
- First peer-reviewed article published, more coming







Citations



Stock Depth

- Stock Depth:
- Company:
- Supply chain:
- Polyolefins:

Cumulative Sales' Coverage over two months' stock five to seven steps long

over one year (!)

"The time a molecule travels"





Reactive stocking







Reactive Stocking & Stock depth



basic industries have wider cycles



Reactive stocking in Automotive





If the change in EMD = 5% in one year, and SD = 1, upstream change is10%





The Bullwhip due to reactive Stocking can be significant. Certainly if chanegs are sudden.

DIY Forecasting with Reactive Stocking and Stock Depth

Demand = EMD+ d(EMD)/dt * SD

NB: Without Lehman Wave , capacity limitations, speculation & other drivers



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Mail <u>info@flostock.com</u> if you want to receive an Excel file with this calculation.



PE & PP price increases



Some extra slides because of yesterday's presentaion about price increases.

PE and PP prices in Europe

- PE and PP are suddenly going up strongly, against the oil price trend (Linda Naylor of ICIS, yesterday).
- Possible causes:
 - Supply: Several force majeures
 - Demand: <u>Active</u> Stocking for Oil-price driven speculation
 - EMD / Bullwhip is probably NOT causing this.
- Will it be a Run-Away?



A Run-Away starts









A Run-Away only takes place if:

- There is a shortage (or a fear of shortage, which triggers extra orders).
- Stocks at producers are too small for the (extra) orders.
- Panic grows faster than production, otherwise the panic cools down.
- Customer inventory can grow for a while, until a ceiling is reached & growth of orders is stopped; or until full production is resumed;
- NB: One run-away can be followed by a second.





- Volatility in Polyolefins
- End Markets determine your demand
- Reactive Stocking Behavior can be

calculated DIY based on Stock Depth, giving at least10% improvement in forecast accuracy

• Flostock's supply chain models do the DIY calculation, plus the other Volatility drivers, including Run-

Aways.

There is a lot of volatility in Polyolefins and we could not descrbet hem all here to day. Despite that, in the end it is always the end market that determines your demand. You could calculate yourself how said EMD looks like in your business. And if you want to include other sources of volatility, you have to contact Flostock.











flostock stock & flow analyses

The Art of Forecasting

