

How to increase understanding and improve decision making in the rapidly changing Pulp and Paper Industry?

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The international pulp and paper industry has faced more fundamental changes in the past few years than in the previous three decades. The most rapid demand growth has taken place in Asia where also the major part of new paper and board production capacity has been built – driven by good cost-competitiveness. South America has taken the lead as the key pulp producing region to meet increasing global needs – driven by the very same reason, the lowest production costs and, naturally, availability of fibres from plantations.

■ This has led to a fundamental change in the global pulp and paper business: The changed direction of trade flows from East to West and from South to North. The risks of building new capacity in Europe and North America have also increased due to the almost doubled cost of paper machines in ten years – this has coincided with declining trend prices. Competition for resources like fibres from outside the paper industry is intensifying. And the consumer has become king, demanding connectivity and interactivity from the media.

So, the world is not functioning in an ordered, straightforward manner but increasingly in a non-linear way. To excel in this rapidly changing and, apparently in a more complex global business environment, new thinking and new tools are required. The System Dynamic approach can be of help to understand how your business functions and to enable you to make timely decisions.

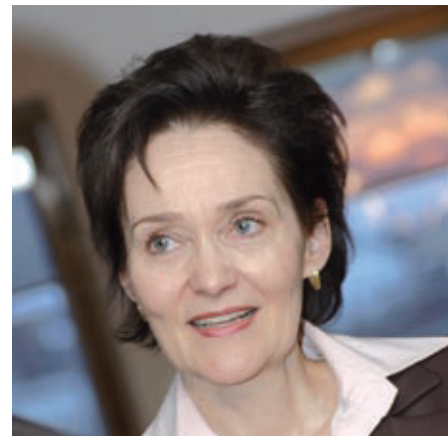
System Dynamics (SD) is a scientific method originally developed by Professor Jay W. Forrester at the MIT Sloan School of Management. In the late 1950's, Prof. Forrester applied the system

theory to explain the dynamics of supply chain management and account for the interactions of human decision-making. Later, Peter Senge, for example, has popularized the approach. SD has become a unique tool in helping to understand how complex systems change over time, at different parts of each business cycle.

What is then the very core of System Dynamic Approach? First, this approach is based on the assumption that markets are never in balance. Closed feedback loops, commonly also referred to as to "vicious cycles" or "virtuous cycles" are in the core. Fig. 1 illustrates the basic mechanism.

In simple terms, a closed feedback loop suggests that most actions and decisions – whether good or bad – come back to haunt or delight us later on. Closed feedback loops are based on cyclical causality as opposed to straightforward cause and effect. Feedback loops are of two different kinds: balancing and reinforcing loops. Systems are controlled by closed feedback loops that are often depicted with causal loop diagrams. Causal loop diagrams are graphs displaying cause-effect relationships between individual market variables.

Actual market rules are determined by interviewing acting business experts and collecting the rules of thumb. These pragmatic decision making guidelines are then verified with historical data to distinguish between facts and beliefs. The following simple example serves to illustrate market rules in the case of speculative purchases: When product prices turn up, paper buyers believe the price trend will continue and raise their stock coverage target from 45 to 55 days. Additional paper orders are placed to producers accordingly, which further reinforces the price trend up. When



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the price turns down, the paper buyers de-stock using similar logic reinforcing the price decline. This rule alone can cause 3 to 5 % per year differences between the end consumption and apparent demand.

By having the rules integrated in the market model it is relatively easy to see when the rules change and what the resulting market dynamics and business environment are. It also allows comparison between an existing decision making policy and potential new policies by demonstrating the consequences of an incorrect policy.

Let's take an example of adding understanding through closed feedback loops. When interviewing fine paper experts to

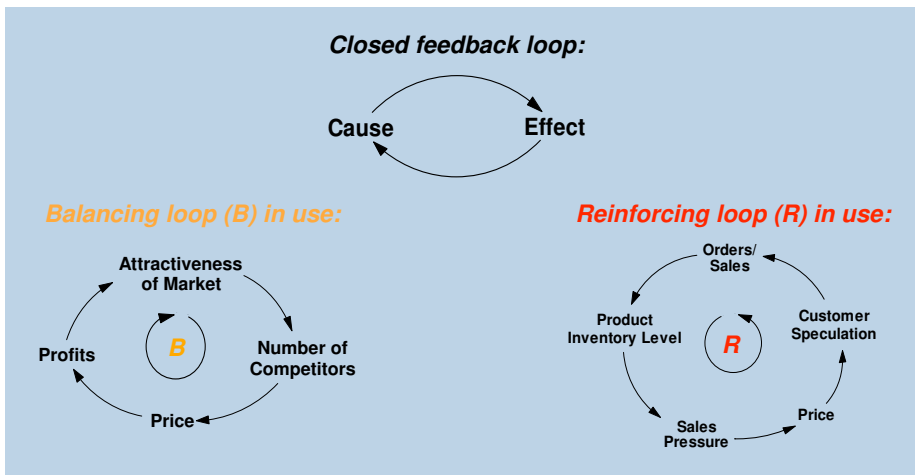


Figure 1: Closed feedback loops are in the core of System Dynamics Approach.

establish market rules for this business we entered into a debate between experts on whether it is the fine paper price that drives the pulp price or the pulp price that drives the fine paper price. Preliminary market rules were established and then verified against historical data. The answer was simple: it is both.

When fine paper prices are raised, buyers increase their paper orders causing the paper mills to order more pulp. This drives the pulp inventory down which then drives pulp prices up. On the other hand the pulp price forms a floor price constrain for the fine paper price. If the fine paper market is very soft the price is on the pulp floor and any changes in pulp price raises or lowers the floor causing similar dynamics in the paper price.

The SD approach aims at better understanding of businesses and markets. In Table 1 some false beliefs are presented which have been corrected through this method.

Better understanding provides answers to notorious but important questions such as “Everybody complaints about the cycles but are those cycles good or bad for paper and pulp producers?” or “Is it beneficial to raise prices only slightly in a tight market or should the prices be raised aggressively as was done for pulp price in 1995?”

What are the concrete benefits of the SD Approach? From experience, I can say that it is simply the increased fact-based understanding of how a business system functions and consequently, improved

readiness to make valid, timely decisions. There are still several deep-rooted beliefs in the Pulp and Paper industry which are unsupported by any fact-based evidence. In the present era of information overflow and rapid change the system dynamic approach also helps to focus when monitoring the business environment. During the process, the key indicators are identified. In addition, traditional and frequently-used econometric models have failed to explain and forecast changes reliably.

What will it take from the company? It all starts from the need. Below are listed some examples of end-use applications where the SD approach has been used: to set sales, production and profitability targets for the next year, to support the change in terms of sales contracts, to support the change of a pricing policy, to identify the business dynamics of a global raw material, to invest in additional capacity; where, when and how much, to close/shut-down capacity; where, when and how much, to evaluate government policy as regards the needs of high level education (medical doctors), to discover the main drivers for agricultural subsidies in EU, to build what-if scenarios, as well as to convince competition authorities for approval in a merger. It is also a good tool for determining the value of a corporation in the case of a merger or acquisition.

The SD approach needs reliable historical data, time from the business leaders for interviews and discussion of the findings in a few meetings as well as a committed contact person from within the company. It will be a learning experience beyond compare for the participating individuals!

Typically one project lasts from two to three months to half a year fully depending on the broadness of a chosen scope. Costs typically vary from EUR 60,000 to 300,000 per project. The updating of a model can be done by a trained person in the company or by external experts. It has proved to be beneficial to review the results at least twice, rather than once per year: once in fall before the business plans are done for the next year and once in spring to follow up how well the business plans have been imple-

Issue	Traditional view	New view
Market price	"A correct price level" does exist	There is no "correct" price level. Today's price could be 35 euros/ton higher or lower and still correct
Key price drivers	Supply/Demand balance (OR, SR)	Order backlog, pipeline and producers' inventories
Budgeting policy in existing markets	Previous year's actuals + co's sales stretch	Consistent with end consumption
Drivers in investment policy	Growth in apparent consumption and cash flow	Different for Market Leader and others
Role of slack capacity	Source of problems	Market Leader must have
Drivers for capacity closures	5 to 10 years of negative cash flow	< 1 to 2 years of low cash flow

Table 1: The corrected market view has for example helped to focus market follow-up on the right indicators

mented. The SD Approach also challenges the leaders as it defines simplicity in a new manner:

Businesses and industries are simple on a structural level even though they produce apparently complex behaviour. So the real measure of an effective leader is not how well (s)he can simplify reality but rather how well (s)he can “see” the

simple fundamental structure through the “haze” of apparent complexity to make correct conclusions and valid, timely decisions.

The Finnish company Systems Thinking Europe (STE) Oy has developed the System Dynamic Approach described through examples in this article during the past ten years. In addition, STE

Oy has served to international Pulp and Paper Industry in Europe, North and South America and Australia and also the energy and health care sector. The writer of this article has operated as a co-developer and user of market models for NBSK and BHKP pulp globally, newsprint in the U.S., LWC in Europe and for the RCF business globally. ■)

This article has been published in IPW Vol. 11(2007), pp. 62-65.



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STE's clients are large, leading global companies with annual sales from \$2 to \$45 Billion USD in Pulp and Paper, Chemical, P&P Machinery industries, Energy and Health Care organizations.

Our ethics are based on the following company values:

We:

- Are Honest
- Produce High Quality
- Rely on facts and facts only
- Believe in structural simplicity

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