Supply Chain Management for a National Timber Manufacturing, Distributions and Sales Company.

1. Introduction

Our case study for this session is drawn from some work we had undertaken in Weyerhaeuser Australia over the last few years.

I would like to primarily focus on some of our experiences and learning’s associated with a project that aimed to implement a suite of supply chain planning and optimisation systems as part of a new Enterprise Resource Planning (ERP) project.

Before looking at the ERP project it is worth briefly describing the business supply chain we were dealing with.
- We have 4 sawmills 1 in each of Victoria, NSW, SA and Qld
- PMO in Mt Gambier and a network of contract manufacturers that do a significant amount of work for our business
- A strong base of suppliers both in Australia and overseas
- Distribution centres in each of the eastern state capitals
- A sales team looking after a customer base in all the mainland states and internationally

The planning systems project did not specifically try to address any of the opportunities in our resources, or residual sales and distribution businesses.

2. The Problem

About 5 years ago the business started evaluating new ERP systems to replace the computer systems we had inherited from our former owners. One of the key aims of the project was to provide the business with a suite of planning systems as well as the core backbone data that we now take for granted. All my comments are focused on the work undertaken around the implementation of the planning systems.

Those of you familiar with MRP systems will be aware they operate with a basic premise that products are put together using a standard recipe. For us as well as many others in our industry this has for the last 10-15 years presented a barrier to the full implementation of ERP systems.

At the time of our initial software evaluation we were aware of work in NZ by CHH and Fletchers, utilising advanced planning systems to integrate their supply chain planning into their ERP’s. The service and profit potential of these developments were potentially exciting.

Given this background the key requirement for the new system to provide a common platform for all our production planning and scheduling needs seemed to be a very reasonable proposition. During the evaluation we were offered a number of potential solutions. Our budget did not extend to using the best of class systems that were being
used by our competitors across the Tasman. We ended up selecting a midrange (in terms of price) ERP system that appeared to have the elements we were looking for.

3. **The Potential Solution**

The proposed solution aimed to provide an integrated planning system for the whole businesses but with a supply chain focus. We were aiming to address the strategic, tactical, operational, and day to day execution needs required in the businesses supply chain.

As illustrated below the system had the following elements:
- A sales forecasting package
- A module to allocate and optimise product distribution within the supply chain (Distribution Planner).
- A module to match sawmill production with the demand derived from the Distribution Planner (Sawmill Planner).
- A scheduling package to provide tools for detailed site scheduling and putting product delivery information in front of our customer service staff.

Each of these was to provide key data outputs back into the ERP, and draw all the base assumptions they needed to operate from the one common data set in the ERP.

**System Overview**

The sales forecasting package was of the standard type that used a range of formula to project sales based on history. The implementation concerns for these types of systems usually relate to cultural fit and data accuracy. Our business has a fairly long history with forecasting 10years+, data accuracy is always something users of systems know they have to work on. As anticipate we had no significant issue with this component of the system, and I don’t propose to discuss it any further.
The Distribution Planner conceptually provided additional capability and functionality to support the Sales and Operations Planning (S&OP) process we had had in place for a number of years. The proposed solution added a number of elements to our current system including the provision of an optimised distribution solution for the business.

The Sawmill Planner aimed to model the sawmilling operating on the premise that using a series of linear programming based models we would be able to simulate the multi stage disaggregation process with a range of possible outcomes that characterise our industry. The optimisation capability was seen as providing a significant benefit in helping match the range of demands with the large range of possible outcomes. We believed this was in many ways an extension of the modelling we had been undertaking for some time to predict both sawmill and planner mill outputs.

During the selection process each of the potential vendors was required to provide a working demonstration of their disaggregation capability. The selected vendor successfully demonstrated their systems capability in this area.

The Detailed Scheduler was a standard sequencing program that allowed you to put dates against planned production that fell out of Sawmill Planner.

4. **Model Requirements**

i) **Distribution Planner**

The model diagram below illustrates the typical sort of product flow we have in our business, multiple suppliers to distribution centres, and multiple suppliers and distribution centres to customers.

![Value Chain Optimisation 2007](Value Chain Optimisation 2007)

The flow above shows the movement for one product. We operate a sales business with 4,000 active products and close to 2,000 customers. In round terms that is 8 million possible product customer combinations for the model to work at an item level. Each of these possible combinations required a separate route definition. Given that we have on balance 8 key supply points in our business there was then a possible 64 million pathways for a customer to get product.

A model this complex would have been totally unmanageable. In the design stage we gave serious though to how we might define these relationships. Rather than using
individual customers we compromised the level of customer data to set up broader customer classifications that were a combination of customer/customer class, the customers segment and the geographical area. The AS&P above are representative of these combinations or sales nodes. From a sales strategy point of view this compromise on level of detail meant the model lost a degree of its value as we not able to identify specific customers especially in the middle range of size and importance, but that had some critical value to business.

The next large data input requirement was to establish all the “node relationships” between the sales nodes and the 8 supply nodes. The key data requirements for these node relationships were; route capacity, transport costs, included (or excluded) product items. In this process we lifted the level of optimisation from item to a level that we called planning item. These were defined as a combination of items that where from a planning point of view essentially no difference in product. For example all 2.4 m and 2.4 m docked to length studs of endsection and grade were combined into one planning item. Despite this process because of the depth of the product range we still ended up close to 500,000 possible node relationships.

Each of the Supply Nodes required definition and a valid set of planning items needed to be attached to each. The planning item set up at this level proved to be another source of additional set-up. Unfortunately this proved to be outside the base ERP as although there were valid Supply Node-item relationships in the ERP there was no room in the product master file for this level of classification.

ii) Sawmill Planner

The aim of the Sawmill Planner was to model the flow illustrated below. The 2 stages in the green mill and planer mill are both disaggregation processes. The other stages kilns, treatment and holtec are processes known certain outcomes.

The key data requirements for greenmill and plannermill components of the model were the process items. The process items describe the possible outcomes for each possible input. The greenmill for example has up to 33 log sorts, for each of these log sorts we have up to 5 log lengths, and several patterns, that generate the 128 greenmill output items. There are a possible 500,000 possible pathways through the greenmill process to obtain the outcomes.
For one log sort the data set up is illustrated below.

As we developed the model the data intensive nature of the task became obvious.

5. Conclusions

We spent several months trying to develop the model structures required for the Planners. At the end of this period following an evaluation of the data outputs, we decided not to proceed with the project.

The key reasons for this were:

- The system would have been extremely complex
- We would have taken on massive additional data collection and maintenance requirements
- The cost of this data collection and maintenance proved to be significant once we were in a position to quantify it
- It was not clear after incurring this cost whether we would have been able to provide better information to our customer service staff and therefore our customers
- Most importantly it was not clear from the results of the trial optimisations if there were going to be any clear significant profitability gains for the business.

From my point of view I would urge extreme caution for businesses in our industry attempting to set up and run such advanced planning tools. The resource intensive nature of such an undertaking was a surprise to our business despite the fact that we already had in place a comprehensive set of systems with similar data requirements.