

Product Mix Planning at Fonterra using JDE/Peoplesoft

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Introduction

The impacts of getting a production plan wrong while processing up to 70 million litres of milk a day can cause an organization enormous amount of logistical and financial problems. Product Mix Planning at Fonterra, New Zealand's largest dairy co-operative plays a vital role in determining what product to make where and when. This critical role ensures that the return to the shareholders is maximized given the number of variables that are possible within a short frame of time.

This paper outlines the approach that has been taken in order to provide a solution to such an organization and the JDE/Peoplesoft and Oracle tools that form part of the solution.

Organisational Background

Fonterra is New Zealand's largest dairy co-operative and producer of dairy products. Fonterra was rated as one the 5th largest Dairy Company in the world¹. It had revenues of over 10 billion NZ dollars in the 2003-2004 year worldwide. It has over 11, 000 employees nationally and close to 20,000 employees worldwide. It owns production facilities in New Zealand and Australia in over 30 sites, which produce over 200 planning level products².

In a typical year production is expected to exceed over 1.8 million tonnes of finished goods resulting in the consumption of over 14 billion litres of Milk. These goods could be packed into various package sizes and under different brands depending on the markets they are destined for.

As a cooperative, the performance of Fonterra is always under scrutiny by its 12,000 plus shareholders. The returns on investments along with the prices paid for milk supply are key factors. The focus shifts on ensuring that that the best product mix is planned. The indirect key performance coming out of this is ensuring that Fonterra continues to maintain or improve its low cost of production.³

Problem Description

The following factors were considered as part of the problem definition. These formed the basic criteria for any possible solution.

- There is a single raw material input into the planning process that can be made into more than 1000 final products. This raises the question of how much and which products to make?
- The product demand is for multiple products and varies between the export and local markets
- The price obtained for the products vary between local and export markets hence the need to ensure that the best revenue is obtained for the products manufactured.
- The milk supply curve has a bell-shape implying a build up, peak and slow down within a year. This means that production cannot remain static throughout the year and some production will have to be made earlier and stored before the demand actually occurs. Some products have a limited shelf life, which means that they have to be manufactured

¹ In terms of Revenues based in USD dollars

² These planning products could end up as over 1000 final product specifications. This paper covers production facilities in NZ & Australia.

³ New Zealand has the third lowest average cost of production amongst the worlds leading dairy producing nations

in the period in which the demand falls. This also challenges the theory of Just-In-Time (JIT) manufacturing versus make-to-order.

- The geography of the sites and the fact that each site may have multiple factories which specialize in different products
- Product diversions also feature prominently in the scenario as some factories specialize in the products they manufacture. This gives rise to the need to divert some of the co-product and by-products from one site to another. Cream is extracted at one site and may be diverted to another site for further production.
- Milk fat & protein composition varies by site, locality and date. This meant that the
- Storage, production capacities and costs vary from one site to another. This requires that the production is manufactured and stored at the best sites.

Solution

The solution implemented comprises of the JDE/Peoplesoft Supply Chain Planning Solution application named Strategic Network Optimization (SNO). This is a product that is mature and has been running at Fonterra (and previously New Zealand Dairy Group) since the mid 1990s.

This solution covers the Milk supply to Production aspect of the Supply Chain. It addresses the problems listed above by modeling around 30 Sites and more than 110 Final planning products across 2 markets (Import & Export).

The application allows multiple scenarios to be modeled. Fonterra uses various types⁴ of models to assist in the planning process relating to the Product Mix that is best suitable for its operation given the changing nature of the business. Each of these models span a different number of periods and have different objectives that need to be optimized given the constraints.

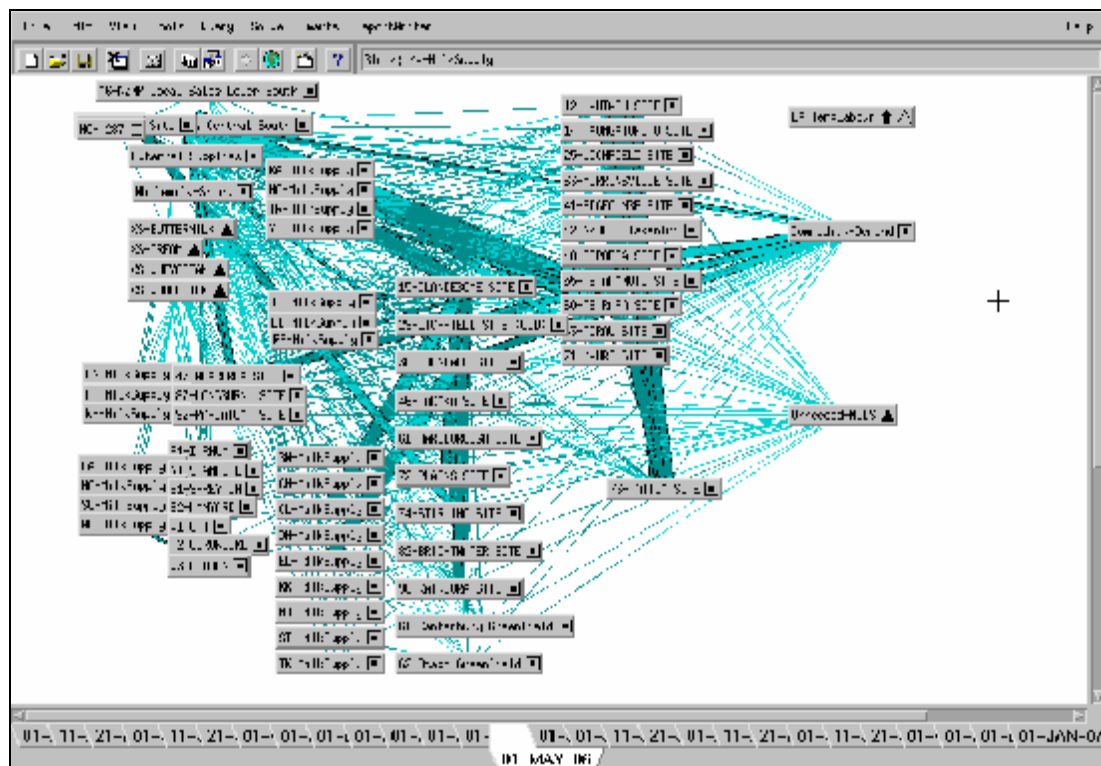


Figure 1 Shows a Product Mix Model with blocked nodes.

⁴ Models vary in period sizes as well as separate model exist for the New Zealand & Australian Businesses

SNO allows Fonterra to optimize the farm to Factory aspect of the supply chain network and provides the following business benefits:

- The Optimized way to meet the different market demands both in terms of satisfying the demand as well as in obtaining the maximum profit.
- Obtaining the best production plan mix at a product group level given that there is one single raw material with varying compositions thus affecting the recipes. The 200 or so product groups can be made into more than 1000 final products. The most ideal manufacturing location is identified as part of this while again maximizing the profits.
- Indication of inventory levels to retain for each planning product in order meet demand of products when raw material supply is limited during certain parts of the season. This helps decide which materials can be make to stock vs. those that can be JIT.
- Determining the optimal flow of materials through various sites and plants in order to best meet the upstream and down stream requirements especially with by products & co-products
- Ability to come up with alternate optimized plans in cases of unexpected natural events impacting on previous production plans.

PL/SQL scripts are used to format the data that is used to build the import file for the application. The application data is resident in an Oracle8i database. Oracle forms are used to maintain the data with reporting done via a combination of SNO smart-graphs, PL/SQL and Oracle Discoverer.

The SNO application uses the CPLEX solver from ilog as part of its optimization engine and runs on a HP-UX model 9000/800. Unix scripts are used to control operational level tasks for this application along with Oracle workflow to control the job queuing and processing of multiple models.

Conclusion

There are significant benefits that can be obtained for a business like Fonterra by using a tool like SNO. The resulting solution provides an optimized allocation of milk components and supply. The Planning cycle is reduced from days to hours and optimized Farms to Factory supply chain information is available for the next 18 months. The tool provides the ability to better respond to changes in supply & demand. An optimized transportation cost is utilised given the other constraints. The above provides an ability to have a competitive advantage over similar industries throughout the world.

References

Fonterra -Facts & Figures from www.fonterra.com

About the Author

Jayendra spent 15 years of his career in consulting, development, and technical roles. He is currently a Senior Consultant at Xelocity who specializes in Business Consulting and Optimization roles.

Jay has been involved with SNO & the other JDE/Peoplesoft Supply Chain Planning applications in various industries such as Aluminum extrusion, Wood Products, Beverages & Dairy in New Zealand, Australia and the Pacific since early 1990s.
