i-Flow

An Interactive modelling and analysis tool for distribution centre design

The problem

An essential stage in warehouse and distribution centre design and development is the creation of a material flow diagram that predicts what the material flow requirements will be at some point in the future. Whilst it is relatively straight forward to produce a diagram for today's volume and usually possible (although difficult) to predict at least some of the ways in which the business might change in the future, putting the two together can be surprisingly difficult. If sensitivity and what-if analysis is also required (and it usually is) then the problem is much greater.

Why is this a problem?

The problem lies in the fact that good material flow analysis relies on the use of discrete order level data so that various Pareto effects can be fully exploited. This usually involves processing large volumes of data and applying business projections. For example, you may be expecting 30% growth in sales with 10% increase in range and 5% deflation. In addition, you are expecting numbers of orders to increase by 40% but order sizes to reduce. All of these will have different effects on the business and pattern of orders and must be reflected in the analysis. In order that the correct shape of Pareto curve can be produced conventional analytical techniques require that new orderlines be synthesized to represent the grown business and existing ones modified. This can take days and in some cases weeks. Repeating the task for sensitivity analysis is even more time consuming, and in many cases it is just impractical.

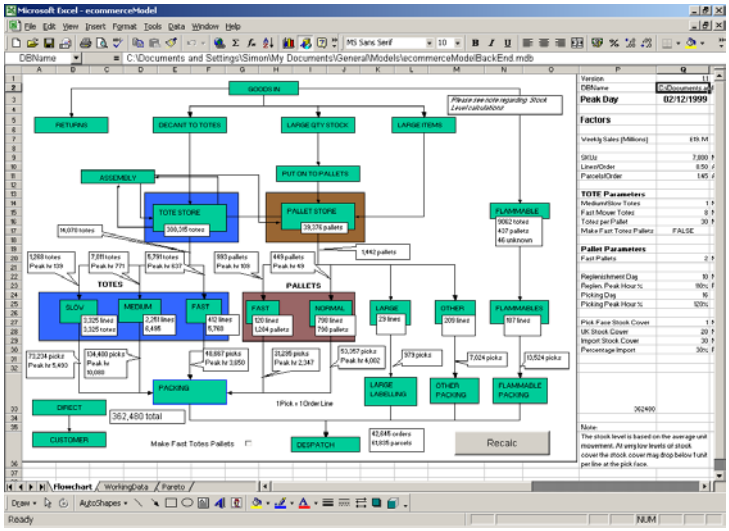
Origins of the Pareto analysis

The Pareto principle, sometimes called the 80/20 rule was named, by Dr. Juran, after the Italian economist Vilfredo Pareto, who noted that 80% of the country's wealth was owned by 20% of the population.

The relevance of the Pareto principle to warehouse design lies in the fact that a small number of products usually account for the majority of movements and the remaining products for a minority of movements. By splitting products into groups (e.g. fast, medium and slow movers) and treating each group differently we can achieve major improvements in operating efficiency and effectiveness.

Our approach

Over the course of many projects we realised that we had to find a way to automate this process, to find a technique that would be quick, repeatable and customisable. We therefore set out to develop a model (the ***i-Flow*** model) to do in one step what would normally require days and weeks of work with spreadsheets and database queries.



At the heart of ***i-Flow*** is a technique for manipulating paretos. This allows the transition to be made from order level data via a series of business projections direct to a material flow model in one step.

In addition we use the pareto analysis to show how a material flow might change over time. For example, as a business grows, what was a slow moving line may become a fast mover and hence it may need to be stored and picked in a different way.

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How it works

The starting point for building a model is to decide what variables you want to model. This varies from business to business. The more common variables such as sales growth, range development, etc. are standard but other much more specific variables can be added. For example, you may want to apply different growth rates to different types of product. Variables are also included that will define how the Pareto's are segmented. For example, we may want to handle fast moving toted product differently to medium moving and variables can be provided to define what we mean by fast and medium.

The other main task in building a model is drawing the material flow diagram. We try to make this as representative of the Client's business as possible using the Client's terminology. This makes interpretation of the output more relevant.

Minimum Data Requirements

Item Master Data

- SKU Number
- Range Code (to be used in conjunction with sales forecasts for the Range).
- Transport unit, e.g. Tote or Pallet.
- Quantity per transport unit
- Warehouse Code if SKUs may be only stored in specific warehouses.

Order line movement Data

- Date order picked
- Warehouse code
- Order number or PO number etc.
- Line number
- SKU number
- Quantity picked

What Next?

In order to build a model we need to know a number of things :-

- The model objectives;
- The key elements of the material flow;
- A data set (see opposite);
- Forecast changes in the business.

We will also need to understand your terminology so that we can tailor the model to your business.

Based on this a model can be built and modelling of your material flow to commence.

We have a number of sample models available to show just some of the capabilities of ***i-Flow***. Every project we work on adds new functionality. We would be happy to discuss with you how ***i-Flow*** could be applied to meet your material flow modelling requirements.

The benefits

- i-Flow allows large amounts of order level data to be analysed easily and quickly.
- i-Flow removes the need to synthesize data to represent growth - saving time.
- i-Flow encourages 'what-if' analysis; impractical with traditional analysis techniques, but vital if the sensitivity of the solution to change is to be fully tested.
- i-Flow presents its output in the form of an easy to read and interpret material flow diagram.
- i-Flow helps to ensure that the distribution centre design is perfectly matched to the forecast demands of the business.

THE LOGISTICS BUSINESS is a management consultancy specialising in the supply chain. As a part of our range of services we develop software applications to help understand and solve Clients' supply chain problems.

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