Models and Modelling: A Case Study



asd

# Dell’s Channel Transformation: Leveraging Operations Research to Unleash Potential Across the Value Chain

## Introduction

The purpose of this essay is to reflect on aspects of models, as used in the field of Management Science, and on the modelling process itself, with particular reference to the industrial case study (Martin et al., 2014) that appears in the title above. The article chosen was published in the Operations Research journal *Interfaces* in January 2014 and was a finalist in the 2103 Franz Edelman Awards competition, an annual contest designed to highlight exceptional examples of OR/MS practice.

At the time of publication, Dell Inc. was the world’s third largest personal computer vendor in terms of market share (iCharts, 2014). In their paper, the authors describe three main “solutions” that were developed in response to Dell’s transition from a predominantly configure-to-order (CTO) provision model to a supply model that emphasised delivering fixed hardware configurations (FHCs), as part of a response to evolving customer attitudes to purchasing technology, including personal computers. For the purpose of this essay, the focus will be on just one of these three solutions, namely that which the authors referred to as the “Online Conversion Rate Accelerator” (“OCRA”).

## Online Conversion Rate Accelerator

The Online Conversion Accelerator is, in essence, a model of the various components that appear on a sales web page on Dell’s website, along with certain technical and business constraints, formulated as a non-linear, mixed-integer program. More specifically, the objective function is to maximise the “conversion rate” (that is, the proportion of customers browsing the web page who then progress to placing an order) which is modelled as the sum of the “main effects” and “interaction effects” relating to a specified set of permissible webpage components, such as “buttons” and “deal banners”, with each component represented by a binary variable and an associated coefficient. The model constraints include a specified minimum and maximum number of page components; merchandising restrictions on certain combinations of FHCs being displayed on the same web page; a restricted permissible set of combinations of page components (based on a sub-model, to be discussed later in this essay); upper and lower bounds for product prices; limitations on permutations of website navigation elements; and an upper limit on the time taken for a web page to load, given its constituent parts.

The model described above in fact represents the final link in a chain of three models, with the inputs to the above model being derived from another model that utilises multivariate testing and A/B testing to generate a set of distinctive permutations of web page components. The authors refer to each of these permutations as a “recipe”. Extending the authors’ analogy, the ingredients for these recipes stem, in turn, from the initial model in the sequence, that was designed to generate a complete inventory of the individual elements of web page design that have a bearing on the conversion rate. The reported methods used to isolate these components include some that are widely used and recognised, such as key driver analysis and text mining, as well as borrowing from more specialised techniques from the literature, including behavioural analysis (Padmanabhan and Tuzhilin, 2003), website-specific usability testing (Hinchliffe and Mummery, 2008) and pathing analysis, an approach that analyses user/website interaction based on website metrics data (Weischedel and Huizingh, 2006).