

## Ministry of Education (MoE)



### The situation and context

This case study describes the new Equivalent Full Time Students (EFTS) forecasting process that Knoware established for the Ministry of Education. The forecast takes into account a number of variables that influence the numbers of students that take up tertiary study.

The EFTS forecast is used to allocate funding across the tertiary education sector, and for this reason attracts a lot of scrutiny in the industry. The Ministry of Education particularly wanted improvements to their current forecasting processes that achieved the following:

- A simpler and more robust forecasting process to ensure the Ministry can reliably repeat the forecast and easily explain the forecast's inputs, process and outputs
- A faster forecasting process than the existing model (which took up to 6 weeks to set up and run through to completion)
- The ability to conduct sensitivity and scenario analysis to enable the Ministry to test the robustness of the forecast
- The ability to easily test whether specific factors are statistically significant when assessed quantitatively
- Improved and detailed documentation of the forecasting process for training purposes, auditability, and to facilitate maintenance of the forecast model over time
- Eliminating the single point of failure around the existing forecast, currently one person only had a detailed understanding of the model.

Upskill and train the Ministry staff, in order that the forecasting knowledge is embedded and retained within the Ministry. Also to enable the Ministry to readily train and upskill staff members new to the forecasting process.



## **The nature of the service and how it was implemented to a high standard and against set timeframes**

The Ministry of Education had a firm (non-moveable) required A completion deadline of October 2014 to complete the Level 3 forecast (the project work commenced in earnest in August 2014)

Internal resource constraints due to the demands of “Business As Usual” work, plus the complex nature of the existing forecast model, had prevented Ministry staff from improving the current forecasting models to achieve the above objectives. The Ministry therefore requisitioned external support from Knoware’s analytics team to assist its own staff to re-develop the forecasting process and produce the Level 3 forecast by the end of September 2014.

## **Issues encountered and how these were resolved**

A number of initial challenges were encountered:

- Understanding the Ministry’s original forecasting procedure was difficult at first due to:
- The original forecast model consisting of approximately twenty Excel spreadsheets in a single Excel workbook
- There were many manual adjustments and complexities
- Documentation on the adjustments and complexities was lacking.
- The Ministry project team member assigned initially had limited forecasting/statistical knowledge.

All of the above challenges were resolved relatively quickly.

Knoware’s consultants effectively reverse engineered the existing forecast model so that the positives were well understood and able to be reused, and then developed an optimum new approach.



### **Any innovations used including, but not be limited to, such aspects as research design, research tools and techniques**

Knoware documented a suitable best practice methodology for forecasting to be used and retained by the Ministry for future forecasting requirements. Knoware also worked to achieve a high quality, robust modelling process that can be both used and stoutly defended by the Ministry's staff, who typically have not specialised in statistics at advanced university level. An important innovation was ensuring that the new forecasting methodology is "software independent". This challenge arises because what is easily accomplished in one software package can be hard or impossible using another tool. This challenge was resolved by ensuring that the methodology successively used a limited number of statistical methods selected from the myriad of methods available. The selection criteria included being satisfied that a high quality statistical process was able to be used and that the analyst can easily accomplish the elements of the forecast process regardless of the software tool used.

For example, obtaining Durbin-Watson statistic for autocorrelation is easy in SAS, but requires significant Excel knowledge to obtain in Excel. Therefore, a simpler way of assessing autocorrelations was found by using the Breusch-Godfrey Lagrange Multiplier test.

### **How the service assisted the customer and the benefits gained**

The project has been a resounding success with all the top priorities deliverables achieved:

#### On Time and on Target

The Ministry of Education forecast analysts completed was able to do the EFTS forecast before the target date of October 2014.

#### Faster Run time

The forecasting model can now be run in just 4 hours, compared with the 6 weeks duration previously.

#### Flexibility

Additional modelling variables can be easily added into the model and the significance/validity of each new variable assessed in a robust statistical manner using regression analysis. In addition, the forecast model can now be adapted and used for other forecasting applications in addition to EFTS.

#### Knowledge Transfer

Full knowledge transfer to Ministry staff was achieved, evidenced by the staff taking ownership of the operation of the forecasting model.

#### Documentation

The new forecast methodology document was created to document how the forecast model works. Later a detailed procedures manual for Excel was produced by the joint team.