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Empirical Forecasting Practices of a British University

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Abstract

This article is based on a single case study aimed at examining behavioral issues of forecasting, in particular the role and practice of forecasting in a British university settings. Key variables were identified in establishing associations between the variables that provide suitable criteria for the purpose of this study. Data collection was based on questionnaires distributed to people involved and interviews which were held with prominent staff of the University. Fisher-exact tests were performed to identify significant associations between variables. Results indicated the various levels of perceptions and practices of forecasting produced by the people involved at the University. The study implies that useful insights can be gathered through forecasting from a different perspective of the non-profit making service industry.

Keywords: Empirical, British university, Forecasting, Questionnaire survey, Interviews

1. Introduction

Forecasting relates to estimating the future in an unknown situation and a *forecast* is the estimate of an unknown value (Armstrong, 2001). Our context relates to predicting actual values of quantitative results in the future to meet organization's objectives. The forecasting archive tends to concentrate on presenting forecasting methods and on strengthening those methods. Indeed, the literature relating to forecasting procedures hardly covers any studies of universities. Jones *et al* (1997) suggested that it is now more imperative to turn towards examining other issues of forecasting besides the forecasting methods.

Diamantopoulos (2001) commented that since few studies have actually looked at the role of forecasting (Hughes, 2001), more emphasis should be placed on linkages with organizational characteristics, which supports this study. Gardner (1991) encouraged studies into how forecasting is accomplished in organizations. Dawes *et al* (1994) pointed out that model implementation to promote better understanding of the practical forecasting process, in a university in

our case, will lead to a 'more careful crafting of the tool'. Though budgets are allocated, it is imperative that the limited budgets are utilized with care. In supporting this, universities via their faculties and schools must forecast their future incomes and expenditures appropriately. Wright and Mechling (2002) indicated in their study that forecasting is important for service organizations. It is a well-known fact that forecasting is a vital element of planning activities for any type of organization (Wheelwright et. al., 1998). Therefore, the purpose of this paper is to highlight the role of forecasting in a British university, especially in the UK which is mainly funded by the Higher Education Funding Council for England (HEFCE).

2. Method and materials

A single case study approach, as recommended by Yin (1994), is employed which offers a rich description of current forecasting practice in developing a greater understanding of the discipline in practice (Moon and Fitzgerald, 1996). The techniques of an exploratory case study (Winklhofer & Diamantopoulos, 1996; Winklhofer et al., 1996; Miles & Huberman, 1994) are adopted owing to the fact that studies relating to forecasting in a university setting are under-explored. Whilst the university plans for its future activities, one of the key tasks involved is forecasting. It is necessary for all faculties, schools, departments and other units to prepare forecasts to allocate budgets to ensure smooth running of the activities concerned. The role of forecasting at the university can be viewed in many different ways depending on the purpose of forecasting. This paper demonstrates the formulation of models to support such combinations and results.

Respondents were interviewed at the University of Salford and they vary in terms of designation and size of the units which they are attached to, with employees ranging between under 50 to more than 200 and with annual income from under £5 million to about £10 million. In general, the university makes forecasts just like any other established firms in industry, and this is as a vital exercise in the organization. Formal methods that are suitable for the university environment are adopted but tend to be less sophisticated than those which other business firms use. The law of parsimony or Occam's Razor was applied in that the model includes only required and important variables and does not include all reasonable predictor variables automatically. Differential equations were introduced to render a complete modeling aspect.

3. Results and discussion

3.1 The forecasting parameters and process

At the university, one of the main reasons for forecasting is for budget allocation. Another reason is as a guidance of what to expect in carrying out activities in the future. The forecasts are used as a check and guide against the activities that will be carried out. Resources involved are negotiated and discussed at various levels to achieve the units' objectives. One more reason for preparing forecasts is for users who are the senior management, heads of school, faculty accountants and administrative officers.

The main forecasts are student numbers, human resources, income and expenditure and budget balancing forecasts. Forecasts are prepared on time before implementation with various levels of frequency, depending on the importance of forecasts to be prepared, the urgency of preparing and reviewing based on a time schedule for meetings and feedback between various levels within the units and the University as a whole. Formal methods are used but only to suit the units' needs in line with fulfilling the University's overall objectives. Discussions and meetings are held to impart feedback in the course of reviewing and revising the forecasts throughout a given period before finalizing them. A simple presentation of the unit's plans for its activities and resource requirements is given in statements and reports such as receipts and payments accounts, and income and expenditure accounts. These statements are brought together into one main plan for the university.

There are two main distinctions in the people involved, namely preparers and users. It can be seen that the preparers need input from users in order to produce the forecasts. Looking at the responses from the questionnaires and interviews, respondents are not too sure whether they are either preparers or users or both. In general, there are mixed feelings amongst the forecast preparers and users towards the forecasting function as a whole. However, they try to put their best efforts into forecasting and produce results even though constrained by various resources.

3.2 Modeling the university forecasting scenario

The number of students is large when tuition fees are low since many people can afford low fees. On the other hand, when tuition fees are high student numbers will be compromised. There are many possible functions that might be suitable for modelling the association between tuition fees and numbers of students, two of which are illustrated in Figure 1 subject to arbitrary scaling on both axes. The mechanism of this relationship is explained using a differential equation as developed below.

Let y = 'number of students enrolling'

x= 'tuition fee payable per student'

If x is small, then an increase in x will reduce y substantially, so $\frac{dy}{dx}$ is large (though finite) and negative. Conversely, when x is large, then a change in x will hardly affect y, so $\frac{dy}{dx}$ is small and negative, such that $\frac{dy}{dx} \to 0$ as $x \to \infty$. Moreover, it is reasonable to suppose that $\frac{dy}{dx}$ is a concave function of x for simplicity, which implies that

$$\frac{d^3y}{dx^3} < 0 \tag{1}$$

for all $x > 0$ in this context.

Restricting likely functions to just two parameters for reasons of parsimony, there are two obvious candidates for functional representations of the first derivative (rate of change of enrolment with respect to fee payable):

$$\text{(i)} \quad \frac{dy}{dx} = \frac{-a}{1+bx} \qquad \text{for a, b} > 0 \tag{2}$$

$$\text{(ii)} \quad \frac{dy}{dx} = -ae^{-bx} \qquad \text{for a, b} > 0 \tag{3}$$

(so that $dy/dx = -a$ when $x = 0$ for both (i) and (ii)). The second of these corresponds to f(x) in Figure 1.

4. Conclusions

A clearer perspective of empirical evidence cultured with mathematics and functional relationships was able to be developed where the outcomes of improved teamwork and decision making were established. These differential equations are applicable in many aspects of associating variables and changes in behavior patterns for related variables in forecasting.

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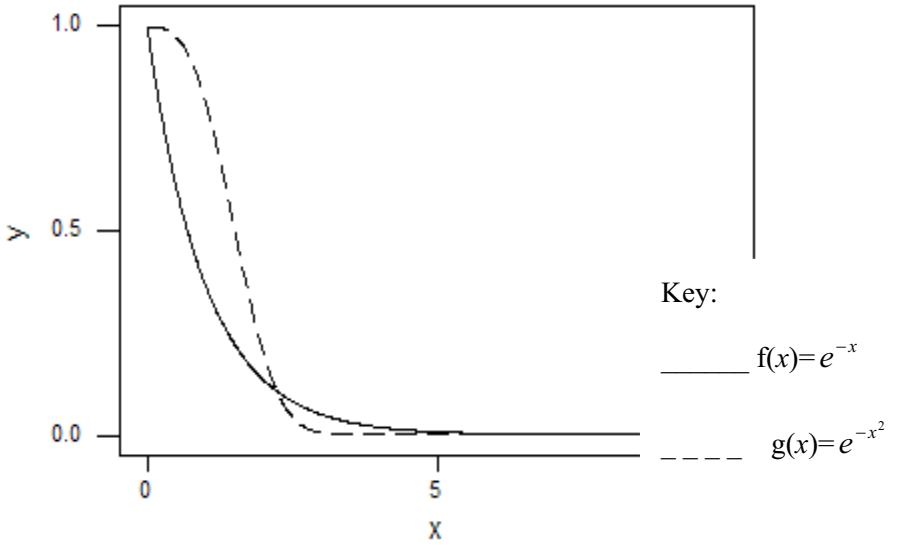

Figure 1. Possible models for dependency of y on x.