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Amplifying the learning effects via a Forecasting and Foresight Support System

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ABSTRACT

Nowadays, informed decision making is conducted through innovative Information and Communication Technology (ICT) support systems. In order to utilize such ICT-based support systems fully, decision makers need suitable training. This paper proposes and evaluates the use of a Forecasting and Foresight Support System in an undergraduate course in business forecasting, so as to amplify the learning effect. The system provides a simple implementation of the forecasting process via realistic business scenarios that utilize both quantitative and qualitative information. Classical operational forecasting related features, as well as elements of a foresight nature, are considered during an exercise, so as to enhance user experience in terms of collaboration and communication. The system's acceptance and perceived educational effects are determined through responses to a purpose-built questionnaire. The results are very encouraging in terms of the final amplification of the learning effect.

1. Introduction

The term Forecasting Support System refers to sets of "procedures that facilitate interactive forecasting of key variables in a given organizational context" (Ord & Fildes, 2013). These include all aspects of operational forecasting, such as data preprocessing, statistical modeling and monitoring processes, while offering the users the ability to perform judgmental interventions with the statistical estimates (Goodwin, Fildes, Lawrence, & Nikolopoulos, 2007). Forecasting Support Systems can be viewed as integral parts of decision support systems (Fildes & Goodwin, 2013).

Foresight extends forecasting in the sense that it incorporates aspects of networking and the preparation of decisions related to the future (Cuhls, 2003). Therefore, Foresight Support Systems may be defined as "collaborative computer-based systems aimed at supporting: communication; decision modeling; rules of order in foresight processes" (Banuls & Salmeron, 2011). Such systems should combine a knowledge base and group models with quantitative data processes (Skulimowski, 2012).

Forecasting Support Systems, as defined above, may be used by more than one user, especially in the case of hierarchical data structures. In this case, it is common for different users (managers) to need to perform forecasting tasks at different levels of the hierarchy (cross-sectional aggregation). This results in several sets of forecasts across the pyramid structure of a company's data, rendering

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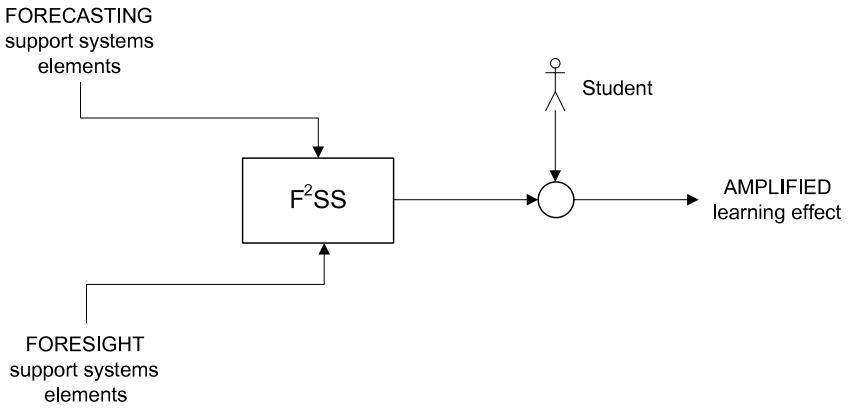

Fig. 1. Forecasting and Foresight Support System for amplifying the learning effect of students.

the reconciliation of such forecasts quite challenging. A natural way of tackling this problem would be to extend an innovative forecasting support system so as to include standard features of foresight support systems. This could be achieved in many ways, but is most commonly done via web-based ready mechanisms that enable the (a)synchronous interaction of users at different managerial levels. Instead of using statistical procedures to deal with the reconciliation of forecasts (Athanasopoulos, Ahmed, & Hyndman, 2009), the users can decide on the reconciliation process themselves and act as necessary. This strategy is expected to result in a consensus among the forecasts derived from different users, causing managers at different levels of the hierarchy to be dependent on each other's opinions. Moreover, collaboration and networking features allow users to analyze and share their views and opinions about the available soft data, on which any judgmental adjustments will be based. A web-based interface seems a prerequisite in facilitating this, in order to enable timely remote connections to the system.

The issue of whether such information systems are used optimally depends heavily on the users' education and training background. This is even more important if we consider that such specialized support systems are crucial for many industries that rely on them heavily for operations and planning. As such, the appropriate training of the practitioners and business managers is of critical importance. Such training should include a balanced mix of a good understanding of the underlying processes, algorithms and statistical methods of these systems, and a comprehension of the way in which information coming from different sources should be managed and used through sharing and collaboration in order to maximize the performance of the forecasting process.

Meeting with modern trends poses a challenge to educational institutes, which have to question the fundamentals of the educational process. Outdated elements must be revised, allowing the integration of new technologies and methods. Institutes have already begun conforming to change by incorporating novel methods of teaching in courses' syllabi and making use of computers, when possible. In particular, expert systems have reasonable prospects for diffusion and proliferation (Armstrong & Yokum, 2001). However, they are not yet represented actively in the traditional lectures of business forecasting and management courses. Moreover, it is suggested (Haak, HilleRisLambers, Pitre, & Freeman, 2011) that frequent and structured practice via "active-learning exercises" is likely to improve students' performances. We suggest that a combination of lectures and tutorials on statistical forecasting methods and processes, together with the use of an advanced support system that simulates the business forecasting and foresight cycle, will result in the amplification of the learning effects and outcomes, with students gaining a holistic statistical *and* business perspective understanding.

The current paper builds on the insights presented in the previous paragraphs and proposes an innovative support system that combines features from both worlds into a Forecasting and Foresight Support System (F^2SS). Building on the idea of a standard forecasting support system, various features from the world of foresight support systems come into play. A schematic view of our approach is presented in Fig. 1.

A direct objective of this study is to measure the system's effect on the learning process when it is used as a training tool in a business forecasting course. In order to achieve this, a prototype system of the proposed framework is introduced to a team of student-users and the perceived impact on their learning experience is measured and analyzed. The custom-built exercise includes traditional aspects of a forecasting support system and simulates a realistic business scenario. Moreover, we examine the satisfaction in the collaboration among users in the same group and the influence across different hierarchical levels towards the reconciliation of final estimates as features of foresight systems are included gradually. The objective of this paper is to measure the effectiveness of such a system in working towards a better understanding of forecasting and foresight, together with the acceptance of the system and its perceived impact. The paper explores the effectiveness of Forecasting and Foresight Support Systems and measures the positive gains from including a specialized system in the curriculum of a business forecasting course.

The remainder of the paper is structured as follows. Section 2 presents a literature review of the features generally integrated in forecasting support systems, and