
Revenue Management Systems as Symbiotic Analytics Systems: Insights from a Field Study (Extended Abstract)

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The role of algorithms and artificial intelligence for business operation is growing [CWW18]. This development increases the importance of examining and understanding the interplay of human analysts and automated systems in the context of Information Systems (IS). To that end, this paper analyses a field study featuring an airline updating its revenue management (RM) systems and processes.

The role of analysts causes some authors to define RM systems as decision support systems (DSS). However, DSS aim to support and improve decision-making on a managerial level and are primarily used for unstructured and underspecified problems, often of a strategic nature [AP05]. Instead, the vast majority of RM decisions are operational, routine, repetitive, and highly frequent, so no fully manual implementation is conceivable. For example, as implemented at the airline featured in the field study, RM controls ticket offers for more than 6,000 flight departures per day. Analysts monitor bookings, adjust the forecast, set the parameters for optimising offers and overbookings, and override inventory controls. Given this balance of analyst input and algorithmic computation, we term RM an example of symbiotic analytics systems (SAS). The effects of integrating analytics algorithms into the firm's processes and the role of analysts who adjust and overwrite parameters and results require further examination.

Thus motivated, we observe a natural experiment in practical RM in a field study: An airline updates its RM methodology by updating the automated systems and, in consequence, updating the organisation of the analysts working to complement the system. Our analysis follows the multilevel approach of Burton-Jones; Gallivan [BG07]. It considers the job definition on the individual level and system usage and necessary communication effort on the group level. The resulting changes in the analyst organisation mirror two different perspectives on the RM process:

In case 1 (compare Figure 1), the firm implements a functional view of the RM landscape. Analyst jobs are organised sequentially, with a high degree of system-oriented specialisation.

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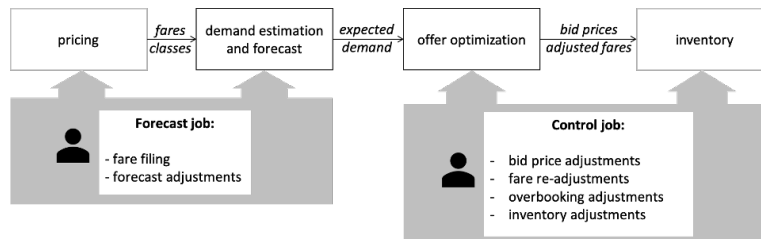


Abb. 1: Case 1

The focus of jobs is on specific RM functions (pricing and forecasting vs optimisation and inventory) and not on the entire process. In case 2, the firm implements the process view: analyst jobs follow a parallel structure along the entire process. All analysts access both predictive and prescriptive analytics systems, with parallelised influences on customer choice and itinerary-levels and on demand and leg-levels.

We find that RM requires configural, heterogeneous system usage. In both cases analyzed, analysts can intervene at various levels: A nudge in the forecast, overwriting optimization parameters for the leg's or itinerary level and finetune overbooking limits at the very end of the process. If in this, RM systems represent further SAS, design choices have to carefully evaluate implications of offering different levels and types of adjustments. We consider further research on other SAS application fields, such as workforce scheduling and inventory management, as necessary to verify this idea.

The cases differ in the implementation of the system landscape and the organizational structure. In the functional view, system units and jobs are specialized in one or a few functions risking that the focus does not lay on the overall process. The process view implements two sub-processes that can work independently. System units and jobs cover a more significant part of the process, emphasising communication. A similarity is as notable as the differences: The firm always considers analysts an inherent part of the system, tasking them with monitoring and giving them the authority to adjust outcomes every step of the process. While we concentrate on a single firm, the relevant software packages' design indicates that this is the case throughout the industry. Thus, the RM system stayed symbiotic, even when updating. Whether this applies to most SAS or is due to specific characteristics of the investigated firm or the RM domain has to be considered by future research.

The perspective on the RM process determines the organizational as well as the system structure. Only when both structures work hand in hand, the collective use of a complex system like the one in RM can contribute to a company's success. If this expectation can be generalized, there arise several caveats for designing SAS. As pointed out in this paper, different job divisions and divisions of responsibility cause different potential fault lines and conflicts in analysts' work. Communication and configural use turned out to be a crucial element of the "human side of systems – therefore, supporting these aspects of analyst tasks should be an intrinsic part of systems design.

Literatur

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