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BPM process implementation in a SMB Service Provider: Managing transitions risks in BPM Life Cycle with Markov Trajectories model and Gamification Techniques

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Abstract One of the main challenges in business process management practices is related to the transition between the "AS-IS" and "TO-BE" stages of the BPM (Business Process Management) life cycle. It is necessary to ensure that the insertion of this management model during those stages, also guarantees the stability of the business, mitigating the possibility of financial or operational instabilities meanwhile. This is one of the central concerns in any change or management process for the adoption of new practices. In this paper we present a methodological approach combining techniques from operational research and information and decision theory, aligned with a gamification strategy that, when applied to the management of changes between the "AS-IS" and "TO-BE" stages of the cycle of life BPM, avoid possible instabilities in corporate results. In order to verify our methodology, we applied the techniques in a small and midsize business (SMB) in the education sector, measuring corporate performance in the transition period and comparing statistically with the evolution to the optimal scenario provided by the applied methodology. Such a combination of techniques opens a new perspective for the application of business process management to corporate environments, because in addition to allowing a smooth transition during the learning phase and the process implementation phase - it still provides us with means to predict the evolution of scenarios during this transition.

Keywords: Business Process Management, Operational Research, Scenario Evolution;

1 Introduction

Business Process Management (BPM) may integrates an organization's strategies and objectives with customers' expectations and needs, focusing on end-to-end processes [1]. The implementation of this organizational capacity occurs following the BPM Life Cycle, established according to the company's management maturity [2]. The optimization of the processes occurs after the modeling steps "AS-IS" and "TO-BE", when the current states will be analyzed, and the future states of the processes will be designed. Organizations may experience critical and decisive risks during the stage of changes, where the positive and negative impacts of the transformation will be perceived, mainly in operational or financial performance [3].

With the aid of the integer linear programming, it is possible to develop a model that enabling to search and find an optimal scenario for the solution of that performance's problem [4]. Also, scenario evolution allows modeling the possible changes as a random process, which can be quantified over the chances of

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changes occurring, enabling to measure the transition probabilities of that scenarios (in BPM Life Cycle) modeled as 'states transition' in a Markov Chain [4, 5].

In order to understand and minimize uncertainty among transitions to an optimal state (the successful expected scenario) the entropy of Markov trajectories [6], and more effectively, the entropy of conditional Markov trajectories [7], was suitable in computing solutions for the entropy associated with a Markov Transition Matrix, thus, it was possible to calculate which states (and its transitions) could be classified in greater, less or without uncertainty in 'scenarios transitions', which was compared with the real results expected to be performed by the team of employees at the SMB, applying the Kruskal-Wallis test to corroborate its statistical proximity. This methodological mix was taken to the organization in the form of a game with the main purpose of training the team and implementing the processes. The gamification strategy was chosen since the teams have responded well to this form of training and development, with a focus on a collective objective [8].

2 Research Methodology

This work is characterized as a case study, following the guidelines of the 'design science research' (DSR) as cited in [9]. The research domain is a music school, categorized as a SMB. A mathematical model was developed in terms of integer linear programming which comprises the company's resources and restrictions to determine an optimal scenario for maximizing profit. The Kruskal-Wallis hypothesis test was used to identify the statistical relevance between the result of the objective function and the reality achieved. The calculation of the Markov Trajectory Matrix indicated the probabilities associated with each change of state, quantifying the uncertainty of the trajectories and, therefore, showing which ones would be easier or more difficult to cover.

3 Results and Discussion

After conducting an enterprise maturity diagnosis, the company was classified as an 'ad-hoc company', which means that, 'little or no definition of processes' and 'low visibility of delivering value' to the customer [1]. As a matter of fact, it was decided to implement at first, only two processes: one for the core business and the other for the business support area, to overcome any initial management difficulty. In this way, three scenarios arose for the company, with the occurrence of zero, one or two implemented processes. The entropy matrix of the trajectories (for those scenarios) calculated that the greatest degree of uncertainty was in leaving the state with zero for two implemented processes. The least degree of uncertainty would be to change the scenario with zero processes to implement one process. The matrix also showed a second highest value of uncertainty regarding the organization should remain in the state with two processes implemented. Through the execution of the game, it was possible to effectively track the critical moments of the transitions in a documented way. At the end of the whole process, the company achieved a complete successful transition from the state with zero to the state with one implemented process, however, it did not reach the state with two processes. The result was consistent with the forecasting of the trajectory matrix.

While these changes were taking place, the company's operating and financial situation was monitored following the situation model given by the objective function, with the aims of getting as close as possible to the optimality condition. This condition met requirements for non-saturation of operational capacity, such as: maximum number of students supported, number of teachers and available working hours, and the class formats with the highest profitability index that should be prioritized. At the end of the whole analysis process, the Kruskal-Wallis hypothesis test showed that there was no statistical difference between the variables determined in the model and the real ones. This provided good evidence about the suitability in the use of resources in operational and financial terms, during the whole life cycle of BPM implementation, validating the efficiency of the model.

4 Conclusion

In this work we have showed a case study where BPM life cycle objectives was satisfactorily met, while states of 'corporate changes' was monitored. Process of changes, from current state to the future states, viewed as scenarios, was designed and modeled with formal and rigorous techniques from stochastic programming, concluding that the applied methodology proved to be effective to deal with possible risks when those scenarios of change was tackled with gamification techniques by the SMB personnel.

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